

## PLEASE NOTE:

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Other sources of information about Oregon State University include the Summer Term Planning Guide, distributed by the Summer Session Office and online at http://summer. oregonstate.edu/; and the Viewbook, available through the Office of Admissions. All of these bulletins are free.

The address for all campus offices:
Oregon State University
Corvallis, Oregon 97331
University telephone information: 541-737-0123 or
541-737-1000
Admission information: 541-737-4411
Published by Oregon State University, Registrar's Office, B102 Kerr Administration Building, Corvallis, OR 97331-2130.

## CATALOG YEAR POLICY

Visit http://catalog.oregonstate.edu/ChapterDetail.aspx?key=6.

## OSU'S POLICY REGARDING UNAUTHORIZED PEER-TO-PEER (P2P) FILE SHARING AND OTHER COPYRIGHT INFRINGEMENT

The university takes copyright infringement seriously. As set forth in the Acceptable Use of University Computing Resources Policy, all students must abide by federal and state copyright laws when using university computing or network resources. The unauthorized publishing or use of copyrighted material on the university computer network is strictly prohibited and users are personally liable for the consequences of such unauthorized use. This specifically applies to Peer-to-Peer or P2P file-sharing of copyrighted music and movies. Students should be aware that by engaging in unauthorized sharing of copyrighted material, they not only violate university policy, but they may also be held criminally and civilly liable by federal and/or state authorities.

Under current copyright law, criminal cases of copyright violation carry a penalty of up to five (5) years in prison and a $\$ 250,000$ fine. Civil penalties for copyright infringement include a minimum fine of $\$ 750$ for each work. Oregon State University will subject students who violate this policy to discipline as appropriate. For a first-time violation of this copyright policy, students are required to pass a copyright quiz within 72 hours or else their network access is disabled. Repeated infringement is subject to disciplinary action by the office of Student Conduct and Community Standards, up to and including expulsion from the university.

To see the entire policy regarding Unauthorized Peer-to-Peer (P2P) File Sharing and Other Copyright Infringement, visit http://fa.oregonstate.edu/gen-manual

Catalog Coordinator: Larry M. Bulling

## OREGON STATE UNIVERSITY <br> ADMINISTRATION

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For more information, see http://
leadership.oregonstate.edu/ administrative-leadership.

## OSU BOARD OF TRUSTEES

The Board of Trustees of Oregon State University governs Oregon's only university with a statewide presence and helps guide OSU's mission to serve the state and the needs of its citizens in a growing global economy.

The board harnesses the talent and energy of education, civic and business leaders to help guide OSU's future as a leader and innovator in excellence in teaching, discovery and service as an internationally recognized public research university. The first 14 members of the board were confirmed by the Oregon Senate in November 2013. OSU President Ed Ray is also a trustee (ex officio and non-voting), for a total of 15 members.

The following list contains the members of the Oregon State University Board of Trustees, as of January 1, 2017:

- Mike Bailey, professor of computer science, OSU Corvallis
- Mark Baldwin, analyst programmer, OSU, Corvallis
- Patricia Bedient, executive vice president/chief financial officer (retired), Sammamish, WA
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- Preston Pulliams, president, Gold Hill Associates, Jackson, MS
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- Kirk Schueler, chief executive officer and president, Brooks Resources Corporation, Bend
- Michael Thorne, wheat farmer, Pendleton
For further information, go to http:// leadership.oregonstate.edu/trustees.


## GRADUATE SCHOOL

## ADMINISTRATION

A300 Kerr Administration Building [Relocating to Heckert Lodge in Fall 2017] 541-737-4881; FAX 541-737-3313 Website: http://gradschool.oregonstate. edu
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Stephanie Bernell, Associate Dean
Rosemary Garagnani, Assistant Dean for Enrollment Management and Student Services
Jessica Beck, Assistant Dean of Graduate Student Development
Fran Saveriano, Assistant Dean for Recruitment and Financial Support
Kim Calder, Executive Assistant to the Dean
Maureen Childers, Assistant to the
Associate Dean and Assistant to the Office of Postdoc Programs

## GRADUATE COUNCIL

TBA - Chair
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Rebekah Elliott (v. Ng), College of Education, 2018
Marie Harvey, College of Public Health \& Human Sciences, 2018
Lisa Price, College of Liberal Arts, 2018
Pat Chappell, College of Veterinary Medicine, 2019
Jim Coakley, College of Business, 2019
Anite Grunder, College of Earth, Ocean, \& Atmospheric Sciences, 2019
TBA - Student Member, 2018

## Ex-officios:

Jennifer Dennis - Graduate School
Chong Fang - Graduate Admissions Committee
Dorthe Wildenschild - Graduate School

## Graduate Council Representation

(appointed annually):
Online Education Committee - TBA (ExOfficio, Non-voting), 2018
David Bernell - Executive Committee Liaison
Current and past Graduate Council membership and information can be found at http://senate.oregonstate.edu/ graduate-council

## EQUAL OPPORTUNITY

Oregon State University, in compliance with state and federal laws and regulations, does not discriminate on the basis of age, color, disability, gender identity or expression, genetic information, marital status, national origin, race, religion, sex, sexual orientation, or veteran status in any of its policies, procedures, or practices. This nondiscrimination policy covers admission and access to, and treatment and employment in, university programs and activities, including but not limited to academic admissions, financial aid, educational services, and employment. Inquiries regarding the university's equal opportunity policies may be directed to the Equal Opportunity and Access, 541-737-3556 or visit http://eoa.oregonstate. edu/.

## General Information

Services for Student Support

Learning Centers and Programs

Division of Extended Campus

Agricultural Sciences

Business

Earth, Ocean, and Atmospheric Sciences

Education

Engineering

## Forestry

Graduate School

Interdisciplinary Studies

International Education

Liberal Arts

Pharmacy

Public Health and Human Sciences

Reserve Officer Training Corps

Science

University Honors College

Veterinary Medicine

## Research

Faculty


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## INNOVATION, LEADERSHIP AND EXCELLENCE FOR OREGON AND THE WORLD

Oregon State University is a community of students, faculty, staff, alumni and supporters who aspire to make the world a better place. It is a community defined by innovation, leadership and excellence in academics, research and outreach to serve Oregon, the nation and the world.

With more than 31,000 students, including more than 5,600 students earning their degrees entirely online, Oregon State is the state's largest university, welcoming a diverse student body from all 36 counties across Oregon, all 50 states and more than 100 countries.

Oregon State is the state's land grant university and is one of only two universities in the U.S. to

have land, sea, space and sun grant designations. As a premier international research university, with a record $\$ 336$ million in external research funding in 2016, Oregon State's impact reaches across the state and beyond.

Oregon State's 2015 strategic plan reaffirms the university's commitment to the three Signature Areas that draw from disciplines across the university and integrate research, engagement and teaching at both graduate and undergraduate levels:

- Advancing the Science of Sustainable Earth Ecosystems
- Improving Human Health and Wellness
- Promoting Economic Growth and Social Progress



## STUDENTS COME FIRST

- Oregon State is committed to diversity. Our students come from all walks of life and from all over the world. These students are extraordinarily bright and high-achieving contributors in the classroom and in their communities. Over the past five years, more of Oregon's high school valedictorians and salutatorians have enrolled at Oregon State than at Oregon's other public research universities.
- Oregon State offers a full range of strong scholarships, grants, work-study and loans from federal, state and university sources to help students get the best possible financial aid package.
- OSU Welcome Week begins at fall movein and includes the first day of classes. This week is filled with events and activities for everyone, including Welcome Week Kick-off and Rec Night, new student convocation, student club events and many other educational and social activities geared toward connecting new students and welcoming returning students back to the university and Corvallis.
- Our First-Year Experience program helps new students transition into university life. A variety of small-group experiences is offered - including U-ENGAGE and first-year experience courses - to connect first-year students to faculty, current Oregon State students and other new students.
- The University Exploratory Studies Program allows students to explore a variety of disciplines before choosing an academic major.
- Our Diversity and Cultural Engagement office, cultural centers and Educational Opportunities Program work with African American, Asian American, Native American and Latino students to ensure that their Oregon State experience is positive.
- Oregon State is the only college or university in the state that offers ROTC programs for all four branches of the military - Air Force, Army, Marines and Navy.
- With more than $\mathbf{4 0 0}$ student organizations, plus club, intramural and Pac-12 Conference sports, students find it easy to keep busy at Oregon State.



## OREGON IS OUR CAMPUS

- OSU Ecampus, with more than 45 undergraduate and graduate programs and over 1,000 courses, is consistently ranked in the top 10 among online bachelor's degrees nationwide by U.S. News \& World Report and is ranked number one in value by valuecolleges.com.
- The OSU Extension Service has programs, staff and volunteers providing essential services in all 36 Oregon counties.
- Consistently ranked among the top college towns in the nation, Corvallis is a welcoming, vibrant city of 55,000 people, offering a wide range of community, recreation, dining, shopping and cultural opportunities. And the city is just an hour or more from the Oregon Coast, the snow-capped Cascade Range and Portland - Oregon's largest city.



## MISSION

## PREAMBLE

Oregon State University is a comprehensive, public, internationally recognized research university. As one of only two land, sea, space and sun grant universities in the country (Penn State being the second), OSU offers programs and employs faculty and staff in every county of the state. OSU views the state of Oregon as its campus and works in partnership with all of Oregon's community colleges and the state's public and private colleges and universities to serve Oregonians' educational needs.

## MISSION

As a land grant institution committed to teaching, research, and outreach and engagement, Oregon State University promotes economic, social, cultural and environmental progress for the people of Oregon, the nation and the world. This mission is achieved by producing graduates competitive in the global economy, supporting a continuous search for new knowledge and solutions and maintaining a rigorous focus on academic excellence, particularly in the three Signature Areas: Advancing the Science of Sustainable Earth Ecosystems; Improving Human Health and Wellness; and Promoting Economic Growth and Social Progress.


## VISION

To best serve the people of Oregon, Oregon State University will be among the Top 10 land grant institutions in America.

## GOALS

- Provide outstanding academic programs that further strengthen performance and pre-eminence in the three Signature Areas of Distinction: Advancing the Science of Sustainable Earth Ecosystems; Improving Human Health and Wellness; and Promoting Economic Growth and Social Progress.
- Provide an excellent teaching and learning environment and achieve student access, persistence and success through graduation and beyond that match the best land grant universities in the country.
- Substantially increase revenues from private fundraising, partnerships, research grants and technology transfers while strengthening our ability to more effectively invest and allocate resources to achieve success.


## CORE VALUES

Accountability. We are committed stewards of the loyalty and good will of our alumni and friends and of the human, fiscal and physical resources entrusted to us.
Diversity. We recognize that diversity and excellence go hand-in-hand, enhancing our teaching, scholarship and service as well as our ability to welcome, respect and interact with other people.
Integrity. We practice honesty, freedom, truth and integrity in all that we do.
Respect. We treat each other with civility, dignity and respect.
Social responsibility. We contribute to society's intellectual, cultural, spiritual and economic progress and well-being to the maximum possible extent.

## CORE THEMES

The core themes and their objectives were selected to align with the OSU Strategic Plan, the university's mission and its three fundamental goals. The following core themes were chosen in early 2010:

- Undergraduate education
- Graduate education and research
- Outreach and engagement

Beginning in the fall of 2010, the university has introduced a Core Theme Planning process that will be conducted on an annual cycle and use continuous improvement principles to inform the campus community of how we are fulfilling our mission.

Source: OSU Strategic Plan


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## FALL 2017

Priority registration:
Phase 1: May 21 to June 7, 2017
Phase 2 with waitlisting: June 8-Oct. 2
START: Summer advising/registration for new Corvallis campus undergraduates. See dates at http://newstudents.oregonstate. edu/future-orientation-dates
Ecampus students do not attend START. Off-Campus Students: Calif., June 10-11; Hawaii, June 17
On-Campus First-Year Students:
June 26-27, 29-30, July 6-7, 9-10
(Bilingüe), 13-14, 17-18, 20-21, 24-25, 27-28, August 28-29
First Year/Transfer Students: Sept. 18
On-Campus Transfer Students:
June 22, July 12, July 26, August 30
International Students: Sept. 15, see http://admissions.oregonstate.edu/ international/after-youre-admitted/start Graduate Student Welcome Week: See http://gradschool.oregonstate.edu/ grad-welcome-week, September 11-15
OSU Welcome Week: Sept. 17-24
Classes begin September 20, 2017
Verification of enrollment begins September 20
\$50 late registration fee assessed, Sept. 20-Oct. 8
Last day to drop a course by Web and receive $100 \%$ refund, Oct. 1, 11:55 p.m.
Last day to add a class by Web without departmental permission Oct. 1, 11:55 p.m.
Withdraw from a course with 50\% refund, Oct 2-15, at 11:55 p.m. 0\% refund after this period. W grade entered on transcript.
Audit registration period, requires instructor approval; tuition and fees assessed.), October 2-6
Tuition bills emailed to ONID accounts October 5, due November 1
Deadline to Apply Online for Graduation (Fall Term), October 6
Last day to add a class by Web with departmental permission, October 8 , at 11:55 p.m.
Late class add through petition begins, $\$ 100$ late registration fee assessed with approved late add petitions, Oct. 9
Last day to change to or from $\mathbf{S} / \mathbf{U}$ grading, Nov. 9, at 5 p.m. Requires academic advisor/dean approval, see AR 18.
Last day to withdraw from a course by Web, Nov. 9, 11:55 p.m. W grade entered on transcript. Students with a hold on their record should contact the Office of the Registrar for assistance.
Veterans Day observed: No classes, Nov. 10
Thanksgiving Holiday observed:
No classes, November 23-24,
Dead week: No finals or midterms except labs, see AR 16, Nov. 27-Dec. 1
Last day for withdrawal from the
term, W grade for each registered course
Dec. 1, at 5 p.m.
Finals week, December 4-8
End of term, December 8
Final grades due to Office of the

Registrar, December 11, at 5 p.m. MyDegrees not refreshing, Dec. 11-12 Grades available on Web, Dec. 13 MyDegrees not refreshing, Jan. 8-9

## WINTER 2018

Priority registration:
Phase 1: Nov. 12 -29, 2017
Phase 2 with waitlisting: Nov. 30,
2017-January 15, 2018
Tuition bills emailed to ONID
accounts, January 4, payment due Feb. 1
Classes begin January 8, 2018
Verification of enrollment begins, Jan. 8
\$50 late registration fee assessed, Jan. 8-21
Last day to drop a course by Web and receive $100 \%$ refund Jan. 14, 11:55 p.m.
Last day to add a class by Web
without departmental permission,
January 14, at 11:55 p.m.
Withdraw from a course with $\mathbf{5 0 \%}$
refund, Jan. 15-28, at 11:55 p.m. 0\% refund after this period. W grade entered on transcript.
Martin Luther King, Jr. Day observed: No classes, January 15
Audit registration period, requires instructor approval; tuition \& fees assessed. January 15-19
Deadline to Apply Online for
Graduation (Winter Term), Jan. 19
Last day to add a class by Web with departmental permission. January 21, at 11:55 p.m.
Late class add through petition
begins, $\$ 100$ late registration fee assessed with approved late add petitions, Jan. 22
Last day to change to or from S/U Grading, February 23, at 5 p.m. Requires academic advisor/dean approval, see AR 18.
Last day to withdraw from a course by Web, February 23, at 11:55 p.m. W grade entered on transcript. Students with a hold on their record should contact the Office of the Registrar for assistance.
Dead week: see AR 16, March 12-16
Last day for total withdrawal from
the term, W grade for each registered course, March 16
Finals week, March 19-23
End of winter term, Friday, March 23
Final grades due to Office of the
Registrar, March 26, at 5 p.m.
MyDegrees not refreshing, March 26-27
Grades available on Web, March 28
Spring Break, March 26-30, 2018
MyDegrees not refreshing, April 2-3

## SPRING 2018

Priority registration:
Phase 1: Feb. 25 to March 14
Phase 2 with waitlisting:
March 15-April 9
Classes begin Monday, April 2, 2018
Verification of enrollment begins, April 2
\$50 late registration fee assessed, April 2-15

Tuition bills emailed to ONID
accounts, April 5, payment due May 1,
Last day to drop a course by Web and receive $\mathbf{1 0 0 \%}$ refund, April 8, at 11:55 p.m.

Last day to add a class by Web without departmental permission. April 8, 2018, at 11:55 p.m.
Withdraw from a course with $\mathbf{5 0 \%}$ refund. $0 \%$ refund after this period. W grade entered on transcript. April 9-22
Audit registration period, requires instructor approval; tuition and fees assessed, April 9-13
Deadline to Apply Online for
Graduation (Spring Term) April 13
Last day to add a class by Web with departmental permission, April 15, at 11:55 p.m.
Late class add through petition
begins. $\$ 100$ late registration fee assessed
with approved late add petitions. April 16
Last day to change to or from S/U
grading, May 18, at 5 p.m. Requires
academic advisor/dean approval, see AR 18.
Last day to withdraw from a course
by Web, W grade entered on
transcript, May 18, at 11:55 p.m.
Students with a hold on their record
should contact the Office of the Registrar for assistance.
Memorial Day Holiday observed: No classes, May 28
Dead week: No finals or midterms except labs, see AR 16, June 4-8
Last day for total withdrawal from
the term, W grade for each registered
course, June 8
Finals week, June 11-15
End of term, June 15
Commencement, Saturday, June 16
Final grades due to Office of the
Registrar, June 18, at 5 p.m.
MyDegrees not refreshing, June 18-19
Grades available on Web, June 20
MyDegrees not refreshing, June 25-26

## SUMMER 2018

Summer Session Planning Guide available, November 2017
Web registration begins, April 15
Verification of enrollment begins, June 25
(Session 6) Inter-session/Zero-week, June 18-22
(Session 1) 11-week session, June 25September 7
(Session 2) First 4-week session, June 25-July 20
(Session 3) 8-week session, June 25August 17
Independence Day Holiday,
Wednesday, July 4, no classes
Deadline to Apply Online for Graduation Degree Audit (Summer Term), July 6
(Session 4) Second 4-week session, July 23-August 17
(Session 5) 3-week session, Aug. 20September 7
Labor Day Holiday, Sept. 3, Monday, no classes)

## ACADEMIC ADVISING

OSU recognizes that quality academic advising is integral to the academic development and well-being of students. Quality academic advising includes both the prescriptive elements of advising (assisting with course selection, maintaining curriculum checklists, tracking degree progress and completing degree audits, etc.) and the developmental aspects of advising (major and career decision making, integration in campus and academic cultures, assistance with and referrals surrounding issues affecting a student's academic success, etc.).

While each college has developed an advising system sensitive to the needs of its academic disciplines and departments, there is consistency in that each also has a head advisor. Undeclared students receive advising through the University Exploratory Studies Program (UESP).

## VISION

Oregon State University aspires to be recognized nationally for excellence in academic advising among land grant institutions.

## MISSION

Oregon State University academic advising is a teaching and learning process dedicated to student success. Academic advising engages students in developing a plan to realize their educational, career and life goals.

## VALUES

The values associated with OSU advising are closely aligned with the stated values of the university.
Accountability: We are committed to providing timely, accurate, and intentional advising.
Diversity: We honor the unique nature and interests of each student. Advising services and delivery methods will be shaped to fit the diverse needs of our campus populations.
Respect: We seek to establish a reciprocal relationship with students based on an ethic of care and shared responsibility.
Social Responsibility: We foster a culture of independent thinking and global awareness so that students make informed, socially responsible choices consistent with their academic, career and life goals.
Integrity: We seek to engage students in a fair and professional process of meaningful self-reflection and authentic inquiry.

## PURPOSE OF ACADEMIC ADVISING

Academic Advisors act as interpreters of the OSU learning environment and facilitators to the undergraduate degree experiences. In working toward degree completion, an advisor can help make sense of options, obligations, and opportunities related to student's academic interests. An advisor can also help students start to think about how undergraduate learning relates to career opportunities. An advisor can help in the decision-making process, especially when the relationship is based on openness, honesty, and trust. Above all, an academic advisor is a person who is invested in helping students create rewarding learning experiences.


For the advising relationship to be effective, students and advisors both need to be engaged in the process. OSU advisors have created this list of Advisor-Advisee Responsibilities to outline the obligations of each:

## AS AN ADVISEE, YOU SHOULD:

- Understand and accept that you are ultimately responsible for your education and your own decisions.
- Initiate a purposeful relationship with your advisor and make appointments when requested and/or when necessary.
- Utilize the technological resources available to you (MyDegrees, OSU Online Catalog and Schedule of Classes, Baccalaureate Core website, your college, school, or department website) to inform yourself about your degree requirements and options.
- Prepare for and be active in your advising session, and ask questions when you have them.
- Work to clarify your personal values, abilities, and goals and share them with your advisor.
- Provide accurate and truthful information when being advised.
- Keep your local address and phone up to date in Online Services and utilize and check your ONID account daily for important information coming from your advisor and the institution.
- Learn and understand OSU's policies, procedures, and requirement as they relate to your academic success and/or degree completion.
- Follow through on plans-of-action identified during advising sessions.
- Be aware of and abide by academic calendar deadlines.
- Call to cancel appointments that cannot be kept.


## YOUR ADVISOR SHOULD:

- Develop a purposeful relationship with and be an advocate for their advisees.
- Inform students of the nature of the advisor/advisee relationship.
- Assist students in defining and developing expressed educational, career, and life plans.
- Provide timely and accurate educational information.
- Promote learning opportunities that will help students define or meet personal goals and plans.
- Assist students in preparing a program that is consistent with their abilities and interests.
- Monitor progress toward educational/career goals.
- Interpret and provide rationale for institutional policies, procedures and requirements.
- Inform inquiring students of campus resources and special services available to them.
- Refer students to those resources that can enhance or supplement their academic or personal experience.


## HEAD ADVISORS BY COLLEGE

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* Colleges and programs offering online degree
programs.


## UNIVERSITY OVERVIEW

Oregon State University provides diverse educational opportunities through the undergraduate and graduate programs of its 13 colleges. Academic choices include studies in scientific, technological, interdisciplinary and professional as well as liberal arts fields. A land grant, sea grant, space grant and sun grant university with beginnings in the 1850s, OSU is now home to more than 30,000 undergraduate, graduate and first professional students, representing more than 100 countries, every state in the nation and every county in Oregon.

In addition to its regular educational programs, the university is responsible for Oregon's land grant mission of research, education and outreach. The OSU Extension Service delivers educational programs in all of Oregon's 36 counties, reaching out to communities with programs as diverse as Master Gardeners, $4-\mathrm{H}$, and community leadership. Working in collaboration with Extension Service faculty, the researchers in Oregon's Agricultural Experiment Station conduct scientific, social and economic research at 11 branch stations at 15 locations across the state, including one of the nation's only urban experiment stations, the Food Innovation Center in Portland.

Oregon State University Ecampus provides learners with access to an OSU education no matter where they live. Ecampus offers accredited courses and degree programs online, with hybrid and continuing education classes offered at various sites throughout the state. There are currently more than 20 undergraduate degree programs, more than 20 undergraduate minors and nearly 30 graduate programs available online. The Ecampus website is ecampus.oregonstate. edu.

In addition to these extended campus opportunities, OSU has established a dual-enrollment Degree Partnership Program (DPP) with all 17 Oregon community colleges and several others in Hawaii. The DPP allows students to take classes at both institutions simultaneously. Students complete just one application, pay one application fee and have the freedom to select courses from either institution's schedule of classes. The DPP website is oregonstate.edu/partnerships.

OSU's educational partners include all Oregon community colleges, Eastern Oregon University, the Oregon Center for Advanced Technology Education, Oregon Health \& Science University, Portland State University, Southern Oregon University, University of Idaho, University of Oregon and Washington State University.

OSU-Cascades in Bend, Oregon - the first branch campus in the state - began offering undergraduate and graduate degree programs in 2001 in partner-
ship with Central Oregon Community College. Students earn an Oregon State University degree in their choice of 18 undergraduate majors, 12 minors and three graduate programs. In 2015, OSUCascades will become a full four-year branch campus and will begin enrolling freshmen and sophomores. The OSUCascades website is osucascades.edu.

## ACCREDITATION

Oregon State University is accredited by the Northwest Commission on Colleges and Universities. The university is authorized to offer baccalaureate, master's, doctorate, and first professional degrees, as well as undergraduate-, postbaccalau-reate-, and graduate-level certificates. The Northwest Commission on Colleges and Universities reaffirmed the accreditation of Oregon State University in Spring 2011. The next comprehensive evaluation is scheduled for 2019. The accreditation includes the College of Pharmacy.
In the College of Agricultural Sciences, the Rangeland Sciences program is accredited by the Society for Range Management. The Department of Food Science and Technology's undergraduate curricula are approved by the Higher Education Review Board of the Institute of Food Technologists. The Agricultural Education major is accredited by the National Council for Accreditation of Teacher Education (NCATE) and the Oregon Teacher Standards and Practices Commission (TSPC).

In the College of Business, the Business Administration programs (undergraduate and graduate) are accredited by the Association to Advance Collegiate Schools of Business-International.

The College of Education programs are accredited by the National Council for Accreditation of Teacher Education (NCATE) and the Oregon Teacher Standards and Practices Commission (TSPC) for the preparation of elementary and secondary teachers. The graduate program in Counseling is accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP). As of November 2016, the College of Education is in the process of seeking CACREP approval to offer the Master in Counseling-Clinical Mental Health Counseling option via Ecampus through hybrid delivery in addition to the land-based program offered in OSU-Cascades.
In the College of Engineering, the Bachelor of Science degrees in Bioengineering, Chemical, Civil, Ecological, Electrical and Computer, Energy Systems, Environmental, Industrial, Manufacturing, Mechanical, and Nuclear Engineering baccalaureate programs are accredited by the Engineering Accreditation Commission of the ABET, Inc. 111 Market Place, Suite 1050, Baltimore, MD 21202-

4012; 410-347-7700. The Construction Engineering Management program is accredited by the American Council for Construction Education. The Bachelor of Science degree in Computer ScienceComputer Systems option is accredited by the Computing Accreditation Commission of the ABET, Inc. 111 Market Place, Suite 1050, Baltimore, MD 212024012; 410-347-7700. The Bachelor of Science degree in Radiation Health Physics is accredited by the Applied Science Accreditation Commission of the ABET, Inc. 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; 410-347-7700.

In the College of Forestry, BS degrees in Forestry, Forest Engineering, and Forest Engineering-Civil Engineering are accredited by the Society of American Foresters (SAF). In addition, the BS degree in Forest Engineering and the BS double degree in Forest Engineering-Civil Engineering are accredited by the Engineering Commission of ABET, www.abet.org. The BS degree in Renewable Materials is accredited by the Society of Wood Science and Technology (SWST).
In the College of Liberal Arts, the Music Education Master of Arts in Teaching (MAT) degree program in the School of Arts and Communication is accredited by the National Council for Accreditation of Teacher Education (NCATE) and by the Oregon Teacher Standards and Practices Commission (TSPC); in the School of Public Policy the Master of Public Policy (MPP) is accredited by the National Association of Schools of Public Affairs and Administration (NASPAA). The next evaluations for both programs are slated for 2021.
The College of Pharmacy's PharmD program is accredited by the Accreditation Council for Pharmacy Education (ACPE). The College also offers PGY1 and PGY2 Community Pharmacy Residencies Community Pharmacy Residencies jointly accredited by the American Society of Health Systems Pharmacists and the American Pharmacists Association.
The College of Public Health and Human Sciences received accreditation in June 2014 by the Council on Education for Public Health as the first accredited school of public health in the state of Oregon. The Athletic Training major is accredited by the Commission on Accreditation of Athletic Training Education. The Dietetic option in the Nutrition major is accredited by the Accreditation Council for Education in Nutrition and Dietetics of the Academy of Nutrition and Dietetics, as is the transcript-visible post-baccalaureate Dietetic Internship. The graduate Physical Education Teacher Education licensure program is accredited by the Council for the Accreditation of Educator Preparation and the Oregon Teacher Standards and Practices Commission. The Health Management and Policy
undergraduate program is certified by the Association of University Programs in Health Administration. In Human Development and Family Sciences, the OSU Child Development Center in Bates Hall is accredited with the National Association for the Education of Young Children (NAEYC). HDFS participates in a double degree program in Early Childhood/ Elementary Education that is accredited through the College of Education's teacher education programs. The Double Degree pathway includes all the course work and field experiences necessary to qualify for an Oregon Initial Teaching License granted by the Teacher Standards and Practices Commission (TSPC).

In the College of Science, the Bachelor of Science in Chemistry Track One is approved by the American Chemical Society and has two options: advanced biochemistry and advanced chemistry. Also, the Bachelor of Science in Biochemistry and Biophysics is accredited by the American Society for Biochemistry and Molecular Biology.

The College of Veterinary Medicine's DVM program is accredited by the American Veterinary Medical Association: Council on Education. In addition to the DVM degree, the Veterinary Diagnostic Laboratory is accredited by the American Association of Veterinary Laboratory Diagnosticians, and the Small Animal Teaching Hospital is accredited by the American Animal Hospital Association.

Student Health Services is accredited by the Accreditation Association for Ambulatory Health Care and is a member of the American College Health Association. The Student Health Services Laboratory is accredited by the Commission on Office Laboratory Accreditation (COLA).

The university's Counseling and Psychological Services (CAPS) office is accredited by the International Association of Counseling Services, Inc., and the pre-doctoral training program at CAPS is accredited by the American Psychological Association.

The Oregon State University Institutional Animal Care and Use Program is fully accredited by AAALAC International. AAALAC accreditation is recognized world-wide as the gold standard for animal research programs. OSU's participation in the rigorous AAALAC accreditation process demonstrates a campus-wide commitment to humane and responsible animal use in research, instruction, production and testing and a dedication to excellent science. This institutional accreditation encompasses the entire campus animal research enterprise and all OSU sites where university-owned animals are housed or maintained, including the College of Agricultural Sciences, the College of Veterinary Medicine, the Eastern Oregon Agricultural

Research Centers, the Hatfield Marine Science Center, the Oregon Hatchery Research Center and the Laboratory Animal Resources Center locations.

The Academic English and General English programs at INTO OSU are accredited by the Commission on English Language Program Accreditation (CEA) for 5 years from August 2013. INTO OSU agrees to uphold the CEA Standards for English Language Programs and Institutions. CEA is recognized by the U.S. Secretary of Education as a national accrediting agency. For further information about this accreditation, please contact the Commission on English Language Program Accreditation, 801 N. Fairfax St., Suite 402A, Alexandria, VA 22314, 703-665-3400, www.cea-accredit.org.

For further information, visit Academic Programs, Assessment \& Accreditation http://oregonstate. edu/admin/aa/apaa/accreditation/ nwccu-institutional-accreditation.

## HISTORY OF OSU

Founded in 1858 as a small, private academy called Corvallis College, Oregon State University has developed into an internationally recognized public research university.

College-level courses were introduced into the curriculum about 1865, and two men and one woman fulfilled the requirements for baccalaureate degrees in 1870, becoming the first graduates of a state-assisted college in the western United States.

Signed into law by President Abraham Lincoln on July 2, 1862, the Morrill Act provided grants of land to be used by states for the sole purpose of endowing, supporting and maintaining public colleges. The Oregon Legislative Assembly designated Corvallis College as the state's land grant institution on October 27, 1868. This was the first state support for higher education in Oregon. Permanent adoption as the state's agricultural college came in 1870.

For many years, the institution was known as Oregon Agricultural College. The name was changed to Oregon State College in 1953 and to Oregon State University in 1961.

Following the designation of the college as a land grant institution, agriculture was added to the existing arts and science curriculum in 1869. The curriculum continued to expand, with professorships in commerce (1880), agriculture (1883), household economy (1889) and engineering (1889) resulting in the establishment in 1908 of the professional schools of commerce, agriculture, engineering and mechanic arts and domestic science and arts. The first summer session was also held in 1908.

Curricular growth continued with the schools of forestry (1913), mines (1913),
pharmacy (1917), education (1918), basic arts and sciences (1922) and health and physical education (1931).

In 1932, the Oregon State Board of Higher Education established the School of Science for the state system at Corvallis, eliminated the School of Mines, and reduced the School of Health and Physical Education to a division. Major work in business administration was discontinued but was reinstated when the College of Business was established (first as a division) in 1943. The College of Liberal Arts was established (as the School of Humanities and Social Sciences) in 1959. The Department of Oceanography was established in 1959, became the School of Oceanography in 1972 and the College of Oceanography in 1983. In 1992, the Department of Atmospheric Sciences in the College of Science was merged with the College of Oceanography and renamed the following year as the College of Oceanic and Atmospheric Sciences. In 2011, the Department of Geosciences in the College of Science was merged with COAS, and the college renamed the College of Earth, Ocean, and Atmospheric Sciences. The College of Health and Physical Education (now the College of Public Health and Human Sciences) was reinstated (as a school) in 1974, and the College of Veterinary Medicine was established (as a school) the following year. In 1983, all schools of the university, except the School of Education, were re-designated as colleges. In 1989, the School of Education became a college. In 1991, the College of Education merged with the College of Home Economics, and within the College of Home Economics and Education, was renamed the School of Education. In 1995, the University Honors College was established. In 2002, the College of Health and Human Performance and the College of Home Economics and Education were merged into the College of Health and Human Sciences. As part of this restructuring, the new School of Education became an independent academic unit. In 2005, the School of Education was renamed the College of Education. The College of Health and Human Sciences was renamed the College of Public Health and Human Sciences in 2011.

Following the approval of legislation adopted by the 2013 Oregon Legislature, Oregon State University made the decision to have its own institutional board of trustees. That board was appointed by Oregon Governor John Kitzhaber in the fall of 2013 and assumed all of its official duties on July 1, 2014.

Presidents of the institution since its founding:
William A. Finley, 1865-72;
Benjamin L. Arnold, 1872-92;
John M. Bloss, 1892-96;

Henry B. Miller, 1896-97;
Thomas M. Gatch, 1897-1907;
William Jasper Kerr, 1907-32;
George Wilcox Peavy, 1934-40;
Frank Llewellyn Ballard, 1940-41;
August Leroy Strand, 1942-61;
James Herbert Jensen, 1961-69;
Robert William MacVicar, 1970-84;
John V. Byrne, 1984-95;
Paul G. Risser, 1996-2002;
Edward J. Ray, August 2003-present.
Acting presidents of the institution since its founding:
Joseph Emery, 1872
John D. Letcher, 1892
George Wilcox Peavy, 1932-34
Francois Archibald Gilfillan, 1941-42
Roy Alton Young, 1969-70
Timothy P. White, 2003
For more details, see http://scarc. library.oregonstate.edu/omeka/exhibits/ show/presidents.

For the OSU Special Collections and Archives Research Center, see http://or-egondigital.org/sets/osu-scarc.

## ORGANIZATION OF THE UNIVERSITY

The president is the chief executive officer of the university and is appointed by the Oregon State Board of Trustees. Subject to the Board, the president is responsible for the overall leadership and direction of the university. The provost and executive vice president is the chief academic and operating officer and is responsible for the daily operations of the university.

In November 2009, four new divisions were created as part of OSU's Strategic Alignment and Budget Reduction Implementation Plan: the Division of Arts and Sciences, Division of Business and Engineering, Division of Earth Systems Science, and the Division of Health Sciences.

The academic programs of Oregon State University are divided among 11 colleges, the Graduate School, and the University Honors College, each with a dean responsible for all faculty, staff, students, and academic programs.

The 11 colleges are the College of Agricultural Sciences; College of Business; College of Earth, Ocean, and Atmospheric Sciences; College of Education; College of Engineering; College of Forestry; College of Public Health and Human Sciences; College of Liberal Arts; College of Pharmacy; College of Science; and the College of Veterinary Medicine.
Colleges are divided into departments or schools administered by a department head, chair, or director. Each department may offer several programs of study leading to degrees, certificates, options, or minors requiring a specific group of courses for completion.
Some courses and programs described in the OSU General Catalog are offered
throughout the year online and at a distance by OSU Ecampus. A list of online and distance education courses and programs are available on the Web at http:// ecampus.oregonstate.edu.
OSU Extended Campus also is home to OSU Summer Session, which serves more than 10,000 students annually on the Corvallis campus, online and at the OSU Hatfield Marine Science Center on the Oregon coast. Summer session courses are published annually in the OSU Summer Session Planning Guide and listed in the online schedule of classes. The OSU Summer Session website is http://summer.oregonstate.edu.

This OSU General Catalog lists requirements for each program, as well as all regular courses offered by Oregon State University. A number of special temporary or ' X ' courses are also offered each year and are listed in the online Schedule of Classes.
The Graduate School section of this catalog offers a summary of graduate programs and general regulations.
Programs and courses offered by OSUCascades on the Central Oregon Community College campus in Bend, Oregon, are available on the Web at http://osucascades.edu/.

## ACADEMIC GLOSSARY/CATALOG DEFINITIONS

The following terms are used throughout the catalog and Registration Information Handbook.

Academic probation: Students who have completed two or more terms at OSU and have an OSU cumulative GPA below 2.0 will be placed on probation. Students who attain a cumulative GPA of 2.0 or better are removed from academic probation.

Academic suspension: Students who are on probation and have a subsequent term GPA of less that 2.0 will be placed on suspension. A student who has been suspended from OSU is prohibited from enrolling in classes, and must fulfill specified criteria before being re-admitted to the university (see Academic Regulation 22. Academic suspension is recorded on the student's academic record.

Academic warning: Students with a term GPA below 2.0 will be placed on academic warning.

Academic year: The time period containing the academic terms fall, winter, and spring (currently September through June). When summer term is considered as part of an academic year, or when it is considered as part of the Banner Student Information Systems (SIS), summer term is the first term of the academic year.

Add/Drop: Students may add or drop classes during the first two weeks of each term.

Advanced placement: Advanced
placement and/or credit may be granted to an entering student who has satisfactorily completed College Board Advanced Placement Examinations taken during high school.

Advanced standing report: A summary of courses and credits completed by a student at one postsecondary institution and accepted by another institution at the time of admission. The advanced standing report is used to determine the number of required and elective credits needed to complete degree requirements.

Advisor: A faculty member appointed by a program, department, school, or college to advise students during their college experience.

Baccalaureate core: The university's general education requirements consisting of skills courses; perspectives courses; difference, power and discrimination courses; synthesis courses; and writing intensive courses. A baccalaureate core course is designated with an asterisk, *, a writing intensive course with a caret, $\wedge$. See Earning a Degree at Oregon State University in this catalog.

Baccalaureate degree: An approved academic award given for the satisfactory completion of an instructional program requiring at least four but not more than five years of full-time equivalent college-level academic work that includes the following: (1) institutional general education requirements (i.e., baccalaureate core); (2) major area of study requirements; and (3) may include option, minor, supporting area, or elective requirements. A minimum of 180 credits is required for most degree programs. Some majors may require more. The conditions and conferral of the award are governed by the faculty and ratified by the Oregon State Board of Higher Education.

BA degree: The Bachelor of Arts degree is conferred for broad and liberal education in humanities, arts, social sciences, and sciences. College BA requirements provide: a) a breadth of preparation in these fields that is significantly greater than that required of all undergraduates through the baccalaureate core; and b) foreign language proficiency certified by the School of Language, Culture, and Society as equivalent to that attained at the end of the second year course in the language. Proficiency in American Sign Language equivalent to that attained at end of the second year also meets the BA language requirement.
BFA degree: The bachelor of fine arts is a professional degree requiring a minimum of 105 credits in the visual arts.

BS degree: The Bachelor of Science degree is conferred for focused curricula that emphasize scientific ways of knowing and quantitative approaches to understanding in the sciences and social sciences, and for curricula in professional fields.

Blanket-numbered courses:
Reserved number courses such as 401/501/601. See Reserved numbered courses.

Certificate program (undergraduate): A specified interdisciplinary program of study leading to an official certificate and notation on the transcript. A certificate program draws courses from more than one department, rather than a single department (as with most minors). An undergraduate certificate program must be taken in conjunction with a formal degree program. An undergraduate certificate requires a minimum of 27 credits.

Certificate program (postbaccalaureate): A specified program of study of undergraduate courses leading to an official certificate and notation on the transcript. A completed baccalaureate degree program from an accredited institution is required. A postbaccalaureate certificate program requires a minimum of 27 credits.

Certificate program (graduate): A structured progression of graduate-level courses that constitute a coherent body of study with a specifically defined focus within a single discipline or a logical combination of disciplines. It is designed for students who have completed a baccalaureate degree and are in pursuit of advanced-level learning. A graduate certificate requires a minimum of 18 graduate credits.

## Certificate program (profes-

 sional): A site-based training and professional development certificate that is not transcript visible.College: A subdivision of the university offering degree programs within a specific subject area. For example, the College of Forestry offers degree programs in forest engineering, forest resources, forest science, and wood science and technology.

Commencement: A term used to refer to the graduation ceremony held in June.

Corequisite: A course that must be taken concurrently with a course.

Course: An organized unit of instruction or research. Types include lectures, recitations, seminars, laboratories, discussions, internships, clerkships, reading and conference, independent study, and other categories of courses.
Course designator (subject code): An abbreviation representing the department, college, or program offering the course. Example: MB indicates that the course is offered through the Department of Microbiology.
Course Reference Number (CRN): A five-digit number used to select a specific course, lab, and/or recitation.
CRED (Credential): A student who has received a previous baccalaureate de-
gree from either OSU or another accredited university or college may be granted a subsequent minor, certificate, major or option under the guidelines of Academic Regulation 27. It indicates the student is not seeking a degree, but rather a credential to accompany an existing degree.
Credit: Credits vary, depending upon the type of course and level at which it is offered. One credit is generally given for three hours per week of work in and out of class. For example, each hour of class lecture is generally expected to require two hours of work out of class. One credit would be given for a lecture course that met for one 50-minute period each week over a 10 -week period; i.e., 10 contact hours between faculty and students. One credit is typically given for a laboratory course that meets for two to three hours per week for an entire term. Equivalent credits are given for recitations, discussions, and other types of courses. All credits given in the General Catalog refer to quarter credits. When transferring in course work from a semester system institution, multiply the number of credits by 1.5 to determine how many quarter credits will be transferred ( 3 semester hours x $1.5=$ 4.5 quarter credits). If planning to transfer OSU credits out to a semester system institution, multiply the number of quarter credits by .67 to determine how many credits will transfer (4 quarter credits x $.67=2.68$ semester credits).

Curriculum: (plural curricula) An organized program of study and courses required for a specific degree or certificate program.

Degree: An academic award granted upon satisfactory completion of a set of collegiate-level educational requirements.
Discipline: A field of study in which a student may concentrate, such as sociology, anthropology, or mathematics.

Doctoral degree: An approved academic award given as a sign of proficiency in scholarship and for the satisfactory completion of an instructional program requiring at least three years of full-time equivalent academic work beyond the baccalaureate degree, the completion of which signifies recognized competence, original research and/or the capacity to do independent advanced graduate-level analysis. A minimum of 108 credits is required beyond the baccalaureate degree. [Note: The total number, above the minimum, will vary by degree program.] The conditions and conferral of the award are governed by the faculty and ratified by the Oregon State Board of Higher Education.
Double degrees: A student may earn multiple, different degrees simultaneously. Additional degrees may also be earned after your first degree was awarded. The degrees may be offered by the same
college, or by different colleges. To earn a double degree, or for each additional degree, a student must complete a minimum of 32 credits above the minimum number of credits needed for one of the degrees. Each degree application is reviewed by the appropriate academic advisor. Advisors complete a separate graduation audit for each of the degrees.
On the student's academic record, each degree awarded will be recorded as a separate degree with its major, e.g., Bachelor of Science in Mathematics, Bachelor of Arts in English. The student will also receive a separate diploma for each degree awarded (See Academic Regulation 26).

Some double-degree programs - Education (BA, BS, HBA, HBS), Innovation Management (BA, BS, HBA, HBS), Sustainability (BS, HBS), International Studies ( $\mathrm{BA}, \mathrm{HBA}$ ) - require that a primary degree be completed in order for the secondary degree to be awarded. When multiple degrees are not dependent on one another, one of the degrees may be awarded even though requirements for the other degree have not yet met. The double degree may be earned concurrently or subsequently. (See Academic Regulation 26.)
Dual (or multiple) majors from same college: A student may earn two or more majors within a single degree program (a particular combination of degree, college, and campus, e.g., BA degree from the College of Liberal Arts on the Corvallis campus). It is sometimes possible to complete two or more majors within the minimum number of credits required for a degree, but usually the student must complete additional credits to complete requirements for all of their majors. For this reason, dual (or multiple) majors are obtained within the same college. The advisor must complete one graduation audit that includes all of the majors. The student's academic record will list one degree with two or more majors, e.g., Bachelor of Science in Mathematics and Chemistry. The student receives one diploma. Dual (or multiple) majors may be obtained concurrently with the completion of the degree, or in some cases may be earned as a credential subsequent to completion of the degree. (See Academic Regulation 27.) Note: Occasionally, with careful planning, a student can complete two majors from separate colleges in less than the 212 credits required for two degrees. When this occurs a student can petition for an exception, and graduate with two majors from separate colleges. The student must pick one college as their home college and all majors will be associated with the home college. The student must have the support of advisors from both major programs to have their petition considered.

Electives: Courses students may select, either for general knowledge or for fulfilling specific degree requirements. They are generally chosen and used by students to supplement or enrich the required curriculum.

Endorsement: An endorsement is the subject matter (content area) or specialty in which an individual is licensed to teach. Endorsements can be part of an initial teaching license or can be added later.

First professional degree: An academic award granted for an instructional program the completion of which: (1) signifies completion of the academic requirements to begin practice in the profession; (2) requires at least two years of full-time equivalent college-level work prior to entrance; and (3) usually requires a total of at least five years of full-time equivalent academic work to complete the degree program, including prior required college-level work plus the length of the professional program itself (examples, DVM in veterinary medicine and PharmD in pharmacy). The conditions and conferral of the award are governed by the faculty and ratified by the state of Oregon Higher Education Coordinating Commission.

Freshman: A student who has completed 44 of fewer term credits toward an undergraduate degree.

Grade-point average (GPA): Total number of grade points received for A, $\mathrm{A}-, \mathrm{B}+, \mathrm{B}, \mathrm{B}-, \mathrm{C}+\mathrm{C}, \mathrm{C}-, \mathrm{D}+\mathrm{D}, \mathrm{D}-$ or F grades divided by total number of credits attempted. OSU uses a 4-point grade scale.

Grade points: Quality points assigned for one term credit of each grade: $\mathrm{A}=4.0 ; \mathrm{A}-=3.7 ; \mathrm{B}+=3.3 ; \mathrm{B}=3 ; \mathrm{B}-=$ 2.7; $\mathrm{C}+=2.3 ; \mathrm{C}=2.0 ; \mathrm{C}-=1.7 ; \mathrm{D}+=1.3$; $\mathrm{D}=1 ; \mathrm{D}-=.7 ; \mathrm{F}=0.0$. Grades of $\mathrm{I}, \mathrm{P}, \mathrm{N}$, $\mathrm{S}, \mathrm{U}$ and W are not computed.

Grades: Letters used to indicate the quality of academic work completed in a given course: A, A-, B+, B, B-, C+, C, C-, D+, D, D-, F, I, S, U, P, N, W.

Graduation audit: An evaluation of a student's academic record to determine if the graduation requirements set forth by the university, college, and major department have been fulfilled.

## Graduate area of concentration:

 A graduate area of concentration is a subdivision of a major or minor in which a strong graduate program is available. Areas of concentration may be referenced on the student's program of study, but they are not listed on the student's transcript. "Areas of concentration" can only be used in association with graduate programs.Graduate major: A graduate major is the area of academic specialization, approved by the State Board of Higher Education, in which the student chooses to qualify for a graduate degree. Upon
completion of a graduate degree, the degree awarded and the graduate major are listed on the student's transcript

Graduate option: Options are for students of a specific major. An option is one of several distinct variants of course aggregations within a major that focus on an area of study designed to provide a student with specialized knowledge, competence, and skills while sharing a minimum core of courses.

A graduate option consists of a minimum of 12 designated quarter credits of related course work (excluding thesis credits), comprised of course work offered by the sponsoring unit as well as by other academic units. The option may be comprised of specific courses, completion of a designated number of credits from a longer list of alternative courses, or a combination of specific and alternative course lists. Approved options may be added to a graduate program of study, and approved by the faculty advisor(s) and the director of the sponsoring unit. On the program of study, there should be no overlap in course credits between options (the same course cannot be used to satisfy credit requirements in multiple options). When the unit submits the final examination card to validate awarding of the major to the Graduate School, the unit will also validate that the requirements of the option have been completed.

Hybrid course: A hybrid course includes both regularly scheduled on-site classroom meetings and significant online, out-of-classroom components that replace regularly scheduled class meeting time. A substantial portion of the course learning activities are delivered online; face-to face meeting time is generally reduced by approximately $50 \%$ compared to a traditional on-campus course. For further information, visit http:// ctl.oregonstate.edu/hybrid-learning/ osu-hybrid-faqs.

Interdisciplinary: A course or program that integrates concepts, knowledge, or faculty from several fields of study.

Junior: A student who has completed at least 90 but not more than 134 term credits toward an undergraduate degree.

Lower-division courses: Course offerings at a level of preparation usually associated with freshmen and sophomore students (e.g., 100- and 200-level courses).

Major (graduate): See Graduate major above.

Major (undergraduate): An extensive program of study in a designated subject area. Majors require at least 36 credits, 24 of which must be upper-division.

Master's degree: An approved academic award given as a mark of proficiency in scholarship and for the
satisfactory completion of an instructional program requiring at least one but not more than two years of full-time equivalent academic work beyond the baccalaureate degree. A minimum of 45 credits is required beyond the baccalaureate degree. [Note: The total number, above the minimum, will vary by degree program.] The conditions and conferral of the award are governed by the faculty and ratified by the Oregon State Board of Higher Education.

Minor (graduate): A graduate minor is an academic area that clearly supports the major. Master's program minors must include a minimum of 15 quarter credits of graduate course work; doctoral minors require a minimum of 18 credits. On a master's or doctoral program, a minor may be:

1. an academic area available only as a minor,
2. a different major,
3. the same major with a different area of concentration, or
4. an integrated minor.

An integrated minor consists of a series of cognate courses from two or more areas. These courses must be outside the major area of concentration, with most of the courses being outside the major department. The graduate faculty member representing the integrated minor must be from outside the major department. Graduate minors are listed on the student's transcript.

Minor (undergraduate): A secondary field of specialized study that may be offered by an academic unit for its own majors and/or majors from other academic units. Minors require at least 27 credits, 12 of which must be at the upper-division level. An approved minor is placed on the student's transcript.

Option (undergraduate): Options are for students of a specific major. Options consist of at least 21 designated credits of course work, 15 of which must be at the upper-division level. If all requirements have been met, the option may be listed on a student's transcript.

Perspectives courses: Baccalaureate core courses that integrate fundamental knowledge from science and liberal arts disciplines to develop cultural, historic, and scientific perspectives.

Postbaccalaureate student: A student holding a baccalaureate degree who is admitted to work toward a second baccalaureate degree or teaching certificate is classified as a postbaccalaureate student (AR 4).
Pre-professional program: Curriculum generally offered at the freshman and sophomore levels. A pre-professional program is designed to ensure students have the aptitude, motivation, and discipline to successfully complete advanced course work as well as achieve the stan-
dards for a chosen career field.
Prerequisites: Requirements that must be completed before enrollment in a particular course. The instructor may waive a prerequisite.
Professional program: Curriculum generally offered at the junior and senior level, designed to prepare students for a professional career within a specific field (e.g., engineering, pharmacy). Admission to professional programs, often based on prior course work and/or work experience, is competitive.

Reading and conference: A course focused on reading assignments to be completed in conferences with the instructor.
Reserved numbered courses: Certain blocks of numbers that have been assigned for specific courses that may be taken for more than one term. The credits being granted vary according to the amount of work done.
100-110 and 200-210: Survey or foundation courses in the liberal arts and sciences
401/501/601: Research and Scholarship
402/502/602: Independent Study
403/503/603: Thesis/Dissertation
404/504/604: Writing and Conference
405/505/605: Reading and Conference
406/506/606: Special Problems/Special Projects
407/507/607: Seminar
408/508/608: Workshop
409/509/609: Practicum/Clinical Experience
410/510/610: Internship/Work Experience
Senior: A student who has completed 135 or more term credits toward an undergraduate degree.

Sequence: Two, three, or four closely related courses that are usually taken in numerical order and through more than one term.

Skills courses: Baccalaureate core courses designed to give the student fundamental mathematical, communication, and fitness competence.

Sophomore: A student who has completed at least 45 but not more than 89 term credits toward an undergraduate degree.
Special topics courses (X99): Like reserved numbered courses, special topics courses may be repeated as specified by the academic unit responsible for the course offering. It is implied that the course content is different each time the student takes the course. In the schedule of classes, section titles are listed as "ST/" followed by the topic covered in the section.

Student enrollment levels: The levels below establish enrollment levels for federal financial aid eligibility and the deferment of student loans. Summer enrollment levels are the same as other terms.

- Full Time: 12 or more credits in a term
- Three Quarter Time: 9 to 11 credits in a term
- Half Time: 6 to 8 credits in a term

Syllabus: A list of course objectives, lecture topics, assigned reading, exams, etc., prepared and distributed by a professor at the beginning of the term.

Synthesis courses: Baccalaureate core upper-division courses that emphasize interdisciplinary, critical thinking approaches to global, technological, and societal issues.

TBA: Commonly used abbreviation for "to be arranged"; time, place, or credit of a course is to be arranged with the instructor.
Term: Usually one-third of the school year. Terms at OSU are divided into fall, winter, and spring terms (also referred to as "quarters"). Summer term is generally an 8 - or 11-week session during the summer. See "Credits" above.

Transfer student: An individual who has completed 36 or more transferable term credits at another institution and will resume his or her college course work at a second institution.
U-Engage: First-year seminar designed to assist the transition of new students to college.

University: An assembly of colleges, each specializing in a different field.

Upper-division courses: Advanced course offerings at a level usually associated with junior or senior students. Upper-division courses are numbered in the 300 s and 400 s .
Waive: This term refers to decisions of advisors to "waive" a course or courses in a student's program. Typical reasons include transfer credit for equivalent courses, equivalent experience in the profession or discipline, and petitioning for and successfully completing an examination. Waiving courses usually does not decrease the total credits required for completion of the degree or program; students should discuss this with their advisor.
Withdraw: To voluntarily leave a course or the term without academic penalty. A W letter grade will be placed on the student's transcript for each course attempted.

Workshop: A brief intensive course for a small group which emphasizes problem solving.

Writing Intensive Courses (WIC): Designated upper-division courses in the major discipline that use student writing as a significant approach to learning. WIC courses must meet a variety of requirements, as do other courses in the baccalaureate core. WIC courses have a carat, $\wedge$, in front of the title.

## READING A COURSE DESCRIPTION

The elements of a typical course description found under department/school headings in the colleges are illustrated by the microbiology course example below:

## Science Course Example:

MB 479. FERMENTATION MICRO-
BIOLOGY (3). An introduction to industrial microbiology with a focus on the physiology of fermentation and use of microorganisms for the production of food ingredients, fermented foods, and beverages. CROSSLISTED as FST 479/FST 579. REQ: Field trips. PREREQS: BB 450 and MB $302^{*}$, (BB 350 or BI 314). This course is repeatable for a maximum of 6 credits.

Course Designator (Subject Code): (MB) an abbreviation representing the department, college, or program offering the course. MB indicates that the course is offered through the Department of Microbiology.

Number: (479) indicates the level of the course. This is an upper-division, undergraduate course. 400-level courses are offered for undergraduate credit. Courses numbered at the 500 - or $600-\mathrm{lev}$ el may be taken for graduate credit. Courses numbered 500-599 are generally taken by master's candidates and courses numbered 600-699 are taken by doctoral candidates. (See Course Numbering System below.)

## Title: FERMENTATION

## MICROBIOLOGY

Credit: (3) the number of credits awarded for successful completion of the course.

Course description: A brief description of what will be taught in the course. "An introduction to industrial microbiology..."

CROSSLISTED: CROSSLISTED as FST 479/FST 579 means the same course is also offered through another department; course numbers, titles, credits, descriptions, and prerequisites are the same for both courses. Only the course designator (subject code) is different.

REQ: A requirement for that course, such as field trips.
PREREQS: Prerequisites a student must have completed or be currently enrolled in before registering for the course. The registration system and/or instructor may not allow students to enroll for the course unless they have the prerequisite on their transcripts or are currently enrolled in the prerequisite. Students may be administratively dropped after registering for their courses if they have not met the prerequisites of a course. These courses are the background necessary for successful performance in the course.

* (Asterisk): The asterisk after a prerequisite (MB 302*) indicates that it may be taken concurrently with the course described.

COREQ: A course that must be taken simultaneously with the course described.

REC: Means the course is recommended but not required by the instructor.

This course is repeatable...: Some courses may be taken again for additional credit that applies toward the student's academic program.

## Liberal Arts Course Example:

## HST 202H. HISTORY OF THE UNIT-

ED STATES (4). Provides an overview of the development of the U.S. from the pre-Columbian era to the present. Attention is given to economic, political, and social trends, as well as to international relations. Covers 1820 to 1920. HST 201 H, HST 202 H , and HST 203H need not be taken in sequence. (H) (SS) (Bacc Core Course PREREQS: Honors College approval required.
Letter suffix: (HST 202H) "H" signifies an Honors College course. An "X" signifies an experimental course.

Liberal Arts Core: Students pursuing College of Liberal Arts majors are required to complete courses in certain study areas. Four abbreviations are used in the college to indicate courses that may be used to fulfill requirements in each of these areas:

- (FA) Fine Arts Core
- (H) Humanities Core
- (NC) Non-Western Core
- (SS) Social Studies Core


## ADDITIONAL CURRICULAR

 TERMS:See the Academic Programs website at http://oregonstate.edu/admin/aa/ apaa/academic-programs/curriculum/ curricular-policies-and-procedures.

## COURSE NUMBERING SYSTEM

State universities in Oregon follow this basic course numbering system:

0-99. Noncredit or credit courses of a remedial, terminal, or semiprofessional nature that are not applicable toward degree requirements.

100-299. Undergraduate, lower-division courses.

300-499. Undergraduate, upper-division courses.

500-599. Graduate courses offered primarily in support of a master's degree but which are also available for doctorallevel credit. Undergraduates of superior scholastic achievement may be admitted on approval of the instructor and department head. An undergraduate student may apply to reserve these courses for later use on a graduate degree program.

600-699. Graduate courses offered principally in support of doctoral-level instructional programs but also available for master's program credit.

700-799. Professional or technical courses that may be applied toward a professional degree (such as DVM or PharmD) but not toward other graduate degrees (such as PhD).

800-899. In-service courses aimed at practicing professionals in the discipline. These courses may not be applied to graduate or professional degree programs.

001NC-099NC. Non-credit courses offered through the INTO Oregon State University Intensive English program.

Commonly Numbered Courses. House Bill 2913 directed the Oregon University System (defunct since June 30,2015 ) and Oregon community colleges to jointly develop, to the extent possible, a common course numbering system for lower-division transfer
courses. The "Commonly Numbered Course List" represents a good faith effort to meet the requirements of the legislation. The list of courses is recommended for use by campuses' faculty and administration as they develop or revise academic programs to better facilitate students transferring from community colleges to public four-year institutions. OSU agreed to this list after review by all affected departments. The "Commonly Numbered Course List" includes course descriptions in addition to the course numbers and titles. Course numbers and title should follow the usage in the list. Descriptions may vary. The list is at: http://oregonstate.edu/admin/aa/ apaa/academic-programs/curriculum/ curricular-policies-and-procedures\#76.

## EQUIVALENT COURSES LIST

Some courses at OSU have equivalent versions with different subject prefixes or course numbers. Such courses are equivalent for degree clearance purposes, in other words, taking either version will meet the requirements for an academic program. Students may only take one of the versions for credit, not both.

Students will not earn credit for a course if they have previously taken its equivalent. Doing so is the same as repeating a course, see Academic Regulation 20, Repeated Courses.
Examples of equivalent courses include:

- Regular and Honors College versions of the same course.
- Crosslisted courses with the same title, course description, and course number (e.g., CS 372 and ECE 372).
- Transfer courses treated as equivalent to OSU courses.
- Courses that have been replaced by a new subject code (e.g., BA 434 replaced by FIN 434).
Equivalent Courses List is in the Registrar's Office website at http://registrar. oregonstate.edu/equivalent-courses.

Oregon State University welcomes all students without regard to race, creed, sex, marital status, sexual preference, age, religion, handicap, or national origin who provide evidence of suitable preparation for course work at the university level.

Information for undergraduate, postbaccalaureate, nondegree undergraduate students is available from the Office of Admissions.
Admission applications are available at http://admissions.oregonstate.edu/ apply-choose-application.
World Wide Web:
http://admissions.oregonstate.edu/
On-campus: B104 Kerr Administration Bldg.
Telephone: 541-737-4411
Toll free: 800-291-4192
Fax: 541-737-2482
OSU code for SAT, AP, TOEFL, or CLEP reports: 4586
OSU code for ACT reports: $\mathbf{3 4 8 2}$

## ADMISSION REQUIREMENTS FOR FIRST-YEAR STUDENTS

## When to Apply

See application deadlines at http:// admissions.oregonstate.edu/ undergraduate-admission-deadlines.

The application and fee must be submitted electronically by the respective deadline.

## The Admission Process

Apply online at http://admissions.oregon-state.edu/apply-choose-application. Applicants are required to use a valid Visa, MasterCard, or Discover credit card to pay the $\$ 60$ nonrefundable application fee. Request that your high school send your official high school transcript to OSU, and have your official SAT or ACT test scores sent to OSU.

Telefax (Fax) credentials of transcripts are considered official if faxed directly from an accredited institution within the U.S.A. with a cover page. The fax number is 541-737-2482.

Portfolios, videotapes, essays and personal interviews are generally not required.

## EVALUATION PROCESS

Admission to Oregon State University is selective and competitive and is based on a holistic review of application materials.

Complete applications are first reviewed to confirm successful completion of the 15 high school subject requirements and GPA earned. There is no minimum SAT or ACT score requirement. However, official scores from one of these tests are required for admission and advising purposes.

Applicants for undergraduate admission are required to complete an "Insight Résumé," a written assessment designed to evaluate students' noncognitive attributes. These attributes include self-concept, realistic self-appraisal, handling the system, ability to set long-range goals, leadership, connections with a strong support person, community engagement, and nontraditional learning.

Academic performance is not the sole criterion for admission to the university. The university may evaluate a person's be-
havior and background to determine their ability to maintain the standards of academic and professional conduct expected at the university. An evaluation may take into consideration current behavior and performance as well as past experiences and actions. Simply qualifying for admission does not guarantee admission.

Go to http://admissions.oregon-state.edu/admission-requirements0\#Notification of status to see when applicants will be notified of their admission status.

## Policy Regarding Students'

## Eligibility to Return to Prior College

Applicants who disclose that they are ineligible to re-enroll at any college or university that they attended within the last seven years for student conduct reasons will be automatically declined admission to OSU. Applicants who disclose that the reason for their ineligibility is for academic reasons will be admitted only if they meet OSU's minimum academic requirements.

All applicants who are denied admission have the right to appeal that decision, and appeals will be reviewed on a case-by-case basis.

## SELECTION OF

## FIRST-YEAR STUDENTS

OSU's admission requirements promote student success by assessing preparedness and academic potential in the unique context of each student's personal experience. Admission assessment will consider all achievement, both academic and nonacademic, to enroll students with a broad range of characteristics and perspectives. These include, but are not limited to academic achievement, creativity, initiative, motivation, leadership, persistence, service to others, intellectual curiosity, exceptional personal or academic recognition, unusual talent or ability, substantial experience with other cultures, and ability to overcome significant challenges.

The admissions process provides a fair and comprehensive review of all applicants for determining potential success at OSU. It is crucial that applicants carefully complete the application process by providing thorough information. Estimating the likelihood of admission is very difficult without considering the complete application file.

## Regular Admission

Initial admission selections are based on a holistic assessment of the criteria listed below.

## Strength of Curriculum

- Quality, quantity, and level of course work throughout the entire high school program, especially course work completed beyond the minimum courses required (See the high school course requirements chart.)

Office of Admissions B104 Kerr Administration Bldg. Oregon State University Corvallis, OR 97331 541-737-4411 Email: osuadmit@ oregonstate.edu Website: http:// admissions. oregonstate.edu/

Administration
Noah Buckley
Director,
541-737-0583
Matt Ogawa
Associate Director, 541-737-9807

Alex Galbreath
Associate Director,
541-737-3418
Erin Rau
Associate Director
541-737-0579
Heather Wofford
Assistant Director, 541-737-9808

Brian Palmer
Assistant Director, 541-737-2499

- Advanced placement (AP), international baccalaureate (IB), or college course work completed or in progress
- Strength of the program taken within the context of the high school attended
- Progressively challenging math sequence (beyond Algebra II), demonstrated by performance


## Academic Performance:

- A recommended high school grade-point average of 3.0 (on a 4.0 scale as calculated by the Office of Admissions)
- Class rank taken in context with academic rigor and size of high school attended
- Performance on standardized tests: SAT or ACT.


## Insight Résumé:

- Understanding of you as a unique, contributing individual
- Your accomplishments, perspectives, experiences, and talents
- Your achievements within the context of your social and personal circumstances
- Participation in activities that develop academic, intellectual, and leadership abilities
Insight Résumé scores are also used for scholarship selection, secondary review of applicants who do not meet admission requirements, and compiling baseline data.


## EXTENDED ADMISSION

(ADMISSION APPEALS)
Students not selected for regular admission may be invited to appeal via in the extended admission process. Extended admission decisions will be determined by the Undergraduate Admissions Committee. In addition to regular admission requirements, students participating in the extended admission review will be asked to provide additional materials for consideration. Please refer to the OSU Admissions website for specifics: http:// admissions.oregonstate.edu/admission-appeals-aka-extended-admissions.

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HIGH SCHOOL COURSE
REQUIREMENTS
College
Preparatory Minimum
Subjects Units
Grades of C- or higher are required.
English......................... 4 years
Mathematics ............... 3 years
Culminating at the Algebra II level or higher
Social Studies.............. 3 years
Science......................... 3 years
One year each of two different sciences
(biology, chemistry, physics, etc.). One year
of lab strongly recommended.
Foreign Language....... 2 years
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(not required if high school graduation of GED date prior to 1997)
May be met in any one of these ways:

- Completing two years of the same high school-level foreign language
- Earning grade of C- or higher in the third year of high school-level foreign language
- Completing two consecutive quarters of the same college-level foreign language
- Earning a satisfactory score on an approved assessment of foreign language knowledge
- Demonstrated proficiency in American Sign Language (ASL)
- Completing grades 1 through 7 at a school in which all courses are taught in a language other than English (Documentation is required.)


## ALTERNATIVES TO

## SUBJECT REQUIREMENTS

Students unable to fulfill the subject requirements will be eligible for consideration by:

1. Earning a 940 total score on two SAT Subject Tests (Math level I or II and a second test of choice [foreign language recommended])
2. OR
3. Successfully completing course work (high school or college transfer) for specific subject deficiencies.
Alternatives should be completed by high school graduation.

## Test Requirements

Freshman applicants (except those applying on the basis of GED scores) must submit Scholastic Assessment Test (SAT-Reasoning) or American College Test (ACT) scores. Test scores are used to determine course placement and are considered for applicants not meeting the minimum high school GPA requirement.

Official scores are required.
The institutional code for having most test scores sent to OSU is $\mathbf{4 5 8 6}$.

The OSU ACT code is $\mathbf{3 4 8 2}$.

## High School Graduation

Public high school students must graduate from standard high schools. ${ }^{1}$ Private high school students must graduate from accredited high schools. ${ }^{2}$

## Footnotes

${ }^{1}$ Standard high schools are public high schools that are certified as meeting specified levels of resources, services, and quality established by the Oregon Department of Education.
${ }^{2}$ Accredited high schools are those that are reviewed and recognized by a regional entity, such as the Northwest Association of Schools and Colleges, as meeting an appropriate level of academic rigor and support.

## Graduates of Nonstandard or Unaccredited High Schools or Home-Schooled Students

Graduates of non-standard or unaccredited high schools, or home-schooled students will be considered for admission
based on a holistic assessment using the following:

## SAT and/or ACT

OSU requires students graduating high school in the year 2011 and beyond to submit SAT or ACT scores. Applicants for Fall 2016 should submit an ACT or an SAT that includes the essay portion (currently required as part of the test).

Students applying to OSU for terms after Fall 2016 can submit an ACT score, or either of the SAT tests - the current version that includes the mandatory essay portion, or the new 2016 version in which the essay will be an optional portion of the test. OSU prefers, but does not require, the essay portion of the new SAT test that began being administered in March 2016.

Note: Only scores sent electronically from College Board (SAT) and/or ACT will be considered official and used for admission purposes. There is not an advantage to pay extra for "rush" scores from the testing agency, and in some cases may add to the time it will take to process the scores within our office.

The SAT college code for Oregon State University is 4586.
The ACT college code for Oregon State University is $\mathbf{3 4 8 2}$.

## SAT subject tests

OSU requires students graduating from non-regionally accredited high schools and home-schooled students to provide scores from two SAT subject tests (Math I or II, and a second exam of the student's choice).

Students who have 12 or more completed college credits in core subject areas (Math, Writing/English, Science) while pursuing their high school diploma will be considered as an alternative to the two SAT subject tests.

## Insight Résumé

OSU seeks to look beyond grades and test scores to determine if applicants bring the necessary skills and abilities to be successful here. Your answers to the Insight Résumé, which is part of the OSU application for admission, provides us with:

- Understanding of you as a unique, contributing individual.
- Your accomplishments, perspectives, experiences, and talents.
- Your achievements within the context of your social and personal circumstances.
- Participation in activities that develop academic, intellectual, and leadership abilities.


## Additional Factors

- Oregon State is also looking for students who will lend educational and cultural diversity to our campus. We are looking for students who go above and beyond the minimum whether in talent, academic ability
or potential. Combined with academic strengths, evidence of these characteristics may be considered in our review of applicants for admission.
- Applicants who are ineligible to re-enroll at any college or university that they attended within the last seven years for student conduct reasons will be automatically declined admission at OSU. Applicants who are unable to re-enroll at a previous college or university for academic reasons will be considered for admission only if they meet OSU's minimum academic requirements.
Please note that academic performance is not the sole criterion for admission to the university. The university may evaluate a person's behavior and background to determine their ability to maintain the standards of academic and professional conduct expected at the university. An evaluation may take into consideration current behavior and performance as well as past experiences and actions.


## GED Students

GED students will be considered for admission if they achieve an average GED score of at least:

- 58 , if taken prior to January 2002, with no subtest score less than 41
- 580, if taken between January 2002 and December 2013, with no subtest score less than 410
- 680 (total from 4 subject tests), if taken in January 2014 or later, with no subtest score less than 150
Students who take the GED test in the 1996-97 school year and later must pass two years of the same foreign language prior to admission or an approved additional way to meet OSU's foreign language requirement. Foreign language taken at an unaccredited high school does not qualify. If you have questions pertaining to these guidelines, please contact the OSU Admissions Office regarding your options for completion of this requirement.

Non-cognitive skills and abilities demonstrated via a GED applicant's Insight Résumé (see above) are also considered in making admission decisions.

Applicants admitted on the basis of GED scores are not required to submit SAT or ACT scores, but scores may be considered if available.

## PETITION FOR ADMISSION CONSIDERATION

Students not approved for admission may appeal via the extended admission process. Eligible students will be provided with information about the petition procedure. Deadlines are in effect each term for appeals. For additional information, please refer to the OSU Admissions
website: http://admissions.oregonstate. edu/admission-appeals-aka-extendedadmissions.

## ADVANCED PLACEMENT <br> (AP) CREDIT

Oregon State University awards ungraded credit for achievement on certain College Board Advanced Placement (AP) examinations. Information pertaining to specific AP credit policies is available in high school counseling centers or may be obtained from the OSU Office of Admissions website. OSU's college code is $\mathbf{4 5 8 6}$ for those wishing to have their scores sent.

## INTERNATIONAL

## BACCALAUREATE CREDIT

Oregon State recognizes IB achievement by awarding credit to students who score 5 or above on standard and higher level IB exams. OSU also grants additional benefits for students who complete the full IB diploma with a score of 30 or higher, as follows:

Sophomore Standing, and IB Scholarships are available. Students with a total score on IB exams of 30 or higher may choose to accept the annual, renewable scholarship award of at least $\$ 3,000$ OR may compete for more substantial awards.

Students must indicate that they would like official test scores sent to OSU. The official International Baccalaureate Certificate is required in order to award credit.

Contact your IB coordinator or IB
North America to request score reports.
IBO North America
212-696-4464
http://www.ibo.org/

## TRANSFER ADMISSION

## When to Apply

Apply online at http://admissions.or-egonstate.edu/apply-choose-application. Applicants are required to use a valid Visa, MasterCard, or Discover credit card to pay the $\$ 60$ nonrefundable application fee. Request that your high school send your official high school transcript to OSU. Official transcripts must be sent to OSU from each college or university attended.

Please refer to http://admissions.or-egonstate.edu/undergraduate-admissiondeadlines for application deadlines.

## MINIMUM REQUIREMENTS FOR

 ADMISSION CONSIDERATION
## U.S. Citizens and Permanent

 Residents:1. Successful completion of no less than 36 quarter ( 24 semester) graded, transferable credits from (a) regionally accredited U.S. institution(s). Students with at least

12 quarter hours but fewer than 36 graded transferable hours will be considered on the basis of their high school records and test scores, and must have a 2.25 GPA on all collegiate work attempted.
2. Only college-level, transferable credits are counted in those accepted in the GPA computation (professional-technical course grades are not included).
3. Grade of C-or better earned in the following courses:

- College-level writing equivalent to WR 121 (English Composition) or equivalent.
- Mathematics equivalent to Math 111 (College Algebra) OR - Math 105 (Contemporary Math)
- Two terms of the same foreign language in college will be required of those high school graduates of the class of 1997 and beyond who did not successfully complete two units (years) of foreign language while in high school. For additional information on how to meet foreign language deficiencies, see http:// admissions.oregonstate.edu/ sites/admissions.oregonstate. edu/files/dfl-ways_to_meet.pdf.

4. Students who graduated from high school in 1997 or later must meet a foreign language requirement with either two years of high school level study in the same language or two quarters/semesters of college level study with a minimum grade of a Cor better. For additional information on how to meet foreign language deficiencies, consult with the Office of Admissions.
5. Applicants who are ineligible to re-enroll at any college or university that they attended within the last seven years for student conduct reasons will be automatically declined admission at OSU. Applicants who disclose that the reason for their ineligibility is for academic reasons will be admitted only if they meet OSU's minimum academic requirements.
6. Applicants who are denied admission have the right to appeal that decision, and appeals will be reviewed on a case-by-case basis. Consult with the Office of Admissions for more information on the appeal process.
Please note that meeting the
minimum admissions require-
ments and/or an individual's
academic performance does not
guarantee them admission to the
university. Applicants' experiences,
actions, and non-cognitive skills are assessed by way of the Insight Résumé. Furthermore, the university may evaluate a person's behavior and background to determine their ability to maintain the standards of academic and professional conduct expected at OSU.

Consideration will be given to applicants with a 2.00 GPA and an Associate of Arts Oregon Transfer (AAOT) degree from an Oregon community college, but admission is not guaranteed.

## EVALUATION AND TRANSFERABILITY OF CREDIT <br> Only official records are used to evalu-

 ate eligibility for admission and transferability of credit.Official transcripts of all college work attempted must be submitted directly from the Registrar's Office of each institution. Telefax (Fax) credentials are considered official if faxed directly from a regionally accredited U.S. school with a cover page. OSU's fax number is 541-737-2482.

OSU considers transfer college-level courses successfully completed at colleges or universities regionally accredited by an appropriate accreditation agency. An advanced standing report acknowledging the courses accepted by the university will be sent via email by the Office of Admissions after the official letter of admission.

Persons transferring to OSU from a community college may have up to 124 quarter credits ( 83 semester units) accepted toward their bachelor's degree. If the school previously attended used the semester system, one semester credit equals 1.5 quarter credits at OSU.

## CLEP

Applicants who want credit for CollegeLevel Examination Program (CLEP) tests should have official test scores sent to Admissions using college code 4586. Additional details are available in the OSU Credit Opportunities brochure and on the OSU Admissions website.

For information on OSU's acceptance of professional-technical courses, please see Academic Regulation 2 below.

## ACCEPTANCE OF CREDIT FROM A TWO-YEAR INSTITUTION

 (OSU Academic Regulation 2):
## Credit From A Two-Year Institution

 (Undergraduate Students)a. College Transfer Credits:

Oregon State University accepts for credit toward a baccalaureate degree all college transfer work completed at an Oregon or other accredited community college up to 124 lower-division quarter credits. For Institutional Requirements for Baccalaureate Degrees, see AR 25.

Students are encouraged to work with the relevant academic unit to ensure that transfer credits meet department and college requirements for the degree. It would be unlikely for an individual student to be able to use all 124 credits toward an OSU baccalaureate degree. Transfer credits and grades are not used in calculating the OSU cumulative GPA. Students who hold OSU-approved direct transfer degrees from Oregon or other accredited community colleges (e.g., the Associate of Arts Oregon Transfer) or who have 90 or more credits accepted in transfer will be granted junior standing. ${ }^{1}$ Students who hold OSU-approved direct transfer degrees will be considered to have met the Perspectives and Skills (except WIC) areas of the Baccalaureate Core. In addition, they must complete the upper-division Synthesis areas of the core. Students transferring from Oregon or other accredited community colleges who do not hold approved direct transfer degrees ordinarily will be given baccalaureate core credit in the Perspectives and Skills area on a course-by-course basis for work that is judged to be equivalent in content.
b. Transfer of ProfessionalTechnical Credits: a maximum of 12 quarter credits (8 semester credits) of professional-technical course work applicable in an associate's degree or certificate program at an accredited institution can be accepted upon admission to OSU as general elective credit (graded as Pass) and as part of the 124-quarter credit total that can be applied toward a baccalaureate degree.
c. Transfer of ProfessionalTechnical Course Credits through Articulation Agreements: Lower-division OSU credit may be awarded for specific professional-technical community college courses when those courses are validated by articulation agreement with the appropriate OSU department. This may be above the 12 quarter credits of general electives (graded as Pass) allowed when a student is admitted to OSU. Credit will be awarded only upon the recommendation of the appropriate department and college, and approval by the Curriculum Council. Community college professionaltechnical course work is not equated to upper-division OSU course work. These course credits will count as part of the 124 quarter credits defined in paragraph 2a above. OSU departments who have articulation agreements with community colleges
regarding community college professional-technical courses shall review the agreements annually and forward a dated list of the articulated community college courses to the Curriculum Council.

## Footnote:

${ }^{1}$ Junior standing does not necessarily imply that OSU institutional, college, division, and/ or departmental requirements, which are normally satisfied by OSU students prior to their junior year, have been satisfied.

## PETITION FOR ADMISSION CONSIDERATION

Transfer students not approved for admission may complete the extended admission requirements and will be provided with information about the petition procedure. Deadlines are in effect each term for appeals.

## NONDEGREE STATUS

Nondegree enrollment status is designed for students who want to take courses but do not want to pursue a degree. In some instances, nondegree students may not meet regular admission requirements. Nondegree students are part-time students who are expected to enroll in no more than 8 credits a term. Students who want to enroll for more than 8 credits a term must apply for regular admission.

Nondegree enrollment status requires no formal admission process and has no requirements for entrance. Nondegree applications should be submitted electronically. Approval is granted for a specific term. Students who are unable to attend the specific term and want to enroll later should contact the Office of Admissions (undergraduate nondegree) or the Graduate School (graduate nondegree).

Nondegree students are given grades and academic records, and are reviewed according to university standards of good academic progress.
Nondegree students who wish to seek full admission and pursue a degree must do so by submitting an undergraduate, postbaccalaureate or graduate application for admission. In all cases, an admission application fee is required. Successful enrollment as a nondegree student does not guarantee regular admission. Credits earned while enrolled under nondegree undergraduate status will be applied to a student's record.

Nondegree graduate students who decide to seek admission to a specific degree program during the course of their studies should note that any credits taken as a nondegree student may or may not be applicable for that degree, depending upon a variety of factors, their chosen program, and the policies of the Graduate School. Graduate students are further advised that academic residency must be completed after full
admission as a degree-seeking graduate student, regardless of the number of credits previously earned while in nondegree status. Please refer to "Reclassification of Postbaccalaureate Students, Nondegree-Seeking Students, and Graduate Certificate Students" at http:// catalog.oregonstate.edu/ChapterDetail. aspx?key=36\#Section1792.

Nondegree students follow the registration procedures and policies as outlined in the Registration Information Handbook. The Schedule of Classes is available through the Web at http:// catalog.oregonstate.edu/Default. aspx?section=ClassListing. Registering students are expected to obtain a student identification card through the ID Center in the Kerr Administration Building.

Tuition and fees for nondegree students enrolled in fewer than 9 credits are assessed at resident rates based on undergraduate- or graduate-course level. Payment of the health service fee is optional. Enrollment in excess of 8 credits requires that tuition and fees be assessed at the same rates as regular students and requires full admission as a regular student.

Registration holds in place prior to applying for nondegree status must be satisfied before registration as nondegree student will be allowed.

## ACADEMIC REGULATION 1.

 ADMISSION FOR NONDEGREE STUDENTS1. Nondegree enrollment status for undergraduate students is designed for students who wish to take 8 or fewer credits per term, but do not wish to pursue a degree or a specific postbaccalaureate credential.
2. Nondegree enrollment status for graduate students is designed for students who wish to take graduate courses, but do not wish to pursue an advanced degree. Nondegree graduate students are not limited as to the number of courses (credits) per term.
3. Credits earned as a nondegree undergraduate student may be used to satisfy degree requirements upon admission as a degree-seeking student.
4. Credits earned while enrolled as a nondegree graduate student will not necessarily apply to a graduate program upon admission to degreeseeking status. Communication with the Graduate School and specific academic programs is advised.
5. Nondegree students seeking admission to a degree program must do so by submitting an undergraduate, postbaccalaureate, or graduate application for admission.

## INTERNATIONAL UNDERGRADUATES AS <br> NONDEGREE STUDENTS

International students who are currently in the U.S. on visas such as an F-1, F-2, $\mathrm{B}-2, \mathrm{~J}-1$, etc. and do not have a valid immigration document from OSU should consult with OSU's Office of International Services (OIS) (email: isas.advisor@ oregonstate.edu) before submitting the OSU non-degree application for admission. Students will be required to turn in copies of their immigration documents to move forward. Only certain visa types allow an individual to pursue part-time or non-degree-seeking course work and still maintain one's visa status.

International students who plan to enroll with OSU as non-degree exchange students should use the application form that is made available at each partner institution. For a list of exchange partner institutions, go to http://international.or-egonstate.edu/files/atosu/osu-exchange-partner-institutions.pdf.

Undergraduate students who wish to enroll with OSU for one or more terms, but who do not plan to complete degree requirements at OSU and will not participate in an established exchange program, should contact International Admissions at intladmit@oregonstate.edu for further information, and before applying.

International students who wish to enroll in Academic English, Undergraduate Pathway or Graduate Pathway programs should contact INTO Oregon State University at intladmit@oregonstate.edu for further information.

## SELECT A MAJOR

Undergraduates and postbaccalaureate applicants are asked to select a college and a major within that college. The University Exploratory Studies Program is a choice available to undergraduates who are undecided about a major. Students may change their major in consultation with an academic advisor.

## ADMISSION OF POSTBACCALAUREATE STUDENTS

Admission for postbaccalaureate applicants is determined by the department, not by the Office of Admissions.
If you are interested in pursuing postbaccalaureate course work, please consult the major department before applying for admission.

## DEGREE SEEKING POSTBACCALAUREATE

Students who would like to earn a subsequent undergraduate degree from OSU or complete prerequisites for a graduate program at OSU may apply for degree seeking postbaccalaureate admission through the Office of Admissions. Appli-
cants for consideration must submit an admission application along with official transcripts of all college work by the application deadline. Generally, applicants must meet the following admission requirements:

- Have a bachelor's degree or equivalent from a regionally accredited institution
- 2.25 accumulated GPA requirements. The GPA is computed on the first baccalaureate degree plus any subsequent credit earned.
- Complete College Algebra and English Composition with a C- or better
- Submit Statement of Objectives of 150 to 200 words with their application
- Academic departments may impose additional requirements
- Nonrefundable $\$ 60.00$ application fee*
Please note that academic performance is not the sole criterion for admission to the university. The university may evaluate a person's behavior and background to determine their ability to maintain the standards of academic and professional conduct expected at the university.

You cannot earn a postbaccalaureate degree in the same field in which you earned your original degree.
*Applicants wishing to be considered for admission to multiple programs must submit a new application and fee for each program.

## ADDITIONAL CREDENTIALS

Students who want to earn a subsequent major, minor, option, or certificate from OSU may apply for credential enrollment status using the Postbaccalaureate Admission Application. Students must complete the current requirements for a minor or certificate and receive the dean's approval. Students must also achieve a minimum GPA of 2.00 and complete a minimum of 15 credits in residence at OSU. A nonrefundable $\$ 60.00$ admission application fee is charged. Students pursuing an additional credential will be categorized as non-degree credentials at OSU and not eligible to receive federal financial aid.

## Credential Classifications

- Minor Credential: Additional minor earned after undergraduate work is completed. Baccalaureate work can be completed at OSU or another institution. Students that previously completed a baccalaureate degree from Oregon State or another college cannot enter the same degree program as the degree program they graduated as an undergraduate.
- Major Credential: Additional major earned after undergraduate work is completed at OSU. Major
credential must be completed within the same degree program.
- Option Credential: Additional option earned after undergraduate work is completed at OSU. Option credential must be completed within the same degree and major program.
- Certificate: A structured progression of courses that constitute a coherent body of study with a defined focus within a single discipline or a logical combination of disciplines. Undergraduate certificates can be earned by students without any prior degree (professionals in a field), or as a credential seeking, graduate student or as an undergraduate student in conjunction with an undergraduate degree. The certificate requirements and pre-requisites are defined at the college level.


## INTERNATIONAL APPLICANTS

International applicants should also refer to the admissions procedures for undergraduate/graduate international students for deadlines, test score requirements, and additional information.

## ADMISSION OF SUBSEQUENT MINOR, CREDENTIAL OR CERTIFICATE

Students who want to earn a subsequent minor, credential or certificate from OSU may apply for nondegree credential enrollment status. Students must complete the current requirements for a minor, credential or certificate and receive the dean's approval. Students must also achieve a minimum GPA of 2.0 and complete a minimum of 15 credits in residence. A nonrefundable $\$ 60.00$ admission application fee is charged.

## ADMISSION WITH

## GRADUATE STANDING

To be considered for admission to the Graduate School, an applicant must have a baccalaureate degree from an accredited college or university, as well as a scholastic record, background, or other evidence that indicates the ability to do satisfactory graduate work. See Graduate Admission Procedures in this catalog: http:// catalog.oregonstate.edu/ChapterDetail. aspx?key=36.

[^0]must have completed their high school diploma or secondary school certificate with a minimum 3.0 on a 4.0 scale, an average " $B$ " grade $(A-F)$, or the equivalent.

Applicants transferring from a recognized college or university outside the U.S. must have a cumulative grade-point average of 2.5 , meet OSU's math requirement for transfer students (if you have earned 36 or more transferrable credits) AND be eligible to return to the most recent institution attended.

Applicants transferring from a regionally accredited college or university in the U.S. must have a cumulative gradepoint average of 2.25 , meet OSU's math and writing requirements for transfer students (if you have earned 36 or more transferrable credits), AND be eligible to return to the most recent institution attended.

Applicants for a bachelor's degree must submit official records of all secondary, middle and high schools attended (in general, these represent years 9-12) AND all colleges, universities and/or professional schools attended. Results of comprehensive examinations are required in the original language and on the official form of the institution, government, or other examining or certifying agency.

Applicants must present proof of English language proficiency, if available, by submitting TOEFL, IELTS or an acceptable alternative, e.g., IGCSE, SAT, ACT, or AP results.

## Exceptions to the English

 proficiency test requirement are:- Individuals who have completed a bachelor's degree from a regionally accredited institution in the U.S. or other English speaking country (See list below).
- Citizens of the following countries: Anguilla, Antiqua and Barbuda, Australia, Bahamas, Barbados, Belize, Bermuda, British Virgin Islands, Canada (English speaking provinces), Cayman Islands, Dominica, Grenada, Ireland, Jamaica, Montserrat, New Zealand, St. Kits and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, Turks and Caicos, United Kingdom, U.S. Virgin Islands.
- **For citizens of African countries whose official language is English, waivers will be considered on a case-by-case basis if the medium of instruction is English.


## INTO OSU PATHWAY PROGRAMS:

## Undergraduate Pathway

INTO Oregon State University's Undergraduate Pathway programs combine intensive language study, academic skills development and academic course
work in a carefully constructed program designed to move students successfully through one to three terms of undergraduate study in their degree program. Entry requirements vary based on the length of program chosen. All students have a study plan and receive academic advising that is reflective of their specific Undergraduate Pathway program.

Successful completion of Undergraduate Pathway progression requirements allows students to complete one to three terms of undergraduate study and progress to their undergraduate degree at Oregon State University in their respective field of study.

## Academic English + Undergraduate Pathway

Academically qualified applicants for Undergraduate Pathway who are unable to provide a language proficiency score (or who provide one that is below the minimum) will begin their program by taking Academic English courses until they complete Level 4 of the program. All students have a study plan and receive academic advising that is reflective of the Academic English + Undergraduate Pathway program.

## GRADUATE PATHWAY

INTO Oregon State University's Graduate Pathway program is a pre-Master's program that provides international students a direct path to various graduate degrees at the university. The program gives students the academic foundation, essential language skills and GMAT/GRE test preparation to successfully move on to the Master's degree. Entry to this program requires satisfactory completion of a four-year undergraduate degree in an appropriate subject with at least a 2.75 GPA or equivalent overall and a minimum of 2.75 GPA for the final year of study and a 70 iBT TOEFL or equivalent test score (some options have higher entry requirements). All students have a study plan and receive academic advising that is reflective of their specific Graduate Pathway program.

Successful completion of Graduate Pathway progression requirements secures students a place in full-time graduate studies at Oregon State University in their respective field of study.

## Academic English + Graduate Pathway

Academically qualified applicants for Graduate Pathway who are unable to provide a language proficiency score (or who provide one that is below the minimum) will begin their program by taking Academic English courses until they complete Level 5 of the program. All students have a study plan and receive academic advising that is reflective of the Academic English + Graduate Pathway program.

## WHEN TO APPLY: INTERNATIONAL <br> UNDERGRADUATE STUDENTS

The Office of International Admissions recommends that international undergraduate applicants submit a complete application and supporting documents preferably 4 to 6 months before the intended term start date.

## Start Date

Term
Summer 2016
Fall 2016
Winter 2017
Spring 2017
(First day of classes)
June 20
September 21
January 9
April 3
For information about Admission of International Graduate Students, please see the Graduate Admissions Requirements section at http://catalog.oregonstate.edu/ChapterDetail.aspx?key=36.

## ADMISSION TO

## SUMMER SESSION

Students who wish to begin work on a degree during summer session at OSU must satisfy regular admission requirements and apply by the specified deadlines.

## ADMISSION TO <br> PROFESSIONAL PROGRAMS

Professional programs are accredited according to requirements set by professional societies. These programs often have more rigorous requirements for admission, continuation in the program, and acceptance of transfer credit. Therefore, admission to OSU is separate from admission to a professional program and does not guarantee such admission.

OSU-CASCADES CAMPUS
Oregon State University's campus in Bend, Oregon, provides students excellence in academics, practical and experiential learning opportunities, and the lifelong advantages of a premier research university-all on a growing campus community of 1,200 students and faculty.
OSU-Cascades features outstanding faculty in degree programs that reflect Central Oregon's vibrant economy, abundant natural resources and commitment to sustainability. Sixteen undergraduate majors, 30 minors and options, and three graduate programs include fields such as computer science, energy systems engineering, kinesiology, hospitality management, and tourism and outdoor leadership. Experiential learning options include faculty research, internships and study abroad programs in 80 countries.

OSU-Cascades' new campus opens to students in September 2016. It is located near downtown Bend, and is walking or biking distance from many services and amenities used by students. A bus system provides students free transportation,
including to Central Oregon Community College.

OSU-Cascades awards master's and bachelor's degrees.

## DEGREE PARTNERSHIP

 PROGRAMS - DUAL ADMISSION AND ENROLLMENT AT DESIGNATED COMMUNITY COLLEGESOregon State University offers special Degree Partnership Programs (dual admission and enrollment) with most of Oregon's community colleges:

1. Blue Mountain Community College in Pendleton
2. Central Oregon Community College in Bend
3. Chemeketa Community College in Salem
4. Clackamas Community College in Oregon City
5. Clatsop Community College in Astoria
6. Columbia Gorge Community College in The Dalles
7. Klamath Community College in Klamath Falls
8. Lane Community College in Eugene
9. Linn-Benton Community College in Albany
10. Mt. Hood Community College in Gresham
11. Oregon Coast Community College in Newport
12. Portland Community College
13. Rogue Community College in Medford
14. Southwestern Oregon Community College in Coos Bay
15. Tillamook Bay Community College in Tillamook
16. Treasure Valley Community College in Ontario
17. Umpqua Community College in Roseburg
OSU also has Degree Partnership Programs with four of Hawaii's seven community colleges:
18. Hawai'i Community College in Hilo, Hawaii (Big Island)
19. Kapi'olani Community College in Honolulu, Oahu
20. Leeward Community College in Pearl City, Oahu [Pending]
21. Maui College, University of Hawaii, in Kahului, Maui
These programs provide students with simultaneous access and admission/ enrollment status at both OSU and the community college. There is one application process to attend both schools, advising is available at either campus, and the student has the opportunity to access services and participate in college life on both campuses. There is flexibility in scheduling with access to more classes, financial aid is available for qualified students while attending both schools, and admitted students have access to
library and computer lab resources at both campuses. For more information on Degree Partnership Programs (dual admission and enrollment), please contact the admissions office at the community college, OSU Degree Partnership Student Program, 541-737-2790, or the University Partnership Programs Web page at http:// oregonstate.edu/partnerships/ or http:// partnerships/oregonstate.edu.
Transfer Student Services and Degree Partnership Programs
B102 Kerr Administration Bldg.
Oregon State University
Corvallis, OR 97331
541-737-2562
Websites: http://transfer.oregonstate.edu; and http://oregonstate.edu/partnerships/ and http://partnerships/oregonstate.edu
Rick DeBellis, Associate Director for Enrollment Management
Degree Partnership Programs 541-737-2790

## Kayleen Salchenberg-Steeves,

Transfer Student Services Manager
541-737-2562, kayleen.salchenberg@ oregonstate.edu
Application deadlines for Degree Partnership Programs vary. Please refer to the DPP website at http://oregonstate.edu/ partnerships/application-deadlines to assure that you meet the appropriate deadline.

## CREDIT FOR

## MILITARY EXPERIENCE

Students are recommended to seek advice from their Academic Advisor prior to transferring in their Military Credits. Oregon State University grants up to 45 credits for military education as recommended by the American Council on Education's (ACE) Guide to the Evaluation of Educational Experiences in the Armed Services. This is in accordance with transfer credit policies at Oregon State University. Students may request evaluation of military credit by furnishing the Office of Admissions with a Joint Services Transcript or Navy SMART transcript or U.S. Coast Guard transcript. Transcripts may be obtained through these homepages:

- JST (https://jst.doded.mil/official. html) Note: Some browser security settings may raise a caution message before entering these Department of Defense websites.
- CCAF (Community College of the Air Force) http://www.au.af.mil/au/ barnes/ccaf/transcripts.asp
- Additional informational links to other service pages can be found on the ACE website (http://www.acenet. edu/higher-education/topics/Pages/ College-Credit-for-Military-Service. aspx).
Oregon State University will grant
1.00 quarter credit for the course HHS

241 Lifetime Fitness Lab. For HHS 241 credit to be granted, please submit either the DD214 or an official ACE transcript. Credit will also be granted if one of the following military science courses has been completed successfully: Physical Fitness, Physical Education, or Physical Conditioning. To receive credit, please submit an official transcript from the institution.

Oregon State University will assess and award block transfer credit upon review of your military record. An evaluation report showing block transfer credits will be sent to you. Your major college will receive a copy of your evaluation report and the ACE recommendation guideline. For a better understanding of how each college uses the 45 -credit block of general elective credits there is a web page on the OSU Veterans website (go to http:// studentlife.oregonstate.edu/veterans, click on Current Students, then click on Military Credit) outlining this information. In addition, if you believe a specific military course, training, experience, etc. directly relates to a university course, you can complete a form to petition for Military Credit Course Substitution (go to http://studentlife.oregonstate.edu/veterans, click on Current Students on the right side, then click on Military Credit on the right side of the page).

Any student receiving GI Bill education benefits while attending Oregon State University is required to obtain transcripts from all previously attended schools and submit them to the school for review of prior credit.

## PLACEMENT EXAMINATIONS

High school seniors planning to enter OSU must take the SAT or the ACT. These tests provide academic advisors with valuable information about a student's educational development, abilities, and aptitudes.

New students are required to take an online Math Placement Test (see http://www.math.oregonstate.edu/mlc-placement-home). Students who enter the university with previous language training from another institution and who wish to continue their study of the language are required to take a language proficiency examination to determine placement level. Please call the OSU School of Language, Culture, and Society at 541-737-4603. Other placement examinations may be required in certain majors.

## REGISTRATION PROCEDURES

Once admitted to Oregon State University, students are eligible for course registration. Complete registration instructions, procedures, schedules and deadlines are detailed in the Schedule of Classes on the Web. A student is officially registered and eligible to attend
classes only when all procedures have been completed. Students who make arrangements to pay outstanding university debts and who do not adhere to the agreed upon plan may be dis-enrolled.

In addition to the basic information regarding registration, the Registration Information Handbook is an essential resource to the student for the academic calendar, fee schedule, academic and other student regulations and procedures, final examination schedule, and listing of baccalaureate core courses.

## RE-ENROLLMENT

Undergraduate students who wish to reenroll in the university after an absence may do so providing they were eligible to re-enroll their last term of attendance. Students who have been absent four or more terms, not including summer terms, should contact the Office of the Registrar to reactivate their records, at which time the current catalog becomes their catalog of record for graduation requirements. The university reserves the right to consider a student's status with respect to voluntary or involuntary leave, as well as any existing student conduct issues when requesting to re-enroll. Students who have been absent less than four terms are still considered active and register following the registration instructions in the current Registration Information Handbook in PDF format in the online catalog at http://catalog.oregonstate. edu/Default.aspx?section=Registration. International students who wish to reenroll after an absence should check in with the Office of International Services (OIS) to make sure they have the required documents to return.

Re-enrolling students who have attended another college or university since their last term at OSU are required to report that enrollment at the time of re-entry. Official transcripts must be forwarded to the Office of Admissions. Returning students with an OSU cumulative GPA below or very near 2.00 are reminded of the OSU graduation requirement (Academic Regulation 25e), which stipulates 2.00 as the minimum OSU cumulative grade-point average required to earn a baccalaureate degree from OSU.
All re-enrolling students are reminded of their responsibility to update any outdated information, such as address, in their OSU records. Contact the Office of the Registrar to make changes.

## OREGON TRANSFER MODULEOSU VERSION

The Oregon Transfer Module (OTM) provides a one-year curriculum for students who plan to transfer to a state of Oregon two-year or four-year college/university of higher education. The Oregon Transfer Module is neither a certificate nor a degree; it represents the successful comple-
tion of certain general education courses. OTM completion will be noted in the student's record. The Oregon Transfer Module documents that a student has met a subset of the common general education requirements at all Oregon community colleges and state universities in Oregon.
The Oregon Transfer Module requirements at Oregon State University are:

- 45 lower-division credits-minimum of 12 credits must be OSU course work according to the attached list
- Minimum grade of C- for each course
- Minimum cumulative GPA 2.0 at time Oregon Transfer Module is completed
- Students are allowed $3 \mathrm{~S} / \mathrm{U}$ credits per full time term or a maximum of 9 S/U credits in the Oregon Transfer Module.
OSU students planning to complete the Oregon Transfer Module must file the OTM Completion Application with the Registrar's Office. Students should fill out the form when the module is completed or they are in the last term of completion.

Upon successful review by OSU and completion of the Oregon Transfer Module, a notation will be added to the student's OSU record indicating the module is complete and the date. The notation will appear on the transcript as follows:
"Oregon Transfer Module Completed day-month-year"

## OREGON TRANSFER MODULE COURSES

Foundational Skills (12-13 credits)
Writing (6 credits)

## Select two writing courses from the

 following:HC 199. Honors Writing (3)
PHL 121. Reasoning and Writing (3)
WR 121. English Composition (3)
WR 201. Writing for Media (3)
WR 214. Writing in Business (3)
WR 222. English Composition (3)
WR 224. Introduction to Fiction Writing (3)
WR 241. Introduction to Poetry Writing (3)
Oral Communication (3 credits)
Select one speech course from the following:
COMM 111. Public Speaking (3)
COMM 114. Argument and Critical
Discourse (3)
COMM 114H. Argument and Critical Discourse (3)
COMM 218. Interpersonal Communication (3)

COMM 218H. Interpersonal Communication (3)

## Mathematics (3-4 credits)

Select one mathematics course from the following:
MTH 105. Introduction to Contemporary Mathematics (3)
MTH 111. College Algebra (4)
MTH 112. Elementary Functions (4)

MTH 211. Foundations of Elementary Mathematics (4)
MTH 241. Calculus for Management and Social Science (4)
MTH 245. Mathematics for Management,
Life, and Social Sciences (4)
MTH 251. Differential Calculus (4)
MTH 251H. Differential Calculus (4)
Introduction to Disciplines (30 credits)
Arts and Letters (9+ credits)
Select a minimum of three courses:
ART 101. Introduction to the Visual Arts (4)
ART 204. Introduction to Art HistoryWestern (3)
ART 205. Introduction to Art HistoryWestern (3)
ART 206. Introduction to Art HistoryWestern (3)
ENG 104. Introduction to Literature: Fiction (3)

ENG 104H. Introduction to Literature: Fiction (3)
ENG 105. Introduction to Literature: Drama (3)

ENG 106. Introduction to Literature: Poetry (3)

ENG 201. Shakespeare (4)
ENG 202. Shakespeare (4)
ENG 204. Survey of British Literature: Beginnings to 1660 (4)
ENG 205. Survey of British Literature:
Restoration to Romantic Era (4)
ENG 206. Survey of British Literature:
Victorian Era to 20th Century (4)
ENG 207. Literatures of Western
Civilization: Classical-Renaissance (4)
ENG 208. Literatures of Western Civilization: 18th Century to Present (4)
ENG 210. Literatures of the World: Asia (4)
ENG 211. Literatures of the World: Africa (4)
ENG 212. Literatures of the World: Meso/ South America, Caribbean (4)
ENG 213. Literatures of the World: Middle East (4)
ENG 215. Classical Mythology (4)
ENG 221. African-American Literature (4)
ENG 253. Survey of American Literature: Colonial to 1900 (4)
ENG 254. Survey of American Literature: 1900 to Present (4)
ENG 260. Literature of American Minorities (4)

ENG 275. The Bible as Literature (4)
FILM 110. Introduction to Film Studies: 1895-1945 (3)
FILM 125. Introduction to Film Studies: 1945-Present (3)
FILM 220. Topics in Difference, Power, and Discrimination (4)
FILM 245. The New American Cinema (4)
FILM 265. Films for the Future (4)
LING 208. Western Culture Study Abroad (3)
LING 209. Cultural Diversity Study Abroad (3)

LING 251. Languages of Oregon (3)
MUS 101. Music Appreciation I: Survey (3)
MUS 102. Music Appreciation II: Periods and Genres (3)
MUS 103. Music Appreciation III: Great Composers (3)
MUS 108. Music Cultures of the World (3)

MUS 121. Literature and Materials of Music I (3)
TA 147. Introduction to the Theatre (3)
WLC 230. France Today: Cultures Within and Beyond Its Borders (3)
WLC 233. Russian Culture I (3)
WLC 234. Russian Culture II (3)
WLC 235. Russian Culture III (3)

## Social Sciences (9+ credits)

Select a minimum of three courses:
AEC 250. Introduction to Environmental Economics and Policy (3)
AEC 253. Environmental Law, Policy, and
Economics (4)
ANTH 110. Introduction to Cultural Anthropology (3)
ANTH 208. Western Culture Study Abroad (3)
ANTH 209. Cultural Diversity Study Abroad (3)

ANTH 210. Comparative Cultures (3)
ANTH 251. Language in the USA (3)
DHE 270. Appearance, Power, and Society (4)
ECON 201. Introduction to
Microeconomics (4)
ECON 201H. Introduction to
Microeconomics (4)
ECON 202. Introduction to
Macroeconomics (4)
ES 101. Introduction to Ethnic Studies (3)
ES 213. Contemporary Latino/a Culture and Issues (3)
ES 221. Survey of African American Studies I (4)
ES 223. Survey of African American Studies II (4)
ES 231. Introduction to Asian American Studies (4)
ES 233. Asian Pacific American Activism and Empowerment (4)
ES 241. Introduction to Native American Studies (4)
ES 243. Native American Assimilation and Activism (4)
FST 260. Food Science and Technology in Western Culture (3)
GEOG 105. Geography of the Non-Western World (3)
GEOG 106. Geography of the Western World (3)
H 210. Introduction to the Health Care System (3)
H 225. Social and Individual Health
Determinants (4)
HDFS 201. Contemporary Families in the U.S. (3)

HST 101. History of Western Civilization (4)
HST 101H. History of Western Civilization (4)
HST 102. History of Western Civilization (4)
HST 102H. History of Western Civilization (4)
HST 103. History of Western Civilization (4)
HST 103H. History of Western Civilization (4)
HST 104. World History I: Ancient Civilizations (3)
HST 105. World History II: Middle and Early Modern Ages (3)
HST 106. World History III: The Modern and Contemporary World (3)
HST 201. History of the United States (4)
HST 202. History of the United States (4)
HST 203. History of the United States (4)
HST 203H. History of the United States (4)
NUTR 216. Food in Non-Western Culture (3)
PHL 150. Great Ideas in Philosophy (3)

PHL 160. Quests for Meaning: World Religions (4)
PHL 170. The Idea of God (4)
PHL 201. Introduction to Philosophy (4)
PHL 205. Ethics (4)
PHL 207. Political Philosophy (4)
PHL 220. World-Views and Values in the Bible (4)
PHL 251. Knowers, Knowing, and the Known (4)
PHL 280. Ethics of Diversity (4)
PS 201. Introduction to United States
Government and Politics (4)
PS 201 H . Introduction to United States
Government and Politics (4)
PS 204. Introduction to Comparative
Politics (4)
PS 205. Introduction to International
Relations (4)
PS 205H. Introduction to International Relations (4)
PS 206. Introduction to Political Thought (4)
PS 206H. Introduction to Political Thought (4)

PSY 201. General Psychology (3)
PSY 202. General Psychology (3)
SOC 204. Introduction to Sociology (3)
SOC 205. Institutions and Social Change (3)
SOC 206. Social Problems and Issues (3)
WGSS 223. Women: Self and Society (3)
WGSS 223H. Women: Self and Society (3)
WGSS 224. Women: Personal and Social
Change (3)
WGSS 280. Women Worldwide (3)

## Science/Math/Computer Science

(12+ credits)
Select three courses, including at least one biological or physical science with a laboratory.
ANS 121. Introduction to Animal Sciences (4)
BI 101. General Biology (4)
BI 102. General Biology (4)
BI 103. General Biology (4)
BI 211. Principles of Biology (4)
BI 211H. Principles of Biology (4)
BI 212. Principles of Biology (4)
BI 212H. Principles of Biology (4)
BI 213. Principles of Biology (4)
BI 213H. Principles of Biology (4)
BOT 101. Botany: A Human Concern (4)
CH 122. General Chemistry (5)
CH 123. General Chemistry (5)
CH 202. Chemistry for Engineering Majors (3)
CH 231. General Chemistry (4)
and CH 261. Laboratory for Chemistry 231 (1)
CH 232. General Chemistry (4)
and CH 262. Laboratory for Chemistry 232 (1)
CH 233. General Chemistry (4)
and CH 263. Laboratory for Chemistry 233 (1)
CSS 205. Soil Science (4)
or SOIL 205. Soil Science (3)
FES 240. Forest Biology (4)
GEO 101. The Solid Earth (4)
GEO 102. The Surface of the Earth (4)
GEO 201. Physical Geology (4)
GEO 202. Earth Systems Science (4)
GEO 203. Evolution of Planet Earth (4)
MB 230. Introductory Microbiology (4)

OC 103. Exploring the Deep: Geography of the World's Oceans (4)
PH 104. Descriptive Astronomy (4)
PH 106. Perspectives in Physics (4)
PH 201. General Physics (5)
PH 202. General Physics (5)
PH 203. General Physics (5)
PH 211. General Physics with Calculus (4)
PH 212. General Physics with Calculus (4)
PH 213. General Physics with Calculus (4)

## Electives (3+ credits)

One additional course as required to bring the total to 45 . The course may be from any of the Introduction to Disciplines areas (Arts and Letters, Social Science, or Science/Math/Computer Science).

## UNIVERSITY DEGREE REQUIREMENTS

Current degree requirements are printed each year in the "Academic Regulations and Procedures" section of the Registration Information Handbook and in the electronic or printed General Catalog, along with other information on a wide range of topics from minimum credits for full-time status to adding courses. All students are encouraged to review this part of the Registration Information Handbook and electronic or printed General Catalog each year for the most current information about OSU requirements and procedures.

Students with questions about baccalaureate degree requirements are encouraged to contact their advisor. Students needing assistance in selecting a major or selecting an advisor may wish to call or stop by the college office.

## CATALOG YEAR POLICY

## Graduation Requirements/Catalog

## Contract Policy

When determining the graduation requirements for a given student:

- Students must meet all applicable degree requirements from the published catalog(s).
- The student's catalog year for institutional and baccalaureate core requirements is established by his or her first term of attendance (matriculation date) at Oregon State University as an admitted student.
- The student's catalog year for college/ major/option/minor requirements is based on the date of declaration of the major/option/minor; consequently, a student's first (primary) major/ option must be in the same catalog year. If a primary option is declared in a subsequent academic year, the primary option will be aligned with the catalog year of the primary major. If the primary option did not exist in the catalog year of the primary major, the primary major will move to the catalog year that the primary option was declared.
- Additionally, while the student's first major/option must be in the same catalog year, any additional declarations of majors/options/minors will be determined by the declaration dates (and corresponding catalog years). A student, in collaboration with an advisor, can also choose to graduate using a subsequent (to their most recent major declaration date) catalog year within the same major/option.
- At the time of graduation, all continuously enrolled students, including transfer students, may not use a catalog that is more than ten years old. Students may petition their college's head advisor for an extension of a catalog greater than ten years prior
to their expected graduation term.
- Current policy requires a student to reapply after not enrolling at OSU for four consecutive terms (not including summer terms). The published catalog for the resulting readmission/matriculation date will become the catalog of record for graduation requirements. The Planned Educational Leave Program defined in AR 13.c beginning with the 2011-2012 academic year, provides a mechanism for a student to keep their original catalog of record during a planned absence.
- For Degree Partnership Program students, the first term the student is admitted to OSU will be the matriculation date and will determine the catalog year for institutional and baccalaureate core requirements. The catalog year for college/major/option/ minor requirements will be the same as all other OSU students.
- Every effort has been made to ensure the accuracy of information in the OSU General Catalog. However, Oregon State University or the Oregon State Board of Higher Education may find it necessary from time to time to make changes in courses, curricula, or degree requirements. Students already admitted to a program in which such changes have been made will be reasonably accommodated, if possible, to ensure their normal progress toward a degree. A student may, however, still be required to conform to changes in courses, curricula, or degree requirements as deemed necessary by Oregon State University or the Oregon State Board of Higher Education.


## THE BACCALAUREATE

## EXPERIENCE

Oregon State University is committed to creating an atmosphere of intellectual curiosity, academic freedom, diversity, and personal empowerment. This will enable everyone to learn with and from others. This compelling learning experience celebrates knowledge; encourages personal growth and awareness; acknowledges the benefits of diverse experiences, world views, learning styles, and values; and engenders personal and societal values that benefit the individual and society.

OSU develops curricula based on sound disciplinary knowledge and input from practitioners. Students acquire skills and knowledge for a lifetime of learning, and will be involved in scholarly and creative pursuits.
The baccalaureate degree includes:

- the baccalaureate core
- an in-depth study in at least one major; and
- individual elective courses.

Minors are available in many areas and are required in certain programs. Students

Office of the Registrar B102 Kerr Admin. Bldg.
Corvallis, OR
97331-2130 541-737-4048 Email: registrars@ oregonstate.edu Website: http:// oregonstate.edu/ registrar/

## Administration

Rebecca Mathern
University Registrar 541-737-4048

Jacob Jones
Associate Registrar
541-737-0604

## Michelle

McAllaster
Associate Registrar,
Interim
541-737-2012

## Jennifer

Ketterman
Associate Registrar-
Operations
541-737-1699

## Autumn Landis

Assistant Registrar-
Athletics and
Eligibility
41-737-2018

## Shannon

Harwood
Operations Manager 541-737-2830
should check college, school, program, or departmental requirements.
The Baccalaureate Core (bacc core) Curriculum represents what the OSU faculty believes is the foundation for students' further understanding of the modern world. Informed by natural and social sciences, arts, and humanities, the bacc core requires students to think critically and creatively, and to synthesize ideas and information when evaluating major societal issues. Importantly, the bacc core promotes understanding of interrelationships among disciplines in order to increase students' capacities as ethical citizens of an ever-changing world.

## THE BACCALAUREATE CORE

The Oregon State University Baccalaureate Core (http://catalog.oregonstate. edu/bcc.aspx) is continually enriched. It emphasizes critical thinking, writing, world cultures, appreciation of differences, the arts, sciences, literature, lifelong fitness, and global awareness in 15 course categories. Over 250 courses are available to meet core requirements. Students must complete a total of 48 credits plus a Writing Intensive Course (WIC) of at least 3 credits.

The Baccalaureate Core Committee determines which courses will satisfy each of the requirements above. WIC courses will be reviewed by the WIC Director and the Baccalaureate Core Committee. The core is governed by the following rules: (1) No more than two courses from any one department may be used by a student to satisfy the Perspectives category of the core. (2) No single course may be used by a student to satisfy more than one subject area of the core even though some courses have been approved in more than one area. (3) Both Synthesis courses may not be taken in the same department.
Defining characteristics of baccalaureate core courses are available at http://oregonstate.edu/admin/aa/ apaa/assessment/baccalaureate-core-assessment-0. Additional information is available at http://main.oregonstate.edu/ baccalaureate-core.

The purpose of the writing intensive requirement is to insure that each graduate is prepared to write in the discourse, conventions, and genres of his or her major field.

A student completing requirements for two majors, including double degrees as well as dual majors (one degree with two majors), may request that one WIC course satisfy the WIC requirement for graduation in both majors. This oppor-
tunity is available if and only if:

1. The discourse, written conventions, and genres of the two majors are closely related, and
2. The substitution of a WIC course from one major for that in another major is approved in writing by the chairs or heads of both departments involved and the approval is placed in the student's academic file.
Students and advisors should be aware that in some cases, the WIC course in a major is an integral part of the degree and substitution may not be appropriate. The final decision rests with the department chair or head.

## BACCALAUREATE CORE <br> REQUIREMENTS

No single course may be used by a student to satisfy more than one area of the core even though some courses are approved for more than one area.
Skills Courses (lower division except WIC) (15)
To support students' success in all courses, the following first-year Skills courses are to be taken and completed satisfactorily within the first 45 hours of OSUgenerated credits.
Writing I (WR 121, must earn at least C-) Mathematics (approved list below) Speech (approved list below)
To prepare for the upper-division Writing Intensive Course in the major, the following Skills course is to be taken and completed satisfactorily within the first 90 hours of OSU-generated credits:

Writing II (approved list below)
For transfer students with sophomore standing or above, Writing II and Speech must be completed within the first 45 hours of OSU-generated credits. These requirements apply to all students, whether full time or part time.
Fitness (3)
Mathematics: MTH 105, *Introduction to Contemporary Mathematics, or higher level mathematics (3)
Writing I (3)
Writing II (3)
Speech (3)

## Perspectives Courses (lower and upper division) (24) <br> No more than two courses from any one

 department may be used by a student to satisfy the Perspectives category of the core. GEO courses listed under Physical Science are considered to be from a different department than GEO courses listed under any other Perspective category. Choose an additional course from either Physical Science or Biological Science.Biological Science (including lab) (4)
Physical Science (including lab) (4)
Plus choice of additional physical or biological science (including lab) (4)
Take a minimum of one course in each of the following areas:

Cultural Diversity (3)
Literature and the Arts (3)

Social Processes and Institutions (3)
Western Culture (3)

## Difference, Power, and <br> Discrimination Courses (3)

Synthesis Courses (upper division) (6)

Both synthesis courses may not be taken in the same department.
Contemporary Global Issues (3)
Science, Technology, and Society (3)
WIC (Writing Intensive Course, upper division, included in credits for major) (3)
Total (48) + WIC (3) = 51

## APPROVED <br> BACCALAUREATE CORE <br> COURSES

For the current and complete list of approved baccalaureate core courses, go to http://catalog.oregonstate.edu/ bcc.aspx.

## SKILLS COURSES (15)

To support students' success in all courses, the following first-year Skills courses are to be taken and completed satisfactorily within the first 45 hours of OSUgenerated credits:

> Writing I (WR 121, minimum passing grade C-)
> Mathematics (approved list below) Speech (approved list below)

To prepare for the upper-division Writing Intensive Course in the major, the following Skills course is to be taken and completed satisfactorily within the first 90 hours of OSU-generated credits:

Writing II (approved list below)
For transfer students with sophomore standing or above, Writing II and Speech must be completed within the first 45 hours of OSU-generated credits. These requirements apply to all students, whether full time or part time.
Fitness (3)
Choose HHS 231, plus a 1-credit course listed below or any PAC course:
HHS 231 LIFETIME FITNESS FOR HEALTH (2)

HHS 241 LIFETIME FITNESS (1)
MS 130 MILITARY PHYSICAL CONDITIONING (1)

## Mathematics (3)

MTH 105 INTRODUCTION TO CONTEMPORARY MATHEMATICS (3)
MTH 111 COLLEGE ALGEBRA (4)
MTH 112 ELEMENTARY FUNCTIONS (4)
MTH 211 FOUNDATIONS OF ELEMENTARY MATHEMATICS (4)
MTH 241 CALCULUS FOR MANAGEMENT AND SOCIAL SCIENCE (4)
MTH 245 MATHEMATICS FOR
MANAGEMENT, LIFE, AND SOCIAL SCIENCES (4)

MTH 251 DIFFERENTIAL CALCULUS (4) MTH 251H DIFFERENTIAL CALCULUS (4)

## Speech (3)

COMM 111 PUBLIC SPEAKING (3)
COMM 111H PUBLIC SPEAKING (3)
COMM 114 ARGUMENT AND CRITICAL
DISCOURSE (3)
COMM 114H ARGUMENT AND CRITICAL
DISCOURSE (3)
COMM 211 COMMUNICATING ONLINE (3)
COMM 218 INTERPERSONAL
COMMUNICATION (3)

## Writing I (3)

WR 121 ENGLISH COMPOSITION (3) WR 121H ENGLISH COMPOSITION (3)

## Writing II (3)

HC 199 HONORS WRITING (3)
PHL 121 REASONING AND WRITING (3) WR 201 WRITING FOR MEDIA (3) WR 214 WRITING IN BUSINESS (3) WR 222 ENGLISH COMPOSITION (3) WR 224 INTRODUCTION TO FICTION WRITING (3)
WR 240 INTRODUCTION TO NONFICTION WRITING (3)
WR 241 INTRODUCTION TO POETRY WRITING (3)
WR 303 WRITING FOR THE WEB (3) WR 323 ENGLISH COMPOSITION (3) WR 324 SHORT STORY WRITING (4) WR 327 TECHNICAL WRITING (3) WR 330 UNDERSTANDING GRAMMAR (3) WR 341 POETRY WRITING (4) WR 362 SCIENCE WRITING (3)

## PERSPECTIVE COURSES (24)

No more than two courses (or lecture/lab combinations) from any one department may be used by a student to satisfy the Perspectives category of the core. GEO courses listed under Physical Science are considered to be from a different department than GEO courses listed under any other Perspective category. Choose one Biological Science lecture/lab combination, one Cultural Diversity, one Literature and the Arts, one Physical Science lecture/lab combination, one Social Processes and Institutions, one Western Culture, plus one additional lecture/lab combination from either Physical Science or Biological Science.

## Biological Science (Lecture/Lab) (4 or 8)

Choose 1 or 2 lecture/lab
combinations. Combination is assumed (uses the same number) unless indicated in the title.
ANS 121 INTRODUCTION TO ANIMAL SCIENCES (4)
ANS 121H INTRODUCTION TO ANIMAL SCIENCES (4)
ANTH 284 PRIMATE ADAPTATION AND EVOLUTION (4)
BI 101 GENERAL BIOLOGY (4)
BI 102 GENERAL BIOLOGY (4)
BI 103 GENERAL BIOLOGY (4)
BI 204 INTRODUCTORY BIOLOGY I (4)
BI 205 INTRODUCTORY BIOLOGY II (4)
BI 206 INTRODUCTORY BIOLOGY III (4)

BI 211 PRINCIPLES OF BIOLOGY (4)
BI 211H PRINCIPLES OF BIOLOGY (4) BI 212 PRINCIPLES OF BIOLOGY (4)
BI 212 H PRINCIPLES OF BIOLOGY (4) BI 213 PRINCIPLES OF BIOLOGY (4)
BI 213H PRINCIPLES OF BIOLOGY (4)
BOT 101 BOTANY: A HUMAN CONCERN (4)
BOT 220 INTRODUCTION TO PLANT BIOLOGY (4)
CSS 205 SOIL SCIENCE (4)
FES 240 FOREST BIOLOGY (4)
FES 240 H FOREST BIOLOGY (4)
FOR 206 FOREST SOILS LABORATORY FOR SOIL 205 (1)
MB 230 INTRODUCTORY MICROBIOLOGY (4)

MB 230H INTRODUCTORY
MICROBIOLOGY (4)
RNG 121 INTRODUCTION TO WILDLAND ECOLOGY (4)
SOIL 206 SOIL SCIENCE LABORATORY FOR SOIL 205 (1)
SUS 102 INTRODUCTION TO
ENVIRONMENTAL SCIENCE AND
SUSTAINABILITY (4)

## Biological Science Lecture (3)

Lectures in this section match with labs from above section. Both the lecture and the corresponding lab must be passed to meet the Biological Science requirement.
SOIL 205 SOIL SCIENCE (3)

## Cultural Diversity (3)

ANTH 209 CULTURAL DIVERSITY STUDY ABROAD (3)
ANTH 210 COMPARATIVE CULTURES (3)
ANTH 311 PEOPLES OF THE WORLD-
NORTH AMERICA (3)
ANTH 311H PEOPLES WORLD-NORTH AMERICA (3)
ANTH 313 PEOPLES OF THE WORLD-
LATIN AMERICA (3)
ANTH 313H PEOPLES OF THE WORLDLATIN AMERICA (3)
ANTH 314 PEOPLES OF THE WORLDMIDDLE EAST (3)
ANTH 314H PEOPLES OF THE WORLDMIDDLE EAST (3)
ANTH 315 PEOPLES OF THE WORLDAFRICA (3)
ANTH 315H PEOPLES OF THE WORLDAFRICA (3)
ANTH 316 PEOPLES OF THE WORLDSOUTH AND SOUTHEAST ASIA (3)
ANTH 317 PEOPLES OF THE WORLDPACIFIC (3)
ANTH 318 PEOPLES OF THE WORLDCHINA (3)
ANTH 318H PEOPLES OF THE WORLDCHINA (3)
ANTH 319 PEOPLES OF THE WORLDJAPAN AND KOREA (3)
ANTH 447 ARCTIC PERSPECTIVES ON GLOBAL PROBLEMS (4)
ANTH 447H ARCTIC PERSPECTIVES ON GLOBAL PROBLEMS (4)
ART 208 INTRODUCTION TO ASIAN ART (3)
ART 310 EARLY CHINESE ART AND ARCHAEOLOGY (3)
ART 311 LATE CHINESE ART AND
CULTURE (3)
ART 312 CONTEMPORARY CHINESE ART (3)
ART 313 ART OF JAPAN (3)

CHN 331 CHINESE CULTURE (3)
CHN 332 CHINESE CULTURE (3)
CHN 333 MODERN CHINESE CULTURE (3)
ENG 210 LITERATURES OF THE WORLD: ASIA (4)
ENG 211 LITERATURES OF THE WORLD: AFRICA (4)
ENG 212 LITERATURES OF THE WORLD:
MESO/SOUTH AMERICA, CARIBBEAN (4)
ENG 213 LITERATURES OF THE WORLD:
MIDDLE EAST (4)
ENG 213H LITERATURES OF THE WORLD: MIDDLE EAST (4)
ENG 360 NATIVE AMERICAN LITERATURE (4)

ES 101 INTRODUCTION TO ETHNIC STUDIES (3)
ES 231 INTRODUCTION TO ASIAN AMERICAN STUDIES (4)
ES 241 INTRODUCTION TO NATIVE AMERICAN STUDIES (4)
ES 241 H INTRODUCTION TO NATIVE AMERICAN STUDIES (4)
ES 243 NATIVE AMERICAN ASSIMILATION AND ACTIVISM (4)
FR 329 FRANCOPHONE CULTURES IN FILM (3-9)
FR 329H FRANCOPHONE CULTURES IN FILM (3-9)
GEOG 105 GEOGRAPHY OF THE NONWESTERN WORLD (3)
GEOG 311 GEOGRAPHY OF AFRICA (3)
GEOG 313 GEOGRAPHY OF ASIA (3)
GEOG 314 GEOGRAPHY OF LATIN AMERICA (3)
HEBR 231 INTRODUCTION TO JEWISH CULTURE (3)
HST 104 WORLD HISTORY I: ANCIENT CIVILIZATIONS (3)
HST 105 WORLD HISTORY II: MIDDLE AND EARLY MODERN AGES (3)
HST 105H WORLD HISTORY II: MIDDLE AND EARLY MODERN AGES (3)
HST 106 WORLD HISTORY III: THE MODERN AND CONTEMPORARY WORLD (3)
HST 106H WORLD HISTORY III: THE MODERN AND CONTEMPORARY WORLD (3)
HST 215 INTRODUCTION TO JEWISH TRADITIONS (4)
HST 320 ANCIENT NEAR EAST (4)
HST 324 ANCIENT JEWISH HISTORY (4)
HST 350 MODERN LATIN AMERICA (4)
HST 350H MODERN LATIN AMERICA (4)
HST 351 MODERN LATIN AMERICA (4)
HST 352 AFRICANS IN LATIN AMERICAN HISTORY (4)
HST 353 SLAVERY IN THE AMERICAS (4)
HST 381 HISTORY OF AFRICA (4)
HST 382 HISTORY OF AFRICA (4)
HST 382H HISTORY OF AFRICA (4)
HST 387 ISLAMIC CIVILIZATION (4)
HST 388 ISLAMIC CIVILIZATION (4)
HST 391 TRADITIONAL CHINA AND JAPAN (4)

HST 392 MODERN CHINA AND JAPAN (4)
HST 396 GENDER, FAMILY AND POLITICS
IN TRADITIONAL CHINA (4)
HST 397 GENDER, FAMILY AND POLITICS IN MODERN CHINA (4)
HST 485 POLITICS AND RELIGION IN THE MODERN MIDDLE EAST (4)
JPN 331 JAPANESE CULTURE (3)

JPN 332 JAPANESE CULTURE (3)
JPN 333 JAPANESE CULTURE (3)
LING 209 CULTURAL DIVERSITY STUDY ABROAD (3)
MUS 108 MUSIC CULTURES OF THE WORLD (3)
MUS 108H MUSIC CULTURES OF THE WORLD (3)
NUTR 216 FOOD IN NON-WESTERN CULTURE (3)
PHL 160 QUESTS FOR MEANING: WORLD RELIGIONS (4)
PHL 160H QUESTS FOR MEANING: WORLD RELIGIONS (4)
PHL 213 INTRODUCTION TO HINDU TRADITIONS (4)
PHL 214 INTRODUCTION TO ISLAMIC TRADITIONS (4)
PHL 312 ASIAN THOUGHT (4)
PHL 315 GANDHI AND NONVIOLENCE (4)
PHL 371 PHILOSOPHIES OF CHINA (4)
PHL 371H PHILOSOPHIES OF CHINA (4)
PS 343 RUSSIAN POLITICS (4)
PS 344 LATIN AMERICAN POLITICS (4)
PS 346 MIDDLE EAST POLITICS (4)
PS 348 CHINESE POLITICS (4)
PS 350 JAPANESE POLITICS (4)
QS 462 QUEER THEORIES (4)
REL 160 QUESTS FOR MEANING: WORLD RELIGIONS (4)
REL 160 H QUESTS FOR MEANING: WORLD RELIGIONS (0-4)
REL 213 INTRODUCTION TO HINDU TRADITIONS (4)
REL 214 INTRODUCTION TO ISLAMIC TRADITIONS (4)
REL 215 INTRODUCTION TO JEWISH
TRADITIONS (4)
REL 312 ASIAN THOUGHT (4)
REL 315 GANDHI AND NONVIOLENCE (4)
REL 324 ANCIENT JEWISH HISTORY (4)
REL 350 MODERN LATIN AMERICA (4)
REL 352 AFRICANS IN LATIN AMERICAN HISTORY (4)
REL 371 PHILOSOPHIES OF CHINA (4)
REL 387 ISLAMIC CIVILIZATION (4)
REL 388 ISLAMIC CIVILIZATION (4)
REL 485 POLITICS AND RELIGION IN THE MODERN MIDDLE EAST (4)
RUS 231 RUSSIAN CULTURE (3)
RUS 232 RUSSIAN CULTURE (3)
RUS 233 RUSSIAN CULTURE (3)
SPAN 237 U.S. LATINO/A IDENTITIES AND CULTURES (3)
WGSS 235 WOMEN IN WORLD CINEMA (3)
WGSS 235H WOMEN IN WORLD CINEMA (3)

WGSS 280 WOMEN WORLDWIDE (3)
WGSS 280H WOMEN WORLDWIDE (3)
WLC 232 INTRODUCTION TO JEWISH CULTURE (3)
WLC 233 RUSSIAN CULTURE I (3)
WLC 234 RUSSIAN CULTURE II (3)
WLC 235 RUSSIAN CULTURE III (3)
WLC 320 FRANCOPHONE CULTURES IN FILM (3-9)
WLC 320H FRANCOPHONE CULTURES IN FILM (3-9)
WLC 331 CHINESE CULTURE I (3)
WLC 332 CHINESE CULTURE II (3)
WLC 333 CHINESE CULTURE III (3)
WLC 335 JAPANESE CULTURE I (3)
WLC 336 JAPANESE CULTURE II (3)

WLC 337 JAPANESE CULTURE III (3)

## Literature and the Arts (3)

ART 101 INTRODUCTION TO THE VISUAL ARTS (4)
ART 204 INTRODUCTION TO ART HISTORY - WESTERN (3)
ART 205 INTRODUCTION TO ART HISTORY - WESTERN (3)
ART 206 INTRODUCTION TO ART HISTORY - WESTERN (3)
ART 208 INTRODUCTION TO ASIAN ART (3)

ART 210 HISTORY OF WESTERN ARCHITECTURE (3)
ART 264 PHOTOGRAPHY: HISTORY,
TECHNOLOGY, CULTURE AND ART (3)
ART 310 EARLY CHINESE ART AND ARCHAEOLOGY (3)
ART 311 LATE CHINESE ART AND CULTURE (3)
ART 312 CONTEMPORARY CHINESE ART (3)

ART 313 ART OF JAPAN (3)
ART 320 ANCIENT GREEK ART (3)
ART 321 ANCIENT ROMAN ART AND ARCHITECTURE (3)
ART 322 MEDIEVAL ART AND ARCHITECTURE (3)
ART 323 ITALIAN RENAISSANCE ART AND ARCHITECTURE (3)
ART 352 CREATIVE COLLABORATION: DESIGNING AND BUILDING (3)
ART 364 NINETEENTH-CENTURY ART (3)
ART 365 HISTORY OF MODERN ART 19001945 (3)
ENG 104 INTRODUCTION TO
LITERATURE: FICTION (3)
ENG 104H INTRODUCTION TO
LITERATURE: FICTION (3)
ENG 105 INTRODUCTION TO
LITERATURE: DRAMA (3)
ENG 106 INTRODUCTION TO
LITERATURE: POETRY (3)
ENG 106H INTRODUCTION TO LITERATURE: POETRY (3)
ENG 107 INTRODUCTION TO CREATIVE NONFICTION (3)
ENG 201 SHAKESPEARE (4)
ENG 202 SHAKESPEARE (4)
ENG 202H SHAKESPEARE (4)
ENG 204 SURVEY OF BRITISH LITERATURE: BEGINNINGS TO 1660 (4)
ENG 204H SURVEY OF BRITISH LITERATURE: BEGINNINGS TO 1660 (4)
ENG 205 SURVEY OF BRITISH LITERATURE: RESTORATION TO ROMANTIC ERA (4)
ENG 205H SURVEY OF BRITISH
LITERATURE: RESTORATION TO ROMANTIC ERA (4)
ENG 206 SURVEY OF BRITISH LITERATURE:
VICTORIAN ERA TO 20TH CENTURY (4)
ENG 207 LITERATURE OF WESTERN CIVILIZATION: CLASSICALRENAISSANCE (4)
ENG 208 LITERATURE OF WESTERN CIVILIZATION: 18TH CENTURY TO PRESENT (4)
ENG 210 LITERATURES OF THE WORLD: ASIA (4)
ENG 211 LITERATURES OF THE WORLD: AFRICA (4)
ENG 212 LITERATURES OF THE WORLD:
MESO/SOUTH AMERICA, CARIBBEAN (4)
ENG 213 LITERATURES OF THE WORLD:

MIDDLE EAST (4)
ENG 213H LITERATURES OF THE WORLD: MIDDLE EAST (4)
ENG 214 LITERATURE OF THE WORLD: EUROPE (4)
ENG 215 CLASSICAL MYTHOLOGY (4)
ENG 221 AFRICAN-AMERICAN LITERATURE (4)
ENG 221H AFRICAN-AMERICAN LITERATURE (4)
ENG 253 SURVEY OF AMERICAN
LITERATURE: COLONIAL TO 1900 (4)
ENG 254 SURVEY OF AMERICAN
LITERATURE: 1900 TO PRESENT (4)
ENG 254H SURVEY OF AMERICAN
LITERATURE: 1900 TO PRESENT (4)
ENG 260 LITERATURE OF AMERICAN MINORITIES (4)
ENG 260 H LITERATURE OF AMERICAN MINORITIES (4)
ENG 275 THE BIBLE AS LITERATURE (4)
ENG 275H THE BIBLE AS LITERATURE (4)
ENG 295 FEMINISM AND THE BIBLE (3)
ENG 295H FEMINISM AND THE BIBLE (3)
ENG 317 THE AMERICAN NOVEL: BEGINNINGS TO CHOPIN (4)
ENG 318 THE AMERICAN NOVEL: MODERNIST PERIOD (4)
ENG 319 THE AMERICAN NOVEL: POSTWORLD WAR II (4)
ENG 320 STUDIES IN PAGE, STAGE, AND SCREEN (4)
ENG 321 STUDIES IN WORD, OBJECT, AND IMAGE (4)
ENG 322 STUDIES IN GLOBALISM, TEXT, AND EVENT (4)
ENG 330 THE HOLOCAUST IN LITERATURE AND FILM (4)
ENG 362 AMERICAN WOMEN WRITERS (4)
ENG 374 MODERN SHORT STORY (4)
ENG 374H MODERN SHORT STORY (4)
ENGR 352 CREATIVE COLLABORATION: DESIGNING AND BUILDING (3)
ES 334 ASIAN PACIFIC AMERICAN LITERATURE (4)
FILM 110 INTRODUCTION TO FILM STUDIES: 1895-1945 (3)
FILM 125 INTRODUCTION TO FILM STUDIES: 1945-PRESENT (3)
FILM 245 THE NEW AMERICAN CINEMA (4)

FILM 245 H THE NEW AMERICAN CINEMA (4)

FILM 255 WORLD CINEMA PART I: ORIGINS TO 1968 (4)
FILM 256 WORLD CINEMA PART II: 1968-PRESENT (4)
FILM 265 FILMS FOR THE FUTURE (4)
GER 261 MASTERPIECES OF GERMAN CINEMA (3)
GER 261H MASTERPIECES OF GERMAN CINEMA (3)
IT 261 WOMEN IN ITALIAN CINEMA (3)
MUS 101 MUSIC APPRECIATION I: SURVEY (3)

MUS 101H MUSIC APPRECIATION I: SURVEY (3)
MUS 102 MUSIC APPRECIATION II: PERIODS AND GENRES (3)
MUS 102H MUSIC APPRECIATION II: PERIODS AND GENRES (3)
MUS 103 MUSIC APPRECIATION III: GREAT COMPOSERS (3)
PHL 295 FEMINISM AND THE BIBLE (3)

PHL 295H FEMINISM AND THE BIBLE (3)
RUS 232 RUSSIAN CULTURE (3)
SPAN 236 CONTEMPORARY LATIN AMERICAN CULTURE (3)
SPAN 361 MODERN SPAIN THROUGH SPANISH CINEMA (3)
TA 147 INTRODUCTION TO THE THEATRE (3)

TA 147H INTRODUCTION TO THE THEATRE (3)
TA 330 HISTORY OF THE THEATRE (3)
TA 331 HISTORY OF THE THEATRE (3)
TA 332 HISTORY OF THE THEATRE (3)
WGSS 295 FEMINISM AND THE BIBLE (3)
WGSS 295H FEMINISM AND THE BIBLE (3)
WLC 221 MASTERPIECES OF GERMAN CINEMA (3)
WLC 221H MASTERPIECES OF GERMAN CINEMA (3)
WLC 222 WOMEN IN ITALIAN CINEMA (3)
WLC 234 RUSSIAN CULTURE II (3)
WLC 321 MODERN SPAIN THROUGH SPANISH CINEMA (3)

## Physical Science (Lecture/Lab or <br> Lab) (4 or 8)

Choose 1 or 2 lecture/lab combinations. Combination is assumed (uses the same number) unless indicated in the title.
Courses listed as lab must also have the corresponding Physical Science Lecture from below.
ATS 201 CLIMATE SCIENCE (4)
CH 122 GENERAL CHEMISTRY (5)
CH 123 GENERAL CHEMISTRY (5)
CH 261 LABORATORY FOR CHEMISTRY 231 (1)
CH 261H LABORATORY FOR CHEMISTRY 231H (1)
CH 262 LABORATORY FOR CHEMISTRY 232 (1)
CH 262H LABORATORY FOR CHEMISTRY 232H (1)
CH 263 LABORATORY FOR CHEMISTRY 233 (1)
CH 263H LABORATORY FOR CHEMISTRY 233H (1)
CH 271 LABORATORY FOR CH 231 FOR CHEMISTRY MAJORS (1)
CH 272 LABORATORY FOR CH 232 FOR CHEMISTRY MAJORS (1)
CH 273 LABORATORY FOR CH 233 FOR CHEMISTRY MAJORS (1)
CSS 205 SOIL SCIENCE (4)
FOR 206 FOREST SOILS LABORATORY FOR SOIL 205 (1)
GEO 100 NATURAL DISASTERS: HOLLYWOOD VERSUS REALITY (4)
GEO 101 THE SOLID EARTH (4)
GEO 201 PHYSICAL GEOLOGY (4)
GEO 202 EARTH SYSTEMS SCIENCE (4)
GEO 203 EVOLUTION OF PLANET EARTH (4)

GEO 221 ENVIRONMENTAL GEOLOGY (4)
GEOG 102 PHYSICAL GEOGRAPHY (4)
GEOG 201 FOUNDATIONS OF GEOSPATIAL SCIENCE AND GIS (4)
OC 103 EXPLORING THE DEEP: GEOGRAPHY OF THE WORLD'S OCEANS (4)

OC 201 OCEANOGRAPHY (4)
PH 104 DESCRIPTIVE ASTRONOMY (4)
PH 104H DESCRIPTIVE ASTRONOMY (4)

PH 106 PERSPECTIVES IN PHYSICS (4) PH 111 INQUIRING INTO PHYSICAL PHENOMENA (4)
PH 201 GENERAL PHYSICS (5)
PH 202 GENERAL PHYSICS (5)
PH 203 GENERAL PHYSICS (5)
PH 205 SOLAR SYSTEM ASTRONOMY (4)
PH 206 STARS AND STELLAR EVOLUTION (4)

PH 207 GALAXIES, QUASARS, AND COSMOLOGY (4)
PH 211 GENERAL PHYSICS WITH CALCULUS (4)
PH 212 GENERAL PHYSICS WITH CALCULUS (4)
PH 213 GENERAL PHYSICS WITH CALCULUS (4)
SOIL 206 SOIL SCIENCE LABORATORY FOR SOIL 205 (1)
SUS 103 INTRODUCTION TO CLIMATE CHANGE (4)
WSE 210 RENEWABLE MATERIALS
TECHNOLOGY AND UTILIZATION (4)

## Physical Science Lecture (4)

Lectures in this section match with labs from above section. Both the lecture and the corresponding lab must be passed to meet the Physical Science requirement.
CH 231 GENERAL CHEMISTRY (4)
CH 231H GENERAL CHEMISTRY (4)
CH 232 GENERAL CHEMISTRY (4)
CH 232H GENERAL CHEMISTRY (4)
CH 233 GENERAL CHEMISTRY (4)
CH 233H GENERAL CHEMISTRY (4)
SOIL 205 SOIL SCIENCE (3)
Social Processes and Institutions (3)
AEC 250 INTRODUCTION TO ENVIRONMENTAL ECONOMICS AND POLICY (3)
AEC 251 INTRODUCTION TO AGRICULTURAL AND FOOD ECONOMICS (3)
AG 351 COMMUNICATING AGRICULTURE TO THE PUBLIC (3)
ANTH 101 INTRODUCTION TO
ANTHROPOLOGY (3)
ANTH 110 INTRODUCTION TO CULTURAL ANTHROPOLOGY (3)
ECON 201 INTRODUCTION TO MICROECONOMICS (4)
ECON 202 INTRODUCTION TO
MACROECONOMICS (4)
GEOG 103 HUMAN GEOGRAPHY (3)
GEOG 240 CLIMATE CHANGE, WATER AND SOCIETY (3)
GEOG 250 LAND USE PLANNING FOR SUSTAINABLE COMMUNITIES (3)
GEOG 251 GEOGRAPHY OF DISASTER MANAGEMENT (3)
H 210 INTRODUCTION TO THE HEALTH CARE SYSTEM (3)
H 225 SOCIAL AND INDIVIDUAL HEALTH DETERMINANTS (4)
H 333 GLOBAL PUBLIC HEALTH (3)
HDFS 201 CONTEMPORARY FAMILIES IN THE U.S. (3)
HDFS 240 HUMAN SEXUALITY (3)
HORT 217 SOCIAL IMPACTS OF SCIENCE (3)

HST 101 HISTORY OF WESTERN CIVILIZATION (4)
HST 102 HISTORY OF WESTERN

CIVILIZATION (4)
HST 103 HISTORY OF WESTERN
CIVILIZATION (4)
KIN 312 SOCIOCULTURAL DIMENSIONS
OF PHYSICAL ACTIVITY (3)
NMC 100 NEW MEDIA AND CULTURE (3)
PS 201 INTRODUCTION TO UNITED
STATES GOVERNMENT AND POLITICS (4)
PS 204 INTRODUCTION TO
COMPARATIVE POLITICS (4)
PS 205 INTRODUCTION TO
INTERNATIONAL RELATIONS (4)
PS 315 THE POLITICS OF MEDIA (4)
PS 331 STATE AND LOCAL POLITICS (4)
PS 366 FROM ATLANTIS TO UTOPIA: THE POLITICS OF THE IDEAL STATE (4)
PS 374 SUSTAINABLE LIVING: PRACTICES AND POLICIES (4)
PSY 201 GENERAL PSYCHOLOGY (3)
PSY 202 GENERAL PSYCHOLOGY (3)
QS 321 QUEER POP CULTURE (3)
SOC 204 INTRODUCTION TO SOCIOLOGY (3)

SOC 205 INSTITUTIONS AND SOCIAL CHANGE (3)
WGSS 223 WOMEN: SELF AND SOCIETY (3)
WGSS 223H WOMEN: SELF AND SOCIETY
(3)

WGSS 224 WOMEN: PERSONAL AND
SOCIAL CHANGE (3)
WGSS 240 GENDER AND SPORT (3)
WGSS 321 QUEER POP CULTURE (3)
WLC 301 INTRODUCTION TO WORLD
LANGUAGE AND CULTURE STUDIES (4)
WSE 266 INDUSTRIAL HEMP (3)

## Western Culture (3)

AEC 240 RURAL ECONOMICS OF PLACE AND PEOPLE (3)
AEC 253 ENVIRONMENTAL LAW, POLICY, AND ECONOMICS (4)
ANTH 208 WESTERN CULTURE STUDY ABROAD (3)
ANTH 261 FOOD IN AMERICAN CULTURE (3)

ANTH 312 PEOPLES WORLD-EUROPE (3)
ANTH 312H PEOPLES WORLD-EUROPE (3)
ART 204 INTRODUCTION TO ART HISTORY - WESTERN (3)
ART 205 INTRODUCTION TO ART
HISTORY - WESTERN (3)
ART 206 INTRODUCTION TO ART
HISTORY - WESTERN (3)
ART 210 HISTORY OF WESTERN ARCHITECTURE (3)
ART 321 ANCIENT ROMAN ART AND ARCHITECTURE (3)
ART 322 MEDIEVAL ART AND ARCHITECTURE (3)
ART 323 ITALIAN RENAISSANCE ART AND ARCHITECTURE (3)
CROP 340 PENS AND PLOWS: WRITINGS
OF WORKING THE LAND (3)
ENG 201 SHAKESPEARE (4)
ENG 202 SHAKESPEARE (4)
ENG 202H SHAKESPEARE (4)
ENG 204 SURVEY OF BRITISH LITERATURE: BEGINNINGS TO 1660 (4)
ENG 204H SURVEY OF BRITISH LITERATURE: BEGINNINGS TO 1660 (4)
ENG 205 SURVEY OF BRITISH LITERATURE:
RESTORATION TO ROMANTIC ERA (4)
ENG 205H SURVEY OF BRITISH
LITERATURE: RESTORATION TO
ROMANTIC ERA (4)

ENG 206 SURVEY OF BRITISH LITERATURE: VICTORIAN ERA TO 20TH CENTURY (4)
ENG 207 LITERATURE OF WESTERN
CIVILIZATION: CLASSICAL-
RENAISSANCE (4)
ENG 208 LITERATURE OF WESTERN CIVILIZATION: 18TH CENTURY TO PRESENT (4)
ENG 214 LITERATURE OF THE WORLD: EUROPE (4)
ENG 215 CLASSICAL MYTHOLOGY (4)
ENG 253 SURVEY OF AMERICAN
LITERATURE: COLONIAL TO 1900 (4)
ENG 254 SURVEY OF AMERICAN
LITERATURE: 1900 TO PRESENT (4)
ENG 254H SURVEY OF AMERICAN
LITERATURE: 1900 TO PRESENT (4)
ENG 275 THE BIBLE AS LITERATURE (4)
ENG 275H THE BIBLE AS LITERATURE (4)
ENG 317 THE AMERICAN NOVEL: BEGINNINGS TO CHOPIN (4)
ENG 318 THE AMERICAN NOVEL: MODERNIST PERIOD (4)
ENG 319 THE AMERICAN NOVEL: POSTWORLD WAR II (4)
FCSJ 261 FOOD IN AMERICAN CULTURE (3)

FILM 110 INTRODUCTION TO FILM STUDIES: 1895-1945 (3)
FILM 125 INTRODUCTION TO FILM STUDIES: 1945-PRESENT (3)
FR 270 FRANCE TODAY: CULTURES WITHIN AND BEYOND ITS BORDERS (3)
FR 270H FRANCE TODAY: CULTURES WITHIN AND BEYOND ITS BORDERS (3)
FR 332 FRENCH CULTURE AND SOCIETY SINCE THE REVOLUTION (3)
FR 333 FRENCH CULTURE AND SOCIETY
SINCE THE REVOLUTION (3)
FR 429 FRENCH SOCIETY THROUGH ITS CINEMA (3)
FR 429H FRENCH SOCIETY THROUGH ITS CINEMA (3)
FST 260 FOOD SCIENCE AND
TECHNOLOGY IN WESTERN CULTURE (3)
FST 273 WINE IN THE WESTERN WORLD (3)
GEO 329 GEOGRAPHY OF THE UNITED STATES AND CANADA (3)
GEOG 106 GEOGRAPHY OF THE WESTERN WORLD (3)
GER 231 GERMAN DICTATORSHIPS: NAZIS AND COMMUNISTS (3)
GER 231H GERMAN DICTATORSHIPS: NAZIS AND COMMUNISTS (3)
GER 241 GRIMMS' FAIRY TALES (4)
GER 331 GERMAN CULTURE (3)
GER 332 GERMAN CULTURE (3)
HST 101 HISTORY OF WESTERN CIVILIZATION (4)
HST 102 HISTORY OF WESTERN CIVILIZATION (4)
HST 103 HISTORY OF WESTERN CIVILIZATION (4)
HST 104 WORLD HISTORY I: ANCIENT CIVILIZATIONS (3)
HST 105 WORLD HISTORY II: MIDDLE AND EARLY MODERN AGES (3)
HST 105H WORLD HISTORY II: MIDDLE AND EARLY MODERN AGES (3)
HST 106 WORLD HISTORY III: THE MODERN AND CONTEMPORARY WORLD (3)
HST 106H WORLD HISTORY III: THE MODERN AND CONTEMPORARY WORLD (3)

HST 201 HISTORY OF THE UNITED STATES (4)

HST 202 HISTORY OF THE UNITED STATES (4)

HST 202H HISTORY OF THE UNITED STATES (4)
HST 203 HISTORY OF THE UNITED STATES (4)

HST 203H HISTORY OF THE UNITED STATES (4)
HST 325 EARLY CHRISTIANITY: ORIGINS TO 600 (4)
HST 335 NINETEENTH-CENTURY EUROPE (4)

HST 338 HITLER'S EUROPE (4)
IT 331 ITALIAN CULTURE (3)
KIN 312 SOCIOCULTURAL DIMENSIONS OF PHYSICAL ACTIVITY (3)
LING 208 WESTERN CULTURE STUDY ABROAD (3)
PHL 150 GREAT IDEAS IN PHILOSOPHY (3)
PHL 170 THE IDEA OF GOD (4)
PHL 201 INTRODUCTION TO
PHILOSOPHY (4)
PHL 205 ETHICS (4)
PHL 205H ETHICS (4)
PHL 206 RELIGIOUS ETHICS AND MORAL PROBLEMS (4)
PHL 207 POLITICAL PHILOSOPHY (4)
PHL 220 WORLD-VIEWS AND VALUES IN THE BIBLE (4)
PHL 251 KNOWERS, KNOWING, AND THE KNOWN (4)
PHL 251H KNOWERS, KNOWING, AND THE KNOWN (4)
PHL 301 HISTORY OF WESTERN PHILOSOPHY (4)
PHL 302 HISTORY OF WESTERN PHILOSOPHY (4)
PHL 303 HISTORY OF WESTERN PHILOSOPHY (4)
PHL 360 PHILOSOPHY AND THE ARTS (4)
PHL 365 LAW IN PHILOSOPHICAL PERSPECTIVE (4)
PS 206 INTRODUCTION TO POLITICAL THOUGHT (4)
PS 349 BRITISH POLITICS (4)
REL 170 THE IDEA OF GOD (4)
REL 206 RELIGIOUS ETHICS AND MORAL PROBLEMS (4)
REL 220 WORLD-VIEWS AND VALUES IN THE BIBLE (4)
REL 325 EARLY CHRISTIANITY: ORIGINS TO 600 (4)
RUS 231 RUSSIAN CULTURE (3)
RUS 232 RUSSIAN CULTURE (3)
RUS 233 RUSSIAN CULTURE (3)
SPAN 331 THE CULTURES OF SPAIN AND PORTUGAL (3)
SPAN 332 THE CULTURES OF SPAIN AND PORTUGAL (3)
SPAN 336 LATIN AMERICAN CULTURE (3)
SPAN 337 LATIN AMERICAN CULTURE (3)
SPAN 338 LATIN AMERICAN CULTURE (3)
SPAN 361 MODERN SPAIN THROUGH SPANISH CINEMA (3)
TOL 132 FOUNDATIONS AND HISTORY OF OUTDOOR AND ADVENTURE PROFESSIONS (3)
WLC 230 FRANCE TODAY: CULTURES WITHIN AND BEYOND ITS BORDERS (3)
WLC 230H FRANCE TODAY: CULTURES WITHIN AND BEYOND ITS BORDERS (3)
WLC 231 GERMAN DICTATORSHIPS:

NAZIS AND COMMUNISTS (3)
WLC 231H GERMAN DICTATORSHIPS:
NAZIS AND COMMUNISTS (3)
WLC 233 RUSSIAN CULTURE I (3)
WLC 234 RUSSIAN CULTURE II (3)
WLC 235 RUSSIAN CULTURE III (3)
WLC 241 GRIMMS' FAIRY TALES (4)
WLC 321 MODERN SPAIN THROUGH SPANISH CINEMA (3)
WLC 429 FRENCH SOCIETY THROUGH ITS CINEMA (3)
WLC 429 H FRENCH SOCIETY THROUGH ITS CINEMA (3)
WSE 266 INDUSTRIAL HEMP (3)

## DIFFERENCE, POWER, AND DISCRIMINATION COURSES (3) Choose one Difference, Power and Discrimination Course.

AG 301 ECOSYSTEM SCIENCE OF PACIFIC NW INDIANS (3)
ANTH 159 LANGUAGE, RACE AND
RACISM IN THE US: AN INTRODUCTION (4)

ANTH 251 LANGUAGE IN THE USA (3)
ANTH 251H LANGUAGE IN THE USA (3)
ANTH 345 BIOLOGICAL AND CULTURAL CONSTRUCTIONS OF RACE (3)
ANTH 361 FOOD JUSTICE (4)
ART 359 PHOTOGRAPHY: ACTIVISM, AND SOCIAL CHANGE (3)
ART 432 GENDER, SEXUALITY, AND THE PHOTOGRAPHIC IMAGE (3)
CS 175 COMMUNICATIONS SECURITY AND SOCIAL MOVEMENTS (3)
DHE 270 APPEARANCE, POWER AND SOCIETY (4)
ECON 383 THE ECONOMICS OF DISCRIMINATION (4)
ED 216 PURPOSE, STRUCTURE, AND FUNCTION OF EDUCATION IN A DEMOCRACY (3)
ENG 220 TOPICS IN DIFFERENCE, POWER, AND DISCRIMINATION (4)
ENG 260 LITERATURE OF AMERICAN MINORITIES (4)
ENG 260 H LITERATURE OF AMERICAN MINORITIES (4)
ENG 420 STUDIES IN DIFFERENCE, POWER, AND DISCRIMINATION (4) ES 159 LANGUAGE, RACE AND RACISM IN THE US: AN INTRODUCTION (4)
ES 201 INVENTING ETHNIC AMERICA (3)
ES 212 SURVEY OF CHICANO/A-LATINO/A STUDIES (3)
ES 213 CONTEMPORARY LATINO/A CULTURE AND ISSUES (3)
ES 221 SURVEY OF AFRICAN AMERICAN STUDIES I (4)
ES 221H SURVEY OF AFRICAN AMERICAN STUDIES I (3)
ES 223 SURVEY OF AFRICAN AMERICAN STUDIES II (4)
ES 233 ASIAN PACIFIC AMERICAN
ACTIVISM AND EMPOWERMENT (4)
ES 243 NATIVE AMERICAN ASSIMILATION AND ACTIVISM (4)
ES 260 INTRODUCTION TO PACIFIC ISLANDS STUDIES (4)
ES 334 ASIAN PACIFIC AMERICAN LITERATURE (4)
ES 351 ETHNIC MINORITIES IN OREGON (4)

ES 353 ENVIRONMENTAL RACISM (4)

ES 353H ENVIRONMENTAL RACISM (4) ES 355 RACE, SPACE, AND DIFFERENCE (4)
ES 355H RACE, SPACE, AND DIFFERENCE (4)

ES 357 FARMWORKER JUSTICE
MOVEMENTS (4)
ES 375 ARTS AND SOCIAL JUSTICE (4)
ES 431 QUEER OF COLOR CRITIQUES (4)
ES 437 (EN)GENDERING ASIAN PACIFIC AMERICA (4)
ES 452 ETHNICITY IN FILM (4)
ES 453 ETHNOHISTORY METHODOLOGY (4)

ES 457 LITERATURE BY WOMEN OF
COLOR IN THE UNITED STATES (4)
FCSJ 361 FOOD JUSTICE (4)
FILM 220 TOPICS IN DIFFERENCE, POWER,
AND DISCRIMINATION (4)
FW 340 MULTICULTURAL PERSPECTIVES
IN NATURAL RESOURCES (3)
GEO 309 ENVIRONMENTAL JUSTICE (3)
GEOG 100 CLIMATE JUSTICE (3)
GEOG 203 HUMAN-ENVIRONMENT GEOGRAPHY (3)
H 465 PUBLIC HEALTH AND WOMEN: SOCIAL AND POLICY ISSUES (3)
HDFS 201 CONTEMPORARY FAMILIES IN THE U.S. (3)
HST 201 HISTORY OF THE UNITED STATES (4)

HST 202 HISTORY OF THE UNITED STATES (4)

HST 202H HISTORY OF THE UNITED STATES (4)
HST 203 HISTORY OF THE UNITED STATES (4)

HST 203H HISTORY OF THE UNITED STATES (4)
HST 210 RELIGION IN THE UNITED STATES (4)
HST 210H RELIGION IN THE UNITED STATES (4)
HST 364 UNITED STATES RELIGION AND SOCIAL REFORM (4)
HST 365 THE CIVIL RIGHTS MOVEMENT IN THE MODERN U.S. (4)
HST 365H THE CIVIL RIGHTS MOVEMENT IN THE MODERN U.S. (4)
HST 368 LESBIAN AND GAY MOVEMENTS IN MODERN AMERICA (4)
HST 369 IMMIGRATION TO THE U.S. SINCE 1880 (4)
HST 370 SOCIAL CHANGE AND AMERICAN POPULAR MUSIC (4)
KIN 475 POWER AND PRIVILEGE IN SPORT (3)

LING 251 LANGUAGES OF OREGON (3)
MB 330 DISEASE AND SOCIETY (3)
PHL 210 RELIGION IN THE UNITED STATES (4)
PHL 210H RELIGION IN THE UNITED STATES (4)
PHL 275 INTRODUCTION TO DISABILITY STUDIES (4)
PHL 280 ETHICS OF DIVERSITY (4)
PHL 345 FIRST FREEDOM: RELIGIOUS
LIBERTY AND INTOLERANCE (4)
PS 110 GOVERNING AFTER THE ZOMBIE APOCALYPSE (3)
PS 322 CONSTITUTIONAL LAW: CIVIL RIGHTS AND LIBERTIES (4)
PS 325 GENDER AND THE LAW (4)
PS 363 GENDER AND RACE IN AMERICAN POLITICAL THOUGHT (4)

PS 375 THE CIVIL RIGHTS MOVEMENT AND POLICIES (4)
PS 375H THE CIVIL RIGHTS MOVEMENT AND POLICIES (4)
PS 425 GENDER AND THE LAW (4)
PSY 426 PSYCHOLOGY OF GENDER (4)
PSY 466 FAT STUDIES (4)
QS 262 INTRODUCTION TO QUEER STUDIES (3)
QS 262H INTRODUCTION TO QUEER STUDIES (3)
QS 364 TRANSGENDER POLITICS (3)
QS 364H TRANSGENDER POLITICS (3)
QS 375 ARTS AND SOCIAL JUSTICE (4)
QS 431 QUEER OF COLOR CRITIQUES (4)
QS 432 GENDER, SEXUALITY, AND THE
PHOTOGRAPHIC IMAGE (3)
REL 210 RELIGION IN THE UNITED STATES (4)

REL 210H RELIGION IN THE UNITED STATES (4)
REL 345 FIRST FREEDOM: RELIGIOUS LIBERTY AND INTOLERANCE (4)
REL 364 UNITED STATES RELIGION AND SOCIAL REFORM (4)
SOC 206 SOCIAL PROBLEMS AND ISSUES (3)

SOC 312 SOCIOLOGY OF THE FAMILY (4)
SOC 312H SOCIOLOGY OF THE FAMILY (4)
SOC 345 CRIMES AND VIOLENCE IN
INTIMATE RELATIONSHIPS (4)
SOC 360 POPULATION TRENDS AND POLICY (4)
SOC 426 SOCIAL INEQUALITY (4)
SPAN 470 ADVANCED SPANISH
COORDINATED STUDIES (1-30)
TA 360 MULTICULTURAL AMERICAN THEATRE (3)
TA 360 H MULTICULTURAL AMERICAN THEATRE (3)
WGSS 223 WOMEN: SELF AND SOCIETY (3)

WGSS 223H WOMEN: SELF AND SOCIETY (3)

WGSS 224 WOMEN: PERSONAL AND SOCIAL CHANGE (3)
WGSS 230 WOMEN IN THE MOVIES (3)
WGSS 230H WOMEN IN THE MOVIES (3)
WGSS 262 INTRODUCTION TO QUEER STUDIES (3)
WGSS 262H INTRODUCTION TO QUEER STUDIES (3)
WGSS 325 DISNEY: GENDER, RACE, EMPIRE (3)
WGSS 325H DISNEY: GENDER, RACE, EMPIRE (3)
WGSS 364 TRANSGENDER POLITICS (3)
WGSS 364H TRANSGENDER POLITICS (3)
WGSS 375 ARTS AND SOCIAL JUSTICE (4)
WGSS 414 SYSTEMS OF OPPRESSION IN WOMEN'S LIVES (4)
WGSS 431 QUEER OF COLOR CRITIQUES (4)

WGSS 432 GENDER, SEXUALITY, AND THE PHOTOGRAPHIC IMAGE (3)
WGSS 462 QUEER THEORIES (4)
WGSS 466 FAT STUDIES (4)
WGSS 496 FEMINIST THEOLOGIES IN THE UNITED STATES (4)
WGSS 496H FEMINIST THEOLOGIES IN THE UNITED STATES (4)
WLC 159 LANGUAGE, RACE AND RACISM IN THE US: AN INTRODUCTION (4)

## SYNTHESIS COURSES (6)

The two courses used to fulfill the Synthesis requirement may not be in the same department.
Contemporary Global Issues (3)
AEC 351 NATURAL RESOURCE
ECONOMICS AND POLICY (3)
AEC 352 ENVIRONMENTAL ECONOMICS AND POLICY (3)
AG 351 COMMUNICATING AGRICULTURE
TO THE PUBLIC (3)
AMS 350 AMERICAN CULTURE AND THE
VIETNAM EXPERIENCE (4)
ANTH 352 ANTHROPOLOGY, HEALTH,
AND ENVIRONMENT (3)
ANTH 374 ANTHROPOLOGY AND GLOBAL HEALTH (3)
ANTH 380 CULTURES IN CONFLICT (3)
ANTH 380H CULTURES IN CONFLICT (3)
ANTH 383 INTRODUCTION TO MEDICAL
ANTHROPOLOGY (3)
ANTH 383H INTRODUCTION TO
MEDICAL ANTHROPOLOGY (3)
ANTH 466 RURAL ANTHROPOLOGY (4)
ANTH 473 GENDER, ETHNICITY, AND
CULTURE (4)
ANTH 478 ANTHROPOLOGY OF TOURISM (4)

ANTH 482 ANTHROPOLOGY OF
INTERNATIONAL DEVELOPMENT (4)
ANTH 484 WEALTH AND POVERTY (3)
ANTH 488 BUSINESS AND ASIAN CULTURE (3)

BA 465 SYSTEMS THINKING AND PRACTICE (4)
BA 465H SYSTEMS THINKING AND PRACTICE (4)
BI 301 HUMAN IMPACTS ON ECOSYSTEMS (3)

BI 306 ENVIRONMENTAL ECOLOGY (3)
BI 306H ENVIRONMENTAL ECOLOGY (3)
COMM 446 COMMUNICATION IN
INTERNATIONAL CONFLICT AND DISPUTES (3)
CROP 330 WORLD FOOD CROPS (3)
DHE 475 GLOBAL SOURCING OF
TEXTILES, APPAREL, AND FOOTWEAR (4)
DSGN 475 GLOBAL SOURCING OF
TEXTILES, APPAREL, AND FOOTWEAR (4)
ECON 352 ENVIRONMENTAL ECONOMICS AND POLICY (3)
ENG 322 STUDIES IN GLOBALISM, TEXT, AND EVENT (4)
ENG 416 POWER AND REPRESENTATION (4)

ENG 497 INTERNATIONAL WOMEN'S
VOICES (4)
ENT 331 POLLINATORS IN PERIL (3)
FCSJ 454 INTERNATIONAL PERSPECTIVES ON FOOD SYSTEMS (4)
FE 456 INTERNATIONAL FORESTRY (3)
FES 365 ISSUES IN NATURAL RESOURCES CONSERVATION (3)
FES 477 AGROFORESTRY (3)
FOR 456 INTERNATIONAL FORESTRY (3)
FW 325 GLOBAL CRISES IN RESOURCE ECOLOGY (3)
GEO 308 GLOBAL CHANGE AND EARTH SCIENCES (3)
GEOG 300 SUSTAINABILITY FOR THE COMMON GOOD (3)
GEOG 330 GEOGRAPHY OF
INTERNATIONAL DEVELOPMENT AND GLOBALIZATION (3)

GEOG 331 POPULATION, CONSUMPTION, AND ENVIRONMENT (3)
GEOG 350 GEOGRAPHY OF NATURAL HAZARDS (3)
H 312 HIV/AIDS AND STIS IN MODERN SOCIETY (3)
HDFS 447 FAMILIES AND POVERTY (4)
HDFS 447H FAMILIES AND POVERTY (4)
HORT 331 POLLINATORS IN PERIL (3)
HST 317 WHY WAR: A HISTORICAL PERSPECTIVE (4)
HST 317H WHY WAR: A HISTORICAL PERSPECTIVE (4)
HST 385 THE ARAB-ISRAELI CONFLICT (4)
HST 385H THE ARAB-ISRAELI CONFLICT (4)

HST 386 MODERN IRAN: REVOLUTION AND ITS AFTERMATH (4)
HST 386H MODERN IRAN: REVOLUTION AND ITS AFTERMATH (4)
HST 390 MIDEAST WOMEN: IN THEIR OWN WORDS (4)
HST 390H MIDEAST WOMEN: IN THEIR OWN WORDS (4)
HST 425 THE HOLOCAUST IN ITS HISTORY (4)

HST 425H THE HOLOCAUST IN ITS HISTORY (4)
HST 465 AMERICAN DIPLOMATIC HISTORY (4)
HST 465H AMERICAN DIPLOMATIC HISTORY (4)
HST 485 POLITICS AND RELIGION IN THE MODERN MIDDLE EAST (4)
HST 488 THE UNITED STATES AND VIETNAM 1945-1995 (4)
NR 477 AGROFORESTRY (3)
PHL 310 CRITICS OF RELIGION (4)
PHL 344 PACIFISM, JUST WAR, AND TERRORISM (4)
PHL 432 YOGA AND TANTRIC TRADITIONS (4)
PHL 433 THEORY AND PRACTICE OF MODERN YOGA (4)
PHL 434 SPIRITUALITY AND ECOLOGY: GREEN YOGA (4)
PHL 434H SPIRITUALITY AND ECOLOGY: GREEN YOGA (4)
PHL 440 ENVIRONMENTAL ETHICS (3)
PHL 440H ENVIRONMENTAL ETHICS (3)
PHL 443 WORLD VIEWS AND
ENVIRONMENTAL VALUES (3)
PHL 443H WORLD VIEWS AND
ENVIRONMENTAL VALUES (3)
PS 341 EUROPEAN AND EU POLITICS (4)
PS 345 POLITICS OF DEVELOPING NATIONS (4)
PS 354 INTERNATIONAL ORGANIZATIONS AND GLOBAL POLITICS (4)
PS 455 THE POLITICS OF CLIMATE CHANGE (4)
PS 458 INTERNATIONAL POLITICAL ECONOMY (4)
QS 476 TRANSNATIONAL SEXUALITIES (4)
REL 310 CRITICS OF RELIGION (4)
REL 344 PACIFISM, JUST WAR, AND TERRORISM (4)
REL 425 THE HOLOCAUST IN ITS HISTORY (4)

REL 432 YOGA AND TANTRIC TRADITIONS (4)

REL 433 THEORY AND PRACTICE OF
MODERN YOGA (4)
REL 434 SPIRITUALITY AND ECOLOGY:

GREEN YOGA (4)
REL 434H SPIRITUALITY AND ECOLOGY:
GREEN YOGA (4)
REL 443 WORLD VIEWS AND
ENVIRONMENTAL VALUES (3)
REL 443H WORLD VIEWS AND
ENVIRONMENTAL VALUES (3)
REL 485 POLITICS AND RELIGION IN THE
MODERN MIDDLE EAST (4)
RNG 477 AGROFORESTRY (3)
SOC 454 LEISURE AND CULTURE (4)
SOC 480 ENVIRONMENTAL SOCIOLOGY (4)

SUS 350 SUSTAINABLE COMMUNITIES (4)
TOL 479 NATURE AND THE HUMAN EXPERIENCE (3)
WGSS 350 POLITICS OF MOTHERHOOD IN A GLOBAL CONTEXT (3)
WGSS 360 MEN AND MASCULINITIES IN A
GLOBAL CONTEXT (3)
WGSS 360H MEN AND MASCULINITIES (3)
WGSS 380 MUSLIM WOMEN (3)
WGSS 463 GLOBAL SEX WORK AND
TRAFFICKING (3)
WGSS 476 TRANSNATIONAL SEXUALITIES (4)

WGSS 480 INTERNATIONAL WOMEN (3)
WGSS 480H INTERNATIONAL WOMEN (3)
WGSS 495 GLOBAL FEMINIST
THEOLOGIES (4)
WGSS 495H GLOBAL FEMINIST THEOLOGIES (3)
WSE 470 FORESTS, WOOD, AND CIVILIZATION (3)
WSE 470H FORESTS, WOOD, AND CIVILIZATION (3)
Z 349 BIODIVERSITY: CAUSES, CONSEQUENCES, AND CONSERVATION (3)

## Science, Technology, and Society

(3)

AEC 353 INTRODUCTION TO COASTAL AND MARINE RESOURCE ECONOMICS (3)

AGRI 411 INTRODUCTION TO FOOD
SYSTEMS: LOCAL TO GLOBAL (3)
ANS 315 CONTENTIOUS SOCIAL ISSUES IN ANIMAL AGRICULTURE (3)
ANS 485 CONSENSUS AND NATURAL RESOURCES (3)
ANTH 330 EVOLUTION OF PEOPLE,
TECHNOLOGY, AND SOCIETY (3)
ANTH 372 SOCIAL NETWORKS AND SOCIETY (3)
ANTH 432 DOMESTICATION, URBANIZATION, AND THE RISE OF CIVILIZATION (4)
ANTH 432H DOMESTICATION, URBANIZATION, AND THE RISE OF CIVILIZATION (4)
ANTH 481 NATURAL RESOURCES AND COMMUNITY VALUES (3)
ART 367 HISTORY OF DESIGN (3)
ATS 320 THE CHANGING CLIMATE (3)
BB 331 INTRODUCTION TO MOLECULAR BIOLOGY (3)
BB 332 MOLECULAR MEDICINE (3)
BI 345 INTRODUCTION TO EVOLUTION (3)

BI 347 OCEANS IN PERIL (3)
BI 348 HUMAN ECOLOGY (3)
BI 420 VIRUSES IN MODERN SOCIETY (3)
BI 435 GENES AND CHEMICALS IN
AGRICULTURE: VALUE AND RISK (3)
BI 435H GENES AND CHEMICALS IN

AGRICULTURE: VALUE AND RISK (3)
BOT 324 FUNGI IN SOCIETY (3)
BRR 325 ENERGY TECHNOLOGY AND SOCIAL CHANGE (3)
CH 374 TECHNOLOGY, ENERGY, AND RISK (3)
CS 391 SOCIAL AND ETHICAL ISSUES IN COMPUTER SCIENCE (3)
DHE 415 RENEWABLE MATERIALS IN THE MODERN AGE (3)
DHE 415H RENEWABLE MATERIALS IN THE MODERN AGE (3)
DHE 462 HISTORY OF THE NEAR ENVIRONMENT II (4)
EAH 411 PERSPECTIVES IN ENVIRONMENTAL ARTS AND HUMANITIES (4)
EAH 412 ENVIRONMENTAL SCIENCE IN CONTEXT (4)
EAH 512 ENVIRONMENTAL SCIENCE IN CONTEXT (4)
ENGR 350 SUSTAINABLE ENGINEERING (3)
ENGR 350H SUSTAINABLE ENGINEERING (3)

ENGR 363 ENERGY MATTERS (3)
ENGR 363H ENERGY MATTERS (3)
ENSC 479 ENVIRONMENTAL CASE STUDIES (3)
ENT 300 PLAGUES, PESTS, AND POLITICS (3)

ES 445 NATIVE AMERICAN SCIENCE AND TECHNOLOGY (4)
FES 435 GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK (3)
FES 477 AGROFORESTRY (3)
FES 485 CONSENSUS AND NATURAL RESOURCES (3)
FST 421 FOOD LAW (3)
FW 350 ENDANGERED SPECIES, SOCIETY AND SUSTAINABILITY (3)
FW 356 CITIZEN SCIENCE (3)
FW 360 ORIGINS OF F\&W MANAGEMENTEVOLUTION, GENETICS, AND ECOLOGY (3)

FW 470 ECOLOGY AND HISTORY:
LANDSCAPES OF THE COLUMBIA BASIN (3)

FW 485 CONSENSUS AND NATURAL RESOURCES (3)
GEO 305 LIVING WITH ACTIVE CASCADE VOLCANOES (3)
GEO 306 MINERALS, ENERGY, WATER, AND THE ENVIRONMENT (3)
GEO 307 NATIONAL PARK GEOLOGY AND PRESERVATION (3)
GEO 307H NATIONAL PARK GEOLOGY AND PRESERVATION (3)
GEO 352 OREGON: GEOLOGY, PLACE, AND LIFE ON THE RING OF FIRE (4)
GEO 380 EARTHQUAKES IN THE PACIFIC NORTHWEST (3)
GEOG 300 SUSTAINABILITY FOR THE COMMON GOOD (3)
GEOG 340 INTRODUCTION TO WATER SCIENCE AND POLICY (3)
GEOG 340H INTRODUCTION TO WATER SCIENCE AND POLICY (3)
GEOG 432 GEOGRAPHY OF FOOD AND AGRICULTURE (3)
H 445 OCCUPATIONAL HEALTH (3)
HEST 310 INTRO TO COMMUNITY ENGAGEMENT AND COMMUNITYBASED DESIGN (3)
HEST 320 ENGINEERING FOR GLOBAL
HEALTH SOLUTIONS (3)
HEST 412 MULTIDISCIPLINARY
CASE STUDIES IN HUMANITARIAN

ENGINEERING, SCIENCE AND
TECHNOLOGY (3)
HORT 330 PLAGUES, PESTS, AND POLITICS (3)

HST 416 FOOD IN WORLD HISTORY (4)
HST 481 ENVIRONMENTAL HISTORY OF
THE UNITED STATES (4)
HSTS 411 HISTORY OF SCIENCE (4)
HSTS 412 HISTORY OF SCIENCE (4)
HSTS 413 HISTORY OF SCIENCE (4)
HSTS 414 HISTORY OF TWENTIETH-
CENTURY SCIENCE (4)
HSTS 415 THEORY OF EVOLUTION AND
FOUNDATION OF MODERN BIOLOGY (4)
HSTS 415H THEORY OF EVOLUTION AND
FOUNDATION OF MODERN BIOLOGY (4)
HSTS 416 HISTORY OF MEDICINE PRE1800 (4)
HSTS 417 HISTORY OF MEDICINE (4)
HSTS 418 SCIENCE AND SOCIETY (4)
HSTS 419 STUDIES IN SCIENTIFIC
CONTROVERSY: METHODS AND
PRACTICES (4)
HSTS 419H STUDIES IN SCIENTIFIC
CONTROVERSY: METHODS AND
PRACTICES (4)
HSTS 421 TECHNOLOGY AND CHANGE (4)

HSTS 422 HISTORICAL STUDIES OF SCIENCE AND POLITICS (4)
HSTS 423 SCIENCE AND RELIGION (4)
HSTS 425 HISTORY OF THE LIFE SCIENCES (4)

HSTS 440 HISTORY OF PSYCHOTHERAPY (4)

HSTS 440H HISTORY OF PSYCHOTHERAPY (4)

HSTS 451 THE HISTORY OF OUTER SPACE (4)

HSTS 470 ECOLOGY AND HISTORY: LANDSCAPES OF THE COLUMBIA BASIN (3)

IE 380 THE RESPONSIBLE ENGINEER (3)
NMC 427 DIGITAL PORNOGRAPHY (3)
NR 351 WHEN SCIENCE ESCAPES
THE LAB: SCIENCE AND RESOURCE
MANAGEMENT (3)
NR 477 AGROFORESTRY (3)
NSE 319 SOCIETAL ASPECTS OF NUCLEAR TECHNOLOGY (3)
NUTR 312 ISSUES IN NUTRITION AND HEALTH (3)
PH 313 ENERGY ALTERNATIVES (3)
PH 331 SOUND, HEARING, AND MUSIC (3)
PH 332 LIGHT, VISION, AND COLOR (3)
PHL 325 SCIENTIFIC REASONING (4)
PHL 444 BIOMEDICAL ETHICS (4)
PHL 444H BIOMEDICAL ETHICS (4)
PPOL 441 ENERGY AND SOCIETY (4)
PS 370 SCIENCE, RELIGION, AND POLITICS (4)
PS 476 SCIENCE AND POLITICS (4)
REL 444 BIOMEDICAL ETHICS (4)
REL 444H BIOMEDICAL ETHICS (4)
RNG 477 AGROFORESTRY (3)
SOC 456 SCIENCE AND TECHNOLOGY IN SOCIAL CONTEXT (4)
SOC 481 SOCIETY AND NATURAL RESOURCES (4)
SOC 485 CONSENSUS AND NATURAL RESOURCES (3)
SOIL 395 WORLD SOIL RESOURCES (3)
SUS 304 SUSTAINABILITY ASSESSMENT (4)
TOX 360 THE WORLD OF POISONS (3)
TOX 435 GENES AND CHEMICALS IN
AGRICULTURE: VALUE AND RISK (3)

TOX 435H GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK (3)
WGSS 320 GENDER AND TECHNOLOGY (3)

WGSS 340 GENDER AND SCIENCE (3)
WGSS 340H GENDER AND SCIENCE (3)
WGSS 440 WOMEN AND NATURAL
RESOURCES (3)
WSE 392 BAMBOOLOOZA: THE
FASCINATING WORLD OF BAMBOO (3)
WSE 415 RENEWABLE MATERIALS IN THE MODERN AGE (3)
WSE 415H RENEWABLE MATERIALS IN THE MODERN AGE (3)

## WRITING INTENSIVE COURSES

## (WIC) (3)

College of Agricultural Sciences
AEC 434 MEASURING RESOURCE AND ENVIRONMENTAL IMPACTS (4)
AEC 461 AGRICULTURAL AND FOOD POLICY ISSUES (4)
AG 421 LEADERSHIP DEVELOPMENT (3)
ANS 420 ETHICAL ISSUES IN ANIMAL AGRICULTURE (3)
BOT 323 FLOWERING PLANTS OF THE WORLD (3)
BRR 403 THESIS (4)
CROP 325 AG AND ENVIRONMENTAL PREDICAMENTS: A CASE STUDY APPROACH (3)
CSS 315 NUTRIENT MANAGEMENT AND CYCLING (4)
FST 385 COMMUNICATING FOOD AND FERMENTATION SCIENCE (3)
FW 435 WILDLIFE IN AGRICULTURAL ECOSYSTEMS (3)
FW 439 HUMAN DIMENSIONS OF FISHERIES AND WILDLIFE MANAGEMENT (3)
FW 454 FISHERY BIOLOGY (4)
FW 497 AQUACULTURE (3)
HORT 318 APPLIED ECOLOGY OF MANAGED ECOSYSTEMS (3)
SOIL 325 AG AND ENVIRONMENTAL PREDICAMENTS: A CASE STUDY APPROACH (3)

## College of Business

BA 353 PROFESSIONAL DEVELOPMENT (4) BA 354 MANAGING ETHICS AND CORPORATE SOCIAL RESPONSIBILITY (4)
DHE 330 FASHION FORECASTING AND MARKET ANALYSIS (4)
DHE 370 TEXTILE AND APPAREL MARKET ANALYSIS (4)
DHE 481 PROFESSIONAL PRACTICE IN HOUSING AND INTERIOR DESIGN (3)
DSGN 330 FASHION FORECASTING AND MARKET ANALYSIS (4)

## College of Earth, Ocean, and

Atmospheric Sciences
GEO 427 VOLCANOLOGY (4)
GEO 463 GEOPHYSICS AND TECTONICS (4)

GEOG 323 CLIMATOLOGY (4)
GEOG 330 GEOGRAPHY OF
INTERNATIONAL DEVELOPMENT AND
GLOBALIZATION (3)
OC 334 POLAR OCEANOGRAPHY (3)

## College of Education

ED 340 SUPPORTIVE DIFFERENTIATED ENVIRONMENTS (3)

## College of Engineering

BEE 469 ECOLOGICAL ENGINEERING DESIGN I (4)
CBEE 414 PROCESS ENGINEERING
LABORATORY (3)
CE 418 CIVIL ENGINEERING
PROFESSIONAL PRACTICE (3)
CE 419 CIVIL INFRASTRUCTURE DESIGN (3)

CEM 443 PROJECT MANAGEMENT FOR CONSTRUCTION (4)
CS 461 SENIOR SOFTWARE ENGINEERING PROJECT I (3)
CS 462 SENIOR SOFTWARE ENGINEERING PROJECT II (3)
ECE 441 ENGINEERING DESIGN PROJECT (3)

ECE 442 ENGINEERING DESIGN PROJECT (3)

ECE 443 ENGINEERING DESIGN PROJECT (2)

ESE 497 MIME CAPSTONE DESIGN (4)
ESE 498 MIME CAPSTONE DESIGN (4)
IE 497 MIME CAPSTONE DESIGN (4)
IE 498 MIME CAPSTONE DESIGN (4)
ME 497 MIME CAPSTONE DESIGN (4)
ME 498 MIME CAPSTONE DESIGN (4)
NSE 474 NUCLEAR SYSTEMS DESIGN I (4)
NSE 475 NUCLEAR SYSTEMS DESIGN II (4)

## College of Forestry

FE 460 FOREST OPERATIONS
REGULATIONS AND POLICY ISSUES (3)
FES 439 HUMAN DIMENSIONS
OF FISHERIES AND WILDLIFE
MANAGEMENT (3)
FOR 460 FOREST POLICY (4)
TOL 375 EXPERIENTIAL EDUCATION (4)
WSE 414 ART AND DESIGN CAPSTONE (3)
WSE 453 GLOBAL TRADE IN RENEWABLE MATERIALS (3)

## College of Liberal Arts

AMS 407 SEMINAR (1-16)
ANTH 370 ANTHROPOLOGICAL THEORIES (4)

ART 368 HISTORY OF PHOTOGRAPHY (3)
ART 411 CONTEMPORARY ISSUES IN ART (3)

ART 469 METHODS AND THEORY OF ART HISTORY (3)
COMM 418 INTERPERSONAL
COMMUNICATION THEORY AND RESEARCH (3)
COMM 422 SMALL-GROUP
COMMUNICATION THEORY AND RESEARCH (3)
COMM 456 RHETORIC: 500 BC TO 500 AD (3)
COMM 458 RHETORIC: 500 AD TO 1900 (3)

COMM 459 CONTEMPORARY THEORIES OF RHETORIC (3)
EAH 411 PERSPECTIVES IN
ENVIRONMENTAL ARTS AND
HUMANITIES (4)
EAH 412 ENVIRONMENTAL SCIENCE IN CONTEXT (4)
EAH 512 ENVIRONMENTAL SCIENCE IN CONTEXT (4)
ECON 428 INTRODUCTION TO
ECONOMIC RESEARCH (4)
ECON 439 PUBLIC POLICY ANALYSIS (4)
ECON 466 ECONOMICS OF TRADITIONAL
AND RENEWABLE ENERGY (4)

ENG 311 STUDIES IN BRITISH PROSE (4)
ENG 312 STUDIES IN BRITISH DRAMA (4)
ENG 313 STUDIES IN BRITISH POETRY (4)
ENG 407 SEMINAR (1-16)
ENG 445 STUDIES IN NONFICTION (4)
ENG 470 STUDIES IN POETRY (4)
ENG 485 STUDIES IN AMERICAN
LITERATURE (4)
ES 350 PUBLIC DISCOURSE AND
WRITINGS ON RACE (4)
ES 354 LITERATURE OF ETHNIC
MINORITIES IN THE UNITED STATES (4)
ES 472 INDIGENOUS TWO-SPIRIT AND QUEER STUDIES (3)
FILM 452 STUDIES IN FILM (4)
FR 439 FRENCH/FRANCOPHONE STUDIES (3)

GD 312 CONTEMPORARY ISSUES IN DESIGN (3)
GD 412 CONTEMPORARY ISSUES IN DESIGN (3)
GER 411 FOURTH-YEAR GERMAN (3)
HST 369 IMMIGRATION TO THE U.S. SINCE 1880 (4)
HST 407 SEMINAR (5)
HSTS 415 THEORY OF EVOLUTION AND
FOUNDATION OF MODERN BIOLOGY (4)
HSTS 417 HISTORY OF MEDICINE (4)
HSTS 419 STUDIES IN SCIENTIFIC
CONTROVERSY: METHODS AND
PRACTICES (4)
HSTS 422 HISTORICAL STUDIES OF
SCIENCE AND POLITICS (4)
HSTS 425 HISTORY OF THE LIFE SCIENCES (4)

HSTS 437 HISTORY OF ANIMALS IN SCIENCE (4)
JPN 411 FOURTH-YEAR JAPANESE (3)
LS 428 INTERSECTIONS (3)
MUS 325 HISTORY OF WESTERN MUSIC (3)

NMC 301 WRITING FOR THE MEDIA PROFESSIONAL (3)
PHL 407 SEMINAR (1-16)
PHL 474 PHILOSOPHY OF BIOLOGY (4)
PS 300 RESEARCH METHODS (4)
PS 449 TOPICS IN COMPARATIVE POLITICS (4)
PSY 434 BRAIN AND BEHAVIOR METHODS (4)

PSY 440 COGNITION RESEARCH (4)
PSY 460 ADVANCED SOCIAL RESEARCH METHODS (4)
PSY 470 PSYCHOMETRICS AND PSYCHOLOGICAL TESTING (4)
PSY 480 CLINICAL RESEARCH METHODS (4)

QS 472 INDIGENOUS TWO-SPIRIT AND QUEER STUDIES (3)
SOC 315 METHODS I: RESEARCH DESIGN (4)

SPAN 438 SELECTED TOPICS IN LUSOHISPANIC CULTURE (3)
SPAN 439 TOPICS IN MEXICAN CULTURE AS EVIDENCED THROUGH MEXICAN FILM (3)
SSCI 301 QUALITATIVE RESEARCH
METHODS FOR THE SOCIAL SCIENCES (4)
TA 332 HISTORY OF THE THEATRE (3)
TA 444 THEORY AND CRITICISM OF THEATRE ARTS (3)
WGSS 460 WOMEN AND SEXUALITY (3)
WGSS 472 INDIGENOUS TWO-SPIRIT AND QUEER STUDIES (3)

WR 411 THE TEACHING OF WRITING (4)
WR 462 ENVIRONMENTAL WRITING (4)
WR 493 THE RHETORICAL TRADITION
AND THE TEACHING OF WRITING (4)
WR 495 INTRODUCTION TO LITERACY STUDIES (4)

## College of Public Health and

Human Sciences
H 434 HEALTH CARE LAW AND REGULATION (3)
H 476 PLANNING AND EVALUATING HEALTH PROMOTION PROGRAMS (4)
HDFS 430 STUDENT TEACHING IN EARLY CHILDHOOD DEVELOPMENT AND EDUCATION (12)
HDFS 461 PROGRAM DEVELOPMENT AND PROPOSAL WRITING (4)
KIN 455 PHARMACOLOGY IN ATHLETIC TRAINING (3)
KIN 481 ANALYSIS OF CRITICAL ISSUES IN KINESIOLOGY (3)
NUTR 416 CULTURAL ASPECTS OF FOODS (3)

NUTR 439 COMMUNICATIONS IN DIETETICS (3)

## College of Science

BB 315 MOLECULAR BIOLOGY LABORATORY (3)
BB 317 SCIENTIFIC THEORY AND PRACTICE (3)
BHS 323 MICROBIAL INFLUENCES ON HUMAN HEALTH (3)
BI 306 ENVIRONMENTAL ECOLOGY (3)
BI 315 MOLECULAR BIOLOGY LABORATORY (3)
BI 317 SCIENTIFIC THEORY AND PRACTICE (3)
BI 319 CRITICAL THINKING AND COMMUNICATION IN THE LIFE SCIENCES (3)
BI 371 ECOLOGICAL METHODS (3)
BI 373 FIELD METHODS IN MARINE ECOLOGY (3)
BI 385 EMERGING INFECTIOUS DISEASES AND EPIDEMICS (3)
BI 388 SPECIAL TOPICS IN BIOLOGY (3-5)
BI 450 MARINE BIOLOGY AND ECOLOGY (15)

CH 462 EXPERIMENTAL CHEMISTRY II (3)
CH 463 EXPERIMENTAL CHEMISTRY II (3)
CH 464 EXPERIMENTAL CHEMISTRY II (3)
MB 311 MOLECULAR MICROBIOLOGY
LAB: A WRITING INTENSIVE COURSE (3)
MB 385 EMERGING INFECTIOUS DISEASES AND EPIDEMICS (3)
MTH 323 MATHEMATICAL MODELING (3)
MTH 333 FUNDAMENTAL CONCEPTS OF TOPOLOGY (3)
MTH 338 NON-EUCLIDEAN GEOMETRY (3)
PH 403 THESIS (1-16)
Z 319 CRITICAL THINKING AND COMMUNICATIONS IN THE LIFE SCIENCES (3)

## Interdisciplinary Programs

ENSC 479 ENVIRONMENTAL CASE STUDIES (3)

## University Honors College

BI 306H ENVIRONMENTAL ECOLOGY (3) BI 414H WRITING FOR THE BIOLOGICAL SCIENCES (2)
BI 415H BIOLOGICAL SCIENCES THESIS (1) CH 462H EXPERIMENTAL CHEMISTRY II (3) CH 463H EXPERIMENTAL CHEMISTRY II (3) CH 464H EXPERIMENTAL CHEMISTRY II (3)

FILM 452H STUDIES IN FILM (4)
HSTS 415H THEORY OF EVOLUTION AND
FOUNDATION OF MODERN BIOLOGY (4)
HSTS 419H STUDIES IN SCIENTIFIC
CONTROVERSY: METHODS AND
PRACTICES (4)
PHL 407H SEMINAR (1-16)
Z 414H WRITING FOR THE BIOLOGICAL
SCIENCES (2)
Z 415H BIOLOGICAL SCIENCES THESIS (1)

## MONITORING DEGREE

## PROGRESS WITH MYDEGREES

MyDegrees is a web-based degree checklist program and academic advising tool designed to assist students and advisors in reviewing degree progress. It organizes a student's academic transcript chronologically and categorically, identifying courses they have completed and courses still needed to fulfill the degree requirements.

Students may access this tool through MyOSU at https://myosu.oregonstate. edu, or through links on the Office of the Registrar's home page, http://registrar.oregonstate.edu. Video tutorials on how to use MyDegrees are available on the Registrar's website at http://registrar. oregonstate.edu/video-tutorials.
The Office of the Registrar works with advisors to update and maintain an accurate degree audit that will be used to clear student degree requirements during the final term of the students' undergraduate year.

## MAJOR PROGRAM

In-depth study in at least one area is required in each baccalaureate degree. Major requirements often include not only courses within the given discipline but also necessary prerequisites and work in related areas.

Students must satisfy all the requirements of their major department and major college. The dean's certification of fulfillment of all requirements of the major college is required.

## UPPER-DIVISION COURSES

1. Credits in upper-division courses: minimum 60 (exclusive of upper-division physical education activity courses).
2. Credits in each major: minimum 36 , including at least 24 in upperdivision courses.
For further details on upper-division course requirements, see Academic Regulation 25c, Institutional Requirements for Baccalaureate Degrees, http:// catalog.oregonstate.edu/ChapterDetail. aspx?key=75\#Section2893.

## PRACTICUM COURSES <br> AND INTERNSHIPS

Academic performance is not the sole criterion for admission to and continuation in certain courses and programs at the
university, particularly practicum courses and internships. The university may find it necessary to evaluate a person's behavior and background to determine the ability to maintain the standards of professional conduct which are necessary in some disciplines. An evaluation may take into consideration current performance as well as past experiences and actions which could affect the ability to perform in the particular course or program.

## GRADE-POINT AVERAGE (GPA)

A minimum GPA of 2.00 on OSU cumulative grade-point average is required. See Academic Regulation 25e, Institutional Requirements for Baccalaureate Degrees, http://catalog.oregonstate.edu/ChapterDetail.aspx?key=75\#Section2893.

## TOTAL CREDITS

A minimum 180 earned credits, which must include: ${ }^{1,2}$

## 1. Credits in upper-division

 courses: minimum 60 (exclusive of upper-division physical education activity courses).2. Credits in each major: minimum 36 , including at least 24 in upperdivision courses.

## Footnotes:

${ }^{1}$ Some degree programs may require more than 180 credits.
${ }^{2}$ Unearned credits are those courses for which
a grade of $\mathrm{F}, \mathrm{N}, \mathrm{U}, \mathrm{I}, \mathrm{W}, \mathrm{AUD}$, or WAU are assigned as a final grade for that course. All other grades are calculated as earned credit.

For further information on total credits required, see Academic Regulation 25 c, Institutional Requirements for Baccalaureate Degrees, http:// catalog.oregonstate.edu/ChapterDetail. aspx?key=75\#Section2893.

## ACADEMIC STANDING

Oregon State University expects students to maintain satisfactory academic progress toward degree completion. At the conclusion of each term, grade-point averages are calculated and academic standings determined for students seeking a baccalaureate degree according to the criteria outlined in the Grades, Regulations, and Records section of this catalog.

## ACADEMIC RESIDENCE

## REQUIREMENT

Academic Regulation 25f, Academic Residence (http://catalog. oregonstate.edu/ChapterDetail. aspx?key=75\#Section2893), Institutional Requirements for Baccalaureate Degrees, states:

- A minimum of 45 of the last 75 credits, or 150 total credits, must be completed while the student is in academic residence at OSU. "Academic Residence" is defined as OSU courses taken as a degreeseeking student of OSU or courses through one of the following
approved special programs: Professional degree programs which require that the student enroll in another institution while finishing the bachelor's degree at OSU or an international study program sponsored by Oregon State University.
- A minimum of 15 upper-division credits used to meet the preceding residency requirement (1) must be taken in each of the student's majors.
- Credits earned by special examination for credit (AR 23) are not considered in academic residence.


## OTHER GRADUATION REQUIREMENTS

## BA Degree Requirements

The bachelor of arts (BA) degree is conferred for broad and liberal education in various approved areas of studies (typically humanities, arts, social science, and sciences). Requirements for the BA degree differ from those for a bachelor of science (BS) degree in the same department. Many departments offer only one or the other of the two baccalaureate degrees. Check departmental curricula for detailed information. The BA degree requires second language proficiency, including American Sign Language (ASL), equivalent to that attained at the end of the second year course in the language as certified by the School of Language, Culture, and Society. See the Academic Regulations for more details.

## Concurrent and Subsequent

## Baccalaureate Degrees

Academic Regulation 26: http:// catalog.oregonstate.edu/ChapterDetail. aspx?key=75\#Section2894
a. Concurrent Baccalaureate Degrees: An undergraduate student may be granted two or more baccalaureate degrees (for example the BA or BS) at the same graduation exercise. The student must:

1. Complete institutional, college, and departmental requirements for the degree;
2. Complete, for each additional degree, a minimum of 32 credits more than the requirements of the curriculum requiring the least number of credits; and
3. Complete each additional 32 credits in residence.
b. Subsequent Baccalaureate Degree: A student who has received a previous baccalaureate degree from either OSU or another accredited university may be granted a subsequent baccalaureate degree. The student must:
4. Complete, for a BA degree, the requirements for foreign language
proficiency (AR 25d);
5. Achieve a minimum of 2.00 on OSU cumulative grade-point average;
6. Complete requirements of the major college and receive the dean's certification; and
7. Meet the requirements for a concurrent degree as specified in AR 26a, if a previous baccalaureate degree has been received from OSU. The additional credits may be taken at any time prior to or subsequent to the granting of a previous OSU baccalaureate degree. Students with a baccalaureate degree from another institution must meet the Academic Residence requirement in AR 25 f.
c. A student seeking a baccalaureate degree under the provisions of either AR 26a or AR 26b also must satisfy the appropriate residence requirements as defined in AR 25 f.

## Subsequent Credentials: Minors,

 Certificates, Options, and Majors Academic Regulation 27: http:// catalog.oregonstate.edu/ChapterDetail. aspx?key=75\#Section2895a. Subsequent Minors and Certificates: A student who has received a previous baccalaureate degree from either OSU or another accredited university or college may be granted a subsequent minor or certificate. The student must:

1. Complete current requirements for minor or certificate and receive the dean's approval;
2. Achieve a minimum of 2.0 OSU cumulative grade-point average on work taken for subsequent credential;
3. Academic residence: minimum 15 credits in residence.
b. Subsequent Options and Majors: A student who has received a previous baccalaureate degree from OSU may be granted a subsequent option or major credential:
4. Complete current requirements for option or major and receive dean's approval;
5. Achieve a minimum of 2.0 OSU cumulative grade-point average on work taken for subsequent credential;
6. Academic residence: minimum 15 credits in residence.
c. Additional credits necessary for subsequent credentials may be taken prior to or subsequent to the granting of a previous baccalaureate degree.

## REQUIREMENTS FOR <br> CERTIFICATES

See individual certificate programs described in this catalog.

## REQUIREMENTS FOR <br> <br> ADVANCED DEGREES

 <br> <br> ADVANCED DEGREES}For advanced degree requirements see the Graduate School section of this catalog or contact the Graduate School. Students who take courses they wish to apply toward an advanced degree before they have received baccalaureate degrees may have a limited number of credits reserved by petition. Also see Reserving Credits in the Graduate School section. A graduate student also may obtain baccalaureate degrees from Oregon State University by satisfying the requirements for subsequent degrees.

## APPLYING FOR

 UNDERGRADUATE GRADUATION
## To become a degree candidate:

- You must be a current OSU student with senior standing of 135 or more credits.
- You may make a formal application for the degree with the Office of the Registrar up to three terms before your expected graduation term.
- The deadline to apply is the end of the second full week of the term in which you expect to complete your degree requirements.
- Graduation applications are submitted through MyOSU,
- https://myosu.oregonstate.edu.

Before you apply to graduate, check if you've completed your

## degree requirements:

Meet with your advisor and review your MyDegrees Checklist and confirm that general university requirements are met:

1. Log in to MyOSU at https://myosu. oregonstate.edu
2. Select Student
3. Under My Student Stuff, choose 'MyDegrees'

## Confirm the following is correct:

1. Major, Minor and Option is correctly stated
2. Degree type (BS, BA, BFA, etc.) is correct
3. The total of your Credits Required and Credits Applied
4. Upper-division credits required and earned (this will not appear in MyDegrees if the requirement is met)
5. Degree requirements that have not yet been met
The Office of the Registrar checks for total credits, academic residency, total upper-division credits and grade-point average.

With your advisor, determine which term you will complete your studies and submit your application to graduate. If you will be completing mul-
tiple degrees (see below) you will need to submit a separate application for each degree.

1. Log in to MyOSU at https://myosu. oregonstate.edu
2. Select Student
3. Under My Student Stuff, choose 'Apply to Graduate'
To change your graduation date or program information after the first application, you must cancel your existing application for graduation and file an new application in accordance with the stated deadline.

Commencement exercises are held annually in June and attendance is optional. Students who have graduated in the previous summer, fall or winter terms and senior-level students who have a pending graduation application for spring, summer, or fall terms may participate in the June Commencement exercises.

Ecampus students planning to travel to Corvallis for Commencement can contact Ecampus Student Services for additional information.

Additionally, please be aware that all corresponding transcripts are sealed, meaning the academic record cannot be altered, by the Office of the Registrar 90 days after the conferral of a degree. This ensures that the academic course work that reflects the components that substantiated the awarding of the degree is accurately and permanently recorded.

## DOUBLE DEGREES

A student may earn multiple, different degrees simultaneously. Additional degrees may also be earned after your first degree was awarded. The degrees may be offered by the same college, or by different colleges. To earn a double degree, or for each additional degree, a student must complete a minimum of 32 credits above the minimum number of credits needed for one of the degrees. Each degree application is reviewed by the appropriate academic advisor. Advisors complete a separate graduation audit for each of the degrees.

On the student's academic record, each degree awarded will be recorded as a separate degree with its major, e.g., Bachelor of Science in Mathematics, Bachelor of Arts in English. The student will also receive a separate diploma for each degree awarded (See Academic Regulation 26).
Some double-degree programs - Education (BA, BS, HBA, HBS), Innovation Management (BA, BS, HBA, HBS), Sustainability (BS, HBS), International Studies (BA, HBA) - require that a primary degree be completed in order for the secondary degree to be awarded. When multiple degrees are not dependent on one another, one of the degrees may be awarded even though requirements for
the other degree have not yet met. The double degree may be earned concurrently or subsequently. (See Academic Regulation 26.)

## DUAL (OR MULTIPLE) MAJORS

A student may earn two or more majors within a single degree program (a particular combination of degree, college, and campus, e.g., BA degree from the College of Liberal Arts on the Corvallis campus). It is sometimes possible to complete two or more majors within the minimum number of credits required for a degree, but usually the student must complete additional credits to complete requirements for all of their majors. For this reason, dual (or multiple) majors are obtained within the same college. The advisor must complete one graduation audit that includes all of the majors. The student's academic record will list one degree with two or more majors, e.g., Bachelor of Science in Mathematics and Chemistry. The student receives one diploma. Dual (or multiple) majors may be obtained concurrently with the completion of the degree, or in some cases may be earned as a credential subsequent to completion of the degree. (See Academic Regulation 27.)

Note: Occasionally, with careful planning, a student can complete two majors from separate colleges in less than the 212 credits required for two degrees. When this occurs a student can petition for an exception, and graduate with two majors from separate colleges. The student must pick one college as their home college and all majors will be associated with the home college. The student must have the support of advisors from both major programs to have their petition considered.

## HONORS DEGREES

Students completing the honors college curriculum receive an honors degree in the college of their major, e.g., HBS Honors Bachelor of Science in Chemistry, or HBA Honors Bachelor of Arts in English. In some cases it might be possible for an Honors College student to earn multiple degrees simultaneously by following the double degrees requirements outlined in Academic Regulation 26.

Students seeking an honors degree must meet the requirements of the Honors College in order to receive their degree. Students that complete an Honors degree will have the honors degree recorded on their academic record. The student's diploma will also include the honors degree designation (e.g., Honors Bachelor of Science, etc.).

Note: Honors degrees are not currently available to Ecampus students.

## DEGREES WITH DISTINCTION

Graduates who have completed at least 90 credits at OSU or sixty upper-division credits at OSU, and who have an OSU cumulative GPA of 3.5 or higher, are awarded an OSU degree with distinction as follows:

| Academic <br> Distinction | OsU GPA <br> Range | Graduation <br> Honor Cord <br> Color |
| :--- | :--- | :--- |
| Cum Laude | $3.50-3.69$ | Orange |
| Magna Cum <br> Laude | $3.70-3.84$ | Gold |
| Summa Cum <br> Laude | $3.85-4.00$ | White |

These distinctions are noted on diplomas.

## UNDERGRADUATE RESEARCH/ ARTS FELLOW HONOR DISTINCTION

Oregon State University recognizes significant engagement and accomplishment in undergraduate research and the arts by awarding an honor distinction of "Undergraduate Research/Arts Fellow" to students of all majors upon completion of a significant research or creative arts experience under faculty mentorship.
"Research" here is intended to encompass modes of scholarship and inquiry as they are variously practiced and defined in OSU's academic disciplines. Students completing significant creative projects in the arts may receive the honorary distinction "Undergraduate Arts Fellow." The distinction will be noted on the student's transcript, and the student will receive a blue honor cord to be worn at graduation ceremonies.
To qualify for the Undergraduate Research/Arts Fellow distinction:

1. Students must demonstrate involvement in all major phases of their project including conception, implementation, and presentation. This involvement will generally consist of sustained work over multiple quarters or the summer resulting in an original contribution relative to the discipline.
2. The project presentation must be to an audience that extends beyond the immediate research group or creative context, for example at a public performance, symposium/seminar, the annual CUE (Celebration of Undergraduate Excellence) at OSU, a professional meeting, or through publication in a journal.
3. Evidence of the presentation must be submitted with the final honorary distinction application and deposited into the OSU Scholars Archive.
4. The faculty mentor must endorse the application, verifying satisfaction of the criteria described above.
To apply for the distinction, students should complete the OSU Undergradu-
ate Research/Arts Fellow Honor Distinction Application, which is available at: http://undergraduate.oregonstate.edu/ research/transcript-notation. Students that complete a thesis in the University Honors College, International Education, Physics, BioResource Research or the Bioenergy Minor should submit Form A while form $B$ is to be used for all other research/creative activities. The Form B which application requires submission of a detailed description of the project and the student's involvement in specific research/creative tasks, a timeline of the student's project engagement, details of the public presentation, and the faculty mentor's endorsement. Applications are submitted to the head advisor in the students' major college, who will sign the application and transmit to the Director for Undergraduate Research for signature before it is sent to the Office of the Registrar for processing. Applications may be submitted at any time during the undergraduate's career but no later than three weeks prior to a student's anticipated graduation date.

## DISSERTATION/THESIS

Upon completion and acceptance of a dissertation/thesis at the conclusion of a program of study, the dissertation/thesis will be recorded on a student's transcript, notating the title and term/year that the dissertation/thesis was accepted by the university.

## RE-ENROLLING STUDENTS

Re-enrolling students are reminded that graduation requirements may have changed. Students are responsible for consulting their college for changes in their curriculum. If a program has been discontinued, students cannot expect to continue pursuit of that program. Re-enrolling students are also reminded that individual retention and re-enrollment standards of specific colleges may be in effect.

## OREGON TRANSFER STUDENTS

Oregon community college students entering OSU who have completed the Associate of Arts Oregon Transfer (AAOT) degree (meeting the block transfer agreement between Oregon community colleges and Oregon public universities) will satisfy the lower-division requirements of the baccalaureate core (except those in the synthesis requirement) and have junior standing for registration.

When entering OSU, Oregon community college students who have completed the Associate of Arts Oregon Transfer (AAOT) degree will have junior standing for registration and will satisfy the lowerdivision requirements of the baccalaureate core, except those in the synthesis requirement. The AAOT degree meets the block transfer agreement between Oregon community colleges and Oregon
public universities.
For more information about how OSU accepts any of the transfer degrees, call OSU Admissions at 800-291-4192.

## WASHINGTON TRANSFER STUDENTS

The Direct Transfer Associate degree awarded by any community college in Washington state will satisfy lowerdivision general (core) requirements at OSU. Students will receive junior level standing with an earned Washington Direct Transfer Associate degree of 90 transferable quarter hours or more. The minimum requirements are: 2.0 GPA on 90 earned quarter hours of transferable credit. OSU will accept a maximum of 12 credits in professional, vocational, and technical courses. You must still meet requirements in your chosen major, minor, or professional program.
For more information about how OSU accepts any of the transfer degrees, call OSU Admissions at 800-291-4192.

## CALIFORNIA TRANSFER STUDENTS

OSU accepts the Intersegmental General Education Transfer Curriculum (IGETC) to satisfy lower-division (general) core requirements. The IGETC was developed for community college students who plan to transfer to a four-year institution but are undecided about which one and/ or undecided about a major. Students interested in the IGETC path to transfer are strongly advised to see an academic advisor prior to enrollment. The minimum requirements are: 36 quarter ( 24 semester) academically transferable hours, 2.25 cumulative GPA, IGETC Area 1 Group A English requirement (C- or higher grade), IGETC Area 2 Mathematical Concepts requirement ( C - or higher grade), and student must be admissible to the last institution they attended.
For more information about how OSU accepts any of the transfer degrees, call OSU Admissions at 800-291-4192.

## TRANSFER CREDITS

Decisions on transfer courses meeting specific baccalaureate core (general education requirements) will be made by the Office of Admissions with the Faculty Senate and the Office of Academic Programs. Some requirements may be met by advanced placement or international baccalaureate. For more information, contact the Office of Admissions. Articulation tables for baccalaureate core courses can be found on the Web at http://admissions.oregonstate.edu/ baccalaureate-core-course-equivalencies.

## INTRODUCTION

These regulations and procedures are published to assist students by providing information that is essential for planning and pursuing their academic programs. Continuing efforts are made each year by the students, faculty, and administration to revise and improve these regulations in order to enhance the quality of the university's programs and the achievement of educational goals.

Every student is responsible for knowing the academic regulations and for observing the procedures that govern his or her relations with Oregon State University. Unless otherwise specified, these regulations apply to both undergraduate and graduate students. Any question regarding these regulations\& that cannot be answered by a student's academic advisor should be referred directly to the Office of the Registrar (B102 KAd). Additional information regarding Graduate School policies should be addressed to the Office of the Graduate Dean (A300 KAd).

Some students encounter special problems whose proper solution may require deviations from the academic regulations or procedures. Requests for such deviations in the regulations below must be presented to the Office of the Registrar on petition forms, which are available in that office. Petitions received by the registrar will be forwarded to the proper committee or office for review and appropriate action. Requests for deviations from Graduate School policies should be presented by letter to the graduate dean (See the Graduate School section of this catalog).

Other special problems may involve academic issues such as academic freedom in the classroom or evaluations of a student's academic performance. All students should appeal academic grievances first to the instructor of the course and then to the chair or head of the academic unit in which the course is offered. If the situation is not resolved to the student's satisfaction, an undergraduate student should consult with the head advisor of the college in which the course is offered to obtain further information about appeal procedures of the college or university; a graduate student should consult the dean of the Graduate School regarding academic appeal procedures above the departmental level. (Appeal procedures for other than academic grievances, e.g., grievances regarding student employment, financial aid, housing, discipline, human rights, etc. are outlined in the Student Life Policy and Regulations, which are available on the OSU website under "Student Conduct" or from the Office of Student Leadership and Involvement, 202 Memorial Union. Some of these regulations pertain to both
undergraduate and graduate students. The Graduate School section of this catalog outlines both academic appeal procedures and those relating to the employment of graduate students.)

## AR 1. ADMISSION FOR

 NONDEGREE STUDENTSa. Nondegree enrollment status for undergraduate students is designed for students who wish to take undergraduate classes, but do not wish to pursue a degree or a specific postbaccalaureate credential. Nondegree undergraduate students are limited to taking a maximum of 8 credits per term. Nondegree Ecampus, International Exchange, credential and certificate students are not limited to 8 credits per term.
b. A maximum of 36 credits attempted as a nondegree undergraduate student may be used to satisfy Baccalaureate degree requirements upon admission as a degree-seeking student. The most recent 36 credits (or all credits if fewer than 36) will be applied to the Baccalaureate requirements.
c. Nondegree enrollment status for graduate students is designed for students who wish to take graduate courses but do not wish to pursue an advanced degree. Nondegree graduate students are not limited as to the number of courses (credits) taken per term.
d. Credits earned while enrolled as a nondegree graduate student will not necessarily apply to a graduate program upon admission to degreeseeking status. The student should refer to the admission requirements given in the Graduate School section of this catalog. Communication with the Graduate School and specific academic programs is advised.
e. Nondegree students seeking admission to a degree program may do so by filing an undergraduate, postbaccalaureate, or graduate application for admission.

## Footnote:

AR 1 revised by Faculty Senate academic year 2012-2013.

## AR 2. CREDIT FROM A

 TWO-YEAR INSTITUTION (UNDERGRADUATE STUDENTS)a. College Transfer Credits: Oregon State University accepts for credit toward a baccalaureate degree all college transfer work completed at an Oregon or other regionally accredited community college up to 124 lower-division quarter credits. For Institutional Requirements for Baccalaureate

Degrees, see AR 25. Students are encouraged to work with the relevant academic unit to ensure that transfer credits meet department and college requirements for the degree. It would be unlikely for an individual student to be able to use all 124 credits toward an OSU baccalaureate degree. Transfer credits and grades are not used in calculating the OSU cumulative GPA. Students who hold OSU-approved direct transfer degrees from Oregon or other regionally accredited community colleges (e.g., the Associate of Arts Oregon Transfer) or who have 90 or more credits accepted in transfer will be granted junior standing. ${ }^{1}$ Students who hold OSU-approved direct transfer degrees will be considered to have met the Perspectives and Skills (except WIC) areas of the Baccalaureate Core. In addition, they must complete the upper-division Synthesis areas of the core. Students transferring from Oregon or other regionally accredited community colleges who do not hold approved direct transfer degrees ordinarily will be given baccalaureate core credit in the Perspectives and Skills area on a course-by-course basis for work that is judged to be equivalent in content.
b. Transfer of Professional-

Technical Credits: a maximum of 12 quarter credits (8 semester credits) of professional-technical course work applicable in an associate's degree or certificate program at a regionally accredited institution can be accepted upon admission to OSU as general elective credit (graded as Pass) and as part of the 124 -quarter credit total that can be applied toward a baccalaureate degree.
c. Transfer of ProfessionalTechnical Course Credits through Articulation
Agreements: Lower-division OSU credit may be awarded for specific professional-technical community college courses when those courses are validated by articulation agreement with the appropriate OSU department. This may be above the 12 quarter credits of general electives (graded as Pass) allowed when a student is admitted to OSU. Credit will be awarded only upon the recommendation of the appropriate department and college, and approval by the Curriculum Council. Community college professionaltechnical course work is not equated to upper-division OSU course work.
These course credits will count as part of the 124 quarter credits defined in paragraph 2a above. OSU departments who have articulation
agreements with community colleges regarding community college professional-technical courses shall review the agreements annually and forward a dated list of the articulated community college courses to the Curriculum Council.

## Footnote:

${ }^{1}$ Junior standing does not necessarily imply that OSU institutional, college, division, and/ or departmental requirements, which are normally satisfied by OSU students prior to their junior year, have been satisfied.

## AR 3. CREDIT FROM AN UNACCREDITED INSTITUTION (UNDERGRADUATES)

After three terms of work at Oregon State University satisfactory to the Undergraduate Admissions Committee, a student may request validation of work done in an unaccredited institution of collegiate rank. The committee will consider each petition separately and base its decision on all information available. In some instances, informal examinations by the departments concerned may be required. Credit for transfer of professional-technical work will be awarded in accordance with paragraphs AR $2, \mathrm{~b}$ and c .

## AR 4. CLASSIFYING STUDENTS

a. Undergraduate students: A student who has earned at least 45 credits is classified as a sophomore. A student who has earned at least 90 credits is classified as a junior. A student who has earned at least 135 credits is classified as a senior.
b. Postbaccalaureate students: A student holding a baccalaureate degree who is admitted to work toward a second baccalaureate degree or teaching certificate is classified as a postbaccalaureate student.
c. Graduate students: A student who has been admitted to the Graduate School is classified as a graduate student.

## AR 5. TRANSFER FROM ONE COLLEGE TO ANOTHER (UNDERGRADUATE STUDENTS)

Registered students may transfer from one college to another at any time. Returning but not-registered students may transfer colleges between the dates of readmission and registration.

## AR 6. CHANGE IN CREDITS SCHEDULED

No change may be made in the number of credits specified for the various courses and published in the OSU General Catalog.

## AR 7. MAXIMUM AND MINIMUM

 REGISTRATION1. The minimum number of credits for which a full-time undergraduate student may register is 12 , and the maximum is 19 , regardless of the method of grading used for the classes selected. (In determining the load for students not normally held responsible for physical education, the credits in activity courses in physical education will be disregarded.) The maximum may be extended:
a. Up to and including 24 credits when a student has completed in his or her most recent term at least 12 credits in courses other than those graded $\mathrm{P} / \mathrm{N}$ and $\mathrm{S} / \mathrm{U}$ with a grade-point average of 3.00 or better or when a student has filed with the registrar a petition approved by his or her advisor and college dean (or head advisor).
b. Over 24 credits by petition approved by a student's advisor and college dean (or head advisor) and the Academic Requirements Committee and filed with the registrar.
2. The minimum number of credits for a full-time graduate student is 9 ; the maximum is 16 . The maximum can be extended by approval of the dean of the Graduate School.
a. Degree-seeking graduate students must take a minimum of 3 credits for any term in which they are enrolled.
b. The following FTE and credit allowances are permitted for graduate students holding an academic appointment.

| FTE | Credits |
| :--- | :--- |
| .15 to .29 | 15 |
| .30 to .50 | 12 |

Appointees on graduate assistantships are limited to the above credits during each term.

## AR 8. LATE REGISTRATION

Registration is permitted through the second full week of classes each term. Late fees are assessed in accordance with the fee policies stated in the Schedule of Classes.

## AR 9. ADMISSION TO CLASS

a. Instructors will receive lists of students in their classes within two days after the opening of the term. Subsequent lists will include the names of later registrants. Students whose names appear on these lists are officially registered; others are
to be referred immediately to the Registrar's Office for completion of registration.
b. If it is anticipated that the demand for enrollment in a given course will exceed the maximum number that can be accommodated, the department offering the course may designate it in the Schedule of Classes with the code "NSHD" (no-showdrop). A student who is registered for such a course who attends no meetings of the course during the first five school days of the term will be dropped from the course by the instructor, unless the student has obtained prior permission for absence. If such action is taken, the instructor will send written notice through the department to the Registrar's Office, which in turn will notify the student that the course has been dropped from his or her schedule. Students should not assume they have been dropped unless they receive notification from the Registrar's Office. No fee will be charged.

## AR 10. ELIGIBILITY

To be eligible to hold office or to participate in any extracurricular activity supervised by Oregon State University, students must meet certain requirements.

1. For student activities, students are responsible for following the Student Life Policy and procedures.
2. For participation in intercollegiate athletics, students must meet all institutional Pac-12 and NCAA requirements. Students should contact the Compliance Office in the Department of Intercollegiate Athletics on all such matters.

## AR 11. ADDING AND DROPPING

 COURSES1. Students may add courses through the second full week of classes each term, depending on the nature of the course and the availability of space. From the end of the first full week of classes to the end of the second full week of classes, permission (signature) of the instructor offering the course must be obtained.
2. A student may drop courses without responsibility for grades through the end of the first full week of classes. After the drop deadline courses may not be dropped. Failure to drop a course properly will result in an F grade being recorded; courses properly dropped do not appear on the student's transcript.
3. Add/drop fees will be assessed in accordance with the fee policies stated in the Schedule of Classes.

## AR 12. WITHDRAWAL FROM INDIVIDUAL CLASSES

Any student may withdraw from a maximum of $12^{1}$ individual OSU credit bearing classes throughout their undergraduate career ${ }^{2}$ at $\mathrm{OSU}^{3}$. Any student may petition for an exception from this limitation if the justification for withdrawal is clearly associated with circumstances beyond the student's control.
Withdrawal from a class with a W grade begins after the drop deadline, which is the first full week of classes, and continues through the end of the seventh full week of classes. After the seventh full week of classes, students are expected to complete the program attempted and will receive letter grades ( $\mathrm{A}, \mathrm{A}-, \mathrm{B}+, \mathrm{B}, \mathrm{B}-$, C+, C, C-, D+, D, D-, F, S, U, P, or N) for all classes in which enrolled unless they officially withdraw from the term. Procedures for withdrawal from individual classes are outlined in the term Schedule of Classes.

## Footnotes:

${ }^{1}$ Withdrawal from the term, as defined in AR
13 , is not included in the maximum of 12 individual OSU classes.
${ }^{2}$ This regulation applies to undergraduate, postbaccalaureate, and nondegree
undergraduate students.
${ }^{3}$ The maximum withdrawal count will begin for all students starting fall 2012.

## AR 13. WITHDRAWAL FROM THE

## TERM

a. Any student is entitled to Withdraw from the Term up to four times without prejudice prior to the beginning of finals week. The student may accomplish this by completing the online withdrawal survey available through online services. Withdrawal from the term prior to the beginning of finals week will result in the grade of W being recorded for each course for which the student is registered.
b. When a student's academic progress is interrupted by an emergency situation such as serious illness, accident, or death of a family member, and the emergency situation occurs within the last four weeks of the term, and the student submits evidence to the college head advisor, then the student will work with academic advisors, faculty members, student care teams or Ecampus student services, depending on the complexities of the circumstances to determine an appropriate course of action to determine the grades for the term.
c. Undergraduate Planned Educational Leave Program. The Undergraduate Planned Educational Leave Program (PELP) is a voluntary, temporary, planned interruption or pause in a student's regular,
full-time education. Its purpose is to enhance an undergraduate student's prospect of successful completion of their academic program. The PELP provides one opportunity ${ }^{\mathbf{1}}$ for a student to arrange a voluntary absence for as many as six consecutive regular academic terms (not including summer terms). The PELP is designed to allow a student to pursue other activities that will assist them in clarifying their educational goals, such as job opportunities and experiences away from campus, military deployment, time to resolve personal or medical problems, or other similar pursuits. The PELP allows an undergraduate student to temporarily suspend their academic work for a period of time (in accordance with AR 13a and 13b), and resume their studies with minimal procedural difficulties. The PELP $\$ 25$ non-refundable application fee allows an undergraduate student to maintain their official standing as a student at OSU and reserves the student's right to keep their original academic catalog ${ }^{2}$ active during their absence. Beginning with the 2011-2012 academic year, all OSU undergraduate students ${ }^{3}$ are eligible to request leave through the PELP. The university reserves the right to consider a student's current academic standing and any existing student conduct issues prior to approving the voluntary PELP leave request. Students who withdraw from OSU prior to the 2011-2012 academic year and who are away from campus for four or more consecutive regular academic terms (not including summer terms) must re-enroll with OSU to re-establish their relationship as an OSU student and their academic catalog will be reset to the academic year they return to OSU.

## Transcript Notation

A notation of the dates of any approved leave will be indicated on each student's official transcript.

## Footnotes:

${ }^{1}$ Military deployments are an exception to this limitation. All military personnel who are deployed for military service may submit a voluntary leave request for each deployment.
${ }^{2}$ In accordance with the university's catalog policy contained in the General Catalog.
${ }^{3}$ The PELP began with the 2011-2012 academic year (Summer 2011). Any former OSU students who attended OSU prior to the 2011-2012 academic year and have been absent for four or more consecutive regular academic terms will be held to OSU's prior policy that resets the academic catalog to the catalog in effect at the time they return to OSU.

## AR 14. ATTENDANCE

Attendance is one of the most important factors in a student's academic success. Therefore, an instructor may consider attendance as part of a course grade. If attendance is used in determining the student's grade, how attendance shall be used needs to be defined in the course syllabus by the instructor.

## AR 15. HONESTY IN ACADEMIC WORK

The administration of the classroom rests with the instructor. When evidence of academic dishonesty comes to the instructor's attention, the instructor should: (a) document the incident, (b) permit the accused student to provide an explanation, (c) advise the student of possible penalties, and (d) take action. The instructor may impose any academic penalty up to and including an F grade in the course after consulting with his or her department chair and informing the student of the action taken. Using the standard form, the instructor must report the incident and the action taken to his or her department chair, who, in turn, shall forward the report to his or her dean.
If the student is not enrolled in the college or school in which the course is offered, the dean of that college shall forward the report to the dean of the college or school in which the student is enrolled for possible disciplinary action.

Grade penalties imposed as a result of academic dishonesty may be appealed by the student in accordance with the procedures developed by the department and college or school in which the course is offered.

## AR 16. FINALS WEEK

1. No final, midterm, or comprehensive examinations shall be given during the week preceding final examination week. (Examinations on laboratory work, course material covered by "weekly" or "section" quizzes, television courses, ROTC activities, and physical education activities are allowed.)
2. Course work shall continue up to final week. Final examinations shall be given during finals week in accordance with the finals week schedule. If a final examination is not to be given in a course, this action must be approved by the department with notification to the Registrar's Office. Requests for changes in the time of final examinations will be submitted to the Registrar's Office.
3. All student petitions for changes in the time of final examinations must be made using forms available from the Registrar's Office. (A summary of university final examination policy is printed on the form.) Petitions
for changing final examinations are submitted directly to the instructor. Students may forward disapproved petitions through the dean of the college to the Registrar's Office. Requests to change the assigned final examination time for an entire class must be approved by the Registrar's Office. Final examinations may not be changed to the week preceding final week without approval of the Academic Requirements Committee.
4. No extracurricular activities or curricular activities other than examinations and final class meetings shall be scheduled during final week.

## AR 17. GRADES

The grading system consists of twelve basic grades, A, A-, B+, B, B-, C+, C, C-, $\mathrm{D}+\mathrm{D}, \mathrm{D}-$, and F . The grade of A denotes exceptional accomplishment; B, superior; C, average; D, inferior; F, failure. Other marks are I, incomplete; W, withdrawal; R, thesis in progress; P, pass; N, no-credit; S, satisfactory; U, unsatisfactory; AUD, audited course; WAU, withdrawal from audited course; NG, no basis for a grade (administratively assigned by the Office of the Registrar, see below); WC, complete withdrawal.
When a requirement of a course has not been completed for reasons acceptable to the instructor and the rest of the academic work is passing, a report of I (incomplete) may be made and additional time granted. The I grade is only granted at the discretion of the instructor. The instructor must submit the grade the student will earn if the missing work is not completed; this is the alternate grade. The alternate grade will become the default grade if the missing work is not completed as part of the contract for completion of the grade. The instructor documents the deficiency and the deadline for completing the missing work. A record of the deficiency shall be kept on file in the unit or department office. The allotted time awarded shall not exceed one calendar year except by petition* or the time of the degree conferral, whichever comes first. To remove the I grade, the student must complete the deficiency within the allotted time and the instructor will then submit the appropriate grade. If the student fails to complete the work within the allotted time, the Registrar's Office will automatically change the I grade on the student's record to the alternate grade submitted by the instructor at the time the I was given. The alternate grade will be included in the grade point average. Under no circumstances shall a student who earns an A-F grade or an N or U grade have his or her grade changed retroactively to an I grade.
An instructor may move to correct a grade by filing a Change of Grade in
the Registrar's Office. Grade changes for students of a permanently separated instructor will be managed by the department chair of the course involved. Upon permanent separation from the university an instructor's change of grade will not be accepted by the Office of the Registrar. The Office of the Registrar will routinely review grade changes.
*A student may petition via the Office of the Registrar for an extension of the one calendar year deadline with the concurrence of the faculty. An approved petition will grant an extension of a single additional term, with a maximum of three total extensions being possible. An approved petition for an extension of time to remove an incomplete will be voided at the time of degree conferral.

## AR 18. ALTERNATIVE GRADING SYSTEMS

In addition to traditional letter grading (A-F), Oregon State University has adopted two alternative grading systems to be employed in accordance with the provisions outlined below:

## a. Satisfactory/Unsatisfactory (S/U)

1. Undergraduate students may elect to be graded on a Satisfactory/ Unsatisfactory ( $\mathrm{S} / \mathrm{U}$ ) basis in a course (except $\mathrm{P} / \mathrm{N}$ courses) under the following conditions:
a. A maximum of 36 credits of those presented in satisfaction of the baccalaureate degree may have been graded on an S/U basis at Oregon State University.
a. A student normally elects the option $\mathrm{S} / \mathrm{U}$ at the time of registration. Changes either to or from S/U grading will be permitted through the end of the seventh full week of any term.
a. A student must obtain the approval of his or her academic advisor or dean in order to elect to be graded on an $\mathrm{S} / \mathrm{U}$ basis.
2. Graduate students may elect to take undergraduate courses on the $\mathrm{S} / \mathrm{U}$ basis except those courses required for the removal of deficiencies. Graduate courses may also be taken on an S/U basis. (Such courses cannot be used as part of a student's graduate program. All other provisions of $\mathrm{S} / \mathrm{U}$ grading apply to graduate students.)
3. A grade of $S$ (satisfactory) shall be equivalent to grades $\mathrm{A}, \mathrm{A}-, \mathrm{B}+\mathrm{B}$, $\mathrm{B}-, \mathrm{C}+\mathrm{C}$, and $\mathrm{C}-$. A grade of U (unsatisfactory) shall be equivalent to grades $\mathrm{D}+, \mathrm{D}, \mathrm{D}-$, or F .
4. Grades of $S$ or $U$ shall have no grade-point equivalents; hence such grades shall not be included in the computation of gradepoint averages. The credit of courses in which an $S$ grade is obtained shall be counted toward graduation. Credits shall not be awarded for U grades.
5. Election of $S / U$ grading for a course shall be known only to the student and the academic advisor. Instructors shall enter on grade forms the traditional letter grade (A-F) earned. Automatic conversion to $S$ grades and to $U$ grades will be made in the Registrar's Office. Grades of I, or $W$ may be assigned wherever appropriate.
6. In compliance with Section III of the Statement on Student Rights, Freedoms, and Responsibilities (dated April 28, 1969), disclosure or nondisclosure of the traditional letter grades received in courses in which S grades were awarded is recognized as an exclusive right of the individual student. The Registrar's Office is obliged and authorized to honor requests for disclosure, provided that the express consent of the student is obtained.
b. Pass/No Credit (P/N)
7. Those courses in which traditional letter grading has been deemed inappropriate because of the nature of the course content or the objectives of the course are graded on a Pass/No Credit (P/N) basis.
8. Grades of P or N shall have no grade-point equivalents; hence such grades shall not be included in the computation of gradepoint averages. The credits of courses in which a grade of P is obtained shall be counted toward graduation. Credit shall not be awarded for N grades.
9. Departments are authorized to designate Pass/No Credit courses, subject to the following guidelines and procedures:
a. The principal criterion for choice of grading system is enhancement of the educational experience for the student;
b. The nature, structure, and/ or objectives of a course may suggest that the Pass/ No Credit grading system be adopted. It is anticipated that courses graded on this basis will generally fall into one of the following categories: skill-building courses or
practicums, courses which stress orientation and awareness rather than academic preparation;
c. The designation of Pass/No Credit grading for a course will follow the academic college's recommendation and approval by the University Curriculum Council, and in the case of graduate courses, by the Graduate Council. Designation of courses for $\mathrm{P} / \mathrm{N}$ grading must be completed prior to the opening of the term in which the course is offered and normally prior to preparation of the Schedule of Classes.
10. Courses approved for grading on a Pass/No Credit ( $\mathrm{P} / \mathrm{N}$ ) basis are identified in the General Catalog course descriptions and in the Schedule of Classes.
c. Nothing stated in the above paragraphs shall be construed as constituting support for petitions requesting change of grade in courses taken during or prior to spring term, 1971.

## AR 19. GRADE POINTS

Grade points are computed on the basis of:

- 4 points for each credit of A grade,
- 3.7 for each credit of A- grade,
- 3.3 for each credit of B+ grade,
- 3.0 for each credit of B grade,
- 2.7 for each credit of B- grade,
- 2.3 for each credit of C+ grade,
- 2.0 for each credit of C grade,
- 1.7 for each credit of C-grade,
- 1.3 for each credit of D+ grade,
- 1.0 for each credit of D grade,
- 0.7 for each credit of D- grade, and
- 0 for each credit of F .

Marks of I, W, P, N, NG, R, S, U, AUD, WAU, and WC are disregarded in the computation of points. The grade-point average (GPA) is the quotient of total points divided by total credits; total credits are the number of term credits in which grades A, B, C, D, and F are received. Thus a person receiving 1 credit of A, 2 credits of B, 3 credits of C, 4 credits of $\mathrm{D}, 5$ credits of F would have 20 grade points ( $1 \times 4$ plus $2 \times 3$ plus $3 \times 2$ plus $4 \times 1$ plus $5 \times 0$ ). The grade-point average would be 20 (grade points) divided by 15 (credits) equals 1.33 . A C average on 15 credits attempted would require 30 grade points; if the student has 20 points, he or she is 10 grade points deficient.

## AR 20. REPEATED COURSES

If a student repeats an Oregon State University course, the grade from each attempt $^{1}$ will appear on the student's academic record but only the second attempt will count toward the student's institutional credits, requirements, and grade-point average ${ }^{2}$. An academic unit ${ }^{3}$ may, however, include subsequent attempts after the second attempt to meet individual course degree requirements associated with the baccalaureate core/ma-jors/options/minors/certificates/endorsements. A course may not be repeated on an $\mathrm{S} / \mathrm{U}$ basis if it was taken previously on a normal grade basis ${ }^{4}$.

## Footnotes:

${ }^{1}$ An attempt comprises a final grade in a course where the grade is: $\mathrm{A}, \mathrm{A}-, \mathrm{B}+\mathrm{B}, \mathrm{B}-, \mathrm{C}+, \mathrm{C}, \mathrm{C}-$, D+, D, D-, F, S, U, P, NP or an I/Alternate Grade (where the Alternate Grade is one of these grades).
${ }^{2}$ Recognized repeatable courses as defined in the Oregon State University course catalog, such as activity courses, research, seminars, and selected topics, do not come under this restriction. Additionally, if a course has been approved as a multiple repeatable course for credit and grade points, each attempt will be included in the institutional credits and gradepoint average until it reaches its defined limit (total allowable attempts or credit maximums for the course). Further, the Office of the Registrar will include all courses from the first repeat taken until it reaches the maximum total allowable attempts or credit maximums for the course. All subsequent repeats after the repeat maximum has been reached will be excluded from both institutional credits earned and grade-point average calculations.
${ }^{3}$ Academic Unit: College, School, or Department
${ }^{4}$ Normal Grade Basis is defined as any grade of A, A-, B+, B, B-, C+, C, C-, D+, D, D-, F, or any I/Alternate Grade (where the Alternate Grade is one of these grades).

## AR 21. HONOR ROLL

At the close of each term, the OSU Registrar publishes a list containing the names of all undergraduate and postbaccalaureate students who for the term have completed at least 12 graded credits with a grade-point average of 3.50 or above.

## AR 22. SATISFACTORY ACADEMIC STANDING (FOR UNDERGRADUATE STUDENTS)

 Oregon State University expects students to maintain satisfactory academic progress toward degree completion. At the conclusion of each term, grade-point averages are calculated and academic standings determined for students seeking a baccalaureate degree according to the criteria outlined below. Students whose standings evidence a lack of satisfactory progress will be warned of this condition and advised to seek help from their academic advisors. Any student who is not on Academic Warning, Academic Probation, or Academic Suspension is in good standing.1. Academic Warning: Students with a term GPA below 2.0 will be placed on Academic Warning.
2. Academic Probation: Students who have attempted ${ }^{\mathbf{1}} 24$ or more credits at OSU and have an OSU cumulative GPA below 2.0 will be placed on Academic Probation. Students who attain a cumulative GPA of 2.0 or better are removed from Academic Probation.
3. Academic Suspension: Students who are on Academic Probation and have a subsequent term GPA below 2.0 will be placed on Academic Suspension. Academic Suspension is recorded on the student's academic record. Students who are academically suspended are denied all the privileges of the institution and of all organizations in any way connected to it, including any university-recognized living group.

## 4. Reinstatement to the

University: Suspended students will be considered for reinstatement to the university after two years or completion of a minimum of 24 quarter credits of transferable collegelevel work at an accredited college or university, with a GPA of 2.5 or above.
The Faculty Senate Academic Standing Committee (http://senate.oregonstate. edu/academic-standing-committee) is responsible for enforcement of the above regulations on Satisfactory Academic Standing. Additionally, this committee has discretionary authority to grant exceptions and to develop guidelines for administering these regulations.

## Footnote:

${ }^{1}$ An attempt comprises a final grade in a course where the grade is: $\mathrm{A}, \mathrm{A}-, \mathrm{B}+, \mathrm{B}, \mathrm{B}-, \mathrm{C}+, \mathrm{C}$, C-, D+, D, D-, F, S, U, P, NP, I/Alternate Grade (where the Alternate Grade is one of these grades), W.

## AR 23. SPECIAL EXAMINATION FOR CREDIT

A regularly enrolled student in good standing, either graduate or undergraduate, currently registered at Oregon State University and wishing credit for an OSU course for which a grade has not been previously received, may petition for credit examination under the following conditions:

1. The application for such examination shall be presented on an Official Student Petition and shall bear the approvals of the dean of the student's college, the dean of the college in which the course is offered, and head of the department in which the course is offered. Petitions for special examination for credit may be approved or denied at the sole discretion of the department/college or the faculty member offering the
course, taking into account both the academic merit of the petition and the department/college's ability to deploy adequate resources to prepare, administer, and grade such an examination.
2. In no case may such examination be based on work used for graduation from high school, or in a foreign language that is the mother tongue of the applicant, or in courses not listed in the Oregon State University General Catalog.
3. Grades earned in special examinations shall be submitted and recorded in the same way as for regularly registered courses, and will count with respect to repeating a course as defined in AR 20.
4. A student may not petition for credit by special examination for a course in any term in which the student is or has been enrolled in the course after the add/drop deadline for that term.
5. An examination for credit will not be approved for courses below the level for which college credit has previously been granted.
6. No examination may be taken until the applicant has received a permit from the Registrar's Office, for which a fee of $\$ 80$ will be charged. ${ }^{1}$

## Footnote:

${ }^{1}$ As an alternative to departmental examinations, students may seek credit through the College Level Examination Program (CLEP) to the College Entrance Examination Board. CLEP includes nationally normed subject matter examinations and general examinations covering material included in a number of relatively standard courses taught in colleges and universities throughout the United States. Some of these subject matter examinations and general examinations have been accepted by departments at this institution. Policy guidelines have been established that make it possible for admitted and enrolled students to (a) transfer credits earned though these accepted CLEP subject matter and general examinations to this institution, providing certain criteria are met, and (b) earn credits through accepted CLEP subject matter and general examinations providing certain criteria are met. Further information about CLEP may be obtained from the Office of Admissions, B104 Kerr Administration Bldg.

## AR 24. SPECIAL EXAMINATION FOR WAIVER (UNDERGRADUATE <br> STUDENTS)

A student may petition for examination to waive a course under the following conditions:

1. The application for examination to waive a course shall be presented on an Official Student Petition and shall bear the recommendations of the dean of the student's college, the dean of the college in which the course is offered, and head of the department in which the course is offered. Petitions for
special examination for waiver may be approved or denied at its sole discretion by the department/college offering the course, taking into account both the academic merit of the petition and the department/ college's ability to deploy adequate resources to prepare, administer, and grade such an examination.
2. No examination may be taken until the applicant has received a permit from the Registrar's Office, for which a fee of $\$ 80$ will be charged.
3. A minimum grade of C (or equivalent) must be attained in an examination for that waiver to be granted.
4. Credit will not be granted for courses waived.
5. This regulation does not invalidate the right of a dean of a college or head of a department to waive a course requirement of their particular college or department, respectively.

## AR 25. INSTITUTIONAL REQUIREMENTS FOR BACCALAUREATE DEGREES

a. Baccalaureate Core: Each student will complete the following requirements:

1. Skills Courses (15 credits) Mathematics, Writing I, and Speech must be taken and completed satisfactorily within the first 45 hours of OSU-generated credits. Writing II must be taken and completed satisfactorily within the first 90 hours of OSUgenerated credits.
Fitness (3 credits)
Mathematics ( 3 credits)
Speech (3 credits)
Writing I (3 credits)
Writing II (3 credits)
2. Perspectives Courses (24 credits)
Physical science (with lab) (4 credits) Biological science (with lab) (4 credits) Plus choice of second course in either of the above (with lab) (4 credits)
Take a minimum of one course in each of the following areas:

Western culture (3 credits)
Cultural diversity (3 credits)
Literature and the arts (3 credits)
Social processes and institutions (3 credits)
3. Difference, Power, and Discrimination Courses (3 credits)
4. Synthesis Courses ( 6 credits) Science, technology, and society (3 credits) Contemporary global issues (3 credits)
5. Writing Intensive Courses, upper division (WIC) (3 credits)

The Baccalaureate Core Committee determines which courses will satisfy each of the requirements above. WIC courses will be reviewed by the Writing Advisory Board. The core is governed by the following rules:
(1) No more than two courses from any one department may be used by a student to satisfy the Perspectives category of the core. (2) No single course may be used by a student to satisfy more than one subject area of the core even though some courses have been approved in more than one area. (3) Both Synthesis courses may not be taken in the same department. ${ }^{3}$
b. An undergraduate student may be granted a baccalaureate degree with one or more majors.
c. Credits: Minimum 180 earned credits, which must include: ${ }^{4,5}$

1. Credits in upper-division courses: minimum 60 (exclusive of upper-division physical education activity courses).
2. Credits in each major: minimum 36, including at least 24 in upper-division courses.
d. Baccalaureate Degrees: All students receiving a BA degree shall have proficiency in a second language, including American Sign Language (ASL), equivalent to that attained at the end of the second year sequence with a grade of C - or better as certified by the School of Language, Culture, and Society. Colleges offering both the BA and the $B S$ will have specific requirements distinguishing the two degrees. The college requirements for the two degrees will place comparable demands upon the time and effort of students, and that assessment of comparability will include the foreign language requirement for the BA. Academic units offering both the BA and BS may have specific requirements distinguishing the two degrees.
e. Grade-Point Average: minimum of 2.00 on OSU cumulative gradepoint average.
f. Academic Residence:
3. A minimum of 45 of the last 75 credits, or 150 total credits, must be completed while the student is in academic residence at OSU. "Academic Residence" is defined as OSU courses taken as a degreeseeking student of OSU or courses through one of the following approved special programs:

Professional degree programs which require that the student enroll in another institution while finishing the bachelor's degree at OSU or an international study program sponsored by Oregon State University.
2. A minimum of 15 upperdivision credits used to meet the preceding residency requirement (1) must be taken in each of the student's majors.
3. Credits earned by special examination for credit (AR 23) are not considered in academic residence.
g. Dean's certification of fulfillment of all requirements of major college. (For details, see college advisors and deans.)
h. Restrictions: A maximum number of credits may be applied to the Baccalaureate Degree as follows:

1. Transfer from first professional programs such as Law, Medicine, Pharmacy, and Veterinary Medicine: maximum 48 quarter credits.
2. Music courses (applied music): maximum 12 credits. (This restriction is not applicable to majors in music.)
3. Physical activity courses: maximum 11 credits.
4. Courses graded on an $\mathrm{S} / \mathrm{U}$ basis at Oregon State University: maximum 36 credits.
5. Academic Learning Service courses: maximum 15 credits.
i. Application for a Degree: To become a candidate for a degree, a student must have achieved senior standing and must make formal application for the degree. It is recommended that the student file an application with the registrar three terms prior to the term in which he or she wishes to graduate. The students deadline to file an application with the registrar is the end of the second week of the term in which he or she expects to complete requirements for a degree. [Approved by Faculty Senate 1/8/09.]

## Footnotes:

${ }^{3}$ Lists of approved courses may be obtained from advisors. Approved courses are also listed in the OSU General Catalog.
${ }^{4}$ Some degree programs may require more than 180 credits.
${ }^{5}$ Unearned credits are those courses for which a grade of F, N, U, I, W, AUD, or WAU are assigned as a final grade for that course. All other grades are calculated as earned credit. Faculty Senate revised AR 25 feffective academic year 2013-2014.

## AR 26. CONCURRENT AND SUBSEQUENT BACCALAUREATE DEGREES

a. Concurrent Baccalaureate Degrees: An undergraduate student may be granted two or more baccalaureate degrees (for example the BA or BS) at the same graduation exercise. The student must:

1. Complete institutional, college, and departmental requirements for the degree;
2. Complete, for each additional degree, a minimum of 32 credits more than the requirements of the curriculum requiring the least number of credits; and
3. Complete each additional 32 credits in residence.
b. Subsequent Baccalaureate Degree: A student who has received a previous baccalaureate degree from either OSU or another accredited university may be granted a subsequent baccalaureate degree. The student must:
4. Complete, for a BA degree, the requirements for foreign language proficiency (AR 25d);
5. Achieve a minimum of 2.00 on OSU cumulative grade-point average;
6. Complete requirements of the major college and receive the dean's certification; and
7. Meet the requirements for a concurrent degree as specified in AR 26a, if a previous baccalaureate degree has been received from OSU. The additional credits may be taken at any time prior to or subsequent to the granting of a previous OSU baccalaureate degree. Students with a baccalaureate degree from another institution must meet the Academic Residence requirement in AR $25 f$.
c. A student seeking a baccalaureate degree under the provisions of either AR 26a or AR 26b also must satisfy the appropriate residence requirements as defined in AR 25 f .

## AR 27. SUBSEQUENT

 CREDENTIALS: MINORS, CERTIFICATES, OPTIONS, AND MAJORSa. Subsequent Minors and Certificates: A student who has received a previous baccalaureate degree from either OSU or another accredited university or college may be granted a subsequent minor or certificate. The student must:

1. Complete current requirements for minor or certificate and receive the dean's approval;
2. Achieve a minimum of 2.0 OSU cumulative grade-point average on work taken for subsequent credential;
3. Academic residence: minimum 15 credits in residence.
b. Subsequent Options and Majors: A student who has received a previous baccalaureate degree from OSU may be granted a subsequent option or major credential:
4. Complete current requirements for option or major and receive dean's approval;
5. Achieve a minimum of 2.0 OSU cumulative grade-point average on work taken for subsequent credential;
6. Academic residence: minimum 15 credits in residence.
c. Additional credits necessary for subsequent credentials may be taken prior to or subsequent to the granting of a previous baccalaureate degree.

## AR 28. SUBSTITUTIONS

a. Undergraduate students: Substitutions for institutional requirements as outlined in AR 25 , except for baccalaureate core requirements of AR 25a, may be petitioned to the Academic Requirements Committee after approval by the student's dean or college head advisor. Substitutions for baccalaureate core requirements of AR 25a may be presented for consideration to the student's dean or college head advisor. Substitutions or adjustments of college or departmental requirements are also subject to approval by the college or department.
b. Graduate students: Substitutions for institutional requirements or deviations from the normal Graduate School regulations and policies may be made only by obtaining the approval of the dean of the Graduate School following a petition by means of a letter signed by the student and the student's major professor. Action taken on such substitutions or petitions will not be considered as a precedent for any future action.

## AR 29. GRADUATION EXERCISES

Attendance at graduation exercises is optional for graduating students. In accordance with procedures obtained from the Registrar's Office, the candidate is responsible for declaring whether or not he or she will attend commencement, regardless of the term in which requirements are completed.

## AR 30. AUDITING COURSES

Audit registration permits a student to enroll in a course for no credit and no grade. Course requirements for an audited course will be determined by the course instructor. Audit registration is available to degree and non-degree students. Audit registration is only allowable during the second full week of the term. Those who wish to audit should contact the Office of the Registrar for registration procedures, which will require approval of the course instructor. Audit courses are assessed instructional fees at the same rate as for credit courses. Any changes to an audit registration are subject to the same procedures, deadlines, and special fees as for registration changes to regular courses. Upon completion of an audited course, the designation of AUD will be recorded on the transcript. The designation of WAU will be recorded on the transcript for students who withdraw from an audit course.

## AR 31. ACADEMIC FRESH START POLICY

An Oregon State University undergraduate student may petition once with the registrar to exclude OSU courses from the calculation of institutional requirements, credits, and grade-point average, under a condition of academic fresh start defined below:

## Conditions to qualify:

The student must have an absence from OSU that begins after the end of the student's last term of attendance and exceeds five academic years before readmittance to a degree program at OSU. Prior to applying for academic fresh start student must, after re-enrolling in the university, have successfully completed a minimum of 24 letter-graded units
over two consecutive terms, and earned a grade-point average of at least 2.5 in these terms. The student must also provide a signed letter of recommendation from a current OSU college dean, school director, or department or program chair/ head. It may be seconded by the college head advisor or a current faculty member within the discipline the student is currently engaged to complete advocating on the student's behalf for academic fresh start.
Effect of the academic fresh start:

- Upon meeting all of the conditions of qualification, the student may select from one to three contiguous academic terms from previous enrollment at OSU for the application of academic fresh start.
- The grades ${ }^{\mathbf{1}}$ from all courses taken during the terms that are proposed for academic fresh start will be excluded from meeting institutional requirements and the calculation of institutional units and grade-point average.
- All grades representing the student's academic history at OSU will appear on the student's academic record (transcript), but all academic fresh start approved courses will be coded as "excluded" similar to a repeated course. Additionally, a comment of "Academic Fresh Start" will be appended to each term that qualifies under academic fresh start.
- All courses excluded under academic fresh start, will also be excluded from the calculation of course repeats defined by AR 20.


## Footnote:

${ }^{1}$ Valid grades include outstanding I (Incomplete) grades that have not been resolved.

## CATALOG YEAR POLICY <br> Graduation Requirements/Catalog Contract Policy

When determining the graduation requirements for a given student:

- Students must meet all applicable degree requirements from the published catalog(s).
- The student's catalog year for institutional and baccalaureate core requirements is established by his or her first term of attendance (matriculation date) at Oregon State University as an admitted student.
- The student's catalog year for college/major/option/minor requirements is based on the date of declaration of the major/option/ minor; consequently, a student's first (primary) major/option must be in the same catalog year. If a primary option is declared in a subsequent academic year, the primary option will be aligned with the catalog year of the primary major. If the primary option did not exist in the catalog year of the primary major, the primary major will roll forward to the catalog year of the primary option.
- Additionally, while the student's first major/option must be in the same catalog year, any additional declarations of majors/options/ minors will be determined by the declaration dates (and corresponding catalog years) established by the change of academic program process. A student, in collaboration with an advisor, can also choose to graduate under a subsequent (to their most recent major declaration date) catalog year within the same major/option.
- At the time of graduation, all students, including transfer students, must use a catalog that is not more than ten years old. Students may petition to the head advisor of their college for an extension of a catalog greater than ten years prior to their expected graduation term.
- Current policy requires a student to reapply after not enrolling at OSU for four consecutive terms (not including summer terms); the published catalog for the resulting readmission/matriculation date will become the catalog of record for graduation requirements. The Planned Educational Leave Program defined in AR 13.c beginning with 2011-2012 academic year, provides a mechanism for a student to sustain their original catalog of record during a planned absence.
- For Degree Partnership Program students, the first term the student is admitted to OSU will be the matriculation date and will determine the catalog year for
institutional and baccalaureate core requirements. The catalog year for college/major/option/minor requirements will be the same as all other OSU students.
- Every effort has been made to ensure the accuracy of information in the OSU General Catalog However, Oregon State University or the Oregon State Board of Higher Education may find it necessary from time to time to make changes in courses, curricula, or degree requirements. Students already admitted to a program in which such changes have been made will be reasonably accommodated, if possible, to ensure their normal progress toward a degree. A student may, however, still be required to conform to changes in courses, curricula, or degree requirements as deemed necessary by Oregon State University or the State Board of Higher Education.


## GRADING SYSTEM

## Grades

The grading system consists of:

- A = Exceptional, 4.0 grade points per credit
- $\mathrm{A}-=3.7$ grade points per credit.
- $\mathrm{B}+=3.3$ grade points per credit.
- $B=$ Superior, 3.0 grade points per credit.
- $\mathrm{B}-=2.7$ grade points per credit.
- $\mathrm{C}+=2.3$ grade points per credit.
- $\mathrm{C}=$ Average, 2.0 grade points per credit.
- $\mathrm{C}-=1.7$ grade points per credit.
- $\mathrm{D}+=1.3$ grade points per credit.
- $\mathrm{D}=$ Inferior, 1.0 grade point per credit.
- D- = 0.7 grade point per credit.
- $\mathrm{F}=$ Failure, 0.0 grade point per credit.
- $\mathrm{G}=$ Reserved for Graduate Credit, no grade point per credit.
- I = Incomplete, no grade points or credits.
- I/Alt Grade = Incomplete, no grade points or credits. If not resolved after 12 months or degree conferral, the " I " reverts to the alternate grade.
- $\mathrm{N}=$ No credit, no grade points or credits.
- $\mathrm{NG}=$ No basis for a grade, no credit or grade points.
- $\quad P=$ Pass, credit given, no grade points.
- $\mathrm{R}=$ Thesis in Progress, credit given, no grade points.
- $\mathrm{S}=$ Satisfactory, credit given, no grade points.
- TR = Accepted Transfer Credit.
- $\mathrm{U}=$ Unsatisfactory, no credit or grade points.
- $\mathrm{W}=$ Withdrawal (passing), no credit or grade points.
- $\mathrm{WC}=$ Complete withdrawal, no
credit or grade points.
- AUD = Audit, no credit or grade points.
- $\mathrm{WAU}=$ Withdrawal from Audit, no credit or grade points.
When a requirement of a course has not been completed for reasons acceptable to the instructor and the rest of the academic work is passing, a report of I (incomplete) may be made and additional time granted. The I is only granted at the discretion of the instructor. The instructor must submit the grade the student will earn if the missing work is not completed. That alternate grade will become the default grade if the missing work is not completed. The instructor documents the deficiency and the deadline for completing the missing work. A record of the deficiency shall be kept on file in the unit or department office. The allotted time awarded shall not exceed one calendar year except by petition* or the time of the degree conferral, whichever comes first. To remove the I grade, the student must complete the deficiency within the allotted time and the instructor will then submit the appropriate grade. If the student fails to complete the work within the allotted time, the Office of the Registrar will automatically change the I grade on the student's record to the alternate grade submitted by the instructor at the time the I was given. The alternate grade will be included in the gradepoint average. Under no circumstances shall a student who earns an A-F grade or an N or U grade have his or her grade changed retroactively to an I grade.
An instructor may move to correct a grade by filing a Change of Grade in the Registrar's Office. Grade changes for students of a permanently separated instructor will be managed by the department chair of the course involved. Upon permanent separation from the University an instructor's change of grade will not be accepted by the Office of the Registrar. The Office of the Registrar will routinely review grade changes.
*A student may petition via the Office of the Registrar for an extension of the one calendar year deadline with the concurrence of the faculty. An approved petition will grant an extension of a single additional term, with a maximum of three total extensions being possible. An approved petition for an extension of time to remove an incomplete will be voided at the time of degree conferral.
Students may withdraw from a course. In such cases, a grade of W is assigned. A student who discontinues attendance in a course without official withdrawal receives a grade of F in the course.


## GRADE POINTS

Grade points are computed on the basis of 4 points for each credit of A grade, 3.70 for each credit of A- grade, 3.30 for
each credit of $\mathrm{B}+$ grade, 3.00 for each credit of B grade, 2.70 for each credit of B- grade, 2.30 for each credit of C+ grade, 2.00 for each credit of $C$ grade, 1.70 for each credit of C- grade, 1.30 for each credit of D+ grade, 1.00 for each credit of D grade, .70 for each credit of D - grade, and 0 for each credit of $F$.

Marks of I/Alt, W, WC, P, N, NG, R, S, and $U$ are disregarded in the computation of points. The grade-point average (GPA) is the quotient of total points divided by total credits; total credits are the number of term credits in which grades $\mathrm{A}, \mathrm{B}, \mathrm{C}, \mathrm{D}$, and F are received.

## ACADEMIC STANDING

Satisfactory Academic Standing (Undergraduate Students) (AR 22) Oregon State University expects students to maintain satisfactory academic progress toward degree completion. At the conclusion of each term, grade-point averages are calculated and academic standings determined for students seeking a baccalaureate degree according to the criteria outlined below. Students whose standings evidence a lack of satisfactory progress will be warned of this condition and advised to seek help from their academic advisors. Any student who is not on Academic Warning, Academic Probation, or Academic Suspension is in good standing.

1. Academic Warning: Students with a term GPA below 2.0 will be placed on Academic Warning.
2. Academic Probation: Students who have attempted ${ }^{\mathbf{1}} 24$ or more credits at OSU and have an OSU cumulative GPA below 2.0 will be placed on Academic Probation. Students who attain a cumulative GPA of 2.0 or better are removed from Academic Probation.
3. Academic Suspension: Students who are on Academic Probation and have a subsequent term GPA below 2.0 will be placed on Academic Suspension. Academic Suspension is recorded on the student's academic record. Students who are academically suspended are denied all the privileges of the institution and of all organizations in any way connected to it, including any university-recognized living group.
4. Reinstatement to the University: Suspended students will be considered for reinstatement to the university after two years or completion of a minimum of 24 quarter credits of transferable collegelevel work at an accredited college or university, with a GPA of 2.5 or above.
The Faculty Senate Academic Standing Committee (http://senate.oregonstate. edu/academic-standing-committee) is
responsible for enforcement of the above regulations on Satisfactory Academic Standing. Additionally, this committee has discretionary authority to grant exceptions and to develop guidelines for administering these regulations.

## Footnote:

${ }^{1}$ An attempt comprises a final grade in a course where the grade is: A, $\mathrm{A}-, \mathrm{B}+, \mathrm{B}, \mathrm{B}-, \mathrm{C}+, \mathrm{C}$, C-, D+, D, D-, F, S, U, P, NP, I/Alternate Grade (where the Alternate Grade is one of these grades), W.

## ATTENDANCE

An instructor has the privilege of considering class participation in arriving at a student's grade, but it is not intended that attendance in and of itself normally be a factor in measuring a student's academic accomplishment in a course.

## OTHER LIMITATIONS

Academic performance is not the sole criterion for admission to and continuation in certain courses and programs at the university, such as practicum courses and internships. The university may find it necessary to evaluate a person's background to determine his or her likelihood of maintaining standards of professional conduct that are necessary in the academic discipline or profession. An evaluation may take into consideration current performance, as well as past experiences and actions that could affect a student's ability to perform in the particular course or program.

## STUDENT CONDUCT <br> REGULATIONS

Oregon State University aspires to stimulate a lasting attitude of civility, social responsibility and openness in our students as well as an appreciation for our values of accountability, diversity, respect, and truth. Consistent with that, all students enrolled at OSU are expected to follow student conduct regulations and university policies that have been developed to govern the behavior of students as well as members of the university community. These regulations and policies are formulated to guarantee each student's freedom to learn and to protect the fundamental rights of others. The assumption upon which these regulations are based is that all people must treat others with dignity and respect in order for scholarship to thrive. The regulations and procedures for disciplinary action and appeal are available on the OSU website, http://studentlife.oregonstate. edu/studentconduct/. Violations of the regulations subject a student to appropriate disciplinary or judicial action. These regulations have been formulated by the Student Conduct Committee, the Student Activities Committee, the university administration, and the State Board of Higher Education.

## STUDENT GRADES

Student grades may be obtained via MyOSU at https://myosu.oregonstate. edu: select Student, then Student Grades. Or obtain an unofficial transcript under Academic Profile, and click on Transcript. Grades are not automatically mailed to the student.

You may request a transcript via the Web at no charge: http://registrar. oregonstate.edu/transcripts.
Grades, GPA calculations, and academic standings are not complete and final prior to 8 a.m. on the Wednesday following the final exam week. Grades and GPAs appearing prior to that day may be incomplete.

## STUDENT RECORDS

Family Educational Rights and Privacy Act of 1974, as amended, (20 U.S.C. 1232 g ) provides that Oregon State University students have the right to inspect and review the student's education records within 45 days of the day the university receives a request for access; the right to request the amendment of the student's education record that the student believes are inaccurate or misleading; the right to consent to disclosures of the personally identifiable information contained in the student's educational record, except to the extent that FERPA authorizes disclosure without consent; and the right to file a complaint with the U.S. Department of Education concerning alleged failures by Oregon State University to comply with the requirements of FERPA. The Student Records Policy is available in the printed and electronic Registration Information Handbook and OSU General Catalog.

## PROGRESS STANDARDS FOR VETERAN STUDENTS

Programs at Oregon State University are approved for the use of VA benefits under the Montgomery GI Bill, Dependents Educational Assistance, and Title 38 and Title 10 of the US Code, or benefits offered by the State of Oregon Department of Veteran Affairs. The university, through the Registrar's Office, provides the certifying service to qualified students. The certifying official issues enrollment certification documents to the appropriate VA regional office and monitors students' satisfactory progress for the VA. Any student receiving GI Bill education benefits while attending Oregon State University is required to obtain transcripts from all previously attended schools and submit them to the school for review of prior credit.

1. OSU students who receive benefits from the Veterans Benefits
Administration of the Department of Veterans Affairs are subject to the satisfactory progress standards as set forth in Chapter 38, U.S.

Code sections 1674, 1724, 1775, and 1776, and to those defined by the university in Academic Regulation 22, Satisfactory Academic Standing:
2. Oregon State University expects students to maintain satisfactory academic progress toward degree completion. At the conclusion of each term, grade-point averages are calculated and academic standings determined for students seeking a baccalaureate degree according to the criteria outlined below. Students whose standings evidence a lack of satisfactory progress will be warned of this condition and advised to seek help from their academic advisors. Any student who is not on Academic Warning, Academic Probation, or Academic Suspension is in good standing.
a. Academic Warning: Students with a term GPA below 2.0 will be placed on Academic Warning.
b. Academic Probation: Students who have attempted ${ }^{1} 24$ or more credits at OSU and have an OSU cumulative GPA below 2.0 will be placed on Academic Probation. Students who attain a cumulative GPA of 2.0 or better are removed from Academic Probation.
c. Academic Suspension: Students who are on Academic Probation and have a subsequent term GPA below 2.0 will be placed on Academic Suspension. Academic Suspension is recorded on the student's academic record. Students who are academically suspended are denied all the privileges of the institution and of all organizations in any way connected to it, including any university-recognized living group.
d. Reinstatement to the University: Suspended students will be considered for reinstatement to the university after two years or completion of a minimum of 24 quarter credits of transferable college-level work at an accredited college or university, with a GPA of 2.5 or above.
3. Students, who are placed on probation by the university, also will be notified that they are on probation insofar as Veterans Affairs' progress standards are concerned. If a student's deficiency is not corrected and they subsequently are placed on academic suspension, the university will notify Veterans Affairs of his or her unsatisfactory progress.
4. The university will recertify students who are suspended by the university and subsequently reinstated by the

Academic Standing Committee
5. Students dismissed from the university for unsatisfactory conduct will be reported as making unsatisfactory progress. The university will recertify the student only upon rescission of the dismissal by the university.

## EXEMPTION FROM NONRESIDENT TUITION

HB 2158 (2013) and HB 4021 (2014) section 1. ORS 352.375
A public university listed in ORS 352.002 or community college shall charge an enrolled student who is not a resident of this state, and who is attending classes as an undergraduate or graduate at a public university or community college campus in this state, tuition and fees no greater than the resident rate if the student:
a. Served in the armed forces of the United States; and
b. Was relieved or discharged from that service with either an honorable discharge or a general discharge under honorable conditions; and
c. Undergraduate student newly enrolled after September 15, 2013, or graduate student newly enrolled after September 15, 2014, and
d. Provides proof that the student has established a physical presence in Oregon within 12 months of being enrolled at the public university or community college.

## MILITARY AND VETERAN

 RESOURCES ADVISOR
## William Elfering, MVRA

541-737-7662
william.elfering@oregonstate.edu Website: http://studentlife.oregonstate. edu/veterans
Office of Student Life
The Military and Veteran Resources Advisor (MVRA) advocates for studentveterans to receive targeted support in navigating campus resources and pursuing academic goals and advises about internal and external support programs. The MVRA collaborates with School Certifying Officials to counsel students and parents concerning eligibility and benefits available under various programs at the local, state, regional, and federal level. The MVRA maintains an informative Military and Veteran Resources website and corresponds with prospective, currently enrolled, and alumni studentveterans to provide them with the latest news on benefits, processes, and procedures from the Veterans Administration.

## SCHOOL CERTIFYING OFFICIAL

 (SCO)The School Certifying Official (SCO) certifies the enrollment of veterans and eligible dependents at Oregon State University. All veterans and eligible dependents, whether new, returning, or transfer students, who expect to receive educational benefits from the Veterans Administration must notify the SCO in the Registrar's Office. For questions about benefits, contact veterans@oregonstate. edu.

The School Certifying Official also monitors and reports to the Veterans Administration the Satisfactory Progress Standards for students who are receiving VA education benefits. See Progress Standards for Veteran Students for more information.

## MILITARY TUITION

## ASSISTANCE PROGRAM

The School Certifying Officials (SCO) at Oregon State University are the direct contact points for students using the Military Tuition Assistance Program. SCOs process students' tuition assistance authorizations and contracts and forward copies to OSU Business Affairs for billing the military branches. Depending on the branch of the military, requirements vary on how grades are reported. Grade reporting is done at the end of each academic term.
For questions about the Military Tuition Assistance Program, contact veterans@oregonstate.edu.

## VETERANS ACCESS, CHOICE,

 AND ACCOUNTABILITY ACT (VACAA) OF 2014 (38 U.S.C. 3679(C))Official School Catalog Addendum
I certify the current policy is true and correct:

The following individuals shall be charged the in-state rate, or otherwise considered a resident, for tuition and fees purposes:

- A Veteran using educational assistance under either chapter 30 (Montgomery G.I. Bill - Active Duty Program) or chapter 33 (Post-9/11 G.I. Bill), of title 38, United States Code, who lives in the State of Oregon while attending a school located in the State of Oregon (regardless of his/her formal State of residence) and enrolls in the school within three years of discharge or release from a period of active duty service of 90 days or more.
- Anyone using transferred Post-9/11 GI Bill benefits (38 U.S.C. § 3319) who lives in the State of Oregon while attending a school located in the State of Oregon (regardless of his/ her formal State of residence) and enrolls in the school within three
years of the transferor's discharge or release from a period of active duty service of 90 days or more.
- Anyone using benefits under the Marine Gunnery Sergeant John David Fry Scholarship (38 U.S.C. § 3311(b) (9)) who lives in the State of Oregon while attending a school located in the State of Oregon (regardless of his/ her formal State of residence) and enrolls in the school within three years of the Service member's death in the line of duty following a period of active duty service of 90 days or more.
- Anyone described above while he or she remains continuously enrolled (other than during regularly scheduled breaks between courses, semesters, or terms) at the same school. The person so described must have enrolled in the school prior to the expiration of the three-year period following discharge, release, or death described above and must be using educational benefits under either chapter 30 or chapter 33, of title 38, United States Code.


## VETERAN AND U.S. MILITARY SERVICE RECOGNITION CORD

## Recognition of U.S. Military Service

 Oregon State University recognizes the significant contribution and sacrifices made by OSU students who are U.S. military service members and veterans. Students may receive a red, white, and blue Military Service Recognition Cord to be worn at commencement.To apply for the recognition, students should complete the OSU Military Service Recognition application which is available on the OSU Veterans website at http://studentlife.oregonstate.edu/veterans. Applications are to be submitted to the School Certifying Officials who will approve the application and distribute the recognition cord.

## UNDERGRADUATE PLANNED

 EDUCATIONAL LEAVE PROGRAM Students may find that a planned interruption or pause in their regular, full-time education is needed. PELP is designed to enhance the prospect of successful completion of an academic program by allowing a student to arrange a voluntary absence that temporarily suspends their academic work for a period of time. For detailed information please refer to Academic Regulation 13.
## STUDENT RECORDS-RICHT TO PRIVACY

## NOTICE TO STUDENTS REGARDING PRIVACY OF RECORDS

The Family Educational Rights and Privacy Act (FERPA) of 1974 (Public Law 93380), as amended, Oregon Revised Statutes 351.065, and Oregon Administrative Rule 580-013-0005 of the State Board of Higher Education afford students certain rights with respect to their education records. They are:

1. The right to inspect and review the student's education records within 45 days of the day the university receives a request for access.
2. Students should submit to the registrar, dean, head of the academic department, or other appropriate official, written requests that identify the record(s) they wish to inspect. The university official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the university official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.
3. The right to request the amendment of the student's education record that the student believes are inaccurate or misleading.
4. Students should write the university official responsible for the record, clearly identify the part of the record they want changed, and specify why it is inaccurate or misleading.
5. If the university decides not to amend the record as requested by the student, the university will notify the student of the decision and advise the student of his or her right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.
6. The right to consent to disclosures of the personally identifiable information contained in the student's educational record, except to the extent that FERPA authorizes disclosure without consent.
7. One exception that permits disclosure without consent is disclosure to school officials with legitimate educational interests. A school official is a person employed by the university in an administrative, supervisory, academic or research, or support staff position (including health staff and members of the Law Enforcement Unit); a person or company with whom the
university has contracted; a person or company acting as consultant or volunteer for the university; a person serving on the Board of Trustees; or a student serving on an official committee, such as a disciplinary or grievance committee, or assisting another school official in performing his or her tasks.
8. A school official has a legitimate educational interest if the official needs to review an educational record in order to fulfill his or her professional responsibility.
9. The right to file a complaint with the U.S. Department of Education concerning alleged failures by Oregon State University to comply with the requirements of FERPA.
The name and address of the office
that administers FERPA is:
Family Policy Compliance Office
U.S. Department of Education

400 Maryland Avenue, SW
Washington, DC 20202-5920
1-800-USA-LEARN (1-800-872-5327)
Website: https://www2.ed.gov/policy/ gen/guid/fpco/index.html
Revised directory information
effective May 2014: Oregon State
University will provide the following
"directory" information to all inquiries
without students' written consent:

- student's name
- current mailing address and telephone number
- current OSU ONID email address
- campus office address
- class standing (e.g., freshman, sophomore, etc.)
- student level (undergraduate, graduate, etc.)
- college
- major field of study
- honors
- full-time or part-time enrollment status
- status as a graduate teaching assistant or graduate research assistant and hours of service.
- participation in officially recognized activities and sports
- dates of attendance
- anticipated graduation date
- degrees and awards received
- date(s) of degree(s)
- most recent previous educational institution attended by student
A student may request in writing that all of the above directory information be kept confidential. This option may be exercised by filing a written, dated, and signed request at the Office of the Registrar at any time. The restriction remains in effect until revoked by the student even if the student leaves the university or graduates.

The procedures for exercising the above rights are explained in Oregon Ad-
ministrative Rules 576-020-0005 through 576-020-0065.

## RELEASE OF STUDENT INFORMATION TO MILITARY RECRUITERS (SOLOMON

## AMENDMENT)

Oregon State University provides information about students that is requested by military recruiters under requirements of the Solomon Amendment (As of Oct. 23, 1998 [63 Fed. Reg. 56819] and the Interim Rule published Jan. 13, 2000 [65 Fed. Reg. 2056] by Department of Defense). Under this federal law military recruiters may request the following information: Name, current mailing address (as provided by the student) including email address, current telephone number (as provided by the student), age, class level (e.g., freshman, sophomore, etc.), and academic major. The information may be requested for the immediately previous term, current term, or future term for all students age 17 and older who are or were registered at OSU for at least 1 credit in the requested term. Recruiters may request this information each term. Recruiters may not obtain any information that is not in the above list of student recruiting information. For example, they may not request any of the following: Social Security Number or ID Number, place of birth, race/ethnicity/nationality, grades and GPA, grades of low-performing students, religious affiliation, names of students with loans in default, veteran status, or names of students no longer enrolled at OSU. Institutions that do not comply with the Solomon Amendment risk losing federal funding from the departments of Defense, Education, Health and Human Services, Labor, and Transportation. Institutions do not risk losing student-aid funding such as Perkins Loans, Federal SEOG or Work-Study funds.

## USE OF SOCIAL SECURITY NUMBER (SSN)

You are requested to provide voluntarily your Social Security Number to assist OSU (and organizations conducting studies for or on behalf of OSU) in developing, validating, or administering predictive tests and assessments; administering student aid programs; improving instructions; internal identification of students and alumni; collection of student debts; or comparing student educational experiences with subsequent workforce experiences. When conducting studies, OSU will disclose your Social Security Number only in a manner that does not permit personal identification of you by individuals other than representatives of OSU (or the organization conducting the study for OSU) and only if the information is destroyed when no longer needed for the purposes for which the study was conducted. By providing your Social Security Number, you are consenting to the use identified above. This request is made pursuant to ORS 352.004, ORS 352.107, and ORS 352.146. Provision of your Social Security Number and consent to its use is not required and if you choose not to do so you will not be denied any right, benefit, or privilege provided by law. You may revoke your consent to the use of your Social Security Number at any time by contacting: Office of the Registrar, Oregon State University, Corvallis, OR 97331-2130; 541-737-4331.

All access and use at Oregon State University of the Social Security Number is prohibited except for meeting federal or state requirements, compliance, and reporting.

## STUDENTS RIGHTS TO PRIVACY

 OF RECORDS TUTORIAL (FERPA)A brief online tutorial that explains students' rights may be viewed at http://registrar.oregonstate.edu/ ferpa-training-module.

## OSU DIRECTORY

The OSU Campus Directory is a directory of staff and student names, addresses and telephone numbers. This information is extracted at the end of the second week of the fall term and is published annually and posted on the OSU website. To find students, faculty and staff, use the Search box for Find people and pages or go to http://directory.oregonstate.edu/.

Students who do not want information to be included in either the printed or electronic version should indicate that in their Directory Profile on the Web before the end of the second week of fall term. Just log in to MyOSU at https:// myosu.oregonstate.edu and under Update Personal Profile select OSU Directory Preferences, then follow the instructions on that page.

## STUDENT PHOTO ROSTER

Getting to know students is an important means by which instructors and advisors can improve the quality of the learning environment.

## Accessing Student Photo Roster System:

1. Login to MyOSU at https://myosu. oregonstate.edu.
2. Under Update Personal Profile, select OSU Directory Preferences.
3. Check or uncheck the checkbox "Photo Viewable to Advisor".
4. Check or uncheck the checkbox "Photo Viewable to Instructor".
5. Click the "Submit Changes" button to update your Directory Profile. To view your choices regarding opting in or out of the Student Photo Roster System, please view it online using the instructions above.

Selecting the "opt in" option for instructors means that all instructors of record associated with the student's current classes will be able to view the photograph.

Students can change their minds at any time.

| College of Agricultural Sciences Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs. | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs. | MAIS | Professional Programs |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Agricultural Business Management | BS, HBS | X |  |  |  |  |  |  |  |  |
| Agricultural Education |  |  |  |  | MS | X |  |  | X |  |
| Agricultural Sciences | BS, CRED, HBS | x |  |  |  |  |  |  |  |  |
| Agronomy |  |  | X |  |  |  |  |  |  |  |
| Animal Behavior |  |  | X |  |  |  |  |  |  |  |
| Animal BioHealth/Pre-Professional |  |  | x |  |  |  |  |  |  |  |
| Animal Production |  |  | X |  |  |  |  |  |  |  |
| Animal Reproduction and Development |  |  | x |  |  |  |  |  |  |  |
| Animal Science |  |  |  |  | MS, PhD | X |  |  | X |  |
| Animal Sciences | BS, CRED, HBS | X |  |  |  |  |  |  |  |  |
| Applied Economics |  |  |  |  | MA, MS, PhD | x |  |  | x |  |
| Applied Genetics |  |  | X |  |  |  |  |  |  |  |
| Applied Systematics in Botany |  |  |  |  | PSM |  |  |  |  |  |
| Bioenergy |  | x | X |  |  |  |  |  |  |  |
| Bioproducts |  |  | X |  |  |  |  |  |  |  |
| Bioresource Research | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Biotechnology |  |  | X |  |  |  |  |  |  |  |
| Botany | BS, CRED, HBS | X |  |  |  |  |  |  |  |  |
| Botany and Plant Pathology |  |  |  |  | MA, MS, PhD | x |  |  |  |  |
| Climate and Biosystems Modeling |  |  | X |  |  |  |  |  |  |  |
| Comparative International Agriculture |  | X |  |  |  |  |  |  |  |  |
| Crop and Soil Science | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Crop Science |  | x |  |  | MS, PhD | X |  |  | X |  |
| Ecological and Sustainable Horticultural Production |  |  | x |  |  |  |  |  |  |  |
| Ecological Landscape and Urban Forestry |  |  | x |  |  |  |  |  |  |  |
| Enology and Viticulture |  |  | X |  |  |  |  |  |  |  |
| Entomology |  | x |  |  | MA, MS, PhD | X | X |  |  |  |
| Environmental Chemistry |  |  | X |  |  |  |  |  |  |  |
| Environmental Economics and Policy | BS, HBS |  |  |  |  |  |  |  |  |  |
| Equine |  |  | X |  |  |  |  |  |  |  |
| Fermentation Science |  | X | X |  |  |  |  |  |  |  |
| Fisheries and Wildlife Administration |  |  |  |  | PSM |  |  |  |  |  |
| Fisheries and Wildlife Sciences | BS, HBS | X |  |  |  |  |  |  |  |  |
| Fisheries Management |  |  |  |  |  |  |  | X |  |  |
| Fisheries Science |  |  |  |  | MS, PhD | X |  |  | X |  |
| Food Economics and Policy |  | X |  |  |  |  |  |  |  |  |
| Food Manufacturing |  | X |  |  |  |  |  |  |  |  |
| Food Quality |  |  | X |  |  |  |  |  |  |  |
| Food Science |  | X | X |  |  |  |  |  |  |  |
| Food Science and Technology | BS, CRED, HBS |  |  |  | MS, PhD | X |  |  |  |  |
| Food Technology |  | x |  |  |  |  |  |  |  |  |
| General Horticulture |  |  | x |  |  |  |  |  |  |  |
| Genomics/Bioinformatics |  |  | X |  |  |  |  |  |  |  |
| Horticultural Research |  |  | X |  |  |  |  |  |  |  |
| Horticulture | BS, CRED, HBS | x |  |  | MS, PhD | X |  |  | X |  |
| International Agricultural Development |  |  |  |  |  | X |  |  |  |  |
| International Studies | BA, HBA |  |  |  |  |  |  |  |  |  |
| Leadership |  | x |  |  |  |  |  |  |  |  |
| Natural Resource and Environmental Law and Policy |  | x |  |  |  |  |  |  |  |  |
| Pest Biology and Management |  |  | X |  |  |  |  |  |  |  |
| Plant Breeding and Genetics |  |  | X |  |  |  | X |  |  |  |
| Plant Growth and Development |  |  | X |  |  |  |  |  |  |  |
| Rangeland Ecology and Management |  | X |  |  | MS, PhD | X |  |  | X |  |
| Rangeland Science |  |  | X |  |  |  |  |  |  |  |
| Rangeland Sciences | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Resource Economics |  | X |  |  |  |  |  |  |  |  |
| Rural Studies |  |  |  |  |  | X |  |  |  |  |


| College of Agricultural Sciences Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs. | Grad. Majors | Grad. Minors | Grad Options | Grad. Certs. | MAIS | Professional Programs |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Soil Science |  | X | X |  | MS, PhD | X |  |  | X |  |
| Sustainability | BS, HBS | x |  |  |  |  |  |  |  |  |
| Sustainable Ecosystems |  |  | X |  |  |  |  |  |  |  |
| Therapeutic Horticulture |  |  | X |  |  |  |  |  |  |  |
| Toxicology |  | x | x |  | MS, PhD | x |  |  |  |  |
| Turf and Landscape Management |  | X |  |  |  |  |  |  |  |  |
| Turf Management |  |  | X |  |  |  |  |  |  |  |
| Viticulture and Enology |  |  | x |  |  |  |  |  |  |  |
| Water Resources |  |  | X |  |  |  |  |  |  |  |
| Wildlife Management |  |  |  |  |  |  |  | X |  |  |
| Wildlife Science |  |  |  |  | MS, PhD | X |  |  | X |  |
| College of Business Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| Accountancy | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Accounting |  |  |  | X |  |  | X |  |  |  |
| Accounting Information Systems |  |  | x |  |  |  |  |  |  |  |
| Apparel Design | BS, CRED, HBS |  | X |  |  |  |  |  |  |  |
| Business Administration | BA, BS, CRED, HBA, HBS |  |  |  |  |  |  |  |  |  |
| Business Administration |  |  |  |  | MBA, PhD | x |  |  |  |  |
| Business Administration and Accountancy |  |  |  |  | MBAA |  |  |  |  |  |
| Business Analytics |  |  |  |  |  |  | X | X |  |  |
| Business and Entrepreneurship |  | X |  |  |  |  |  |  |  |  |
| Business Information Systems | BA, BS, CRED, HBA, HBS |  |  |  |  |  |  |  |  |  |
| Corporate Finance |  |  |  |  |  |  | X |  |  |  |
| Design and Human Environment |  |  |  |  | MA, MS, PhD | X |  |  | X |  |
| Design and Innovation Management | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Design Management |  |  | X |  |  |  |  |  |  |  |
| Entrepreneurship for Business Majors |  |  | X |  |  |  |  |  |  |  |
| Finance | BA, BS, CRED, HBA, HBS |  |  |  |  |  |  |  |  |  |
| Financial Planning |  |  |  |  |  |  |  | X |  |  |
| General Business |  |  | X |  |  |  |  |  |  |  |
| Hospitality Management | BA, BS, CRED |  | X |  |  |  |  |  |  |  |
| Innovation Management | $\begin{aligned} & \hline \text { BA, BS, HBA, } \\ & \text { HBS } \\ & \hline \end{aligned}$ |  |  |  |  |  | x |  |  |  |
| Innovation/Commercialization |  |  |  |  |  |  | X |  |  |  |
| Interior Design | BS, CRED, HBS |  | x |  |  |  |  |  |  |  |
| International Business |  |  | X |  |  |  |  |  |  |  |
| International Studies | BA, HBA |  |  |  |  |  |  |  |  |  |
| Management | BA, BS, CRED, HBA, HBS |  |  |  |  |  |  |  |  |  |
| Marketing | BA, BS, CRED, HBA, HBS |  |  |  |  |  | x |  |  |  |
| Merchandising Management | BS, CRED, HBS | X | X |  |  |  |  |  |  |  |
| Organizational Leadership |  |  |  |  |  |  | x |  |  |  |
| Research Thesis |  |  |  |  |  |  | X |  |  |  |
| Retail Management |  |  | X |  |  |  |  |  |  |  |
| Supply Chain and Logistics Management |  |  | x |  |  |  | x |  |  |  |
| Sustainability | BS, HBS | X |  |  |  |  |  |  |  |  |
| College of Earth, Ocean, and Atmospheric Sciences Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs. | Grad. Majors | Grad. Minors $\qquad$ | Grad. Options | Grad. Certs. | MAIS | Professional Program |
| Alternative Energy |  |  | X |  |  |  |  |  |  |  |
| Applied Ecology |  |  | X |  |  |  |  |  |  |  |
| Aquatic Biology |  |  | x |  |  |  |  |  |  |  |
| Climate Science |  |  | X |  |  |  |  |  |  |  |
| Conservation, Resources, and Sustainability |  |  | X |  |  |  |  |  |  |  |
| Earth Sciences | BS, CRED, HBS | X |  |  |  |  |  |  |  |  |
| Earth Systems |  |  | x |  |  |  |  |  |  |  |
| Environmental Agriculture |  |  | X |  |  |  |  |  |  |  |
| Environmental Policy and Economics |  |  | X |  |  |  |  |  |  |  |


| College of Earth, Ocean, and Atmospheric Sciences Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs. | Grad. Majors | Grad. Minors | Grad Options | Grad. Certs. | MAIS | Professional Program |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Environmental Science Education |  |  | X |  |  |  |  |  |  |  |
| Environmental Sciences | BS, CRED, HBS | x |  |  |  |  |  |  |  |  |
| Environmental Water Resources |  |  | X |  |  |  |  |  |  |  |
| Geographic Information Science |  |  |  | X |  |  |  | X |  |  |
| Geography |  | x | x |  | MA, MS, PhD | x |  |  |  |  |
| Geography and Geospatial Science | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Geology |  | X | X |  | MA, MS, PhD | X |  |  | x |  |
| International Studies | BA, HBA |  |  |  |  |  |  |  |  |  |
| Marine Resource Management |  |  |  |  | MA, MS | X |  | X |  |  |
| Ocean Science |  |  | X |  |  |  |  |  |  |  |
| Ocean, Earth and Atmospheric Sciences |  |  |  |  | $\begin{array}{\|l} \begin{array}{l} \text { MA, MS, } \\ \text { PhD } \end{array} \\ \hline \end{array}$ | x |  |  | x |  |
| Oceanography |  | X |  |  |  |  |  |  |  |  |
| Risk and Uncertainty Quantification in Earth Systems |  |  |  |  |  | x |  |  |  |  |
| Sustainability | BS, HBS | X |  |  |  |  |  |  |  |  |
| Water Conflict Management and Transformation |  |  |  |  |  | x |  | x |  |  |
| College of Education Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| Adult and Higher Education |  |  |  |  | $\begin{array}{\|l} \text { EDD, EDM, } \\ \text { PhD } \end{array}$ |  |  |  | x |  |
| Adult Education |  |  |  |  |  | X |  |  |  |  |
| Advanced Mathematics Teaching |  |  | X |  |  |  |  |  |  |  |
| Advanced Science and Mathematics Education |  |  |  |  |  |  | x |  |  |  |
| Agricultural Education |  |  |  |  |  |  | X |  |  |  |
| Basic Mathematics Teaching |  |  | X |  |  |  |  |  |  |  |
| Biology Teaching |  |  | X |  |  |  |  |  |  |  |
| Chemistry Teaching |  |  | X |  |  |  |  |  |  |  |
| Clinical Mental Health Counseling |  |  |  |  |  |  | X |  |  |  |
| Clinically Based Elementary |  |  |  |  |  |  | X |  |  |  |
| Community College Leadership |  |  |  |  |  |  | X |  |  |  |
| Counseling |  |  |  |  | $\begin{array}{\|l} \hline \text { MCOUN, } \\ \text { PhD } \\ \hline \end{array}$ | x |  |  |  |  |
| Early Childhood/Elementary Teaching |  |  | X |  |  |  |  |  |  |  |
| Education | $\begin{aligned} & \hline \begin{array}{l} \text { BA, BS, HBA, } \\ \text { HBS } \end{array} \\ & \hline \end{aligned}$ | x |  |  | $\begin{aligned} & \text { EDD, EDM, } \\ & \text { MS, PhD } \end{aligned}$ | x |  |  | x |  |
| Elementary |  |  |  |  |  |  | X |  |  |  |
| Family and Consumer Sciences Teaching |  |  | x |  |  |  |  |  |  |  |
| Free-Choice Learning |  |  |  |  |  |  | X |  |  |  |
| Health Teaching |  |  | X |  |  |  |  |  |  |  |
| Integrated Science Teaching |  |  | X |  |  |  |  |  |  |  |
| Language Arts |  |  |  |  |  |  | X |  |  |  |
| Language Arts Teaching |  |  | X |  |  |  |  |  |  |  |
| Language Equity and Educational Policy |  |  |  |  |  |  | x |  |  |  |
| Leadership in Higher Education |  |  |  |  |  |  | X |  |  |  |
| Mathematics |  |  |  |  |  |  | X |  |  |  |
| Mathematics Education |  |  |  |  | $\begin{aligned} & \mathrm{MA}, \mathrm{MS}, \\ & \mathrm{PhD} \end{aligned}$ | x | X |  |  |  |
| Music |  |  |  |  |  |  | X |  |  |  |
| Physics Teaching |  |  | X |  |  |  |  |  |  |  |
| PK-12 English to Speakers of Other Languages (ESOL) |  |  |  |  |  |  | x |  |  |  |
| School Counseling |  |  |  |  |  |  | X |  |  |  |
| Science |  |  |  |  |  |  | X |  |  |  |
| Science Education |  |  |  |  | $\begin{array}{\|l\|} \hline \begin{array}{l} \mathrm{MA}, \mathrm{MS}, \\ \text { PhD } \end{array} \\ \hline \end{array}$ | X | X |  |  |  |
| Science/Mathematics Education |  |  |  |  |  |  | X |  |  |  |
| Social Justice Education |  |  |  |  |  |  | X |  |  |  |
| Social Studies |  |  |  |  |  |  | X |  |  |  |
| Social Studies Teaching |  |  | X |  |  |  |  |  |  |  |
| Teaching |  |  |  |  | MAT |  |  |  |  |  |


| College of Engineering Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Advanced Manufacturing |  |  |  |  |  |  | X |  |  |  |
| Aerospace Engineering |  | X |  |  |  |  |  |  |  |  |
| Applied Computer Science |  |  | X |  |  |  |  |  |  |  |
| Bioengineering | BA, BS, CRED, HBA, HBS |  |  |  | $\begin{array}{\|l} \hline \begin{array}{l} \text { MENG, MS, } \\ \text { PhD } \end{array} \end{array}$ |  |  |  |  |  |
| Biological and Ecological Engineering |  |  |  |  | $\begin{aligned} & \text { MENG, MS, } \\ & \text { PhD } \end{aligned}$ | x |  |  |  |  |
| Business Engineering |  |  | X |  |  |  |  |  |  |  |
| Chemical Engineering | BA, BS, CRED, HBA, HBS |  |  |  | $\begin{aligned} & \text { MENG, MS, } \\ & \text { PhD } \end{aligned}$ | x |  |  |  |  |
| Civil Engineering | BA, BS, CRED, HBA, HBS |  |  |  | $\begin{aligned} & \text { MENG, MS, } \\ & \text { PhD } \end{aligned}$ | x |  |  |  |  |
| Computer Science | BA, BS, CRED, HBA, HBS | x |  |  | MA, MENG, MS, PhD | x |  |  | x |  |
| Computer Science Double Degree |  |  | X |  |  |  |  |  |  |  |
| Computer Systems |  |  | X |  |  |  |  |  |  |  |
| Construction Engineering Management | BA, BS, CRED, HBA, HBS |  |  |  |  |  |  |  |  |  |
| Design |  |  |  |  |  |  | X |  |  |  |
| Ecological Engineering | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Electrical and Computer Engineering | BS, CRED, HBS |  |  |  | $\begin{array}{\|l} \hline \begin{array}{l} \text { MENG, MS, } \\ \text { PhD } \end{array} \end{array}$ | x |  |  |  |  |
| Energy Systems Engineering | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Engineering Management |  |  |  |  |  |  | X |  |  |  |
| Environmental Engineering | BA, BS, CRED, HBA, HBS | x | x |  | $\begin{aligned} & \text { MENG, MS, } \\ & \text { PhD } \end{aligned}$ | x |  |  | X |  |
| Human Systems Engineering |  |  |  |  |  |  | X |  |  |  |
| Humanitarian Engineering |  | X |  |  |  |  |  |  |  |  |
| Industrial Engineering | BS, CRED, HBS |  |  |  | $\begin{aligned} & \text { MENG, MS, } \\ & \text { PhD } \\ & \hline \end{aligned}$ | x |  |  | x |  |
| Information Systems Engineering |  |  |  |  |  |  | x |  |  |  |
| International Engineering |  | X |  |  |  |  |  |  |  |  |
| International Studies | BA, HBA |  |  |  |  |  |  |  |  |  |
| Irrigation Engineering |  | x |  |  |  |  |  |  |  |  |
| Manufacturing Engineering | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Manufacturing Systems Engineering |  |  |  |  |  |  | x |  |  |  |
| Materials Mechanics |  |  |  |  |  |  | x |  |  |  |
| Materials Science |  |  |  |  | MS, PhD | X |  |  |  |  |
| Mechanical Engineering | BS, CRED, HBS |  |  |  | $\begin{aligned} & \text { MENG, MS, } \\ & \text { PhD } \end{aligned}$ | x |  |  |  |  |
| Medical Physics |  |  |  |  | $\begin{aligned} & \mathrm{MMP}, \mathrm{MS}, \\ & \text { PhD } \end{aligned}$ |  |  |  |  |  |
| Nuclear Engineering | BS, CRED, HBS | x |  |  | $\begin{aligned} & \text { MENG, MS, } \\ & \text { PhD } \end{aligned}$ | x |  |  |  |  |
| Radiation Health Physics | BS, CRED, HBS | X |  |  | $\begin{aligned} & \text { MA, MHP, } \\ & \text { MS, PhD } \end{aligned}$ | x |  |  |  |  |
| Radiation Health Physics - Pre Med |  |  | x |  |  |  |  |  |  |  |
| Renewable Energy |  |  |  |  |  |  | X |  |  |  |
| Robotics |  |  |  |  | $\begin{aligned} & \hline \text { MENG, MS, } \\ & \text { PhD } \end{aligned}$ | x | x |  |  |  |
| Sustainability | BS, HBS | x |  |  |  |  |  |  |  |  |
| Thermal Fluid Sciences |  |  |  |  |  |  | X |  |  |  |
| College of Forestry Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| Adventure Leadership Education |  |  | X |  |  |  |  |  |  |  |
| Arid Land Ecology |  |  | X |  |  |  |  |  |  |  |
| Art and Design |  |  | X |  |  |  |  |  |  |  |
| Conservation and Technology |  |  | X |  |  |  |  |  |  |  |
| Ecological Restoration |  |  | X |  |  |  |  |  |  |  |
| Fish and Wildlife Conservation |  |  | x |  |  |  |  |  |  |  |
| Forest Ecosystems |  |  | X |  |  |  |  |  |  |  |
| Forest Ecosystems and Society |  |  |  |  | $\begin{aligned} & \hline \text { MF, MS, } \\ & \text { PhD } \end{aligned}$ |  |  |  | x |  |
| Forest Engineering | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Forest Engineering - Civil Engineering | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Forest Management |  |  | X |  |  |  |  |  |  |  |


| College of Forestry Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Forest Operations Management |  |  | X |  |  |  |  |  |  |  |
| Forest Restoration and Fire |  |  | X |  |  |  |  |  |  |  |
| Forestry | BS, HBS | X |  |  |  |  |  |  |  |  |
| Forests and Climate Change |  |  |  |  |  |  |  | x |  |  |
| Human Dimensions in Natural Resources |  |  | x |  |  |  |  |  |  |  |
| Individualized Specialty (NR major) |  |  | X |  |  |  |  |  |  |  |
| International Studies | BA, HBA |  |  |  |  |  |  |  |  |  |
| Landscape Analysis |  |  | X |  |  |  |  |  |  |  |
| Law Enforcement Natural Resources |  |  | x |  |  |  |  |  |  |  |
| Management and Marketing |  |  | X |  |  |  |  |  |  |  |
| Nature, Eco, and Adventure Tourism |  |  | X |  |  |  |  |  |  |  |
| Natural Resource Education |  |  | x |  |  |  |  |  |  |  |
| Natural Resource Policy and Management |  |  | x |  |  |  |  |  |  |  |
| Natural Resources | BS, CRED, HBS | X |  |  | MNR |  |  |  |  |  |
| Outdoor Recreation Management |  |  | X |  |  |  |  |  |  |  |
| Recreation and Tourism Management |  |  | x |  |  |  |  |  |  |  |
| Renewable Materials | BS, CRED, HBS | X |  |  |  |  |  |  |  |  |
| Science and Engineering |  |  | X |  |  |  |  |  |  |  |
| Sustainability | BS, HBS | X |  |  |  |  |  |  |  |  |
| Sustainable Agroforestry |  |  | X |  |  |  |  |  |  |  |
| Sustainable Forest Management |  |  |  |  | MF, MS, PhD |  |  |  |  |  |
| Sustainable Natural Resources |  |  |  |  |  |  |  | x |  |  |
| Sustainable Tourism Management |  |  | X |  |  |  |  |  |  |  |
| Tourism, Recreation, and Adventure Leadership | BS, HBS |  |  |  |  |  |  |  |  |  |
| Urban Forest Landscapes |  |  | X |  |  |  |  |  |  |  |
| Urban Forestry |  |  |  |  |  |  |  | X |  |  |
| Watershed Management |  |  | X |  |  |  |  |  |  |  |
| Wildland Fire Ecology |  |  | X |  |  |  |  |  |  |  |
| Wood Science |  |  |  |  | MS, PhD | X |  |  | X |  |
| Graduate School Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| Applied Biotechnology |  |  |  |  | PSM |  |  |  |  |  |
| Biological Data Sciences |  |  |  |  |  | X |  |  |  |  |
| Biomedical Sciences |  |  |  |  |  |  | x |  |  |  |
| Clinical Sciences |  |  |  |  |  |  | X |  |  |  |
| College and University Teaching |  |  |  |  |  |  |  | X |  |  |
| Comparative Health Sciences |  |  |  |  | MS, PhD | x |  |  |  |  |
| Environmental Sciences |  |  |  |  | $\begin{aligned} & \hline \text { MA, MS, } \\ & \text { PhD, PSM } \end{aligned}$ | X |  |  |  |  |
| Interdisciplinary Studies |  |  |  |  | MAIS |  |  |  |  |  |
| Molecular and Cellular Biology |  |  |  |  | MS, PhD | X |  |  |  |  |
| Water Resources |  |  |  |  |  | X |  |  |  |  |
| Water Resources Engineering |  |  |  |  | MS, PhD | X |  |  |  |  |
| Water Resources Policy and Management |  |  |  |  | MS | x |  |  |  |  |
| Water Resources Science |  |  |  |  | MS, PhD | X |  |  |  |  |
| College of Liberal Arts Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| 20th Century Studies |  |  |  | X |  |  |  |  |  |  |
| American Studies | BA, BS, CRED, HBA, HBS |  |  |  |  |  |  |  |  |  |
| Anthropology | BA, BS, CRED, HBA, HBS | X |  |  |  | X |  |  |  |  |
| Applied Anthropology |  |  |  |  | MA, MS, PhD | X |  |  | X |  |
| Applied Ethics |  |  |  | X | MA | X |  |  | X |  |
| Applied Visual Arts | CRED |  |  |  |  |  |  |  |  |  |
| Archaeology |  |  | X |  |  |  |  |  |  |  |
| Art | BA, BFA, BS, CRED, HBA, HBFA, HBS |  |  |  |  | X |  |  |  |  |
| Art History |  | x | X |  |  |  |  |  |  |  |
| Asian Languages and Cultures |  | X |  |  |  |  |  |  |  |  |


| College of Liberal Arts Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Asian Studies |  | X |  |  |  |  |  |  |  |  |
| Biocultural Option |  |  | X |  |  |  |  |  |  |  |
| College Student Services Administration |  |  |  |  | EDM, MS |  |  |  |  |  |
| Communication |  | X | X |  |  |  |  |  |  |  |
| Community Development and Leadership |  |  | X |  |  |  |  |  |  |  |
| Contemporary Hispanic Studies |  |  |  |  | MA | X |  |  |  |  |
| Creative Writing |  |  |  |  | MFA | X |  |  |  |  |
| Crime and Justice |  |  | x |  |  |  |  |  |  |  |
| Cultural/Linguistic |  |  | X |  |  |  |  |  |  |  |
| Digital Communication Arts | BA, BFA, BS, CRED, HBA, HBFA, HBS |  |  |  |  |  |  |  |  |  |
| Economics | BA, BS, CRED, HBA, HBS | X |  |  |  |  |  |  |  |  |
| English | BA, CRED, HBA | X |  |  | MA | X |  |  | X |  |
| Environmental and Energy Politics |  |  | X |  |  |  |  |  |  |  |
| Environmental and Natural Resource Sociology |  |  | x |  |  |  |  |  |  |  |
| Environmental Arts and Humanities |  |  |  |  | MA | X |  |  |  |  |
| Ethnic Studies | BA, BS, CRED, HBA, HBS | x |  |  |  | X |  |  |  |  |
| Film Studies |  | X |  |  |  |  |  |  |  |  |
| Food in Culture and Social Justice |  |  |  | X |  | X |  |  |  |  |
| Foreign Languages and Literatures |  |  |  |  |  | X |  |  |  |  |
| French | BA, CRED, HBA | X |  |  |  |  |  |  |  |  |
| General Anthropology |  |  | X |  |  |  |  |  |  |  |
| German | BA, CRED, HBA | X |  |  |  |  |  |  |  |  |
| Global Development Studies |  | X |  |  |  |  |  |  |  |  |
| Graphic Design | $\begin{aligned} & \text { BFA, CRED, } \\ & \text { HBFA } \end{aligned}$ |  |  |  |  |  |  |  |  |  |
| History | BA, BS, CRED, HBA, HBS | x |  |  |  | X |  |  |  |  |
| History of Science |  |  |  |  | MA, MS, PhD | x |  |  | x |  |
| Instrumental Performance |  |  | X |  |  |  |  |  |  |  |
| International Affairs |  |  | X |  |  |  |  |  |  |  |
| International Studies | BA |  |  |  |  |  |  |  |  |  |
| Language in Culture |  |  |  | X |  |  |  |  |  |  |
| Latin American Affairs |  |  |  | X |  |  |  |  |  |  |
| Law and Politics |  |  | X |  |  |  |  |  |  |  |
| Law, Economics and Policy |  |  | X |  |  |  |  |  |  |  |
| Liberal Studies | BA, BS, CRED, HBA, HBS |  |  |  |  |  |  |  |  |  |
| Managerial Economics |  |  | x |  |  |  |  |  |  |  |
| Mathematical Economics |  |  | X |  |  |  |  |  |  |  |
| Medical Humanities |  |  |  | X |  |  |  |  |  |  |
| Multimedia |  | X |  |  |  |  |  |  |  |  |
| Music | BA, BS, CRED, HBA, HBS | X |  |  |  | X |  |  |  |  |
| Music Education |  |  | X |  |  |  |  |  |  |  |
| Music Performance |  | X |  |  |  |  |  |  |  |  |
| Music Production |  |  | X |  |  |  |  |  |  |  |
| New Media Communications |  | X |  |  |  |  |  |  |  |  |
| Peace Studies |  |  |  | X |  |  |  |  |  |  |
| Philosophy | BA, BS, CRED, HBA, HBS | x |  |  |  | X |  |  |  |  |
| Photography |  | X |  |  |  |  |  |  |  |  |
| Photography and Digital Studio |  |  | X |  |  |  |  |  |  |  |
| Photography and Digital Studio BFA |  |  | X |  |  |  |  |  |  |  |
| Piano Performance |  |  | X |  |  |  |  |  |  |  |
| Political Science | BA, BS, CRED, HBA, HBS | x |  |  |  | x |  |  |  |  |
| Popular Music Studies |  | X |  |  |  |  |  |  |  |  |
| Pre-Education |  |  | X |  |  |  |  |  |  |  |


| College of Liberal Arts Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Psychology | BA, BS, CRED, HBA, HBS | X |  |  | MS, PhD | X |  |  | X |  |
| Public Policy |  |  |  |  | MPP, PhD |  |  |  |  |  |
| Queer Studies |  | X |  |  |  | X |  |  |  |  |
| Religion and Culture |  |  |  | X |  |  |  |  |  |  |
| Religious Studies | BA, BS, CRED, HBA, HBS | x |  |  |  |  |  |  |  |  |
| Russian Studies |  |  |  | X |  |  |  |  |  |  |
| Scientific, Technical, and Professional Communication |  |  |  | X |  |  |  |  |  |  |
| Social Justice |  | x |  |  |  |  |  |  |  |  |
| Social Science | BA, BS, CRED |  |  |  |  |  |  |  |  |  |
| Sociology | BA, BS, CRED, HBA, HBS | x |  |  |  | x |  |  |  |  |
| Spanish | BA, CRED, HBA | x |  |  |  |  |  |  |  |  |
| Speech Communication | BA, BS, CRED, HBA, HBS |  |  |  |  | x |  |  |  |  |
| Studio Art |  | X | X |  |  |  |  |  |  |  |
| Studio Art BFA |  |  | x |  |  |  |  |  |  |  |
| Sustainability | BS, HBS | x |  |  |  |  |  |  |  |  |
| Theater Arts |  | X | X |  |  |  |  |  |  |  |
| Vocal Performance |  |  | x |  |  |  |  |  |  |  |
| Women, Gender, and Sexuality Studies | BA, BS, CRED, HBA, HBS | x |  | x | MA, PhD | x |  |  | x |  |
| Writing |  | X |  |  |  |  |  |  |  |  |
| College of Pharmacy Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| Pharmaceutical Sciences |  |  |  |  | MS, PhD | X |  |  |  |  |
| $\begin{aligned} & \text { Pharmacy, Doctor of Pharmacy } \\ & \text { (4-year) } \\ & \hline \end{aligned}$ |  |  |  |  | D PHAR |  |  |  |  | X |
| College of Public Health and Human Sciences Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| Adapted Physical Activity |  |  |  |  |  |  | X |  |  |  |
| Aging Sciences |  |  |  |  |  | X |  |  |  |  |
| Athletic Training |  |  |  |  | MATRN |  |  |  |  |  |
| Biostatistics |  |  |  |  |  |  | X |  |  |  |
| Child Development |  |  | X |  |  |  |  |  |  |  |
| Community Health |  |  |  |  |  | X |  |  |  |  |
| Dietetics |  |  | X |  |  |  |  |  |  |  |
| Early Childhood Development and Education |  | X |  |  |  |  |  |  |  |  |
| Environmental and Occupational Health |  | x |  |  |  |  | x |  |  |  |
| Epidemiology |  |  |  |  |  |  | X |  |  |  |
| Exercise Physiology |  | x |  |  |  |  |  |  |  |  |
| Gerontology |  |  |  | X |  | X |  |  |  |  |
| Global Health |  |  |  |  |  |  | X |  |  |  |
| Health Management and Policy |  | x | x |  |  |  | x | X |  |  |
| Health Promotion and Health Behavior |  |  | x |  |  |  | x |  |  |  |
| Human Development and Family Science, General |  |  | x |  |  |  |  |  |  |  |
| Human Development and Family Sciences | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Human Development and Family Studies |  |  |  |  | MS, PhD | X |  |  | X |  |
| Human Services |  |  | x |  |  |  |  |  |  |  |
| International Studies | BA, HBA |  |  |  |  |  |  |  |  |  |
| Kinesiology | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Kinesiology |  |  |  |  | MS, PhD | x |  |  | X |  |
| Nutrition | BS, CRED, HBS | x |  |  | MS, PhD | x |  |  | X |  |
| Nutrition and Foodservice Systems |  |  | X |  |  |  |  |  |  |  |
| Nutrition and Health Sciences |  |  | X |  |  |  |  |  |  |  |
| Pre-Dietetics |  |  | X |  |  |  |  |  |  |  |
| Pre-Therapy and Allied Health |  |  | X |  |  |  |  |  |  |  |
| Public Health | BS, CRED, HBS | x |  |  | MPH, PhD | X |  | X |  |  |
| Sustainability | BS, HBS | X |  |  |  |  |  |  |  |  |


| College of Science Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Actuarial Science |  | X |  |  |  |  |  |  |  |  |
| Advanced Biochemistry |  |  | X |  |  |  |  |  |  |  |
| Advanced Chemistry |  |  | X |  |  |  |  |  |  |  |
| Advanced Molecular Biology |  |  | x |  |  |  |  |  |  |  |
| Applied and Computational Mathematics |  |  | x |  |  |  |  |  |  |  |
| Applied Physics |  |  | X |  | MS, PSM |  |  |  |  |  |
| Aquatic Microbiology |  |  | x |  |  |  |  |  |  |  |
| Biochemistry |  |  | x |  |  |  |  |  |  |  |
| Biochemistry and Biophysics | BS, HBS |  |  |  | MA, MS, PhD | x |  |  | x |  |
| Biochemistry and Molecular Biology | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| BioHealth Sciences | BS, CRED, HBS |  |  |  |  |  |  |  |  |  |
| Biological Physics |  |  | x |  |  |  |  |  |  |  |
| Biology | BS, HBS | X |  |  |  |  |  |  |  |  |
| Business |  |  | x |  |  |  |  |  |  |  |
| Chemical Engineering |  |  | X |  |  |  |  |  |  |  |
| Chemical Physics |  |  | X |  |  |  |  |  |  |  |
| Chemistry | BA, BS, CRED, HBA, HBS | x |  |  | $\begin{aligned} & \mathrm{MA}, \mathrm{MS}, \\ & \text { PhD } \end{aligned}$ | x |  |  |  |  |
| Chemistry Education |  |  | x |  |  |  |  |  |  |  |
| Computational Molecular Biology |  |  | x |  |  |  |  |  |  |  |
| Computational Physics |  |  | x |  |  |  |  |  |  |  |
| Data Analytics |  |  |  |  | MS |  |  | X |  |  |
| Ecology |  |  | x |  |  |  |  |  |  |  |
| Environmental Chemistry |  |  | x |  |  |  |  |  |  |  |
| Forensic Science |  |  | X |  |  |  |  |  |  |  |
| Genetics |  |  | x |  |  |  |  |  |  |  |
| Geophysics |  |  | x |  |  |  |  |  |  |  |
| Integrative Biology |  |  |  |  | MS, PhD | x |  |  |  |  |
| International Studies | BA, HBA |  |  |  |  |  |  |  |  |  |
| Management for Science Professionals |  |  |  |  |  |  |  | X |  |  |
| Marine Biology |  |  | X |  |  |  |  |  |  |  |
| Marine Biology and Ecology |  | X |  |  |  |  |  |  |  |  |
| Materials Science |  |  | x |  |  |  |  |  |  |  |
| Mathematical Biology |  |  | x |  |  |  |  |  |  |  |
| Mathematical Physics |  |  | X |  |  |  |  |  |  |  |
| Mathematics | BS, CRED, HBS | x |  |  | $\begin{aligned} & \mathrm{MA}, \mathrm{MS}, \\ & \text { PhD } \end{aligned}$ | x |  |  | x |  |
| Microbiology | BS, HBS | x |  |  | MA, MS, PhD | x |  |  |  |  |
| Optical Physics |  |  | X |  |  |  |  |  |  |  |
| Physics | BA, BS, CRED, HBA, HBS | x |  |  | MA, MS, PhD | x |  |  | x |  |
| Physics Teaching/Physics |  |  | x |  |  |  |  |  |  |  |
| Physiology and Behavior |  |  | x |  |  |  |  |  |  |  |
| Pre-Clinical Laboratory Science |  |  | x |  |  |  |  |  |  |  |
| Pre-Dentistry |  |  | X |  |  |  |  |  |  |  |
| Pre-Dentistry/Biology |  |  | X |  |  |  |  |  |  |  |
| Pre-Education Biology |  |  | X |  |  |  |  |  |  |  |
| Pre-Medicine (Chemistry major) |  |  | X |  |  |  |  |  |  |  |
| Pre-Medicine (BioHealth Sciences major) |  |  | x |  |  |  |  |  |  |  |
| Pre-Medicine/Biochemistry and Molecular Biology |  |  | X |  |  |  |  |  |  |  |
| Pre-Medicine/Biology |  |  | x |  |  |  |  |  |  |  |
| Pre-Medicine/Microbiology |  |  | x |  |  |  |  |  |  |  |
| Pre-Optometry |  |  | X |  |  |  |  |  |  |  |
| Pre-Pharmacy |  |  | x |  |  |  |  |  |  |  |
| Pre-Physical Therapy |  |  | X |  |  |  |  |  |  |  |
| Pre-Physician Assistant |  |  | x |  |  |  |  |  |  |  |
| Pre-Podiatry |  |  | X |  |  |  |  |  |  |  |
| Pre-Veterinary Medicine |  |  | X |  |  |  |  |  |  |  |
| Secondary Teaching Emphasis |  |  | X |  |  |  |  |  |  |  |


| College of Science Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Statistics |  | X | X |  | MA, MS, PhD | X |  |  | x |  |
| Sustainability | BS, HBS |  | X |  |  |  |  |  |  |  |
| Zoology | BS, HBS |  |  |  |  |  |  |  |  |  |
| College of Veterinary Medicine Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| Veterinary Medicine - DVM |  |  |  |  | DVM |  |  |  |  | X |
| ROTC Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| Aerospace Studies |  | X |  |  |  |  |  |  |  |  |
| Military Science |  | X |  |  |  |  |  |  |  |  |
| Naval Science-U.S. Marine Corps |  | x |  |  |  |  |  |  |  |  |
| Naval Science-U.S. Navy |  | X |  |  |  |  |  |  |  |  |
| University Honors College Programs | Undergrad. Majors | Undergrad. Minors | Undergrad. Options | Certs | Grad. Majors | Grad. Minors | Grad. Options | Grad. Certs | MAIS | Professional Programs |
| Honors Associate | HBA, HBFA, HBS |  |  |  |  |  |  |  |  |  |
| Honors Scholar | HBA, HBFA, HBS |  |  |  |  |  |  |  |  |  |

## TUITION AND FEES AND PAYMENT: 2017-2018

For a full listing of tuition and fees, please visit OSU Business Affairs at http://fa.oregonstate.edu/business-affairs/ tuition-and-fee-information.
Advance Tuition Deposit: $\mathbf{\$ 2 0 0 . 0 0}$
New undergraduate students will be requested to submit a tuition deposit of $\$ 200.00$ after being admitted to the university. This deposit is the indication of a student's intent to enroll at OSU.

- Fall Term only: Payment for your Advance Tuition Deposit is required to participate in the START program, which allows students to register for fall term classes. After May 1, the deposit is nonrefundable. Note: Not applicable to Ecampus students.


## MANDATORY ENROLLMENT FEES

Students paying mandatory enrollment fees are entitled to services maintained by OSU for the benefit of students. These services include the use of the library; use of laboratory equipment and materials; medical attention and advice at the Student Health Center; use of gymnasium equipment; the student newspaper; admission to some athletic events; admission to concerts and lectures; and registration. No reduction in fees is made to students who may not wish to use these privileges. Employees paying staff fees are entitled to instructional and library privileges only.

MATRICULATION FEE: $\$ 350.00$
All new students (except non-degree seeking) are charged a one-time fee of $\$ 350.00$ at the start of their first term at OSU. This fee provides access to a variety of OSU programs and services at no additional charge. Programs and services included in the fee include, but are not limited to, open house programs, START, CONNECT, pre-enrollment advising, course drop/add/withdrawal, and official transcripts.

## OTHER FEES

Subject to change without notice.

## GRADUATE RESEARCH

ASSISTANT TUITION AND FEES
See Tuition and Fee Information on the OSU Business Office website (http:// fa.oregonstate.edu/business-affairs/ tuition-and-fee-information). Click on "Corvallis Campus Tuition/Fees." Then click on "GRA/GTA Remission."

## PHARMACY TUITION AND FEES

See Tuition and Fee Information on the OSU Business Office website (http:// fa.oregonstate.edu/business-affairs/ tuition-and-fee-information). Click on "Corvallis Campus Tuition/Fees" for the desired year. This opens a PDF within
which you scroll down to the information for Oregon State University-Corvallis Campus Pharmacy Program (usually page 6).

## VETERINARY MEDICINE TUITION AND FEES

See Tuition and Fee Information on the OSU Business Office website (http:// fa.oregonstate.edu/business-affairs/ tuition-and-fee-information). Click on "Corvallis Campus Tuition/Fees" for the desired year. This opens a PDF within which you scroll down to the information for Oregon State University-Corvallis Campus Veterinary Medicine (usually the last page).

## ACADEMIC YEAR FEE BOOK

For more information about tuition and fees, see the Academic Year Fee Book on the OSU Budgets website at http:// fa.oregonstate.edu/budget.

## CURRENT STUDENT ACCOUNTS OFFICE WEBSITE

Go to http://fa.oregonstate.edu/ business-affairs/studentbilling.

## NONDEGREE STUDENTS

(This category is designed for students not planning to complete a degree at OSU.)

Nondegree students may only enroll in 8 or fewer credits and pay tuition/fees at resident rates based on undergraduate or graduate course level. To be eligible to use Student Health Services, you must also pay the student health fee.

If a nondegree student were to enroll in 9 or more credits they would pay tuition/fees based on the undergraduate or graduate tuition fee schedule determined by the student's status.
For more information, call Student Accounts at 541-737-3775.

## FEE PAYMENT OBLIGATION

Web registration presents you with a confirmed class schedule. When you finish registering, your schedule is official. This obligates you to pay all tuition and fees for your classes. If you wish to cancel this commitment and reduce or eliminate tuition charges for the term, you must officially cancel your registration or withdraw from the term. See the Tuition Reduction Schedule at http://fa.oregonstate.edu/business-affairs/tuition-and-fee-information/ tuition-reduction-schedule.
Electronic billing statements are processed around the 5th of each month. Notification that your statement is ready will be sent to your ONID email address. It is very important that your ONID address is active and that you are checking it regularly. You may also select to have your ONID email forwarded to an alternate address. You may view your month-
ly billing statements by logging onto the eBill website at http://mybill.oregonstate. edu. See "eBill and eCheck" at http:// fa.oregonstate.edu/business-affairs/ ecommerce-osu/ebill-and-echeck.

## You may pay your tuition and fees

 in the following ways:OSU currently accepts eCheck, paper checks, money orders and cash as acceptable payment methods. Students can use MyOSU, http://myosu.oregonstate. edu/, (Paying for College, Financial Services, Pay My Bill), as a convenience option for making credit card payments. Please see the Cashiers website for more details regarding all acceptable payment methods.
Accounts are "due upon receipt" of the monthly statement, and any unpaid balance remaining after the 1st of each month is subject to an interest charge of 1 percent per month ( 12 percent APR).

## REGISTRATION/TRANSCRIPT HOLD POLICY

If you are enrolled for the current term, you will be allowed to register for the following term only if your account balance consists of charges only from recent academic terms-the current term and one term prior-and your overall account balance does not exceed $\$ 2,200.00$. If you are not currently enrolled, you must have your account balance paid in full in order to register.

Requests for transcripts cannot be processed until your account balance is paid in full.

## DROP/WITHDRAW REFUNDS

Students who drop or withdraw from a class, or withdraw from the term may be eligible for a tuition refund. Refunds are based on assessed tuition, course fees, and mandatory fees, and are calculated from the date you officially drop, withdraw, or cancel your registration or reduce your class load, not the last date of class attendance. Please see "Registration Cancellation/Withdrawal from the Term."

Refunds are processed as a credit on your account. A check will be issued to you if any credit balance remains after other charges and financial aid repayments have been satisfied. No refunds are authorized for persons paying staff rates. Allow about two weeks for processing a refund. Your refund will be sent to your current mailing address. Be sure to update your current mailing address online in MyOSU, https://myosu.oregonstate.edu/.

The Tuition/Fee Reduction
Schedule below follows those policies as established by Oregon State University (there are no refunds given for persons paying staff rates):

| Academic Year 2017-2018 |  |  |
| :---: | :---: | :---: |
| Drop Dates | Tuition | on |
| for Tuition Refunds | Credit | Due |
| Fall 2017 |  |  |
| October 1 | 100\% | 0\% |
| October 2-15 | 50\% | 50\% |
| After October 15 | 0\% | 100\% |
| Winter 2018 |  |  |
| January 14 | 100\% | 0\% |
| January 15-28 | 50\% | 50\% |
| After January 28 | 0\% | 100\% |
| Spring 2018 |  |  |
| April 8 | 100\% | 0\% |
| April 9-22 | 50\% | 50\% |
| After April 22 | 0\% | 100\% |
| All deadlines are up to | 11:55 p.m |  |

## HOW TO HANDLE AN ERROR IN BILLING

If there appears to be an error on your monthly statement, use the following guidelines:
Graduate Assistants: Errors may occur due to incorrect rate codes. Please notify your department.

Residents Billed Nonresident
Rates: Pay the amount appropriate for a resident and then go to the Office of Admissions to confirm your residency status. You will be advised as to the next action to take.

Financial Aid Not Applied: If financial aid has not been applied you should verify approval of scholarships and grants at the Office of Financial Aid and Scholarships, A218 Kerr Administration Building, 541-737-2241, financial. aid@oregonstate.edu.
Support Payments Not Applied: Verify approval for support billing at Business Affairs, B100 Kerr Administration Building, ThirdPartyBilling@oregonstate.edu.

Housing: Verify the billed amount with the University Housing and Dining Office, Oxford House, 957 SW Jefferson Ave., 541-737-4771.

Any Other Billing Amount Errors: Pay based upon the correct amount, then contact the Business Affairs, B100 Kerr Administration Building for assistance, 541-737-3775, Accounts.
Receivable@oregonstate.edu.

## SPECIAL FEES

Application Fee for Admission (not refundable)-
Undergraduate - \$60
Graduate - \$60.00
Nondegree-Seeking Student - \$30.00

## Archiving Doctoral Thesis -

All doctoral candidates pay a minimum fee of $\$ 25, \$ 80$ if paying for copyright (optional), for archiving of the doctoral dissertation. See the Thesis Guide at http://gradschool.oregonstate.edu/ progress/thesis-guide.

## Auditor's Fee- <br> Fee to audit a course is the same as regular fees in all classes. <br> Collection Fee - \$10 to \$60.00 <br> If you are enrolled Fall term 2017 and do not enroll Winter term 2018 and you leave school owing the university money and collection proceedings are initiated, you may be assessed a service charge. For balances of $\$ 50$ to $\$ 99.99$, the fee is $\$ 10$; for $\$ 100$ to $\$ 499.99$, the fee is $\$ 20$; for $\$ 500$ or more, the fee is $\$ 60$. <br> Course Fees <br> Certain courses have additional fees. Refer to the Schedule of Classes for individual course fees.

Diploma Mailing Fee- \$25.00
(\$40.00 out of country)
Duplicate Diploma - \$40.00 (Covers mailing)
Assessed to cover the cost of special printing order and handling.

## Examination for Credit-

 \$80.00 per exam
## Examination for Waiver-

 $\$ 80.00$ per examFAX Service - \$20.00 per request to fax documents.
Individual Music Lesson Fee -
Consult the Music office in the School of Arts and Communication.
Late Registration Change - \$20.00 per course changed
There is no charge to change registration (add, drop, withdraw from a course, change credits, change grade option, or change to audit) by the stated deadlines. Each registration change after the stated deadlines will be charged a $\$ 20.00$ late registration fee. This applies to any late add, late add to audit, late drop, late withdrawal from a course, late change in grading basis, or late change in course credit. If you initially register after the end of the second week of the term, you will be charged a $\$ 100.00$ late registration fee, but the $\$ 20.00$ fee is not charged when the $\$ 100.00$ late registration fee is charged. For any registration change thereafter, however, you will be charged the $\$ 20.00$ fee.

## Late Registration Fees - \$50.00 and \$100.00

A late registration fee of $\$ 50.00$ will be assessed for all initial registrations during the first two weeks of classes. For registrations approved after the first two weeks of classes (i.e., after the end of the late registration period) a late fee of $\$ 100.00$ will be assessed.

## Library Fines and Fees

- Overdue fine for OSU circulating books is $\$ 0.25$ per day; Summit and Interlibrary Loan are $\$ 1.00$ per day.
- Overdue fine for Reserve Book Room material and Equipment checkout:

1. Hourly Reserves, $\$ 2.00$ per hour.
2. Daily Reserves, $\$ 2.00$ per day.
3. Hourly Equipment, $\$ 1$ to $\$ 10$ per hour.
4. Daily Equipment, $\$ 1$ per day.

Borrowers failing to return regular materials within 42 days of the due date, or equipment and reserves within 6 days of the due date are charged the replacement cost of equipment or a generalized replacement cost of $\$ 70$ for books, $\$ 140$ for Reserve and AV materials. When such items are returned before the replacement has been ordered, the replacement cost will be refunded, and the borrower is only charged the amount of the fine (not to exceed the replacement cost). When such items are returned after replacement items have been ordered, no refund will be made. A charge at cost, to be determined by the library, may be made for repair or replacement of damaged or mutilated library material. For further details, see http://osulibrary.oregonstate. edu/borrowing/fines.

## PELP Fee (Undergraduate Planned

 Educational Leave Program) \$25.00Non-refundable application fee allows an undergraduate student to maintain their official standing as a student at OSU and reserves the student's right to keep their original academic catalog active during their absence.

## Re-Admission Fee: Graduate - Domestic Students \$75.00; International Students \$85.00

 Required after an absence of one term unless on an approved and recorded leave of absence. See "Registration Requirements" in the Graduate School section of the catalog.
## Re-Admission Fee: Undergraduate

 - \$25.00Required after an absence of one year.
See "Eligibility to Register" in the How to Register section for details.

## Reinstatement Fee - \$50.00

If a student is suspended and wishes to be reinstated, the student must pay the reinstatement fee to return to the university.
Returned Check Fee - \$25.00
If a check is returned because of any irregularity for which the student is responsible, a fine of $\$ 25.00$ will be charged.
Replacement ID Card Fee - \$30.00
Senior Citizen Fee - for special materials only
Persons 65 or older may attend class on a noncredit, space-available basis.

## Service Fee for International <br> Programs -

A $\$ 275.00$ per term administrative management fee will be charged for international students supported under
contractual arrangement with sponsoring agencies or entities requiring special administrative or management services beyond those normally provided. This program and finance fee will be assessed for these international student programs that are administered and managed by the International Student and Faculty Services office.

## Special Examination Fee -

See examination for credit/waiver in the list above.

## Staff Fee (except staff auditors) - $\mathbf{3 0}$ percent of resident undergraduate tuition

 Staff members or their dependents may register for courses at 30 percent of the per credit resident undergraduate tuition. Academic, professional, and classified employees whose appointment is equivalent to 0.50 or more may take up to 12 credits a term at this rate. Payment of the staff fee entitles the staff members to instructional and library privileges only. The fee is not refundable. The applicable course fees and resources fees are charged at 100 percent, and family members are subject to other mandatory enrollment fees. Eligibility for the staff rate must be approved by the Office of Human Resources.If you are intending to enroll for course work at another state university in Oregon, you must submit the staff fee privileges approval form to OSU-HR two days prior to the first day of classes.

If you are transferring the staff fee privilege to your dependent, and they are intending to enroll for course work at another state university in Oregon, you must submit the staff fee privileges approval form to OSU-HR two weeks prior to the first day of classes.

Staff fees are nonrefundable.

## Stop Payment Fee - \$15.00

Fee assessed when the payee of an OSU check requests a stop payment order.

## Student ID Card Services Fee \$20.00

Charged to all new and readmitted students their first term after admission or readmission. Ecampus students are not charged this fee unless they request an ID card (ID.Center@oregonstate.edu) or attend an on-campus class.
Transcripts - $\mathbf{\$ 1 0 . 0 0}$ or no fee, depending on delivery method Official electronic transcripts or E-transcripts (PDF) are $\$ 10.00$. Official paper transcripts and unofficial transcripts are free. Instructions on how to order transcripts are available at http://registrar.oregonstate.edu/transcripts. Please note that all obligations to OSU must be cleared before transcript orders can be processed.

## Verification of Enrollment Fee \$15.00 per verification

See Certification of Enrollment or Degree "You can do it on the Web" for other options.

## FINANCIAL AID

## Scholarships, Student Loans, and Grants

Eligible students who have accepted scholarships, student loans and grant awards will have those funds applied automatically to their student billing account. You can monitor your financial aid eligibility and billing account through MyOSU.

If financial aid amounts exceed the amount of qualifying tuition/fees expenses owed, a refund will be generated if the surplus exceeds $\$ 1.00$. Distribution of the refund can be made by direct deposit or check. Please note that federal financial aid cannot be posted toward the balance of the matriculation fee, accrued interest, printing charges, parking or library fines or student health service charges.

- If you would like direct deposit of your financial aid refund, complete the Direct Deposit form found through Online Services or Student Finance website at http:// fa.oregonstate.edu/business-affairs/ student-finance.
- If you would like your refund as a check, your current mailing address must be up to date for all check processing. You can do this through MyOSU, https://myosu.oregonstate. edu/.
For full details, visit the Business
Affairs Office Website. Click on Current Student.

Beginning the third week of the term, students eligible for refunds due to financial aid or scholarship disbursements may request a refund at the Cashier's Office or through email at refund@oregonstate.edu.

## EMERGENCY LOANS

Emergency loans, not to exceed $\$ 350.00$ per term, are available to students in good financial standing, attending at least half time, and formally admitted to the university. Loans are to be repaid by the last day of the current term. Loan amounts become part of the revolving account balance and carry interest at 1 percent per month (12 percent APR). The Cashier's Office reviews the applications and issues payment if approved. Application forms are available at the Cashier's Office in the Kerr Administration Building. Be sure to have your OSU ID and a second photo ID to present with the application.

Ecampus students can email cashiers. office@oregonstate.edu to request the
application. They will be asked to scan the completed form and email it back to the Cashier's Office with accompanying identification.

## PAYMENT OF STUDENT FEES

## Payment of Nonresident

## Instruction Fee (580-10-080)

1. All students classified as nonresidents shall pay a nonresident fee.
2. Refunds of the nonresident fee may be granted if the student shows that the classification previously assigned was in error. However, no such refund shall be made unless the student applies and submits all supporting information for residency status prior to the last day to register for the term in which the student seeks the change of status.

## Enrollment of Spouse and

Dependent Children (580-010-086)
The spouse and dependent children of regular department staff members with a full-time equivalent of at least .50 may enroll as students at resident fee rates in department institutions.

## In-State Tuition for Veterans

The following individuals shall be charged the in-state rate, or otherwise considered a resident, for tuition and fees purposes:

- A Veteran using educational assistance under either chapter 30 (Montgomery G.I. Bill - Active Duty Program) or chapter 33 (Post-9/11 G.I. Bill), of title 38, United States Code, who lives in the State of Oregon while attending a school located in the State of Oregon (regardless of his/her formal State of residence) and enrolls in the school within three years of discharge or release from a period of active duty service of 90 days or more.
- Anyone using transferred Post-911 G.I. Bill benefits (38 U.S.C. § 3319) who lives in the State of Oregon while attending a school located in the State of Oregon (regardless of his/ her formal State of residence) and enrolls in the school within three years of the transferor's discharge or release from a period of active duty service of 90 days or more.
- Anyone using benefits under the Marine Gunnery Sergeant John David Fry Scholarship (38 U.S.C. § 3311(b) (9)) who lives in the State of Oregon while attending a school located in the State of Oregon (regardless of his/ her formal State of residence) and enrolls in the school within three years of the Service member's death in the line of duty following a period of active duty service of 90 days or more.
- Anyone described above while he or she remains continuously
enrolled (other than during regularly scheduled breaks between courses, semesters, or terms) at the same school. The person so described must have enrolled in the school prior to the expiration of the three-year period following discharge, release, or death described above and must be using educational benefits under either chapter 30 or chapter 33 , of title 38, United States Code.


## RESIDENGY REQUIREMENTS

RESIDENCY: OSU ADMISSIONS WEBSITE
For further details about residency, please visit the OSU Admissions website at http://admissions.oregonstate.edu/residency or email Residency@oregonstate. edu.

## APPENDIX I: RESIDENCY

## STANDARDS: A-G

## A. Definitions

For the purpose of these Residency Standards the following definitions apply:

1. "Domicile" is a person's true, fixed, and permanent home and place of habitation. It is the place where a person intends to remain and to which the person expects to return when the person leaves without intending to establish a new domicile elsewhere. In order to establish a domicile in Oregon, a person must maintain a predominant physical presence in Oregon for 12 consecutive months after moving to the state.
2. A "financially independent person" is a person who, at the time of application for residency status: (a) declares himself or herself to be financially independent; (b) has not been claimed as a dependent during the immediately preceding tax year, and will not be claimed as a dependent during the current tax year, on the federal or state income tax returns of any other person; and (c) has not received in the immediately preceding calendar year, and will not receive during the current calendar year, one-half or more of his or her support, in cash or in kind, from another person or persons, except for support received from his or her spouse.
3. A "financially dependent person" is a person who, at the time of application for residency status: (a) declares himself or herself to be financially dependent; and (b) has been claimed as a dependent on the federal and state income tax returns of another person during the immediately preceding tax year.
4. "University" or "Universities" are

Oregon public universities listed in ORS 352.002.
5. "Residency Procedure" is the procedure attached as Appendix II to the Interinstitutional Residency Compact, including any subsequent amendments as described in that

## B. Determination of Residence

1. For purposes of admission and instruction fee assessment, Universities who apply these Residency Standards shall classify a student as Oregon resident or nonresident ${ }^{1}$. In determining resident or nonresident classification, the primary issue is a person's intent in coming to Oregon. Intent is inferred from a person's conduct and history as they relate to the requirements of these Residency Standards. If a person is in Oregon primarily for the purpose of obtaining an education, that person will be considered a nonresident. It is possible for an individual to qualify as a resident of Oregon for purposes of voting or obtaining an Oregon driver's license and not meet the residency requirements established by these Residency Standards.
2. An Oregon resident is a financially independent person who, prior to the term for which Oregon resident classification is requested, has both: (a) established and maintained a domicile in Oregon for 12 consecutive months; and (b) during that period, has been primarily engaged in activities other than those of being a college student.
3. A student may be considered primarily engaged in educational activities regardless of the number of hours for which the student is enrolled. However, a student who is enrolled for more than 8 hours in any semester or quarter during the 12-month period referred to in section B. 2 of these Standards shall be presumed to be in Oregon for primarily educational purposes. Such period of enrollment shall not be counted toward the establishment of a bona fide domicile of 12 consecutive months in this state unless the student proves, in fact, establishment of a bona fíde domicile in this state primarily for purposes other than educational.
4. An Oregon resident is also a financially dependent person who is claimed as a dependent by another person who has both: (a) established and maintained an Oregon domicile for 12 consecutive months; and (b) during that period, has been primarily engaged in activities other
than those of being a college student.
5. A financially dependent person who is claimed as a dependent by another person who has not established and maintained an Oregon domicile shall be presumed to be a non-resident. This presumption may be overcome by evidence of the student's longstanding presence in Oregon and demonstration of other factors under Section C of these Standards.
6. The criteria for determining Oregon resident classification shall also be used to determine whether a person who has moved from Oregon has established a non-Oregon residence.
7. If institution records show that the residence of a student or the person upon whom the student is dependent is outside of Oregon, the student shall continue to be classified as a nonresident until entitlement to resident classification is shown. The burden of showing that the residence classification should be changed is on the student requesting the change.
8. Notwithstanding section B. 4 of these Standards, a student who is financially dependent on a nonOregon resident may nonetheless be considered an Oregon resident if the student resides in Oregon for at least 12 consecutive months with a parent or legal guardian who has both: (a) established and maintained an Oregon domicile for 12 consecutive months; and (b) during that period, has been primarily engaged in activities other than those of being a college student.

## Footnote:

${ }^{\mathbf{1}}$ Oregon law establishes two exemptions from non-resident tuition. ORS 351.641 provides an exemption for students who are not US citizens or lawful permanent residents, but who meet certain other qualifications, including attendance at an Oregon school and receiving a high school diploma or equivalent in Oregon. ORS 352.375 provides an exemption for qualified veterans of the U. S. Armed Forces. Students who qualify for either of these exemptions are not considered Oregon residents under these Residency Standards. However, they are exempt from paying non-resident tuition. Questions about these exemptions and the process for establishing eligibility should be directed to the appropriate official at each university.

## C. Residency Consideration Factors

1. The following factors, although not necessarily conclusive or exclusive, have probable value in support of a claim for Oregon resident classification:
a. Reside in Oregon for 12 consecutive months prior to the beginning of the term for which resident classification is sought and during that period be primarily engaged in activities other than those of a college student;
b. Reliance upon Oregon resources for financial support;
c. Domicile in Oregon of persons legally responsible for the student;
d. Acceptance of an offer of permanent employment in Oregon; and
e. Ownership by the person of his or her living quarters in Oregon.
2. The following factors, standing alone, do not constitute sufficient evidence to effect classification as an Oregon resident:
a. Voting or registration to vote;
b. Employment in any position normally filled by a student;
c. The lease of living quarters;
d. Admission to a licensed practicing profession in Oregon;
e. Automobile registration;
f. Public records, for example, birth and marriage records, Oregon driver's license;
g. Continuous presence in Oregon during periods when not enrolled in school;
h. Ownership of property in Oregon or the payment of Oregon income or other Oregon taxes; or
i. Domicile in Oregon of the student's spouse.
3. Reliance upon non-Oregon resources for financial support is an inference of residency in another state.

## D. Evidence of Financial

## Dependency

In determining whether a student is financially dependent, a student must provide:
a. Evidence of established domicile of the person claiming the student as a dependent; and
b. The identification of the student as a dependent on the federal and state income tax returns of the person claiming the student as a dependent. Additional documentation to substantiate dependency during the current calendar year may be required at a later time if deemed necessary by the institution.
c. A student who provides evidence that he or she is a financially dependent person under these rules shall not be required to establish a 12 -month domicile prior to classification of resident status, provided such a student may not be classified as a resident while receiving financial assistance from another state or state agency for educational purposes.

## E. Residence Classification of

## Armed Forces Personnel

1. For purposes of these Standards, members of the armed forces means officers and enlisted personnel of:
a. The Army, Navy, Air Force, Marine Corps, and Coast Guard of the United States;
b. Reserve components of the Army, Navy, Air Force, Marine Corps, and Coast Guard of the United States;
c. The National Guard of the United States and the Oregon National Guard.
2. Notwithstanding Section B, active members of the armed forces and their spouses and dependent children shall be considered residents for purposes of an institution's tuition and mandatory enrollment fees if the members:
a. Reside in this state while assigned to duty at any base, station, shore establishment, or other facility in this state;
b. Reside in this state while serving as members of the crew of a ship that has an Oregon port of shore establishment as its home port or permanent station; or
c. Reside in another state or a foreign country and file Oregon state income taxes no later than 12 months before leaving active duty.
3. An Oregon resident entering the armed forces retains Oregon residence classification until it is voluntarily relinquished.
4. An Oregon resident who has been in the armed forces and assigned on duty outside of Oregon, including a person who establishes residency under section E.2.c of these Standards, must, within a reasonable time, demonstrate intent to retain classification as an Oregon resident. Such intent may be shown by returning to Oregon within six months after completing service in the armed forces.
5. A person who continues to reside in Oregon after separation from the armed forces may count the time spent in the state while in the armed forces to support a claim for classification as an Oregon resident.
6. The dependent child and spouse of a person who is a resident under Section E. 2 of these Standards shall be considered an Oregon resident. "Dependent child" includes any child of a member of the armed forces who:
a. Is under 18 years of age and not married, otherwise emancipated or self-supporting; or
b. Is under 23 years of age,
unmarried, enrolled in a full-time course of study in an institution of higher learning, and dependent on the member for over one-half of his/her support.

## F. Residence Classification of

 Members of Oregon Tribes1. Students who are enrolled members of federally recognized tribes of Oregon or who are enrolled members of a Native American tribe which had traditional and customary tribal boundaries that included parts of the state of Oregon or which had ceded or reserved lands within the state of Oregon shall be assessed resident tuition regardless of their state of residence.
2. For purposes of these Standards, the federally recognized tribes of Oregon are:
a. Burns Paiute Tribe;
b. Confederated Tribes of Coos, Lower Umpqua and Siuslaw;
c. Confederated Tribes of Grand Ronde Community of Oregon;
d. Confederated Tribes of Siletz Indians of Oregon;
e. Confederated Tribes of the Umatilla Indian Reservation;
f. Confederated Tribes of the Warm Springs Indian Reservation;
g. Coquille Indian Tribe;
h. Cow Creek Band of Umpqua Indians;
i. Klamath Tribes.
3. For purposes of this rule these Standards, the Native American tribes which had traditional and customary tribal boundaries that included parts of the state of Oregon or which had ceded or reserved lands within the state of Oregon are:
a. CALIFORNIA:
4. Benton Paiute Tribe;
5. Big Bend Rancheria;
6. Big Lagoon Rancheria;
7. Blue Lake Rancheria;
8. Bridgeport Indian Colony;
9. Cedarville Rancheria;
10. Fort Bidwell Indian Tribe;
11. Hoopa Valley Tribe;
12. Karuk Tribe of California;
13. Likely Rancheria;
14. Lookout Rancheria;
15. Lytton Rancheria;
16. Melochundum Band of Tolowa Indians;
17. Montgomery Creek Rancheria
18. Pit River Tribe;
19. Quartz Valley Indian

Community;
17. Redding Rancheria;
18. Roaring Creek Rancheria;
19. Smith River Rancheria;
20. Susanville Rancheria;

Tolowa-Tututni Tribe;
21. Winnemucca Colony;
22. XL Ranch;
23. Yurok Tribe.
b. IDAHO:

1. Nez Perce Tribe of Idaho;
2. Shoshoni-Bannock Tribes.
c. NEVADA:
3. Duck Valley ShoshonePaiute Tribes;
4. Fallon Paiute-Shoshone Tribe;
5. Fort McDermitt PaiuteShoshone Tribe;
6. Lovelock Paiute Tribe;
7. Pyramid Lake Paiute Tribe;
8. Reno-Sparks Indian Colony;
9. Summit Lake Paiute Tribe;
10. Walker River Paiute Tribe;
11. Winnemucca Indian Colony;
12. Yerington Paiute Tribe.
d. OKLAHOMA: Modoc Tribe of Oklahoma.
e. WASHINGTON:
13. Chehalis Community Council;
14. Colville Confederated Tribes;
15. Quinault Indian Nation;
16. Shoalwater Bay Tribe;
17. Yakama Indian Nation.
18. A student seeking to be assessed resident tuition and mandatory enrollment fees under these Standards shall submit, following procedures prescribed by the University where the student seeks to enroll, a photocopy of tribal enrollment which documents tribal membership.

## G. Residence Classification of NonCitizens

1. A person who is not a citizen of the United States may be considered an Oregon resident if the person qualifies as a resident under Section B and is one of the following:
a. A lawful permanent resident. The date of approval of lawful permanent residency shall be the earliest date upon which the 12 -month residency requirements under Section B may begin to accrue.
b. An immigrant granted refugee or political asylum in the United States. The date of approval of political asylum or refugee status shall be the earliest date upon which the 12 -month residency requirements under Section B may begin to accrue.
c. A person holding one of the following non-immigrant visa classifications: A, E, G, H-1B, $\mathrm{H}-1 \mathrm{C}$, the spouse or child of a person holding an $\mathrm{H}-1 \mathrm{~B}$ or H-1C visa, I, K, L, NATO, O, R, S, T, TN, U, or V. The date of the issuance of a visa for one of these classifications shall be the earliest date upon which the 12-month residency requirements under Section B may begin to accrue. A person possessing a non-immigrant or temporary visa that is not identified under these Standards shall not be considered an Oregon resident under this Section G.1.c.

## Appendix II: Residency Procedure: A-C

## A. Definitions

Definitions in the Residency Standards shall also apply to this Residency Procedure.

## B. Changes in Residence Classification

1. Unless otherwise specified in the Residency Standards, if an Oregon resident student enrolls in an institution outside of Oregon and later seeks to enroll in a University that applies these Residency Standards, the residence classification of that student shall be re-examined and determined on the same basis as for any other person.
2. A student who becomes eligible for resident tuition during a term of enrollment at a University will not qualify for resident tuition until the beginning of the next term.
3. Once established, classification as a resident continues so long as the student remains in continuous academic year enrollment in the classifying University.
4. A person who seeks eligibility for resident tuition under these rules shall complete and submit a notarized Residence Information Affidavit. The affidavit and all required supportive documents and materials must be submitted by the last day to register for the term in which resident status is sought.
5. Universities that apply this Residency Procedure are only bound by determinations of residency that follow this Procedure, including timely submittal of the notarized affidavit.

## C. Review of Residence

Classification Decisions

1. An inter-institutional residency committee (IRC) is established consisting of the officers who determine student residence classification at each University that
applies this Residency Procedure. The chair of the committee shall rotate among the Universities with no chair serving more than two consecutive years. A majority of the members of the Committee shall constitute a quorum. A majority of a quorum may make recommendations.
2. Residence cases of unusual complexity, especially where there may be conflict of rules, may be referred by the originating classification officer to the IRC for its recommendation to the registrar or designee.
3. Any person who is aggrieved by the originating classification officer's classification decision may, within ten days of the date of mailing or other service of the classification decision, request that the IRC review the classification and make recommendations to the registrar or designee of the originating university. The appeal must be in writing and shall be filed with the originating University. An aggrieved person may supply written statements to the IRC for consideration in reviewing the case and may also make an oral presentation to the IRC on a date to be scheduled by the IRC. The IRC shall make a recommendation to the registrar or designee of the originating University. That registrar or designee shall then issue a decision. The decision of the registrar or designee shall be final unless appealed.
4. A person dissatisfied with the decision of the registrar or designee may, within ten days of the date of the mailing or other service of the decision, appeal the decision to the president or designee of the originating University. An appeal shall be in writing only. The decision of the president or designee shall be final.
5. A person granted a meritorious hardship exception to residency under the Oregon Administrative Rules regarding residency prior to July 1, 1990, shall not lose the exception solely because of the repeal of the exception authorization.

The Office of Financial Aid and Scholarships is here to help you invest in your future. We have many financial aid options for undergraduate and graduate students. In general, it is a good idea to submit your FAFSA early January every year to maximize your opportunities. Although we won't review your financial aid information until after your admission application is filed, you can still apply for financial aid before you have been admitted to OSU. Learn more about your options at OSU by choosing a category below so that you can start the process of applying for aid and reaching your goals.

Financial aid is based on the premise that the student and parents are primarily responsible for providing for their education expenses and is intended to supplement student and family contributions toward educational costs. Financial aid comes from many sources, including the federal and state governments, private organizations, and Oregon State University's institutional funds. These funds consist of grants, scholarships, Federal Work-Study, subsidized loans, unsubsidized loans, and parent loans.

## ELIGIBILITY/APPLICATION PROCEDURES

To be eligible for federal financial aid, a student must:

1. Fill out the Free Application for Federal Student Aid (FAFSA), applying as soon as possible after Jan. 1 using previous year tax data (for example the 2016-2017 application will use 2015 tax information). Parents and students may estimate their income information as accurately as possible in order to complete the form and submit it by the OSU priority deadline of February 28. The FAFSA application process allows for the completion of tax information questions from the IRS directly from your return! Follow the prompts while completing the application to authorize this information exchange. Always remember that there is no fee to apply for federal aid.
2. List Oregon State University as a school that you would like your information to be sent to on the FAFSA. Oregon State's federal school code is 003210.
3. The priority FAFSA application deadline for OSU is February 28th. This date is used to determine eligibility for some need-based aid programs as well as state and institutional funds. Applications received after the priority deadline will still be eligible for federal aid such as the Pell Grant and Direct Loans. Graduate students are not eligible for federal Title IV grants or subsidized loans.
4. Make sure you are eligible to receive financial aid. In order to receive federal funding you must:

- Have a high school diploma or a General Education Development (GED) certificate, or complete a high school education in a home school setting that is treated as such under state law.
- Be enrolled or accepted for enrollment in a degree or approved certificate program (e.g., not special admit)
- Be a U.S. citizen or eligible noncitizen.
- Have a valid Social Security Number.
- Register with the Selective Service if required. You can register at http://www.sss.gov, or you can call 1-847-688-6888. (TTY users can call 1-847-688-2567.)
- Maintain satisfactory academic progress as defined by Oregon State University once in school.
- Are not in default on a federal student loan and do not owe money on a federal student grant.
- The Higher Education Act of 1965 as amended (HEA) suspends aid eligibility for students who have been convicted under federal or state law of the sale or possession of drugs, if the offense occurred during a period of enrollment for which the student was receiving federal student aid (grants, loans, and/or workstudy).

5. Apply for admission to Oregon State University: Apply Online. You will not be considered for any financial aid award until you have applied to the university.

WHAT HAPPENS AFTER I APPLY?
Once you have submitted your FAFSA application online you will receive a confirmation of receipt from Federal Student Aid. They will also send you a Student Aid Report that will give you a summary of your application and inform you of any problems you might need to resolve. You should read this report carefully and resolve problems in a timely manner. If you receive notification that something on your FAFSA is missing or incorrect, you can check your financial aid information through MyOSU Financial Aid information or email the OSU Office of Financial Aid and Scholarships for further information.

Students whose aid application was received by the end of February may expect to receive an initial award letter by approximately April 1 . Aid applications are then completed on a rolling basis by date of receipt with award notifications being sent out as files are completed.

Financial Aid and Scholarships
A218 Kerr
Administration
Bldg.
Oregon State
University
Corvallis, OR 97331
541-737-2241
Email: financial. aid@oregonstate.
edu
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financialaid.
oregonstate.edu/
Administration
Doug Severs,
Director
Patti Brady-
Glassman,
Associate Director
Brian Hultgren,
Associate Director
Lois DeGhetto,
Assistant Director
Regan Kaplan,
Assistant Director
Kirk Lind,
Assistant Director
Cynthia Stickle,
Assistant Director
Bobbi Jo
williams, Office Manager

Collyn Arnold, Advisor

Jacob Logan, Advisor

Michele Lynam, Advisor

Cassie Smith, Advisor

## Julie

Vanblokland, Advisor

You will receive an email or letter once your financial aid award has been completed. You will also be notified if you need to provide further information in order for us to complete your application. All correspondence will be sent to your ONID email account, so be sure to keep your information up to date!

The award notification will show the type and amount of aid available to you for the coming school year. To reserve these funds, the student must read and accept the award within 30 days. The accepted award indicates the student has read and agrees to the terms of the award as outlined.
You can accept, reject, or revise your Financial Aid Award through MyOSU by completing the following steps:

- Log in
- Select the Paying for College tab
- Select Financial Aid Awards
- Select the appropriate year (ex. 2016-2017)
- Review your Terms \& Conditions by selecting the Terms and Conditions tab
- Then select Accept Award Offer tab
- Make your decisions about the aid that you want
- Click Submit when done
- Go to www.studentloans.gov to complete any necessary Entrance Counseling or Master Promissory Notes
Your parents can also apply for a Parent PLUS loan up to the remaining cost of attendance by completing a PLUS loan application and Master Promissory Note available for them through the Federal Student Loans website. The PLUS application for the upcoming aid year is available after May 1.

Please note that PLUS loans are credit based and require a separate application process. Please visit www.studentloans.gov for additional information. PLUS credit checks/ applications expire within 180 days, so be sure to wait until 180 days or less prior to the start of the term you are attending before your parent applies.

You are responsible for notifying the OSU Office of Financial Aid and Scholarships in the event that you receive any additional awards from any other source. The OSU Office of Financial Aid and Scholarships will then make any required revisions to your aid package. The receipt of additional aid may result in a reduction or elimination of aid from universi-ty-administered programs, even if it has already been paid.

## TYPES OF FINANCIAL AID

## Federal Programs

Federal Pell Grant - The Federal Pell Grant is a need-based grant from the federal government intended for undergraduate students who have not earned
a bachelor's degree. Each student's award amount is determined on the basis of family circumstances and cost of attendance. After the Free Application for Federal Student Aid (FAFSA) is filed, the Department of Education sends you a Student Aid Report (SAR) or an Information Acknowledgement if you filed online. These documents will indicate if you are Pell eligible and it is important to review them for accuracy.

## Federal Supplemental Edu-

 cational Opportunity Grant (FSEOG) - The Federal Supplemental Educational Opportunity Grant is awarded to undergraduate students with exceptional financial need and is administered by the OSU Office of Financial Aid and Scholarships. Funds are limited and eligibility is based in part by meeting the OSU priority FAFSA submission deadline of February 28.Federal College Work-Study Program (FWS) - The Federal WorkStudy (FWS) program provides part-time jobs for students with financial need to help them pay for their education. It's designed to put you to work in the community or in a job related to your studies, whenever possible. The program is administered by the OSU Office of Financial Aid and Scholarships. Funds are limited and eligibility is based on need and in part by meeting the OSU priority FAFSA submission deadline of February 28. The amount of FWS indicated on your award is the maximum amount you may earn for the academic year. Funds are paid monthly on the basis of hours worked in the pay period not to exceed 20 hours per week. Wages range from the state minimum rate up to $\$ 10.00$ per hour, depending on job responsibilities.

Federal Perkins Loan - A Federal Perkins Loan is a low-interest (5 percent) loan for full-time undergraduate, post-
baccalaureate, and graduate students. Funds are limited and eligibility is based on need and in part by meeting the OSU priority FAFSA submission deadline of February 28. Perkins Loans are made through OSU's Financial Aid office. OSU is your lender, and the loan is made with government funds. Repayment and Deferment options are handled by the OSU Business Affairs Student Loan Office. Students must be enrolled at least halftime and repayment begins nine months after graduation, withdrawal, or if you drop below half-time enrollment. The maximum loan amount per year at OSU depends on available institutional funds and may not meet the federal yearly maximum. The Subsidized Federal Direct Ford Loan is need-based with the government paying the interest on the loan while the student is enrolled. Students must be enrolled at least half-time and repayment begins six months after graduation, withdrawal, or if you drop below half-time enrollment. For current interest rates, visit http://financialaid. oregonstate.edu/.
The Unsubsidized Federal Direct Ford Loan is non-need-based with the student being responsible for paying the interest while enrolled. Students may choose to defer the interest by having it added to the principal, which is called capitalization. Students must be enrolled at least half-time and repayment begins six months after graduation, withdrawal, or if you drop below half-time enrollment. The maximum annual loan limit is $\$ 2,000$. For current interest rates, visit http://financialaid.oregonstate.edu/.
Independent undergraduate students are eligible to borrow an additional Federal Direct Unsubsidized Ford Loan amount. Dependent undergraduates may not borrow from this program, unless

Federal Direct Ford Loan Program - Direct Stafford Loans, from the William D. Ford Federal Direct Loan (Direct Loan) Program, are low-interest loans for eligible students to help cover the cost of higher education. Eligible students borrow directly from the U.S. Department of Education (the department) at participating schools.

## Yearly Loan Limits

If you have been awarded a Ford loan, you are eligible for additional Ford loan funding as you progress through school. Depending on your credits and class standing, you will be able to receive different loan amounts. Below are the credit requirements and loan amounts::

| Class Standing | Credits | Loan Limit (Dependent) | Loan Limit <br> (Independent) |
| :--- | :--- | :--- | :--- |
| Freshman | $0-44$ | $\$ 5,500$ | $\$ 9,500$ |
| Sophomore | $45-89$ | $\$ 6,500$ | $\$ 10,500$ |
| Junior/Senior | $90-$ up | $\$ 7,500$ | $\$ 12,500$ |

If you change class standing in either fall or winter term, you may request that your loans be increased for the current academic year. Download and complete the Loan Revision Form and return it to the Office of Financial Aid and Scholarships for review.
an exception is made by a financial aid advisor due to the student's parent being denied the FDPLUS loan. The additional loan limits are:

- $\$ 4,000$ for the first year and second year of undergraduate study;
- \$5,000 per academic year for the remaining years of undergraduate study.
Federal Direct Parent Loan for Undergraduate Students (FDPLUS) - The FDPLUS is a federal loan borrowed by the parent on behalf of a dependent student to assist with educational expenses. Students are awarded the maximum amount they are personally eligible to receive. Parents may borrow the remaining amount up to the cost of attendance in the form of a Parent PLUS loan. As with all loans, you are not required to take it. Parents are required to complete a FAFSA application to be eligible for a Direct PLUS Loan, and the parent must complete a Direct PLUS Loan Application and Master Promissory Note (MPN) on the Federal Loan website. The PLUS is a non-need based loan. Interest is charged on the loan from the date the first disbursement is made until the loan is paid in full. Payment can be deferred while the student is attending school at least half-time, but interest will continue to accrue. For current interest rates, visit http://financialaid.oregonstate.edu/.


## STATE AND INSTITUTIONAL PROGRAMS <br> Campus Scholarships - Limited

 merit and need-based campus scholarships are administered by the Office of Financial Aid. Eligibility is limited to students who have completed fewer than 12 terms and submit the aid application (FAFSA) by February 1. Recipients must be enrolled full time and are notified of their awards in writing.Departmental Awards - Each department on campus administers their own awards. Contact the department or donor directly for specific information regarding the award. For a searchable database of scholarships, visit: https:// scholarship.ucsadm.oregonstate.edu/ prod/search_schol.php.

Private Awards - These awards come from outside donors and can affect your financial aid package. Outside scholarship checks should be mailed to: Student Accounts, Oregon State University, PO Box 1086, Corvallis, OR 97339. If you have not already submitted notification to the Financial Aid Office regarding your outside scholarships, please submit the Reporting Additional Sources of Assistance form located on the Financial Aid Forms page.

State of Oregon Opportunity Grant - The Opportunity Grant is a state grant administered by the Oregon Student Access Commission (OSAC) and
awarded to full-time undergraduates Oregon residents based on need and allowable funding. Twelve terms of eligibility are possible. This grant is not available during summer term.

## OTHER PROGRAMS

Private Supplemental/Alternative Loan - Students needing additional funding for school, whose aid package has not fully met their cost of attendance, may opt to apply for funding through a private lending agency. These loans have a variable interest rate, and a credit check must be done on all applicants. OSU cannot recommend lenders for private/alternative loans.

## GRADUATE STUDENTS

Graduate students are only eligible to receive Unsubsidized Direct Loans effective July 1, 2012. The annual loan maximum is $\$ 20,500$ per academic year for graduate students with an aggregate borrowing limit of $\$ 138,500$, which includes all Federal Direct Subsidized and Unsubsidized loans borrowed for undergraduate study. Students must be enrolled at least half time (5 credits) and repayment begins six months after graduation, withdrawal, or if you drop below half-time enrollment. For current interest rates, visit http:// financialaid.oregonstate.edu/.

In addition to Unsubsidized Direct Loan eligibility, Graduate Students can also apply for a GRAD PLUS loan to help cover education expenses.

The terms and conditions applicable to PLUS Loans for parents also apply to PLUS Loans for graduate and professional students. These terms and conditions include a determination that you (the applicant) do not have an adverse credit history.

Before you can receive a PLUS Loan, your school must have determined your maximum eligibility for Direct Unsubsidized Stafford Loans.

In addition to these Federal Aid Programs, the Graduate School offers additional information on Assistantship, Grant and Scholarship Opportunities on their website, http://gradschool.oregonstate.edu/.

## RECEIPT OF AID FUNDS

OSU Office of Business Affairs is responsible for disbursing refunds from student accounts once financial aid has been applied. You must be registered and have your tuition and fees billed to your account for financial aid to be applied. Aid funds are never made available in advance. Textbooks cannot be charged to a student's account. It is assumed that the student will purchase textbooks out-of-pocket and use any refund to "reimburse" themselves for the costs. If a credit balance remains on your student account after current university charges
are paid, you will be issued a refund. Federal Work-Study earnings are paid by payroll check to you each month for hours worked. You may receive a refund and still have an outstanding balance on your account. For more information about your bill or refund, visit the Business Affairs website.

## Delayed Disbursements

There are several ways in which your aid may be delayed. Here are the most common reasons:

- You may be required to complete Entrance Counseling and sign a Master Promissory Note (MPN) for your Ford Direct Loans. You would have been notified of these requirements via an email to your ONID email account.
- Dropping classes (below 12 for undergraduates, 9 for graduates). All students are assumed to be full-time unless they notify Financial Aid in writing that they will be less. If you are not enrolled at full-time and have not notified us, your aid will not disburse.
- Registering late for classes.
- Being waitlisted for classes. These classes do not count toward your enrollment level until you are actually enrolled in them.
- Having unsatisfied requirements with your financial aid file. Check your status through MyOSU/Financial Aid/ My Eligibility.
You are responsible for managing your Financial Aid experience, so be sure to check MyOSU frequently and review any emails you receive from us as they may include requests for additional information or action.


## REQUESTING CHANGES

It is understood that you want as much grant and scholarship money as possible. When you are awarded your financial aid, your award will reflect your eligibility for available grant aid. When accepting your award, you may always request a lesser loan amount. Please note that loan funds are divided into equal disbursements, based on your enrollment at OSU within the given year. You may replace your Federal Work-Study funds with a Direct Ford loan, however this is dependent upon your loan eligibility. In addition, if you initially decline loan funds but find later that you in fact need them, you may also request that the loan be reinstated up to the total of your original offer. Please request any changes in writing by submitting a Loan Revision Request form to the financial aid office. Be aware that not all budget requests can be accommodated.

## ADDITIONAL COSTS

In certain instances, your cost of attendance may be adjusted to include other
allowable costs incurred to meet your educational needs. Requests are reviewed on a case-by-case basis to determine approval. Documentation of the additional expense must be included for consideration. If approved, additional expenses are usually funded with "self-help" assistance in the form of loans. Adjustments are not made for consumer debts, car payments, or private school tuition.
Adjustments may include, but are not limited to:

- Medical or dental cost not covered by insurance
- Computer expense (one time allowance)
- Child care cost for children 12 and under
- Commuting costs from outside the Corvallis area
- Costs related to students with disabilities
- Study abroad program fees


## PARENT OR STUDENT EXPECTED CONTRIBUTIONS (EFC)

The information you reported on your FAFSA is used to calculate a number called the Expected Family Contribution (EFC). The EFC is not the amount of money that your family must provide. The school uses the EFC to determine the amount of your federal grants, loans, or work-study awards for which you may be eligible.

## CHANGES IN YOUR SITUATION

Financial Aid offices may consider special or unusual circumstances that impact your family situation. Please contact us with any questions you might have regarding your eligibility for a review.

## RENEWING AID

You must apply for financial aid every year by submitting a FAFSA application. Applications must be received before February 28 at the central processor to be considered for priority funding. You may apply for aid online after Jan. 1 for the following academic year. Be sure to keep on top of managing your award!

## DROPPING COURSES AND THE CENSUS DATE

Dropping courses impacts your financial aid in several ways. Aid assistance is based on your enrollment level each term and may be adjusted accordingly. All students are initially awarded based on full-time enrollment. Full-time undergraduate status is 12 or more credits, $3 / 4$ time is $9-11$ credits, $1 / 2$ time is $6-8$ credits, and anything below 6 credits is considered less than half time. Changes in your enrollment levels may affect your financial aid eligibility.

Your financial aid is paid each term
based on your level of enrollment at the "census date". The term Census Date refers to the point at which your enrollment is locked for financial aid purposes, and it happens to coincide with the last date you can add or drop classes for a full tuition refund. This Census Date is used for all terms, including the summer session. At this point in the term, credit hours are locked and financial aid for the term is adjusted to reflect the student's official enrolled credits. For example, if the student received aid at the beginning of the term based on full-time enrollment and then dropped credits, aid is then revised to match their eligibility based on the number of credits enrolled in as of the Census Date and types of aid that were awarded. Credits added after the Census Date cannot be used to increase financial aid eligibility.

When you drop credits after the census date and your aid has been paid, you will not need to repay your financial aid you unless you completely withdraw from ALL classes for the term. You will instead need to be concerned with meeting Satisfactory Academic Progress, as this will affect your overall PACE (completion rate).

## WHAT HAPPENS IF I WITHRAW?

## What Happens If I Withdraw From or Do Not Complete One Or More Courses in a Term?

The impact of a partial withdrawal (official or unofficial) will vary greatly by term, student status, type of aid awarded, participation, and other factors. Students, who plan to drop, withdraw, or not complete one or more course, should contact the Office of Financial Aid and Scholarships for a personalized evaluation of how a partial withdrawal will impact their current and future aid eligibility.

Students are expected to understand the terms, conditions, and requirements that relate to their financial aid award. Additional information on retaining full financial aid eligibility may be found on the Financial Aid Web page:

- http://financialaid.oregonstate.edu/ course-participation
- http://financialaid.oregonstate.edu/ receive
- http://financialaid.oregonstate.edu/ review_termsconditions


## What Happens If I Withdraw From All Courses or Do Not Complete Any Courses in a Term?

The information below is a brief summary of the process that takes place when a student withdraws from all courses or fails to receive a passing grade for a given term. The policies and procedure listed are subject to change without advance notice based on changes in federal or institutional policies. This is not an exhaustive list of the rules pertaining to the

Return of Title IV funds. Further guidance regarding these policies and procedures may be obtained by contacting the Office of Financial Aid and Scholarships. Reference material relating to the federal rules for this process may be found in Volume 5 of the Federal Student Aid Handbook.

Federal financial aid is awarded based on the expectation that a student will participate in all of their courses through the last day of the term. When a student does not complete the term, the Office of Financial Aid is required to review their eligibility for aid that has been or could be disbursed. A student is considered to have earned the full amount of disbursed federal aid if they participated in all courses and completed at least $60 \%$ of the term. In cases where full participation and $60 \%$ term completion cannot be verified, a return of federal Title IV and other types of aid may be required.
An official withdrawal may impact a student's eligibility for current or pending financial aid. Students who withdraw from the university after the start of the term must complete a Withdrawal Survey through the Registrar's Office (click "Withdraw for the Term") and should contact the Office of Financial Aid and Scholarships regarding the impact on their eligibility. The date of official withdrawal (as reported by the Registrar's Office) may be utilized in the federal Return of Title IV funds calculation. If financial aid funds were used to pay tuition and fees, and a student withdraws, any refundable tuition amount is returned to the appropriate financial aid sources (refer to the tuition/fee refund schedule in the OSU Schedule of Classes).

A student is considered unofficially withdrawn if they fail to receive any passing grades in a given term. In the case of an unofficial withdrawal, the Office of Financial Aid is required to review participation reported by OSU and partner school instructors. This participation information is used to establish a last date of participation that may be utilized in the federal Return of Title IV funds calculation.

## Return of Title IV Funds Calculation and Withdrawal Record

OSU is required to calculate the Return of Title IV financial aid funds for students that officially or unofficially withdraw during the academic term. Students who do not intend to complete the term for which they are enrolled, should follow the official withdrawal process as outlined by university regulations.

The Return of Title IV Funds calculation determines the amount of federal funds that must be returned by the institution as well as how much aid the student must return for the period of non-enrollment. For students who
completed less than $60 \%$ of the term, a pro-rated schedule is used to determine the amount of aid that must to be returned. That means the percentage of aid that a student is eligible to retain for the term is based on the percentage of the term that they completed. If a return of aid amount is calculated, the funds must be repaid to the financial aid programs in the following order:

Federal Direct Unsubsidized Ford Loan
Federal Direct Ford Loans
Federal Perkins Loan
Federal Direct PLUS Loan
Federal Pell Grant

## FSEOG

The amount of federal aid that you must repay is determined via the Federal Formula for Return of Title IV funds (Section 484B of the Higher Education Act). This law also specifies the order in which funds are to be returned to the financial aid programs from which they were awarded, starting with loan programs.

You may be required to make a repayment when cash has been disbursed from financial aid funds, in excess of the amount of aid that you earned (based on the date of your total withdrawal or last date of participation) during the term. The amount of Title IV aid earned is determined by multiplying the total Title IV aid (other than FWS) for which you qualified by the percentage of time during the term that you were enrolled.

If less aid was disbursed than was earned, you may submit a request to receive a late disbursement for the difference.

If more aid was disbursed than was earned, the amount of Title IV aid that you must return (i.e., not earned) is determined by subtracting the earned amount from the amount actually disbursed.

The responsibility for returning unearned Title IV aid is shared between the university and you. It is allocated according to the portion of disbursed aid that could have been used to cover university charges, and the portion that could have been disbursed directly to you once those charges were covered. OSU will distribute the unearned aid back to the Title IV programs, as specified by law. You will be notified if you owe a repayment due to an official/unofficial withdrawal within 45 days of the date the determination of the withdrawal is made.
You will be billed for the amount that you owe to the Title IV programs, as well as any amount due to the university, as a result of Title IV funds that were returned that would have been used to cover university charges.

Withdrawing (official or unofficially) from a term may also impact a student's eligibility for financial aid in future terms. Students should familiarize them-
selves with the Satisfactory Academic Progress requirements for federal aid and should contact the Office of Financial Aid and Scholarships regarding how federal and other types of aid may be impacted.

## Summer Term Withdrawals

Withdrawals during the summer term at OSU are evaluated differently than the other terms due to the modules that make up this term. During the summer term a student's completion percentage will be evaluated based on a calendar that encompasses all modules of enrollment.

During all terms a student's Pell Grant will be adjusted to exclude payments made for courses in which participation cannot be verified. During the summer, the Pell Grant is also adjusted throughout the term to exclude payments for courses from which the student withdrew.

## Withdrawals and the Degree Partnership Program

In cases of unofficial withdrawal an instructor reported last date of participation may be required to determine a student's aid eligibility. The OSU Office of Financial Aid and Scholarships is not able to contact partner school instructors directly to obtain this information. After a term has ended DPP students may be contacted with instructions on how to complete this participation verification process. Due to the time sensitive nature of this process, it is very important for DPP students to check their OSU Student (ONID) email regularly to look for these financial aid notifications. Failure to verify participation may result in the reduction or full loss of financial aid eligibility for the term.

## STUDENT RESPONSIBILITIES

## Reporting Changes

Your financial aid is based on the information submitted to our office for the current academic year in which you requested aid. To keep your file current and accurate, you are required to report the changes to the OSU Office of Financial Aid and Scholarships. You should expect a revision of your award in most cases. Reasons for changes can include but are not limited to:

- Additional financial assistance: scholarships, grants, loans, fee waivers, Tribal Assistance, tuition/ book support, social security benefits or any other monetary award not reported previously.
- Receipt of graduate teaching or research assistantship, and/or fellowship.
- Receipt of resident advisor position.
- Changes in enrollment hours and/or withdrawal from the university.
- Changes in residency status for
tuition purposes.
- Change in course load if below full time.


## Entrance and Exit Interview

All Federal Direct Ford loan recipients are required to complete an entrance interview prior to receiving the first disbursement of their loan proceeds. They are also required to complete an exit interview during their last term of attendance. (For further information, visit www. studentloans.gov).

## Appeals

Students who are not satisfied with a decision of a financial aid staff member may appeal that decision, in writing, and then in person to the following staff in the order indicated: the director of Financial Aid and Scholarships, and then the Financial Aid Appeals Subcommittee. The decision of the director and/or Financial Aid Appeals Subcommittee will be considered final.

## STUDENT ENROLLMENT LEVELS

Federal financial aid eligibility and deferment of student loans are affected by enrollment levels. Summer enrollment levels are the same as other terms.

## Undergraduate

Full Time: 12 or more credits in a term Three Quarter Time: 9 to 11 credits in a term
Half Time: 6 to 8 credits in a term Graduate
Full Time: 9 or more credits in a term Half Time: 5 to 8 credits in a term

## SCHOLARSHIP MANAGEMENT SYSTEM (SMS)

In an effort to maximize student access to OSU scholarship opportunities, we have a searchable database that consolidates all available departmental scholarships into a centralized location. Each department administers and awards their own scholarships based on established criteria. The Scholarship Management System consists of a searchable database and an application for scholarships available to continuing OSU students. In the database, click on the name of the scholarship for specific criteria and which department oversees that award. Visit a department's website for more details on their specific scholarship awarding process. For further information about the Scholarship Management System, please email the Scholarship Office at scholarship.office@oregonstate.edu.

- SMS Searchable Database: https:// scholarship.ucsadm.oregonstate.edu/ prod/search_schol.php
- SMS Scholarship Application: https:// scholarship.ucsadm.oregonstate.edu/ prod/app_login.php


## Student Leadership and Involvement maintains a listing of all OSU-recognized student organizations at http://sli.oregonstate.edu/findorg.

Professional Fraternities and National Societies

| Organization | Type or Field of Interest | Current Email or Website Contact |
| :--- | :--- | :--- |
| AIGA-Oregon State University | Design | Aiga@oregonstate.edu |
| Alpha Kappa Psi | Business | akpsi@oregonstate.edu |
| Alpha Pi Mu | Industrial engineering | alpha.pi.mu@oregonstate.edu |
| American Fisheries Society/The Wildlife Society, Oregon <br> Student Chapters of | Fisheries, wildlife | Fishandwildlifeclub@oregon- <br> state.edu |
| American Institute of Aeronautics and Astronautics, OSU | Aerospace engineering | AIAA@oregonstate.edu |
| American Railway Engineering and Maintenance-of-way | Railway engineering | Railway.engineers@oregonstate. <br> edu |
| Association, OSU Student Chapter of | Engineering education | Engineeringeducation@oregon- <br> state.edu |
| American Society for Engineering Education | Transportation <br> and traffic engineering | ASPransportationengineers@or- <br> egonstate.edu |
| American Society for Photogrammetry and Remote Sensing Transportation Engineers - OSU Student Chapteregonstate.edu |  |  |
| (OSU Chapter) | Collegiate Cattlewomeng industry | Civil engineering |


| Integrative Biology Club of OSU | Biology, zoology | integrativebiologyclub@oregonstate.edu |
| :---: | :---: | :---: |
| Materials Research Society | Materials science | materialsresearchsociety@oregonstate.edu |
| Mortar Board National College Senior Honor Society | Senior scholarship, leadership, services | mortarboard@oregonstate.edu |
| National Society of Collegiate Scholars | First- and second-year scholarship | collegiatescholars@oregonstate. edu |
| Phi Beta Kappa, Epsilon of Oregon Chapter | Academic honor society | tara.williams@oregonstate.edu http://leadership.oregonstate. edu/phi-beta-kappa |
| Phi Delta Chi | Pharmacy | phideltachi@oregonstate.edu |
| Pi Tau Sigma | Mechanical engineering | http://groups.engr.oregonstate. edu/pts/home.html |
| Psi Chi | Psychology | psi.chi@oregonstate.edu |
| Rho Chi | Pharmacy | rhochi@oregonstate.edu |
| Society for Industrial \& Applied Mathematics, Oregon State University Student Chapter of | Industrial and applied mathematics | siam@math.oregonstate.edu |
| Society for Theriogenology, Student Chapter | Animal reproduction | societyfortheriogenology@ oregonstate.edu |
| Society of American Foresters | Forestry | Americanforesters@oregonstate. edu |
| Society of Automotive Engineers, OSU | Automotive and aerospace engineering | societyofautomotiveengineers@ oregonstate.edu |
| Society of Hispanic Professional Engineers | Hispanics in STEM | SHPE@oregonstate.edu |
| Society of Manufacturing Engineers, Oregon State University Chapter of | Manufacturing engineering | manufacturingengineering@ oregonstate.edu |
| Society of Women Engineers | Engineering | womenengineers@oregonstate. edu |
| Student Chapter of The American College of Veterinary Pathologists at Oregon State University | Veterinary pathology | vetmedpathclub@oregonstate. edu |
| Xi Sigma Pi - Zeta Chapter | Forestry | xisigmapi@oregonstate.edu |

Contact: Danté Holloway, Coordinator, Student Organizations, Memorial Union 103, dante.holloway@oregonstate.edu

## ASOSU OFFICE OF ADVOCACY

## Daniel Dietz, Advocate

Student Experience Center 325
Corvallis, OR 97331
541-737-9200
Websites: http://asosu.oregonstate.edu/ advocacy
**The Office of Advocacy does not handle immigration, taxes, copyright, patent, small business or real estate issues.**

The following are some of the areas with which the Office of Advocacy assists:

- Academic Dishonesty
- Financial Aid
- Privacy
- Student Conduct
- Tuition, Fees, Business
- On-Campus Disputes with OSU

Security Officers/Oregon State Police

- Faculty Misconduct
- Grade Appeals
- Parking
- Residency Appeals
- Student Health Insurance
- University Housing \& Dining

Services/The Gem

- INTO OSU

If you are unsure whether your issue falls within the scope of the Office of Advocacy, please contact one of our student interns at 541-737-9200 for clarification.

## About Us

The Office of Advocacy has worked with thousands of students in a wide array of conflicts. Since 2000, the Office of Advocacy has served to empower and support students within the university. In addition to helping with conflicts, researching and providing general assistance to students, we work to support and further the best interest of students throughout the university. We encourage all students to contact our office with any questions or disputes that involve the university.

## ASSOCIATED STUDENTS OF ORECON STATE UNIVERSITY

## ASOSU

110 Student Experience Center
541-737-2101
541-737-5560 FAX
asosu@oregonstate.edu
Website: http://asosu.oregonstate.edu
The Associated Students of Oregon State University (ASOSU) is an alliance encompassing all students at OSU. The elected and appointed officers comprise the officially recognized student government at OSU. The ASOSU represents students at the campus, community, state, and federal levels on issues that directly influence the quality of, and access to, postsecondary education. ASOSU provides
numerous opportunities for leadership development and professional experience in areas as diverse as political organizing and other forms of social activism.

The structure of ASOSU is similar to other forms of national government. Governance is shared among three branches-the legislative, judicial, and executive. The legislative portion is divided into two bodies, the ASOSU House of Representatives and the ASOSU Senate. House Representatives and Senators are elected by popular vote during the student officer elections in spring term of each academic year. The judiciary function in ASOSU is carried out by the Judicial Council. The Judicial Council, comprised of seven students at large, oversees any controversies or cases that involve interpretation of the ASOSU Constitution.

The Executive branch is led by the president and vice president whom are elected as a ticket by popular vote of the entire student body. Upon election, this executive duo appoints executive officers, service directors, 10 taskforce directors, as well as various support staff. Each executive appointee is subject to approval by the ASOSU Congress. Those seeking employment with ASOSU are welcome and encouraged to apply for positions during the spring hiring process, which usually takes place early in May.

ASOSU is constantly seeking interms and volunteers and future leaders who are ambitious about making a difference in the lives of OSU students.

There are a number of ways to get involved in a broad range of interests and topics. One of the easiest ways to get involved in ASOSU is to simply volunteer. Volunteers work at their own pace and chose their level of involvement.

Through the ASOSU Organizing for Social Change Internship Program, students spend between 2 to 6 hours per week working with any of the various members of the executive branch, as well as attend a class one night a week to learn fundamental leadership and organizing skills. The Internship is a great way to create your own path into campus governance at OSU.

Students can also serve as representative on one of the various campus committees at OSU that govern issues ranging from public safety to budgets and fiscal planning. Students who serve on a university committee are eligible to receive academic credit.

If you are interested in getting involved in one of the nation's premiere student governments, or have any questions or concerns regarding any other matter, please feel free to contact ASOSU any time.

## CAREER DEVELOPMENT CANTER

Brandi Fuhrman, Executive Director<br>Jennifer Elston, Assistant to Executive Director

Breanne Hiivala, Assistant Director/ Career Consultant,College of Liberal Arts and Education

Carolyn Killefer, Assistant Director/ Career Consultant, Colleges of Forestry, Agriculture Science \& Earth, Ocean and Atmospheric Sciences

Claire Wu, Assistant Director/Career Consultant, College of Science, Veterinary Medicine \& Pharmacy
Jennifer Edwards, Student/Alumni Mentoring Coordinator

Joanna Abbott, Assistant Director/Career Consultant, College of Public Health and Human Sciences
Rachel Finch, ;Employer Relations \& Events Manager
Wendy Allison, Employer Relations Events Coordinator

Jenna Riccolo, Marketing
Communications Coordinator
Office Contact Information
B008 Kerr Administration Bldg.
Corvallis, OR 97331-2127
541-737-4085
Website: http://career.oregonstate.edu
The Career Development Center (CDC) provides career planning and employment services and resources for undergraduate students, graduate students, alumni and post docs. The Fall, Winter, and Spring Career Expos bring over 500 organizations each year to campus and virtually to meet with thousands of OSU students and alumni. More than 100 employers interview OSU undergraduate students, graduate students, and alumni each year in the Career Development Center Interviewing Suite.

Career Consultants are available to discuss career exploration, resume and cover letter development, job seeking strategies, mock interviews, and all other career-related topics. Beaver Careers is a comprehensive online resource that includes job and internship listings, mock interviewing tools, and online access to schedule career consultations. Customized workshops are frequently presented in academic classes or for other campus groups, with topics including cover letters and résumés, interviewing techniques, job search strategies, and making connections for career success.

Resources on the job market and company information, listings of oncampus employer recruitment schedules and career fairs, job listings, and links to
employer home pages, as well as other information about the Career Development Center and how to be successful in today's competitive job market are available on the Web at http://career. oregonstate.edu/. Call 541-737-4085 for more information or to schedule your appointment today.

## CENTER FOR CMVIC

ENCACEMENT
Emily Bowling, Assistant Director for Civic Engagement \& Sustainability
Oregon State University
Student Experience Center, Suite 206
Corvallis, Oregon 97331-2212
541-737-3041
cce@oregonstate.edu
Website: http://sli.oregonstate.edu/cce
Facebook: https://www.facebook.com/ OSUCCE
Twitter: https://twitter.com/OSU_CCE Instagram: https://www.instagram.com/ osu_cce/

## Imagine a better world.

## Make it happen.

Get to know OSU's Center for Civic Engagement (CCE)! The CCE strives to engage students in community service, philanthropy and giving, and activism and advocacy. Join us to further discover where your passions meet our community's needs.

In partnership with community-based organizations, the Center for Civic Engagement (CCE) facilitates meaningful service, community engagement, and educational programs. The CCE strives to:

- Engage students in service, philanthropy, and activism-based work,
- Meet diverse community-identified needs,
- Inspire positive change in local and global communities,
- Enhance students' knowledge of self and sense of place, and
- Foster social responsibility.


## Events and Programs:

- Annual Service Days (Fall into Service, Make a Difference Day, Dr. Martin Luther King Jr. Day of Service, Earth Day Service Day, Day of Caring)
- DOT: Do One Thing to better the world
- Alternative Break Service Trips
- Nonprofit Opportunities Fair
- National Hunger and Homelessness Action Week
- Craft 'N Care


## Services:

- Individual and group service consultations to assist students in finding service opportunities and areas of passion
- Custom workshops and trainings
related to community service, civic leadership, service-learning, reflection strategies, and social change
- Civic engagement tracking and recording
- Networking between the OSU campus and surrounding nonprofit and public service community


## Why get involved?

Here are a few potential benefits of civic engagement and community service:

- Enhance your sense of self and place
- Impact change in your areas of passion and interest
- Build relationships with people motivated to create change
- Explore your values, interests, and passions
- Develop your leadership and career readiness skills
- Deepen your understanding of social issues
- Survey various career paths and options to aid with career decisionmaking
- Feel happier, people who volunteer are happier on average!
- You make a difference! Your community needs YOU!


## COUNSELING AND <br> PSYCHOLOCICAL SERVICES (CAPS)

Ian Kellems, Director
Snell Hall, 5th floor
541-737-2131
Website: http://counseling.oregonstate.edu/
Counseling and Psychological Services (CAPS) is staffed by licensed mental health professionals who are especially trained to work with university students. We provide a variety of short-term confidential counseling, wellness, and educational services to help students address the challenges they face and to help them thrive during their time at OSU.

- CAPS provides clinical services which include individual, couples and group counseling that assist students in understanding themselves better, creating and maintaining satisfying relationships, managing anxiety and stress, improving mood, enhancing academic performance, and addressing mental health problems that interfere with their ability to succeed.
- CAPS seeks to promote mental wellbeing within four areas of emphasis which include Suicide Prevention, Sexual Assault Support Services, which has a separate confidential phone line (541-737-7604), SUCCEED which includes our Mind Spa services, and the Mental Health Initiative.

We are dedicated to helping students within our agency, or-if more intensive or specialized care is needed-making referrals to health care providers in the community. Our counseling services are confidential. This means that anything said to a counselor, the fact that a student used the service, or any test results, are not disclosed to other people or agencies, within the limits of professional ethical and legal standards.

All regularly enrolled Oregon State University students who have paid the Student Health and Counseling Fee are eligible for services. Ecampus students are eligible for services if they pay the entire student fee package for the quarter(s) they receive services.

CAPS staff members are strongly committed to affirming diversity in a broad sense, to treating all with dignity and respect, and to opposing discrimination, prejudice, and oppression.

## DIVERSITY AND CULTURAL <br> ENGACEMIENT

228 Student Experience Center
2251 SW Jefferson Way
Corvallis, OR 97331
Phone: 541-737-9030
Fax: 541-737-7874
Email: dce@oregonstate.edu
Website: http://dce.oregonstate.edu/

## About:

Diversity \& Cultural Engagement creates and advocates for inclusive and educationally purposeful initiatives that enhance deep learning, academic success, cross-cultural fluency and self-efficacy by fostering a climate that supports social equality, community engagement, and global membership. We bridge differences and build community through many programs that involve Transformative Learning, Positive Social Change, Identity Development, Student Engagement, and Academic Success. All of our programs and events are open to all students regardless of race, gender, nationality, religion, ability and class.

## Diversity \& Cultural Engagement

Allison Davis-White Eyes, Director
allison.davis-whiteeyes@oregonstate.edu
Maleah Harris, Administrative
Program Specialist
maleah.harris@oregonstate.edu
DCE serves as the umbrella for all student diversity efforts, including the Cultural Resource Centers (CRCs). The unit as a whole is comprised of professional staff, student workers, and graduate teaching assistants.

DCE provides hands-on guidance and customer service to students, faculty, staff, and community members for all endeavors related to DCE, including
scheduling of CRC facilities and general information on the various opportunities within the unit.

Salvador Miramontes Jr., Marketing and Communications Coordinator salvador.miramontesjr@oregonstate.edu
Serves as the hub for communicating everything housed under DCE through multi-level marketing and all forms of communication. Also represents the unit in all Division of Student Affairs aspects related to diversity communication efforts.

## Research \& Communication

TBA, Associate Director
Contributes to the development of a culture of inquiry among students, faculty, and staff affiliated with DCE. Primarily related to the creation of Participatory Action Research (PAR) initiatives aimed to investigate and transform systems of injustice affecting historically marginalized communities on campus.
Global Diversity Initiatives (GDI)
Amarah Khan, Associate Director amarah.khan@oregonstate.edu Serves as a bridge between various academic and administrative units supporting international students. And looks for ways to cultivate a culturally competent, globally knowledgeable, inclusive and socially responsible student body.

## Cultural Resource Centers

Jason Dorsette, Associate Director jason.dorsette@oregonstate.edu
Responsible for the greater alignment in curriculum development, orientation programming, community building and academic engagement and success strategies of the Cultural Resource Centers.

## Asian \& Pacific Cultural Center

 (APCC)Reagan Le, Assistant Director
reagan.le@oregonstate.edu
2695 SW Jefferson Way
Corvallis, OR 97331
541-737-6361
apcc@oregonstate.edu
Provides a welcoming and engaging space for the retention and success of all students through academic, cultural, and social programming that address the personal needs, academic excellence, and professional development of Asian and Pacific Islanders.

## Centro Cultural César Chávez (CCCC)

Melisa Lopez, Assistant Director
melisa.lopez@oregonstate.edu
691 SW 26th Street
Corvallis, OR 97331
541-737-3790
cccc@oregonstate.edu
Strives to inform both the respective cultural groups and the greater university communities about issues central to the

Chicano/Latino/Hispanic culture and heritage. It's where all students are able to accept and appreciate their differences while encouraging a sense of purpose and unity.

## Ettihad Cultural Center (ECC)

Amarah Khan, Associate Director, GDI amarah.khan@oregonstate.edu
380 Student Experience Center 2251 SW Jefferson Way
Corvallis, OR 97331
EttihadCC@oregonstate.edu
A cross-cultural resource that provides a space for cross-cultural dialogue, learning, understanding, and community building both within the Ettihad region ( North Africa, Southwest Asia and the Middle East) and the campus at large. This center is open to all who are interested in learning more about those cultures and regions.

## Lonnie B. Harris Black Cultural

 Center (BCC)Terrance Harris, Assistant Director terrance.harris@oregonstate.edu
100 SW Memorial Place
Corvallis, OR 97331
541-737-4372
bcc@oregonstate.edu
Compliments the academic program of studies and enriches the quality of campus life for all students interested in or who identify as African and AfricanAmerican students. It also serves as a safe place that promotes activities that educate all on the histories and issues affecting all peoples of African heritage.

## Native American Longhouse Eena Haws (NAL)

Luhui Whitebear-Cupp, Assistant Director
luhui.whitebear-cupp@oregonstate.edu 311 SW 26th Street
Corvallis, OR 97331
541-737-2738
nal@oregonstate.edu
Builds a bridge of understanding between the regions' tribes and visitors of all cultures; a hospitable environment and a source of support honoring the cultures of the first people of this land. It's also used as a teaching area for traditional singing, dancing, storytelling and ceremony.

## Pride Center (PC)

Cindy Konrad, Assistant Director
konrad@oregonstate.edu
1553 SW A Avenue
Corvallis, OR 97331
541-737-9161
pride.center@oregonstate.edu
Provides programs/support services for lesbian, gay, bisexual, transgender, queer, questioning, intersex and asexual (LGBTQQIAA) members and their allies. It's a safe space for all everyone to explore
aspects of sexual orientation and gender identity in an open and non-judgmental atmosphere.

## SOL: LGBT Multicultural Support Network (SOL)

Marisa Moser, Graduate Teaching Assistant
marisa.moser@oregonstate.edu
(Shared space with the Pride Center)
SOL@oregonstate.edu
Supports and improves the campus climate for lesbian, gay, bisexual, transgender, queer, questioning, intersex, and allied (LGBTQQIA) persons of color through counseling, educational programming, advocacy, and ally building among the Oregon State community.

## Women's Center (WC)

Whitney Archer, Senior Assistant Director
whitney.archer@oregonstate.edu Benton Annex - 1700 SW Pioneer Place Corvallis, OR 97331
541-737-3186
womenscenter@oregonstate.edu
Serves as a campus focal point for projects directed at addressing women's issues on campus, in the community-at-large, and globally. As an open community of leaders inspiring change, the center provides advocacy and resources/ opportunities to transform ideas into positive action and reality.

## Academic Success and Engagement

TBD, Associate Director
Implements initiatives from the Vice Provost of Student Affairs addressing pro-active strategies to help retain underrepresented and under-served students. Closely facilitates academic programs committed to equalizing academic success through cohort programs, bridge programs and various retreats.

## Integrated Learning for Social Change

Charlene Martinez, Associate Director charlene.martinez@oregonstate.edu

Programs and resources incorporate interdisciplinary methods for social change education, to transform ourselves and our communities. Civic professionalism, art, empathy, leadership development, and partnerships are core components of each of the programs: Arts and Social Justice, Living Learning Community, PROMISE internship program, and Multiracial Beavers.

## Social Change Leadership Programs <br> (SCLP)

Kali Furman, Interim Coordinator
kali.furman@oregonstate.edu
204 Student Experience Center
2251 SW Jefferson Way
Corvallis, OR 97331
sclp@oregonstate.edu
Works with multiple partners on and off
campus to act as a hub for social justice-and-social change-related education, training and outreach. Programs aim to prepare students to deal with complex social problems by providing transformative learning opportunities in a variety of ways.
Men's Development \& Engagement (MDE)
Allen Dean, Graduate Teaching
Assistant
allen.dean@oregonstate.edu
Focuses on encouraging Oregon State's men to engage in a process of positive gender identity development with the hope of creating a safer and empowering environment for all. Founded in 2011, this program is assisted by interested students, faculty, and staff while continually growing and serving the entire campus community.
Women of Color Coalition (WOCC)
Megan Spencer, Graduate Teaching Assistant
megan.spencer@oregonstate.edu
Formed by the efforts of concerned students following racial and gender bias incidents in March 2014; this collaboration between all students, staff, and faculty work to facilitate a safe space, dialogue, allyship and support in addressing intersections of race/gender/nationality as embedded cultural narratives and of structural violence.

## EDUCATIONAL

OPPORTUNHIES PROCRAM

## Janet Nishihara, Director

## 337 Waldo Hall

541-737-3628
Website: http://eop.oregonstate.edu/
The Educational Opportunities Program (EOP) was created at Oregon State University in 1969 and provides a welcoming environment that supports the full development of the personal and academic potential of undergraduate students who have traditionally been denied equal access to higher education.

These undergraduate groups include students of color, older-than-average students, students with disabilities, students who are single parents, low-income students, students who have been rurally isolated, veterans, and students who are the first generation in their family to attend college.

The goals of the program include providing services which will:

- acclimate students to university culture,
- enhance each student's academic performance,
- develop each student's professional and personal growth, and
- assist students in developing a sense
of belonging and a strong connection to the university.
Students in the program will have access to the following services:
- assistance through the admissions process,
- assistance in locating financial resources,
- orientation to the university,
- academic and personal counseling,
- courses in math, reading and writing, and
- assistance with finding jobs and internships,
- assistance with international study experience and undergraduate research, and
- support in writing resumes and cover letters.
U.S. citizens or permanent residents interested in learning more about the program or in applying for services should visit the EOP website, http://eop. oregonstate.edu/.


## MEMORIAL UNION

PROCRAMS AND SERVICES
Memorial Union and Memorial Union East
Robin Jones, Director of Food Service and Marketing

## Sid Cooper, Director

Deb Mott, Director of Operations
112 Memorial Union

## 541-737-6256

Website: http://mu.oregonstate.edu/ muhome
The Memorial Union, located in the heart of campus, is the community center of the university. It provides services, facilities, and programs to meet the varied social, recreational, and cultural needs of OSU students, faculty, staff, alumni, and campus guests.

The building provides five restaurants, a coffee shop, and banquet facilities, a bookstore, recreation area including billiards and bowling; music practice rooms, ballroom, post office, art gallery; lounges, the Joyce Powell Leadership Center and meeting rooms of all types.

The president of the Memorial Union is a student; other students share actively in its management and in organizing social, recreational, and cultural programs, including the Memorial Union Program Council, a student-led programming board.

The Memorial Union houses the office of the Department of Student Leadership and Involvement, which supports OSU students in organizational and leadership development. Under the Department of Student Leadership and Involvement are Student Activities, Club and Organization Development, Greek Life, and Leadership Education and Development
(LEAD).
The Memorial Union East (MU East, Snell Hall) houses the student governing body, the Associated Students of OSU, and staff who provide support to the Department of Student Leadership and Involvement, as well as financial advising for student groups. MU East also provides a communication center for student broadcast and publications media, meeting rooms, and a craft center.

The Memorial Union buildings stand as constant reminders of this nation's struggle for peace and as living memorials to Oregon Staters who have given their lives in the service of their country.

## MEMORIAL UNION PROGRAM COUNCIL (MUPC)

Linda Howard, Program Advisor
Student Experience Center, Room 264 541-737-1369
Linda.howard@oregonstate.edu
MUPC Office
Student Experience Center, Room 250 541-737-6872
Website: http://sli.oregonstate.edu/osupc
The Memorial Union Program Council (MUPC) is a student-led, student-driven organization that plans and produces high-quality events. MUPC is committed to serving the OSU community by upholding traditions and creating inclusive, accessible, and entertaining programming. Programs and events are intended to create community, make memories, and enhance the college experience.

This is achieved through many traditional events such as Moms \& Family Weekend, Dads \& Family Weekend, Comedy Shows, Fashion Shows, Children's Holiday Party, Battle of the Bands, Dam Jam Concert and more. MUPC also programs a variety of new events, such as Javacoutics Series, Western Windup, OSU Has Talent, Grocery Bingo, Battle of the DJ's, Art Festival, and more.

MUPC offers many opportunities for students to get involved outside of the classroom by helping us plan and implement events. By joining one of our event planning committees, students can hone their leadership skills, network, and build their portfolios. Students can also gain a variety of transferable skills by getting involved with MUPC that will further their growth for any profession. Please contact us about volunteering on the following committees: Music and Concerts, Entertainment and Recreation, Fashion, Community Relations and Traditions, Moms and Dads Weekends, Marketing and Social Media.

## ART AND MUSIC

Yuji Hiratsuka, School of Arts and Communication
541-737-5006
yhiratsuka@oregonstate.edu

## Marlan Carlson, School of Arts and Communication <br> 541-737-5591 <br> mcarlson@oregonstate.edu

Art exhibits, lectures, concerts, and recitals sponsored by the School of Arts and Communication, Memorial Union Program Council, and student musical and art organizations play a central part in the cultural life of the community. Under the patronage of the Memorial Union, exhibitions in the Memorial Union stimulate interest in architecture, painting, sculpture, and related arts. They offer students knowledge of their cultural heritage and an awareness of contemporary art movements.
The School of Arts and Communication features the Fairbanks Gallery of Art http://oregonstate.edu/fairbanksgallery/About.html, which features exhibitions focusing on contemporary Northwest, national, and international artists. This program provides the campus and student communities diverse creative experiences and interactions. The Visiting Artists and Scholars Lectures Series also brings internationally acclaimed artists to the school for free public lectures.
Student and faculty art exhibits are shown in various galleries throughout the year (see "Museums, Galleries, Collections.")

Noncredit classes in ceramics, photography, woodworking, weaving, and glass are offered through the Memorial Union Craft Center.

The School of Arts and Communication offers more than two dozen performance ensembles, giving student musicians of all majors the opportunity to participate at their level of ability. Students enroll in these organizations as a class and earn regular credit. Some ensembles require an audition. All require a consultation with the instructor. The Corvallis-OSU Symphony Orchestra, Wind Ensemble, Campus Band, Chamber Choir, Bella Voce women's chorus, Meistersingers men's chorus, OSU Opera Workshops, jazz band, and the athletic bands present numerous performances on or near campus, in which free or reduced-price tickets are available to students. Faculty members and advanced music majors also perform free, public recitals throughout the school year. The OSU Steinway Piano Series, Chamber Music Corvallis and the Corvallis-OSU Symphony Orchestra bring artists of international fame to campus for public concerts. The Music à la Carte Concert series, held most Thursdays at noon in the Memorial Union Lounge, gives students and faculty the opportunity to see fine amateur and professional chamber, jazz, and ethnic musicians and performance ensembles for free over the lunch hour. Several dance recitals are also
given each year under the auspices of the College Health and Human Sciences and other organizations.

## ATHLETICS

Kyle Pifer, Senior Associate Athletic Director - Compliance
kyle.pifer@oregonstate.edu
132 Gill Coliseum
541-737-7369
Website: http://www.osubeavers.com/
Oregon State University conducts athletic programs for men and women under the auspices of the NCAA. Men's programs compete as part of the Pacific-12 Conference in baseball, basketball, crew, football, golf, soccer, and wrestling. Women's programs also compete in the Pacific-12 Conference in basketball, cross country, crew, golf, gymnastics, soccer, softball, swimming, indoor/outdoor track, and volleyball.

## FORENSICS

Mark J. Porrovecchio, Director 541-737-8230
Shepard Hall 205
Website: http://stuorgs.oregonstate.edu/ forensics/
OSU's nationally recognized forensics program-a member of the Performing Arts Board in the School of Arts and Communication-invites all undergraduates to participate in speech and debate activities. Continuing a tradition at Oregon State that started in 1890s, the forensics team involves members from all majors and schools on campus. Each year, students compete in state, regional, national, and international intercollegiate tournaments. Events include public debate (following the limited preparation model of the Lincoln-Douglas format) and individual public speaking formats such as informative, persuasive, and after dinner, as well as a range of oral interpretation categories involving prose, poetry, and drama. The team travels to tournaments in both the fall and winter terms.

## LECTURES

Frequent public lectures by faculty members, visiting scholars, and persons prominent in national affairs supplement the regular curriculum. Campus sponsors of lectures include the Y-Round Table, Associated Students, Memorial Union Program Council, Sigma Xi, and others.

## ORANGE MEDIA NETWORK

Candace Baltz, Director
Student Experience Center, 4th Floor 2251 SW Jefferson Way
Corvallis, OR 97331
541-737-4615
Email: candace.baltz@oregonstate.edu
Website: http://sli.oregonstate.edu/omn and http://www.orangemedianetwork. com/

## The Daily Barometer

The 120 -year-old campus newspaper of Oregon State University covers local news and events and brings awareness to important student and community issues. Student editors determine news and editorial content and direct the staff in reporting, writing, and editing assignments. 12,000 copies of The Barometer are printed each Monday, and available on racks the same day. The Barometer is also delivered through The Gazette Times each Tuesday. Newsroom: 541-737-2231. Advertising: 541-737-6373. Website: http://www.orangemedianetwork.com/ daily_barometer/.

## Beaver's Digest

This quarterly student life magazine launched in 2014 and focuses on student life, food, style, and fun at OSU. The magazine is produced by students and prints three issues per year. 541-737-3501 Website: http://www.orangemedianetwork.com/beavers_digest/.

## KBVR-FM Radio

KBVR-FM broadcasts locally on 88.7 FM, which can be heard anywhere within a 30 -mile radius of the OSU campus, and a live stream at OrangeMediaNetwork. com lets people tune in from around the world. More than 140 student DJs select what music they want to play and topics they want to talk about, ranging from music, sports, art, science and public affairs programming. 541-737-6323. Website: http://www.orangemedianetwork. com/kbvr_fm/.

## KBVR TV

Orange Media Network students have access to a fully equipped television studio, editing facility and remote gear for practical training and use in television production. KBVR-TV can be seen on Comcast cable channel 26 in Corvallis, Albany and Philomath, and live stream is available in HD at OrangeMediaNetwork.com. KBVR-TV is one of the only college TV stations with 24/7 studentmade shows and programing. TV shows include live music and event coverage, game shows and talk shows, the Emmynominated "State of the Arts" and daily NewsBlasts. 541-737-6326. Website: http://www.orangemedianetwork.com/ kbvr_tv/.

## Prism

The quarterly literary arts journal features content created and submitted by student artists, including poems, paintings, sculptures, essays, and photography. Prism also hosts an artist showcase each year. 541-737-2253. Website: http://www. orangemedianetwork.com/prism/.

## DAMchic

This quarterly fashion magazine is the authority on all matters of style at Oregon State University. The latest edition is at OrangeMediaNetwork.com. 541-737-
7906. Website: http://www.orangemedianetwork.com/damchic/.

## OSU CRAFT CENTER

## Susan Bourque, Manager

Student Experience Center Basement 541-737-2937 Front Desk Information craftcenter@oregonstate.edu susan.bourque@oregonstate.edu 541-737-6371
Website: http://sli.oregonstate.edu/craft
Engage your creativity at the OSU Craft Center...a dynamic, user-supported arts and crafts studio. With its hands-on, friendly and casual environment, it's a great place to take a creative time out from the whirlwind of life. Open seven days per week, the craft center offers studio workspaces, late night programming and a wide variety of classes and workshops for the beginning to experienced artist/craftsperson.

Facilities include fully equipped studios in ceramics; digital photography; fine woodworking; stained glass, fused glass and glass torchwork; fibers and sewing, silkscreen and weaving; jewelry/ metalwork; plus other mixed media crafts and lots of room to work. Power and hand tools are available for use in all the craft areas. The center also operates a promotional button-making business.

Each term, over 35 non-credit classes and workshops are offered. Taught by skilled local artisans, classes focus on non-competitive learning; their small size enables students to receive individual attention. Open studio memberships are also available for those with prior experience who are interested in using the center's studio areas tools and equipment for projects and exploration. Catalogs with current class offerings are located each term around campus, at the Craft Center, or by calling 541-737-2937. The OSU Craft Center's hours of operation follow the OSU academic calendar.

## UNIVERSITY THEATRE

Elizabeth Helman, Coordinator
Withycombe Hall 141
541-737-3067
elizabeth.helman@oregonstate.edu Website: http://liberalarts.oregonstate. edu/school-arts-and-communication/ theatre
University Theatre, continuing a tradition of more than 100 years of public performances in Corvallis, offers all students involvement in the theatre creative process. Each season, three main stage and numerous studio and classroom productions give student actors, designers and technicians ample opportunity to develop as theatre artists and craftspeople.

For several years, the University Theatre, with the support of the Memorial Union and Summer Session, has
produced "Bard in the Quad," summer outdoor performances of Shakespeare on the MU Quad. Auditions and crew assignments for the University Theatre are open to all students, no matter what their major. Students can also earn academic credit for participation on stage and behind the scenes.

## OFFICE OF EQUAL <br> OPPORTUNHY AND ACCESS

Kim D. Kirkland, Executive Director
kim.kirkland@oregonstate.edu 541-737-3556
Leanna Ott, Executive Assistant
leanna.ott@oregonstate.edu
541-737-3001
Marnie Johnson, Executive Support
Specialist/Office Coordinator
marnie.johnson@oregonstate.edu 541-737-6368
Kerry McQuillin, Affirmative Action Manager
kerry.mcquillin@oregonstate.edu 541-737-4381
Gabriel Merrell, Director of Access and Affirmative Action
gabriel.merrell@oregonstate.edu 541-737-3671
Binh Le, Affirmative Action Associate binh.le@oregonstate.edu 541-737-4384
Yesenia Gutierrez, Director of Equal Opportunity, Deputy Title IX Coordinator yesenia.gutierrez@oregonstate.edu 541-737-6184
Chris Lenn, Equal Opportunity
Coordinator
chris.lenn@oregonstate.edu
541-737-6083
Andrea Bibee, Equity Associate
andrea.bibee@oregonstate.ed 541-737-0872
Hope Brian, Equity Associate hope.brian@oregonstate.edu 541-737-0837
Anne Bonner, Equity Associate anne.bonner@oregonstate.edu 541-737-0871
Fay Stetz-Waters, Equity Associate Fay.Stetz-Waters@oregonstate.edu 541-737-5401
Office of Equal Opportunity and Access 330 Snell Hall
Oregon State University
Corvallis, OR 97331
541-737-3556
541-737-8232 FAX
Email: equal.opportunity@oregonstate.edu
Website: http://eoa.oregonstate.edu
Accessibility Website: http://oregonstate. edu/accessibility/

## Principles

The Office of Equal Opportunity and Access is committed to success for the entire campus community through equality, fairness, and understanding. Our work is guided by three principles:

- Equity-Ensuring equality of opportunity in all that we do. We strive to ensure equality in terms of the opportunity to become a member of the Oregon State University learning and working community; in one's opportunity to participate in and contribute to the work; in one's opportunity to participate in and benefit from the programs, services, and activities; and in terms of the communities of the state that are served by the university.
- Inclusion-Welcoming, valuing, and seeking to understand the experiences of everyone with whom we interface. We create and sustain this environment through interpersonal interactions that explicitly support and affirm the inherent dignity and uniqueness of individuals and communities, and through institutional efforts that address systemic barriers to inclusion.
- Diversity-Recognizing that a diversity of people, perspectives, experiences, and thought is essential to a compelling research, scholarship, and learning environment. We aim to develop policies and practices that promote and enhance diversity in all university endeavors, striving to benefit maximally from our different ideas, perspectives, and ways of being, knowing, and doing.


## Expertise and Leadership

In service to both Oregon State University and the broader community, the Office of Equal Opportunity and Access provides expertise and leadership in the following areas:

- Engaging in community development, including creating, leading, and supporting opportunities for involvement with an array of equity and inclusion efforts.
- Partnering with a range of individuals and groups to develop and deliver programs, initiatives, and resources related to campus-wide diversity and social justices issues.
- Working to eliminate barriers to achievement for individuals and groups historically underrepresented in higher education.
- Managing the university's affirmative action and equal opportunity efforts.
- Responding to discrimination complaints through investigation and resolution.
- Providing advice and assistance to individuals who believe they have experienced bias or discrimination.
- Promoting understanding about affirmative action, equal opportunity, diversity, and inclusion.
- Coordinating access and accommodation in accordance with the Americans with Disabilities Act.
- Offering education and training on a variety of topics related to equity and inclusion.
- Assisting individuals and offices or units who would like guidance in areas such as search and selection, inclusive working and learning environments, and policy and best practices development.


## OFFIGE OF INSTHUTIONAL DIVERSITY

Charlene Alexander, Vice President and Chief Diversity Officer
charlene.alexander.oregonstate.edu Twitter: @OSUDiversity
Facebook: @osudiversity
\#WeAreOregonState
Website: http://leadership.oregonstate. edu/diversity
B236F Kerr Administration Bldg. OSU Sanctuary University FAQs website: http://leadership.oregonstate. edu/diversity/news-and-updates/ sanctuary-university-faqs

The Office of Institutional Diversity (OID) designs, plans, leads and implements, in collaboration with university partners, institutional change actions, initiatives and communications to advance diversity, equity and inclusion throughout all facets of Oregon State University. The Leadership Council for Equity, Inclusion and Social Justice advises the president, the provost, the chief diversity officer and other university leaders. The OID also coordinates the University's response to bias incidents impacting all OSU students, staff and faculty members.

More information about the Office of Institutional Diversity can be found at http://leadership.oregonstate.edu/ diversity.

## OFFICE OF STUDENT LIFE

Dan Larson, Associate Vice Provost for Student Affairs, Interim Dean of Student Life, \& Executive Director-University Housing \& Dining Services
Dan.Larson@oregonstate.edu
Melissa Morgan, Associate Dean of Student Life
Melissa.Morgan@oregonstate.edu
Leslie Schacht Drey, Assistant Dean of Student Life
Leslie.SchachtDrey@oregonstate.edu 150 Snell Hall
Oregon State University

Corvallis, OR 97331-8659
541-737-8748
Website: http://studentlife.oregonstate. edu/
The Office of Student Life (OSL) CAREs for students by building COMMUNITY for students, facilitating ACCESS for students, navigating RESOURCES for students and supporting EMPOWERMENT for students. We assist students in the resolution of problems and concerns, provide information about and referral to campus resources, and promote initiatives that address students' needs and interests. We also serve as a resource for parents, families, faculty and staff in supporting student success from the First-Year Experience program through graduation.

## CHILDCARE AND FAMILY RESOURCES

## Amy Luhn, Director

amy.luhn@oregonstate.edu
Kristi King, Student Family Coordinator kristi.king@oregonstate.edu
Erika Woosley, Program Assistant
Erika.woosley@oregonstate.edu
Avery Lodge
541-737-4906
Website: http://childcare.oregonstate. edu/

## Office of Student Life

The Childcare and Family Resources office supports parents at OSU by advocating for student parent needs, as well as the needs of all parents and caregivers on campus and by providing direct services, child care and other family-centered resources in support of a parent's academic and professional success. We oversee Beaver Beginnings, the campus child care center; provide free short-term drop-off child care for students with children; provide lactation rooms across campus and lactation support information; administer student and faculty/staff child care subsidy programs; provide monthly parenting education and support opportunities; and host special events for families, in addition to other services and resources. The Childcare and Family Resources office is primarily student fee funded and is directed by an advisory board of students, faculty and staff. Our Little Village (OLV) is a short-term drop-off child care center with two locations on campus, open evenings and weekends. Drop-off child care enables student parents to take advantage of two important resources on campus: The Valley Library and Dixon Recreation Center. Any currently enrolled student may drop off their child aged 6 months to 10 years old. The free service is paid for by student fees. In The Valley Library, parents must remain in the building while their
child is in care. In Dixon Recreation Center, parents may leave the facility and work or study elsewhere on campus.

## CORVALLIS COMIMUNITY

## RELATIONS

## Jonathan Stoll, Director

jonathan.stoll@oregonstate.edu
B066 Kerr Administration Bldg.
541-737-8606
Website: http://studentlife.oregonstate. edu/ccr

## Office of Student Life

Corvallis Community Relations enhances neighborhood livability and inspires a shared responsibility for creating a healthy, inclusive OSU-Corvallis community. We connect students with community resources to foster good neighborly behavior and educational tools to educate tenants of their rights and responsibilities. Corvallis ranks among the nation's top college towns and best places to live. Through collaboration, communication, education, and celebration, CCR helps to keep it that way.

- Collaboration: Establish synergistic community-university partnerships with key stakeholders. Create valuable partnerships with community stakeholders to achieve shared or mutually agreed upon results.
- Education: Implement programming and outreach to inform off-campus students of city ordinances, tenant rights, conduct processes and the value of positive civil behavior.
- Communication: Build and restore internal and external communication channels to effectively disseminate information and liaise with offcampus living groups.
- Celebration: Highlight the substantial contributions of OSU and its students to the local community.


## Live Smart Workshops

While the independence of living on one's own may be liberating, managing new challenges and increased responsibilities can be challenging. Live Smart Workshops provide OSU students with the tools to transition to living off-campus and to live smarter-to be respectful, good neighbors. Workshop topics include local laws and ordinances, tips on hosting responsible parties, safety and security, financial literacy, and tenant rights and responsibilities. Students who attend the Live Smart Workshop and pass the corresponding online Preferred Renters Exam are eligible to receive a $\$ 50$ rental deposit discount with properties participating in the Preferred Renters program.

## DISABILITY ACCESS SERVICES

Martha Smith, Director
A200 Kerr Administration Bldg. 541-737-4098
martha.smith@oregonstate.edu 541-737-7354 FAX
Disability.services@oregonstate.edu Website: http://ds.oregonstate.edu/home/ Accessibility Website: http://oregonstate. edu/accessibility/

## Office of Student Life

The Disability Access Services office (DAS) offers an array of services to students with documented disabilities. Services include, but are not limited to, note taking, sign language interpreting, real-time transcribing, alternative testing, captioning media for accessibility, and conversion of text into Braille, digital (for audio access) text and tactile images. DAS can also assist with registration, disabil-ity-related housing needs, and access to OSU community events. DAS offers two scholarships for students with physical disabilities or sensory disabilities (hearing loss or visual impairment). DAS also assists the Office Equal Opportunity and Access in supporting faculty, staff and other members of the OSU community with access consultation and accommodation requests.

## FRATERNITIES AND SORORITIES (GREEK LIFE)

Leslie C. Schacht Drey, Director Student Experience Center, Room 314 541-737-5459
Leslie.SchachtDrey@oregonstate.edu Website: http://studentlife.oregonstate. edu/cfsl

## Office of Student Life

Oregon State University is host to 45 different fraternities and sororities representing three governing councils of the College Fraternity Movement. The Greek experience on the OSU campus places emphasis on academic achievement, community building, community service, service learning, and preparing the Greek students for leadership roles following graduation.

The Greek community participates in leadership roles as ASOSU officers, Barometer staff members, MUPC chairs, resident assistants, and varsity athletes.

Representing approximately 12 percent of the undergraduate student population, the Greek community at OSU has provided 100 continuous years of excellence in service and support to Oregon State University.

Students interested in exploring membership in a fraternity or sorority may contact the Center for Fraternity \& Sorority Life at Student Experience Center, Room 314, Corvallis, OR 97331; 541-737-5459, or visit our website for additional information, http://studentlife. oregonstate.edu/cfsl.

## HUMAN RESOURCES SERVICE CENTER (HSRC)

Nicole Hindes, HSRC Coordinator nicole.hindes@oregonstate.edu

## Avery Lodge

541-737-3747
Website: http://studentlife.oregonstate. edu/hsrc

## Office of Student Life

The Human Services Resource Center provides direct service, outreach, education, and referral services to OSU students facing hunger, housing problems, and poverty. Our aim is to ensure basic human needs are met so that students can pursue a quality education. We also work to create a dynamic learning environment in which students, faculty, and the community can learn how to best address current pressing challenges facing college students.
The HSRC provides the following

## services:

- Intermediary services between students and agencies that offer rental assistance, food stamps, food boxes, and health insurance.
- Food Pantry offering emergency food to students in need.
- Textbook Lending Program helping connect eligible students to free textbooks (as well as other affordable ways for everyone to obtain textbooks).
- Workshops, seminars, and opportunities for internships and employment.
- Connecting students to ServiceLearning and community service opportunities.
- Help with applications for food stamps.


## MILITARY AND VETERAN RESOURCES ADVISOR

## William Elfering, MVRA

541-737-7662
william.elfering@oregonstate.edu
Website: http://studentlife.oregonstate.

## edu/veterans

## Office of Student Life

The Military and Veteran Resources Advisor (MVRA) advocates for studentveterans to receive targeted support in navigating campus resources and pursuing academic goals and advises about internal and external support programs. The MVRA collaborates with School Certifying Officials to counsel students and parents concerning eligibility and benefits available under various programs at the local, state, regional, and federal level. The MVRA maintains an informative Military and Veteran Resources website and corresponds with prospective, currently enrolled, and alumni studentveterans to provide them with the latest news on benefits, processes, and procedures from the Veterans Administration.

## NEW STUDENT PROGRAMS \& FAMILY OUTREACH

## Leslee Mayers, Director

leslee.mayers@oregonstate.edu
TBD, First-Year Experience Coordinator
Natalie Rooney, Orientation
Coordinator
natalie.rooney@oregonstate.edu
TBD, Office Manager
A150 Kerr Administration
541-737-7627
Website: http://newstudents.oregonstate. edu/
Office of Student Life
New Student Programs \& Family Outreach supports the college transition process with educational programs and outreach for new OSU students and their families. New Student Programs \& Family Outreach coordinates new student orientations and Welcome Week programs, as well as parent/family outreach through orientations, events, websites and the OSU Parent \& Family Association.

## STUDENT CONDUCT AND COMMUNITY STANDARDS

Carol Millie, Director
Willie Morgan, Assistant Director
150 Snell Hall
541-737-3656
SCCS@oregonstate.edu
Website: http://studentlife.oregonstate. edu/studentconduct/

## Office of Student Life

Student Conduct and Community Standards serves as the central coordinating office for violations of University Student Conduct Regulations. The office acts on reports of possible violations from law enforcement, faculty and staff or others. The program provides conflict resolution support for students, faculty, and staff as well as staff training.

## RECREATIONAL SPORTS

Leah Hall Dorothy, Director
Recreational Sports
541-737-1713
leah.halldorothy@oregonstate.edu Website: http://recsports.oregonstate.edu
Social engagement, physical activity, and healthy living are the signature products of the Department of Recreational Sports. Over four thousand students access campus recreation facilities each day, as extensive programming provides varied activities and growth opportunities for OSU's diverse student interests. Student incidental fees ensure that all registered students have drop-in access to these important, life-balance resources.

## RECREATION FACILITIES

Dixon Recreation Center includes
multiple gyms and courts, a comprehensive fitness center, an indoor track, an indoor climbing center, a sand volleyball court, and Steven's Natatorium. Full-service locker rooms and equipment issue are also available.
The Dixon Climbing Center provides over 7,000 square feet of climbing surface for climbers of all abilities. This 42-foot-tall facility has three types of wall surface and is equipped with several cracks for lead climbing. It also contains the world's only elevator-accessible rappel station. The McAlexander Climbing Center provides over 4,000 square feet of high performance climbing wall surface including a 60 -foot-long bouldering wall. This wall is equipped with several instructional components such as a rappelling ledge, and a cliff-top training platform.
McAlexander Fieldhouse includes indoor turf, multi-sport courts, and an indoor climbing center.
The Stevens Natatorium includes an 8-lane, 25 -yard lap pool, a deep-water pool, and a spa with an adjoining observation deck. Full-service locker rooms, equipment issue area, and a private changing room are also available. When the weather is nice there is also an outside sun deck.

Student Legacy Park includes turf fields, indoor and outdoor tennis courts, a track, basketball court, and outdoor pavilion.

Peavy Sports Fields (grass) are commonly used for intramural play.

Recreational Sports also rents facilities for large and small groups-camps, conference activities, events, etc. Learn more about available spaces, fees, and schedules at http://recsports.oregonstate. edu/rentals.

## RECREATION SERVICES AND PROGRAMS

## The Adventure Leadership Insti-

 tute includes a variety of facilities, classes, programs, and services that support educational and leadership experiences outside the classroom. Special 'for-credit' classes are offered to provide the skills needed to lead trips or facilitate groups. Professional certificates can be obtained in these areas. Call 541-737-4341 to setup an appointment with an advisor. The Adventure Leadership Institute is also the home of the Adventure Club, offering a variety of outdoor pursuits for the OSU community to join in throughout the year.Experiential education is offered to students, faculty, and community groups on a six-acre challenge course of low and high elements designed to actively engage the mind and body. Participants develop a greater understanding of communication and problem solving skills, as well as the people they live
and work with through group challenge activities. Highly trained instructors are on hand to assist all groups.

Fitness programs offer drop-in group fitness classes in activities such as zumba, indoor cycling, yoga, kickboxing, step, boot camp and group strength and resistance. Personal training and small-group training are available by appointment. Fitness hosts special events, presentations and workshops year-round and upon request. Appointments are available for fitness testing, personal training, and athletic training.
Intramural sports emphasize participation and fun through competition with others on campus. There are over\& 40 individual, dual, and team sports including 5 K walk/runs, badminton, basketball, billiards, bowling, dodgeball, flag football, golf, indoor baseball, kickball, pickle ball, racquetball, soccer, softball, swimming, tennis, track, ultimate disc, volleyball, water polo, wrestling, and others.
Safety programs are a campus resource for CPR and First Aid training, first aid kits and supplies, emergency response staffing for events, and safety awareness seminars.
Special events hosted at the recreation center include Start Night, RecNight, and After Dark-popular late-night forums of food, music and activities with friends.

Sport clubs are student run and often compete with other universities around the state and across the United States. Clubs are available for student intercollegiate competition in archery, badminton, baseball, bass fishing, cycling, disc golf, dodgeball, equestrian (dressage, drill, hunter-jumper, IHSA), gymnastics, judo, karate, kendo, lacrosse, pistol, polo, racquetball, rifle, rugby, running, sailing, soccer, table tennis, tae kwon do, tennis, triathlon, ultimate disc, volleyball, and water polo.
Wellness coaching helps students, faculty, and staff develop a personal plan to pursue goals for well-being.

## STUDENT HEALTH SERVICES

Jennifer Haubenreiser, Executive

## Director

201 Plageman Building
541-737-9355
jenny.haubenreiser@oregonstate.edu Website: http://studenthealth.oregonstate.edu/
Appointments 541-737-WELL (9355)
Information/Nurse Advice Line
541-737-2724
SHS@Dixon 541-737-7556
Student Health Services (SHS) at Oregon State provides leadership for health and wellness on campus with a goal to enhance students' success while at OSU
and throughout their lifetimes. SHS is accredited by the Accreditation Association for Ambulatory Health Care and is a member of the American College Health Association. The laboratory is accredited by the Commission on Office Laboratory Accreditation (COLA). The mandatory student health fee covers routine office visits at SHS. See Fees below for information about additional charges.
SHS offers comprehensive primary health care, disease prevention and treatment services, as well as extensive prevention, advocacy and wellness programs for all OSU students. Most services are housed in the Plageman Building on campus, including the medical center, lab, pharmacy and prevention, advocacy and wellness programs. Specialized services are available at the Dixon Recreation Center (SHS@Dixon) and the clinic at Tebeau Hall offers same-day appointments for minor medical concerns.
During the academic year the medical center is open Monday-Friday, 9 a.m. to 6 p.m., and 10 a.m. to 3 p.m. on Saturdays. Hours and services vary during summer session, term breaks and on holidays. A telephone nurse information and advice line is available during clinic hours and after hours. More extensive clinic information and an online self-care guide is available at http://studenthealth. oregonstate.edu/.

## IMMUNIZATION AND MEDICAL HISTORY REQUIREMENTS

A complete Medical Health History Form is required of all registered OSU students. Required immunizations include measles, mumps, and rubella; varicella; hepatitis B; tetanus-diphtheria-pertussis and meningococcus (MCV4) for those under age 22. A tuberculosis screening test is required for students arriving from certain countries and is available at SHS. Students are encouraged to satisfy all immunization requirements before arriving at OSU, but SHS can also administer these vaccinations once a student is attending OSU. Non-compliance results in a hold placed on registration for classes. While not required, students are encouraged to be immunized against hepatitis A, HPV, and meningococcus B. Annual flu immunizations are offered to students and travel immunizations are recommended where appropriate. More information is available at the Immunization Help Line: 541-737-7573.

## MEDICAL SERVICES

## Plageman Building Student Health

 CenterConfidential and high-quality health care is provided by physicians, nurse practitioners, physician assistants, registered nurses, physical therapists and other health care professionals. Students are
encouraged to become established with a primary care clinician early in their academic career. Clinical services include general medicine, women's health, sexual health, allergy/asthma, sports medicine, travel medicine, psychiatry and specialty consultations in orthopedics. Nutrition services and tobacco cessation counseling are also available, and the Oregon Contraceptive Care (CCare) unit provides free contraceptive services to students who meet residency and income guidelines. SHS provides x-ray and laboratory services. A full-service pharmacy, operated by the OSU College of Pharmacy, is located on the first floor of the building.

## Tebeau Hall Same-Day Clinic

SHS's satellite clinic at Tebeau Residence Hall provides same-day appointments for minor illnesses and medical concerns, such as sore throats, coughs and colds, headaches or back pain. Hours are Monday through Friday, 9 a.m. -12 p.m. and 1:00-4:30 p.m. during the academic year. Hours vary during holidays, breaks and summer. Appointments can be made by calling 541-737-9355.

## SHS@Dixon Recreation Center

SHS@Dixon provides services to treat ac-tivity-related injuries and other medical conditions and supports and promotes positive health behaviors. SHS staff provide physical therapy, sports medicine, massage therapy, nutrition consultation, acupuncture, chiropractic and wellness coaching at Dixon Recreation Center. Hours are Monday through Friday, 9-5 p.m. during the academic year. Hours vary during holidays, breaks and summer. For appointments and information, please call 541-737-7556.

## PREVENTION, ADVOCACY \& WELLNESS (PAW)

## Prevention

The prevention team strives to ensure student success through:

- The prevention of high-risk alcohol use and illicit/harmful drug use
- The prevention of sexual violence, interpersonal violence, hazing and other forms of violence
- Engaging evidence-based workshops and other programs
- Early intervention for students with indicated needs through referrals to the Certified Alcohol \& Drug Counselor (CADC) and mandated students through the IMPACT Program
- Supporting students who are in active recovery from substance use dependence through the Collegiate Recovery Community
It is the vision of this team to create a safe and supportive living and learning environment in which all students can thrive and succeed.


## Advocacy: Survivor Advocacy and Resource Center

The Survivor Advocacy and Resource Center (SARC) serves as a first point of contact for all university community members affected by different forms of sexual harassment, including sexual assault, unwanted sexual experiences, domestic violence, dating violence and stalking. Safe and confidential services are available for crisis intervention and stabilization, safety planning, information about reporting options, on-campus advocacy for academic and housing concerns, referral and accompaniment to medical examinations or police and Title IX hearings and more. Free and confidential services are available 24 hours a day, 365 days a year at 541-737-2030 or for walk-in visits at 311 Plageman Building.

## Wellness

The Wellness team works to build knowledge and skills, change attitudes and behaviors, and promote healthy choices among OSU students. The Wellness team provides workshops on a variety of issues most commonly faced by college students, including sexual health, nutrition, stress and body image. Other free services include nutrition counseling with registered dietitians and wellness coaching to explore students' personal strengths and wellness goals. Students interested in contributing to these health promotion efforts are encouraged to participate in the Wellness Agents peer leader program where they can gain professional experience and mentorship while learning about prevention and health promotion in higher education.

## FEES

Students pay a quarterly health fee that provides access to clinical office visits at no charge. Additional fees are charged for certain procedures, laboratory tests, x-rays, pharmacy and on-site medical specialists. The most common fees are listed on the SHS website http://studen-thealth.oregonstate.edu/general/feesservices. Any fees for service can be billed directly to the student's OSU account.

## OSU STUDENT HEALTH <br> INSURANCE

OSU offers insurance plans for students and their eligible dependents. Insured family members who are not OSU students are not eligible to be seen at SHS but can see medical providers within the community. Domestic students must meet minimum credit requirements to qualify for the health insurance. International students registered for one credit or more are automatically charged for the mandatory health insurance unless they submit a health insurance waiver by the third Friday of the term. In order to waive the mandatory OSU insurance
plan a student's health insurance must meet or exceed the current benefit requirements. More information is available in the Insurance Office in the Plageman Building, Room 110, or by calling 541-737-7568.

## STUDENT LEADERSHIP AND INVOLVEMENT, <br> clubs, organizations, ACTIVITIES

Damoni Wright, Executive Director Student Experience Center (SEC) 109 541-737-8849
General SLI Information: 541-737-2101 Website: http://sli.oregonstate.edu/sli
Comprised of the Center for Leadership Development, the Student Events and Activities Center, the Center for Fraternity and Sorority Life, and the Center for Civic Engagement, the Department of Student Leadership and Involvement (SLI) provides programs, services and opportunities that intentionally promote student learning and growth in four critical areas: 1) Civic Engagement \& Sustainability, 2) Community Building \& Celebration, 3) Leadership Development, and 4) Global Perspective \& Multiculturalism. See individual listings for information about each center.

SLI works in direct support of the following Student-Coordinated Programs: Coalition for Community Dialogue, International Student Community Team (ISCT), the Memorial Union Program Council (MUPC), and the Student Sustainability Initiative (SSI); and indirectly with other groups, including ASOSU and the Cultural Resource Centers. See individual listings for information about each program.

Additionally, SLI supports OSU Recognized Student Organizations with leadership, organizational development and activity/event planning, including events through the Cultural Meal Support program.

## STUDENT SUPPORT SERVICES (TRIO)

## Amas Aduviri, Director

Amy Davila-Klautzsch, Assistant Director
333 Waldo Hall/324A Waldo Hall 541-737-3923/541-7373907
Website: http://trio-sss.oregonstate.edu/
Student Support Services (SSS) is a federal TRiO program, funded by the U.S. Department of Education, with the intent of providing assistance to low-income, first generation (neither of whose parents graduated from a four-year institution), and students with a learning or physical disability. SSS is able to provide academic
counseling, peer mentoring, tutoring, and cultural enrichment opportunities for students who qualify for the program. In addition, financial assistance is available to students who meet certain additional criteria.

## STUDENT SUSTAMNABHMTY INTIATIVE

Jen Myers, Advisor
Jen.ChristionMyers@oregonstate.edu Student Experience Center, Suite 206 2251 SW Jefferson Way
Corvallis, OR 97331
541-737-3172
Email: ssi.admin@oregonstate.edu Website: http://sli.oregonstate.edu/ssi
The Student Sustainability Initiative (SSI) is a student fee-funded organization whose mission is to advance student efforts to create a culture of sustainability at Oregon State University through programming that fosters environmental, social, and economic justice.
The Student Sustainability Initiative (SSI) is a place for sustainability-minded individuals and groups to network and exchange ideas. Office hours are 9 a.m. to 5 p.m., Monday through Friday during the school year.
If you would like to get involved, visit the SSI's website, check out their Facebook page (http://www.facebook.com/ osussi), follow them on Twitter (http:// twitter.com/\#!/osussi), e-mail them, or drop by the Student Experience Center.

## SURVIVOR ADVOCACY AND BESOURCE CENTER

Judy Neighbours, Associate Director 541-737-2030
judy.neighbours@oregonstate.edu
Jessica Haymaker, Advocacy Specialist jessica.haymaker@oregonstate.edu 311 Plageman Building, Student Health Services
Corvallis, OR 97331
Website: http://studen-
thealth.oregonstate.edu/
survivor-advocacy-and-resource-center
The OSU Survivor Advocacy and Resource Center is committed to providing free and confidential support to all university community members, including students, faculty and staff affected by different forms of violence, including sexual assault, dating or domestic violence, sexual harassment and stalking. Services include assistance with academic support measures and housing concerns, crisis intervention and stabilization, safety planning, support groups for survivors, information about reporting options to law enforcement or school officials, accompaniment to medical examinations,
police interviews, and Title IX proceedings, and connections to on- and offcampus resources.

## UNIVERSTYY HOUSING ADD DINING SERVICES <br> Dan Larson, Executive Director <br> Teresita Alvarez-Cortez, Director of Diversity Initiatives and Programs <br> David Craig, Director of Business Development

Steve Hoelscher, Director of Finance and Information Services
Stephen Jenkins, Director of Residential Education
Kerry Paterson, Director of Residential Dining and Catering
Patrick Robinson, Director of Facilities Maintenance and Construction

Brian Stroup, Director of Operations
Jennifer Viña, Director of Marketing and Communications
957 SW Jefferson Ave. (Oxford House) Oregon State University
Corvallis, OR 97333
541-737-4771
Website: http://uhds.oregonstate.edu/
The department of University Housing and Dining Services (UHDS) provides a diverse selection of housing and dining alternatives-residence halls and student family housing-all of which offer a variety of programs and services.
Oregon State University (OSU) recognizes the impact the living environment has upon student life. This environment, whether on or off campus, is an important part of the student's educational experience. The university is committed to providing all students in the residential setting an integrated program for personal, social, cultural, and educational development beyond the classroom.

First-year students are required to live on campus their first academic year at OSU. It is easier for students to make friends and adjust to university life if they live on campus for a year or more. Academic indicators have shown that students who live on campus typically do better academically and are more likely to continue their education.
UHDS's main goals are to help students succeed academically, become active citizens of their communities, and to enrich and enjoy their university experience. Through UHDS, students can make arrangements for meals and accommodations, consult with residential education staff, bring suggestions for improvements, and seek counsel on university resources available to them. UHDS's vision is to engage students, enrich their lives and help them thrive.

## RESIDENCE HALLS

Through its 15 residence halls, the university offers a variety of living environments, including living-learning communities, designated quiet floors, coeducational facilities, and substancefree housing, and an academic success program focus with in-hall academic tutoring. More details about the living communities can be found at http:// uhds.oregonstate.edu/halls.

Most student rooms are designed for double occupancy. A limited number of single rooms are available in each hall. All residence halls, like the OSU campus, are smoke-free.
The residence hall dining program features an a la carte meal service, with services offered in Marketplace West, McNary Central, and Arnold Dining centers, Bing's at Weatherford Café is located in Weatherford Hall. Cascadia Market and Peet's Coffee are located in the International Living Learning Center. Residential students have a choice of flexible meal plans, which can be used in any of the UHDS operated dining facilities and cafes. They can also participate in the Orange Rewards program, which allows them to eat in all 28 campus dining venues.
For more detailed descriptions of dining options, please visit the University Housing and Dining Services' website at http://uhds.oregonstate.edu/dining.

## RESIDENCE HALL APPLICATION

Once admitted to OSU, students submit an online application for universityowned residence halls at http://uhds. oregonstate.edu/housing/apply-now. Academic year contracts are available to all students. Comprehensive UHDS information packets titled Living in Beaver Nation are distributed to admitted students or are available from UHDS by calling, 541-737-4771.

## RESIDENCE HALL RATES

Note: The figures listed below are estimated room and meal rates for 20162017. When established, the new rates will be available through UHDS.

## Residence Halls

Estimated rates listed are for the academic year; room and meal package rates will vary by type of room style and meal plan chosen.
Double room with Meal Plan 3 (including $\$ 100$ Orange Rewards):
\$9,900-\$12,300
Rates vary by room option and type, with singles, doubles, triples and quad room options available.

All Oregon State University residence halls and dining facilities are built and operated entirely with income from resident students and summer conferences and camps. No state tax funds are used.

## UNIVERSITY HOUSING FOR STUDENT FAMILIES (ALL <br> TERMS)

Oregon State University maintains 107 unfurnished apartments in Orchard Court for student families. Rentals start at approximately $\$ 525$ a month with water, electricity, garbage, and TV cable service furnished. Additional information is available at http://uhds.oregonstate. edu/housing/family-housing.

## HOUSING IN SUMMER SESSION

Summer Session housing is available for short- or long-term stays. Additional information is available at http://uhds.or-egonstate.edu/housing/summer-housing.

## OFF-CAMPUS HOUSING

Current bulletin board listings for a variety of rentals available in Corvallis and surrounding communities are located in the Memorial Union lower concourse. A copy of the Renters Guide may be obtained upon request from The Daily Barometer office, 118 MU East, Corvallis, OR 97331.

## UNIVERSHY OMBUDS

Sue Theiss, University Ombuds
Waldo Hall 116
541-737-4537
Weekdays, (M-Th) 8:30 a.m.-5:30 p.m., (F) 9 a.m. -5 p.m.

Website: http://oregonstate.edu/ombuds/ Email: ombuds@oregonstate.edu The University Ombuds strengthens campus communication and administrative processes by acting as a designated neutral and conflict management practitioner. The Ombuds' major function is to provide informal, impartial, and confidential* assistance to the university community by listening to concerns, clarifying issues, exploring options for resolution, providing information and referrals, and if all parties agree, facilitating informal, non-binding mediation. Serving as a designated neutral, the ombuds is not an advocate for any individual or for the university, but rather acts as an advocate for fairness and healthy conflict management. The ombuds does not provide legal advice or psychological counseling. This position compliments, but does not replace, the university's existing resources for conflict resolution.

To schedule an appointment, please contact the office by telephone or email. Walk-in appointments are welcome, however, scheduling appointments in advance is preferred to assure availability.
*Confidentiality cannot be promised in matters relating to threats to public safety, child abuse, if there is imminent risk of serious harm, or if compelled by a court of law. Speaking with an ombuds does not constitute legal notice to the university of any problem, concern, or complaint. You must pursue alternative complaint avenues if you wish to obligate the university to respond in any way. The ombuds has no duty or responsibility to report incidents to any person or authority, other than as described above.

## ACADEMICS FOR STUDENT <br> ATHLETES

## Kate Halischak, Director

Third Floor
Beth Ray Center for Academic Support 541-737-4382
kate.halischak@oregonstate.edu
Website: http://oregonstate.edu/ studentathlete/

The mission of Academics for Student Athletes (ASA) is to enable student athletes to achieve academic success through the provision of services that support the teaching and learning mission of the university. ASA strives to provide outstanding academic support and counseling that strengthen the persistence and success of student athletes through graduation, the academic performances of student athletes, the academic selfdirection for student athletes, and the maintenance of NCAA compliance.

## ACADEMIC SUCCESS CENTER

Clare Creighton, Director
102 Waldo Hall
541-737-2272
clare.creighton@oregonstate.edu Website: http://success.oregonstate.edu/
The Academic Success Center (ASC) supports students as they learn how to learn. The ASC offers Academic Coaching, Supplemental Instruction, ALS 116, The Learning Corner (online), and academic success workshops, and engages in crosscampus collaboration and referral.

ACADEMIC LEARNING SERVICES (ALS) AND UNIVERSITY EXPLORATION (UEXP) COURSES

## Jesse Nelson, Director

102 Waldo Hall
541-737-2272
jesse.nelson@oregonstate.edu
Website: http://success.oregonstate.edu/
Academic Learning Services courses are designed to help students acquire a basic foundation of skills necessary for success in the university environment. They are not intended to form a significant part of any student's program, but instead, to help them complete a regular university degree program.
ALS is housed within the Academic Success Center. Many campus organizations and programs make up the courses within ALS, UEXP, and instructors come from throughout the university.

ALS courses are listed at http://catalog. oregonstate.edu/CourseList.aspx?campus =corvallis\&subjectcode=ALS.
UEXP courses are listed at http://catalog.oregonstate.edu/CourseList.aspx?cam pus=corvallis\&subjectcode=UEXP.

## CENTER FOR TEACHING

AND LEARNING
Kay Sagmiller, Director
Brooke Howland, Assistant Director
Cub Kahn, Coordinator, Hybrid Course Initiative

## Jeanna Towns, Office Manager

jeanna.towns@oregonstate.edu 466 Learning Innovation Center (LiNC) 541-737-2816
Website: http://ctl.oregonstate.edu/
The CTL supports excellence in teaching and learning in the academic curriculum and learning in co-curricular settings.
We have particular expertise in pedagogy and course design; general education; writing in the disciplines; difference, power and discrimination; teaching and learning technologies; global learning; GTA training and development; and classroom assessment techniques. Our services include individual consultation, faculty workshops and seminars, faculty learning communities, and orientations.

## COLLABORATIVE LEARNING CENTER

Victoria Heiduschke, Library
Experience Coordinator
victoria@oregonstate.edu
Website: http://osulibrary.oregonstate. edu/clc

Located on the main floor of The Valley Library, the Collaborative Learning Center (CLC) offers a variety of resources for OSU students. During scheduled hours, peer tutors and graduate teaching assistants from the College of Science and the Writing Center are available to help students succeed.
Free drop-in tutoring is available from the Math Learning Center, Chemistry (Mole Hole), and CAMP. Students may also make appointments with Writing Center consultants. There is no charge to use any of the learning services available in the CLC. Current schedules and a list of participating departments are available on the CLC website at http://osulibrary. oregonstate.edu/clc.
The CLC is designed to be a welcoming space for students. As part of the Learning Commons, it provides easy access to all of the resources in The Valley Library as well as

- Computer workstations configured for both individual and collaborative work
- Moveable whiteboards
- Moveable tables and chairs, providing seating for more than 100 students
- "Mini" classrooms equipped with whiteboards, tables and chairs.


## COLLEGE ASSISTANCE

## MIGRANT PROGRAM (CAMP)

## Amas Aduviri, Director

541-737-3923
amas.aduviri@oregonstate.edu
337 Waldo Hall
Oregon State University
Corvallis, OR 97331
541-737-2389
Website: http://oregonstate.edu/dept/ camp/
The College Assistance Migrant Program is a federally-funded program through the U.S. Department of Education that provides support for first-year college students from migrant/seasonal farmworker backgrounds
To be eligible, the student or the student's parents must have worked at least 75 days in the past 24 months in migrant/seasonal farmwork (including crop, dairy, poultry or livestock production, the cultivation or harvesting of trees, or work on a fish farm), be eligible for participation in a Migrant Education Program, or have attended a High School Equivalency Program (HEP) within the last 12 months and have completed a GED.
CAMP students are eligible for the following scholarships and services:

- Placement testing and academic advising
- Quarterly book allowance to cover the cost of textbooks
- Monthly stipend throughout the academic year
- Personal counseling
- Travel allowance
- Supplemental aid to reduce debt and meet financial need
- Internship in residence halls
- Orientation/study skills workshops
- Financial aid counseling
- Health services
- Free tutoring
- Career orientation, job search skills development
- Other services as needed


## COMPUTER CENTERS

Students at Oregon State have access to a wide variety of computer resources, from microcomputers to supercomputers, throughout the university. There are general access microcomputer facilities available to students at no charge. The microcomputer systems are networked so that they can act as workstations to access the campus mainframe and other facilities nationally and internationally. The College of Business facility contains 125 Hewlett-Packard PCs; the Milne facility contains 80 Pentium and 66 Power Macintosh systems; and the Bryan (Sackett Hall) facility houses 15 Pentium and 15 Power Macintosh systems. All facilities contain laser printers. The Milne facility is open 24 hours a day, seven days a week
during the regular academic year.
In addition, many individual colleges, schools, and departments at OSU have their own computer facilities for use by students and faculty.

With thousands of individual computers located all over the campus, OSU students and faculty don't have to look far for the computer resources they need.

## DIFFERENCE, POWER AND DISCRIMINATION (DPD) PROGRAM

Nana Osei-Kofi, Director
316 Waldo Hall
541-737-2824
nana.osei-kofi@oregonstate.edu
The Difference, Power, and Discrimination (DPD) Program offers curriculum development support and education for faculty who teach DPD courses at Oregon State University. The DPD Program promotes the advancement of undergraduate courses that provide multidisciplinary perspectives on difference, power, and discrimination in the United States.

## ECAMPUS SUCCESS COUNSELING

Amy Riley, Student Success Manager 541-737-9211
Ecampus.success@oregonstate.edu
Success counseling is an academic counseling service for undergraduate Ecampus students. Success Counselors work in partnership with students to improve academic skills, to identify support resources, and to address obstacles to academic success at OSU. Success counseling is individualized, strengths-based, and holistic.

For further information, visit http:// ecampus.oregonstate.edu/services/stu-dent-services/success-counseling-current. htm.

## EDUCATIONAL OPPORTUNITIES PROGRAM (EOP) <br> Janet Nishihara, Director

## 337 Waldo Hall

541-737-3628
Website: http://eop.oregonstate.edu/
The Educational Opportunities Program (EOP) was created at Oregon State University in 1969 and provides a welcoming environment that supports the full development of the personal and academic potential of undergraduate students who have traditionally been denied equal access to higher education.

These undergraduate groups include students of color, older-than-average students, students with disabilities, students who are single parents, low-income students, students who have been rurally isolated, veterans, and students who are the first generation in their family to attend college.

The goals of the program include pro-
viding services which will:

- acclimate students to university culture,
- enhance each student's academic performance,
- develop each student's professional and personal growth, and
- assist students in developing a sense of belonging and a strong connection to the university.
Students in the program will have ac-
cess to the following services:
- assistance through the admissions process,
- assistance in locating financial resources,
- orientation to the university,
- academic and personal counseling,
- courses in math, reading and writing, and
- assistance with finding jobs and internships,
- assistance with international study experience and undergraduate research, and
- support in writing resumes and cover letters.
U.S. citizens or permanent residents interested in learning more about the program or in applying for services should visit the EOP website, http://eop. oregonstate.edu/.


## MATH LEARNING CENTER

Thomas P. Dick, Director
108 Kidder Hall
541-737-1570
tpdick@math.oregonstate.edu Website: http://www.math.oregonstate. edu/? $\mathrm{q}=\mathrm{mlc}$

The Mathematics Learning Center provides assistance in all lower-division mathematics courses. Help is available on a drop-in basis at no cost to students. Center hours in 108 Kidder Hall are 9 a.m. to 5 p.m., Monday through Thursday and 9 a.m. to 4 p.m. on Fridays from the second week of the term through dead week. MLC tutors are also available evenings in the Valley Library, 7 p.m. to 10 p.m., Sunday through Thursday. Make-up tests are sometimes administered in the MLC. Study materials, reference texts, and calculators are available. A computer lab is available for use by advanced math students in connection with some math courses. For more information, visit the website at http://www. math.oregonstate.edu/?q=mlc.

## UNIVERSITY EXPLORATORY

 STUDIES PROGRAM
## Kerry Kincanon, Head Advisor

102 Waldo Hall
541-737-8144
uesp.advisor@oregonstate.edu
Website: http://uesp.oregonstate.edu/
The University Exploratory Studies Program (UESP) is an academic advising program for students who choose to explore majors at Oregon State University.

OSU students who are undecided about a major can elect to be in UESP. UESP students work through a decisionmaking process to help them learn more about themselves and the numerous academic options that OSU offers. They are encouraged to declare a major and transfer to an academic school or department once they have found the best fit. As part of a successful academic and university experience, UESP has targeted several important learning outcomes for its students:

- Per the university requirement, UESP students should complete the FirstYear Skills courses (Writing I, Speech, Mathematics) in the baccalaureate core by the time they have earned 45 OSU-generated credits, and the Second-Year Skills course (Writing II) by the time they have finished 90 OSU-generated credits.
- UESP student should know how to access and utilize MyDegrees, OSU's online degree audit system.
- UESP students should engage with active exploration activities and resources.
- UESP students should pursue involvement outside of the classroom.
- UESP students should set goals related to major declaration in alignment with UESP's defined major-decision making process. UESP believes that regular consultation with a trained academic advisor will aid students in meeting these learning outcomes and moving through the major decision-making process. UESP students are required to meet with an advisor at least once a term to discuss major options and experiential learning opportunities and to plan course work for the subsequent term. Many students in UESP will also utilize Sigi3© , ALS 114, and the UESP website to assist in their exploration. UESP and the Career Development Center co-sponsor access for all OSU students to Sigi3@, a comprehensive career planning website. Students can use the site to help them clarify their interests, values, and abilities, as well as find extensive information about the world of work. UESP coordinates ALS 114, Career Decision Making, a two-credit class available each term to any first- and secondyear student interested in exploring
major and career options in a classroom setting. UESP also provides a departmental website with exploration strategies, information about major and career exploration events on campus, and links to several career information websites.

THE WRITING CENTER
Dennis Bennett, Director
Galina Romantsova, English Language Learning Coordinator
Chris Nelson, Graduate Writing Center Coordinator
123 Waldo Hall
541-737-5640
Website: http://writingcenter.oregonstate.edu
The Undergraduate and Graduate Writing Centers are support services for students and faculty at Oregon State University. Their mission is to provide writing programs that enable students at all levels to function effectively, efficiently, and confidently in an academic environment.

The Writing Centers offer free help with any writing task at any stage of the writing process and are open to all OSU students, as well as to staff, faculty, and members of the Corvallis community. Writing assistants can help with all aspects of the writing process from brainstorming and organization to questions of grammar and usage. Call 541-7375640 for an appointment.

## WRITING INTENSIVE

 CURRICULUM (WIC) PROGRAM Vicki Tolar Burton, Director306 Waldo Hall
541-737-3711
vicki.tolarburton@oregonstate.edu
The Writing Intensive Curriculum (WIC)
Program offers support and training for faculty who teach writing intensive courses in the majors and promotes excellence in the teaching of writing at the university.

Primary functions include:

- Offering faculty development seminars on best practices for teaching writing in the disciplines.
- Consulting with faculty who are designing or revising WIC courses.
- Reviewing WIC course proposals and assessing WIC courses in the Baccalaureate Core.
- Consulting with and making presentations to departments on issues of writing in the major.
- Publishing the WIC newsletter, Teaching with Writing.
- Developing and maintaining the WIC website, a rich resource for students and faculty, http://wic. oregonstate.edu/. In addition to writing help, the website includes criteria for WIC courses as well as links to a list of approved WIC courses.
Annually, the program invites departments to nominate their most outstanding student writer for a WIC Culture of Writing award in the discipline. Students who want information on WIC courses in their major should consult their departmental advisor.

With the complementary mission of learning, discovery and engagement, Oregon State University is a powerful force for moving the country forward in the 21st century. OSU's Outreach and Engagement enhances access to enrichment and problem solving through reciprocal relationships for the exchange of knowledge and resources in partnership with individuals, communities, businesses, industries, government and educational institutions.

Outreach and Engagement is an essential component of a contemporary Land-Grant university. It builds upon historic traditions in serving the state's residents in innovative ways through a statewide presence in local communities and a worldwide presence through courses and programs. Engagement will increasingly be defined by learner and student involvement in community issues as a part of their academic experience and by working relationships among stakeholders.
The OSU Extension Service has a presence in 36 Oregon counties and delivers programs in agriculture, family and community development, forestry, Sea Grant and 4 -H youth development. These units have a direct impact on Oregon's economy and the lives of Oregonians.
OSU Open Campus is a collaborative, community-based approach to meeting emerging educational issues and needs.

## OSU EXTENSION SERVICE

A. Scott Reed, Vice Provost for University Outreach and Engagement, Director Extension Service
Lindsey Shirley, Associate Provost for University Outreach and Engagement, Associate Director Extension Service 101 Ballard Extension Hall
Corvallis, OR 97331-3606
541-737-2713
Website: http://extension.oregonstate.edu
Oregon State University's Extension Service provides education and information based on timely research to help Oregonians solve problems and develop skills related to youth, family, farm, forest, and marine resources. It carries out its mission by extending the research and knowledge bases of the university to people who need the information and provides leadership in applying this knowledge to the problems people have identified.

Anyone may participate in Extension offerings. Thousands of Oregon citizens volunteer to assist in Extension programs by leading and teaching groups, responding to questions, and providing educational information. OSU students support their communities, gain practical experience and learn through Extension placements, applying academic learning to address local community needs.

Extension educational programs are developed in response to the needs of people in Oregon. Needs are identified by OSU Extension faculty, who are located throughout the state in county offices. Offcampus faculty, who work with people to assess their needs, partner with members of Extension's on-campus faculty to prepare and deliver useful educational programs. About two-thirds of OSU's Extension faculty and staff are located in offices off campus. Financial support is from county, state, and federal governments, grants, and other sources.
There are five major Extension education program areas:

## AGRICULTURAL SCIENCES AND NATURAL RESOURCES

Extension's agricultural program provides education and technical assistance for people with agricultural interests. The major program emphasis is on food, feed, energy, fiber, seed, and ornamental production and management of animal and plant production systems. Programs include farm/ranch business management, marketing, valueadded processing, natural resource use and conservation, community horticulture, human and environmental health, and bioethics. Audiences include urban and rural residents and businesses, government agencies and communities with wide-ranging interests in conservation, production, and community development.

## FAMILY AND COMMUNITY HEALTH

Extension's Family and Community Health program helps Oregonians improve their health, family, and community through education and community partnerships. Major programming extends knowledge related to public health, nutrition, exercise science, human development, family financial management, and aging to address important needs in Oregon's communities.

## FORESTRY AND NATURAL RESOURCES

Extension's Forestry and Natural Resources Program improves Oregonians' knowledge of forestry and natural resources and their options for enhancing benefits from these resources. This educational program assists forest owners, managers, processors, users, and students in understanding the importance of both production and environmental benefits from Oregon's forests. Priority subjects include reforestation, forest management, silviculture, forest health, wildland fire, intergenerational land transfer, harvesting and processing wood, protection of soil and water, wildlife habitat, and related natural resources use, management, and protection.

University
Outreach and
Engagement 101 Ballard Extension Hall Corvallis, OR 97331-3606 541-737-2713 Website: http:// outreach. oregonstate.edu

## Administration

A. Scott Reed,

Vice Provost for University Outreach and Engagement, Director OSU Extension Service

Lindsey Shirley, Associate Provost for University Outreach and Engagement, Associate Director OSU Extension Service

## SEA GRANT PROGRAM

Extension's Sea Grant Program provides education, training, and technical assistance to people with coastal-related needs and interests. Major efforts are concentrated in the areas of fisheries and wildlife, watersheds and other natural resource management, marine engineering, food science and technology, economics, business, resource management, education, and recreation. The program is primarily supported by the OSU Sea Grant College and the OSU Extension Service.

4-H YOUTH DEVELOPMENT
4-H helps young people learn and grow through an intentional process that builds competence, confidence, connection, compassion and character. Young people participate in $4-\mathrm{H}$ through clubs, afterschool programs, camps, and school enrichment activities. These youth are supported by trained volunteers who work under the direction of local 4-H professionals located in all 36 counties. As the only nationwide youth development program with direct ties to the land grant university system, 4-H is uniquely positioned to ensure that its programs are based on what is known about how young people develop and learn.

## OSU OPEN CAMPUS

A. Scott Reed, Vice Provost for University Outreach and Engagement, Director Extension Service
Jeff Sherman, Program Leader, Open

## Campus and Innovation

303 Ballard Hall
Corvallis, OR 97331-3606
541-737-1384
Website: http://opencampus.oregonstate. edu/
OSU Open Campus is a shared initiative between OSU Extension, OSU Ecampus, and local communities, led by the Division of Outreach and Engagement. In an effort to collaboratively engage community colleges, $\mathrm{K}-12$ education, and universities, OSU convenes local educational teams to provide access to degree completion, career and college readiness, and professional and economic development.

## STUDENTS AND FACULTY

 ENGAGING IN COMMUNITIESStudents and faculty who have an interest in working with communities around the state can feel free to contact us for more information.

0regon State University Libraries and Press cultivate superior scholarship and creativity, empowers discovery, and preserves and disseminates knowledge. We develop user-focused services, share our expertise through teaching and research, and build gateways to unique resources to further the growth of the OSU community, the people of Oregon, and the global scholarly community. OSU Libraries supports the instructional and research needs of OSU students, faculty, and staff through both traditional and innovative services and collections. We advance OSU's land grant mission, contributing to learner success, scholarly excellence, and community engagement.

## RESOURCES

The Oregon State University Libraries is the second largest research library in Oregon with three locations: The Valley Library at the main campus in Corvallis, The Marilyn Potts Guin Library at the Mark O. Hatfield Marine Science Center in Newport, and The OSU Cascades Library co-located at Central Oregon Community College in Bend.

The Valley Library collection includes materials in all subject areas, containing nearly 2 million printed volumes; subscriptions to more than 74,000 journal titles, most of which are available online; 500,000 maps and government documents; and hundreds of video and DVD recordings. As of 2014, more than 100,000 electronic books were available via the OSU Libraries' catalog. In addition to the primary research collection, a robust resource sharing program ensures access to information for research and pedagogical needs. OSU Libraries has digitized thousands of documents, photographs, and maps to make them more widely accessible for researchers, students, and the general public. Additionally, a notable collection of contemporary Northwest artwork is on display throughout The Valley Library with over 80 different artists represented.

The Valley Library provides a flexible learning environment that supports community and engaged learning. Two of its learning spaces are the Learning Commons and the Collaborative Learning Center (CLC). The Learning Commons offers a variety of spaces for groups to collaborate, as well as 118 computers (both Windows PCs and iMacs) that give students access to a wide variety of software. The CLC offers a variety of academic and student support services. Peer tutors and graduate teaching assistants from the College of Science, the Academic Success Center, and the Writing Center are available to assist students during scheduled hours in the CLC.
Partnering with Academic Technologies gives students access to video editing and multimedia production software, large format printing, along with hardware
including video cameras, microphones and audio recording equipment. In addition, The Valley Library has 31 three-hour group study rooms, 3790 -day research rooms, six long-term research rooms, one media preview room and three designated floors for quiet study. A drop-in daycare facility is available on the third floor. Laptop computers and tablets are available to OSU students, staff and faculty for six-hour checkout and can be used with the wireless network anywhere in the library.

OSU Libraries supports faculty and student research not only through the purchased collection, but also through unique and rare materials held by the Libraries' Special Collections and Archives Research Center. Content in signature collecting areas is made freely accessible on the web to facilitate use by students, faculty, and other researchers. This includes extensive documents from the Ava Helen and Linus Pauling Papers, the History of Science Collections, the Oregon Multicultural Archives, the Natural Resources Collections, the Oregon Hops and Brewing Archives, and the University Archives.

OSU Libraries also manages the ScholarsArchive@OSU institutional repository. This database makes a wide variety of information resources produced at OSU freely available on the web. Examples include faculty articles, OSU theses and dissertations, and all experiment and extension publications. ScholarsArchive@ OSU is consistently ranked among the top ten institutional repositories in the United States, according to Webometrics.

OSU Libraries extends services and resources to the campus and off-campus community in a variety of ways. The collections can be accessed both online and through mobile devices. Hours at The Valley Library have been extended to 24 hours, five days a week (24/5), allowing OSU students and faculty access to collections as well as computers. The Valley Library has wireless throughout the building. Reference assistance is available in person and by phone, by e-mail, by text message, and by instant message during most hours when The Valley Library is open. Subject specialists are available by appointment for individual research consultation.

The Autzen Electronic Classroom in The Valley Library is an enhanced electronic classroom for library-related instruction. It provides a hands-on setting with 24-networked Mac mini dual-boot student workstations, white boards, 6 large-format projectors and screens, and built-in sound. Additional furniture provides seating for classes up to 50 students, clickers, and white boards.
OSUL\&P teaching librarians provide workshops, tutorials and digital learning objects to help students develop their research skills. In partnership with faculty, they provide targeted learning experiences

Oregon State University Libraries and Press 121 The Valley Library Corvallis, OR 97331-4501 541-737-3331

## Administration

Faye A. Chadwell,
Donald and Delpha

## Campbell University

 Librarian and OSUPress Director
541-737-7300
in classes and lend their expertise to assignment design and assessment project. Over 7,200 students participate in more than 400 library classes and workshops each year. Teaching librarians also provide individual, in-depth consultations for over 300 students each year in addition to consultations with OSU faculty, staff, and community members.

OSU Libraries has two off-site branches. The Guin Library houses the research and teaching collection of Oregon State University's Hatfield Marine Science Center. The library's collection of more than 35,000 books and journals covers a broad range of marine-related topics including fisheries, aquaculture, oceanography, geology, environmental studies, and biology. Particular attention is paid to collecting material on marine fisheries, marine mammals, and information specific to the Northeast Pacific Ocean.

The Cascades Library in Bend, housed in the Barber Library of Central Oregon Community College, supports OSU-Cascades upper-division programs, including tourism and outdoor leadership and graduate programs in education. This is a relatively new branch campus that relies on the Cascades Library sharing the space and collections of the Central Oregon Community College Library to deliver services.

One on-campus branch facility is located in the College of Veterinary Medicine on campus. Open 24/7 to the college's academic community, the library has one full-time staff member, along with student employees paid by the college. OSU Libraries handles acquisitions and cataloging for the veterinary medicine collection, while the Veterinary Medicine Library fills interlibrary loan requests for items in the OSU Libraries' collection.

Since 2007, OSU Press has been a department of the OSU Libraries. OSU Press supports the university's strategic plan through its publication of scholarly and general interest books in forestry, natural resources management, and natural history as well as the cultural and social history of Oregon and the Pacific Northwest. The Press and Libraries collaborate on several projects including an open textbook initiative that supports the development of free online textbooks by OSU faculty.

## COLLABORATION

As libraries move away from ownership to access, consortial memberships give OSU faculty and students a wide variety of information in a timely and efficient manner.

- OSU Libraries is a member of the Orbis Cascade Alliance which includes 37 Washington, Idaho, and Oregon universities, colleges,
and community colleges with total holdings of 28.7 million titles.
- Membership in the Greater Western Library Alliance (GWLA) enables the Libraries to increase its digital presence through such sites as the Western Waters Digital Library. GWLA is a consortium of 33 research libraries from 17 Midwestern and Western states.
- OSU Libraries is a founding member and active contributor to the Archives West, a consortium of 43 archives and special collections in Oregon, Washington, Idaho, Montana, and Alaska. NWDA provides enhanced access to archival and manuscript collections across the northwest through a union database of Encoded Archival Description (EAD) finding aids.
- OSU Libraries participates in the Oregon Statewide Database Licensing Program that provides a suite of 22 general periodicals and reference database products from Gale/Cengage Learning, the database vendor that was awarded the state contract in 2013.
- As a member of the Center for Research Libraries, the OSU Libraries can provide unlimited access to all CRL resources - approximately five million publications, archives, and collections to supplement our holdings, especially in the areas of humanities and social science. OSU faculty can borrow CRL materials for extended loan periods.
- OSU Libraries is a member of the Western Regional Storage Trust (WEST), a distributed retrospective print journal repository program serving research libraries, college and university libraries, and library consortia in the Western Region of the United States.
- OSU Libraries is a member of the Coalition for Network Information, the Council on Library and Information Resources, OCLC (the world's largest library cooperative), the Library Publishing Coalition, and the Scholarly Publishing and Academic Resources Coalition."
OSU Libraries also collaborates with the University of Oregon Libraries on making joint decisions on collections, expanding access to each library's collections, sharing software, providing joint faculty/ staff development opportunities, and, in general, viewing the two libraries as a single library with shared purposes. This collaboration is especially visible in "Oregon Digital" (https://oregondigital. org/catalog/), which provides integrated online access to digitized materials from both libraries.

OSU Libraries partners with the Institute for Natural Resources on the Oregon

Explorer, a comprehensive, natural resources digital library designed to provide easy and rapid access to reliable, up-to-date information about the state's natural resources.

The most notable addition to the library's instruction program since 2010 has been the implementation of a library course designator that will allow OSU Libraries and Press to develop and offer a for-credit library sciences curriculum to partner with other academic departments to enhance student success in learning and development of critical thinking and life-long learning.

## OSU PRESS

Faye Chadwell, OSU Press Director and the Donald and Delpha Campbell University Librarian
Thomas S. Booth, Associate Director OSU Press
121 The Valley Library
541-737-3166
Email: OSU.Press@oregonstate.edu Website: http://osupress.oregonstate.edu
Since its founding in 1961, the Oregon State University Press has supported and enhanced the university's place as a major research institution by publishing outstanding works of scholarship by the faculty of OSU and of other institutions as well as works of general interest to readers in the state and beyond.

The OSU Press specializes in books of importance to the Pacific Northwest, especially those dealing with natural resource issues and the history, natural history, cultures, and literature of the region. The OSU Press has a long history of publishing books about the state and region, including guides to flora and fauna, atlases, guides to natural and historic sites; biographies, memoirs, and oral histories of cultural or historic importance; and literary works by some of the region's most accomplished writers. The editorial program of the OSU Press includes several distinguished series of books:

- Women and Politics in the Pacific Northwest
- Culture and Environment in the Pacific West, which probes the relationships between cultural and environmental subjects west of the Rockies
- Northwest Reprints, which brings back into print classic works of fiction and nonfiction from the region's past
- Northwest Readers, which makes available collections of writing by notable Northwest authors and anthologies on provocative regional themes
- Oregon Literature Series, a project of the Oregon Council of Teachers of English
- Northwest Photography Series
- Horning Visiting Scholars Series
- First Peoples: New Directions in Indigenous Studies
Books published by the OSU Press have received awards for editorial and design excellence, including the Pacific Northwest Booksellers Association Special Award for Outstanding Contributions to Northwest Literature; Choice Magazine Outstanding Academic Title of the Year; inclusion in the Association of American University Presses Book, Jacket, and Journal Show; Oregon Book Awards for Nonfiction and Literary Nonfiction; and the John Burroughs Society Medal from the American Museum of Natural History for a Distinguished Book of Natural History.

In 2007, OSU Press joined the OSU Libraries. Oregon State University Libraries and Press is a dynamic environment that promotes innovation, values diversity, nurtures creativity, and builds strong communities. Press staff work closely with library colleagues on projects and digital initiatives.
The press publishes 20 to 25 new books each year and has approximately 300 titles in print. The press also distributes select titles published by the University of Oregon Press and partners with other nonprofit organizations in the state on some projects. Publishing decisions are made in consultation with a faculty advisory board after external peer review of each project.

Members of the Editorial Board for
2016-2017 academic year are:

- Peter Betjemann, Chair, Oregon State University, English
- Katy Barber, Portland State University, History
- Natchee Barnd, Oregon State University, Ethnic Studies
- Steve Clark, Oregon State University, University Relations and Marketing
- Ellen Eisenberg, Willamette University, History
- Kenneth Helphand, University of Oregon, Landscape Architecture
- Peg Herring, Oregon State University, Extension and Experiment Station Communications
- Michael Nelson, Oregon State University, HJ Andrews Experimental Forest
- Cristina Eisenberg, Lead Scientist, Earthwatch Institute
The OSU Press is a member of the Association of American University Presses (http://www.aaupnet.org/)—a nonprofit organization whose purpose is to support university presses in their endeavor to make widely available the best of scholarly knowledge and the most important results of scholarly research; to provide an organization through which the exchange of ideas relating to university presses and their functions may be facilitated; and to afford technical advice and assistance to learned bodies, scholarly associations, and institutions of higher learning.

OSU Press books can be purchased from local and national booksellers as well as online at http://osupress.oregonstate.edu. Additional information for authors wishing to submit manuscripts, is also available at http://osupress.or-egonstate.edu/for-authors.

## INFORMATION SERVICES, COMPUTERS, AND ACADEMIC TECHNOLOGIES

Information Services supports OSU students by providing accounts, technologies, equipment checkout, printing, computing networks and computing labs. The OSU Computer Helpdesk provides students with technical support for laptops, mobile devices, and campus systems like Canvas. If you need inperson support, please visit the Walkup Helpdesk in the Valley Library.
Student employment opportunities are available from a variety of units within IS, including the OSU Computer Helpdesk and Academic Technology, with the greatest opportunities announced just prior to each new term.

## ACCOUNTS AND PASSWORDS

http://is.oregonstate.edu/
accounts-support

- Accounts \& Technologies Guide for New Students: This guide is for new OSU students who need to get connected to OSU systems such as email and Canvas. Even if you are already connected to one or more OSU systems, we recommend you go through this guide, just to be sure you've covered the bases and know where to get computing help.
- ONID: ONID stands for OSU

Network ID. It's a universal computer account available to all OSU students, employees and associates. You use your ONID username and password to access Online Services, Canvas, email, the wireless network and many other university computing services.

- Google Apps for OSU: ONID email is accessed via Google Apps for OSU. All OSU students, instructors, and employees may access all the supported core apps: Drive, Mail, Calendar, Site and Groups.
- Office365 for OSU: All OSU students, instructors and employees may collaborate using native Microsoft Office tools: Word, Excel, PowerPoint and OneNote.


## LEARNING TECHNOLOGIES

## http://is.oregonstate.edu/

learning-technologies

- Canvas, OSU's Learning Management System used by both off-campus and on-campus students for classwork.
- Classroom Technology Services
- Event Support
- Technology Consulting
- Computing Labs
- Equipment Loan and Rental
- Standard Printing
- Media Creation
- Virtual Computing Lab


## SOFTWARE

http://is.oregonstate.edu/
accounts-support/software

- Many software packages are available to students.


## TECHNICAL SUPPORT

- OSU Computer Help Documents, http://oregonstate.edu/helpdocs, 24/7 help guides and FAQs
- OSU Service Desk, http:// is.oregonstate.edu/service-desk, Monday-Friday support via phone, 541-737-3474, and webform
- Walkup Helpdesk, in-person support at the Valley Library, Sunday-Friday


## STUDENT EMPLOYMENT

(Opportunities subject to availability) Student workers provide programming, development, and support services for the OSU community. Potential employment is contingent upon eligibility per university policy on student employment.

- OSU Service Desk
- Technical support, programmers
- Central Web Services
- Web app and mobile app developers
- Customer service and support, system maintenance


## MISSION

To produce timely statistics, qualitative information and analyses that support university strategic planning and decision-making.

## FUNCTION

Institutional Research, under the Office of Academic Affairs, provides services to offices and departments at Oregon State University. Responsibilities include:

- Developing and analyzing university strategic indicators and performance measures, drawing upon institutional data from all sectors of the university;
- Maintaining data archives to support longitudinal profiles and studies;
- Generating datasets of strategic interest to the university using survey instruments;
- Conducting research on issues of strategic importance to the university using national and institutional databases;
- Responding to federal, state and other external requests for institutional data;
- Supporting the academic unit program review process;
- Enhancing and improving the curricular review process; and
- Serving as a resource for the university on institutional research issues.

Office of
Institutional
Research
Oregon State
University
500 Kerr
Administration
Building
Corvallis, OR
97331-8572
541-737-9600
Website: http:// oregonstate.edu/ admin/aa/ir/

Administration

## Salvador

Castillo,
Director
541-737-8083
salvador.castillo@
oregonstate.edu

## Susan Wang,

Assistant Director
541-737-9183
susan.wang@ oregonstate.edu

The educational resources of the university include art, galleries, collections, and exhibits of cultural and scientific materials. Research, teaching, and extension functions are combined in these collections, which serve both the institution and the general public.

Over the years, various departments and schools of the university have become repositories for extensive holdings of manuscripts; rare books; prints, paintings, and other art objects; costumes; textiles; historic artifacts; archaeological material; fossils; preserved plants and animals; wood products; and marine material. These collections serve many of the same functions as a library or make possible the identification of materials whose age, name, or significance is unknown.
Most university collections serve primarily research and teaching functions and may be viewed by prior appointment with their curators. Permanent collections and museums include:

## ARCHAEOLOCICAL COLLECTION

## David R. Brauner, Curator

The Archaeological Collection consists of artifacts, field notes, maps, drawings, sketches, and photographs accumulated in archaeological investigations. Several thousand items of primary archaeological documentation comprise this collection. Location: Waldo Hall.

## ABT ABOUT AGRICULTURE

## S.J. Curtis, Curator

Website: http://agsci.oregonstate.edu/art
The College of Agricultural Sciences has sponsored Art About Agriculture since 1983, as a source for education, inspiration, and research enabling people to understand and value agriculture and natural resources through the universal language of visual arts. The program, in part, recognizes regional artists for investigating agriculture and natural resources themes as content and subjects for creating their works of art. It also enables the college to acquire art for a permanent collection of contemporary fine art now representing more than 150 artists with their more than 300 works of art. The Art About Agriculture permanent collection, selected through peer review, comprises fiber arts, mixed media assemblages, paintings, sculptures, watercolors, and works on paper including drawings, photographs, and prints. Many distinguished artists are represented in the Art About Agriculture permanent collection, including Harrison Branch, Sally Cleveland, Betty Feves (1918-1985), Sally

Finch, Sally Haley (1908-2007), Carl Hall (1921-1996), Yuji Hiratsuka, Manuel Izquierdo (1925-2009), Analee Fuentes, Mary Josephson, Betty LaDuke, Marjorie McDonald (1898-1995), Jay Stratton Noller, John Henry Rock (1919-1993), Laura Ross-Paul, Nelson Sandgren (1917-2006), Robert Schlegel, Robert Weller, Phyllis Yes, and Renée Zangara.
In 2015, the College opened Gallery 440 in Strand Agriculture Hall, Rm 440. This reception and meeting space is dedicated for displays from the Art About Agriculture Permanent Collection. Additionally the gallery is a space for promoting artists represented in this collection by exhibiting their recent works of art in group and solo invitational shows.
Since the program began the college has collaborated with more than 50 galleries, primarily in Oregon, and also Washington, and British Columbia, Canada, for presenting the permanent collection, invitational art exhibitions, and regional art competitions. In 2006 the college cosponsored in partnership with the Oregon Historical Society a retrospective exhibition of the entire peerreviewed Art About Agriculture permanent collection. The late Brenda Hood, in memory of her husband, the late Gordon Hood, sponsored This Bountiful Place: Art About Agriculture, the Permanent Collection, the exhibition catalog published in association with the Oregon Historical Press, 2006.
Accessions to the Art About Agriculture permanent collection are made possible from patron-donor partnerships. The College of Agricultural Sciences is grateful for support from the deans of OSU Extension Service, College of Agricultural Sciences, and College of Liberal Arts; Mark Abrahamson; Dan and Wanda Arp; Betty Brose; Gene and Cande Buccola; Capital Press; James and Stella Coakley; Marybeth Collins; William Cook and Gwil Evans; Dan and Sally Edge; The Ford Family Foundation; the Carl Hall Family Collection through Bill Rhoades; the late Margaret Hogg; the late Brenda and Gordon Hood; E.R. Jackman; Larry and Sherry Kaseberg; Betty LaDuke; the Lamb Foundation; Ed Ray; Scott Reed; and the late Gayle Strome. All gifts made to the OSU Foundation-Art About Agriculture qualify as contributions under current state and federal tax codes, including the Oregon Cultural Trust, and may be made at any time.

## COLLECE OF BUSINESSDEsICN COLLECTION

## Elaine L. Pedersen, Collection Curator/Manager

The College of Business, Design Program houses a collection of historic Western and non-Western textiles and clothing.

The collection consists of Euro-American clothing and accessories that span the 19th and 20th centuries. The nonWestern artifacts include textiles and objects largely from the 16th through 20th centuries but including objects from Coptic Egypt and pre-Columbian Peru. The collection, with display cases on the 2nd floor of Milam Hall, supports the outreach missions of the College of Business Design Programs by providing an educational resource and creative inspiration for students, researchers, and the general public. Additional information is available by contacting Elaine L. Pedersen (Collection Manager) at pedersee@oregonstate.edu or Dawn L. Figueroa (Collection Assistant) at dawn.figueroa@ oregonstate.edu, or visiting the collection on the website at: http://business.oregon-state.edu/sdhe/historic-collection.

## DEPARTMENT OF FISHERIES AND WILDLIFESS BIRDS, MAMMALS, AND FISHES COLLECTIONS

Doug Robinson, Curator of Birds
Brian Sidlauskas, Curator of Fishes
Clinton W. Epps, Curator of Mammals
Peter Konstantinidis, Curator of Vertebrates

The Department of Fisheries and Wildlife's Birds and Mammals Collections include more than 9,000 specimens of birds and 10,000 specimens of mammals, as well as the Braly Ornithological Collection; Overton Dowell, Jr., Bird Collection; Alex Walker Ornithological Collection; and Oregon Game Commission Collection. The Ichthyological Collection contains more than 20,000 cataloged lots of fishes representing approximately 150,000 specimens and 45 nominal type specimens. In addition, there are about 100,000 uncataloged specimens available for study. More than 13,000 frozen tissue specimens are available for genetic analysis. The collection emphasizes fishes of the Pacific Northwest, but also holds specimens from many parts of the world including Japan, Iran, Peru, Trinidad, Thailand and India. It recently added many fishes from Guyana and Gabon. The ichthyological collection also holds substantial series of marine and freshwater ichthyoplankton. The freshwater holdings are mainly from Oregon while the marine holdings are from the Pacific Northwest, the Gulf of Mexico, the Caribbean and Florida. Currently we are inventorying the larval fish collection to make it accessible for research. Use of the Department of Fisheries and Wildlife collections is restricted to qualified students and investigators. Location: Nash Hall.

## FAIRBANKS ART GALLERY

## Andrew Nigon, Gallery Coordinator

 Website: http://liberalarts.oregonstate. edu/school-arts-and-communication/art/ fairbanks-gallery-artFairbanks Gallery features exhibitions focusing on contemporary Northwest regional, national, and international artists, as well as Oregon State University art faculty and student exhibitions. The gallery provides the public, campus, and student communities diverse creative experiences and interactions with the inspired, inventive world of visual art. In many cases exhibitions are accompanied by gallery talks, and sometimes also by classroom workshops, critiques and public lectures. Past one-person exhibits have featured notable artists such as Ruth Bernhard, Sue Coe, Wolf Kahn, Jacob Lawrence, Robert Motherwell, Philip Pearlstein, Wayne Thiebauld, Jerry N. Uelsmann, Edward Weston, Jenny Schmid, and Bill Viola. Group shows have included artists Robert Colescott, Christo, Jim Dine, Eric Fischl, Roy de Forest, Helen Frankenthaler, Ann Hamilton, David Hockney, Jenny Holzer, Roy Lichtenstein, Henri Matisse, Peter Milton, Robert Motherwell, James Rosenquist, Frank Stella, Andy Warhol, and William Wegman.

Fairbanks Gallery is also host to many engaging and informative events. On the third Thursday of each month, the gallery is open extended hours in the evening as part of the Corvallis Arts Walk. Artist talks are frequently scheduled on that night, refreshments are offered and there is frequently a free, interactive activity. Upon request and schedule permitting, we can arrange for private group tours and gallery talks for visitors ranging from elementary school students to art museum docents.

## Email list

If you would like to be added to the email list to be notified of Fairbanks Gallery events and the Visiting Artists and Scholars Lecture program, please email OSU.art@oregonstate.edu with "Add to Fairbanks Mailing List" in the subject line.

## Location and Hours

Fairbanks Gallery is open from 8 a.m. - 5 p.m. Monday - Friday. The gallery is located on the first floor of Fairbanks Hall, 220 N.W. 26th St., on the Oregon State University campus in Corvallis, Oregon.

Parking on campus is available at Reser Stadium, a short walk to Fairbanks Hall, with shuttle service offered from the east side of the stadium. Shuttles run approximately every 10 minutes. After 5 p.m., permits are not required in " $A$ " and " $B$ " campus parking lots. There are also two 30-minute loading zone spaces directly
behind Fairbanks Hall. Disabled permit parking is available directly behind Fairbanks, as well as along Jefferson Street near the building. There are two electric vehicle charging spaces directly behind the building.

## Facebook

Become a fan of Fairbanks Gallery of Art at Oregon State University at https:// www.facebook.com/ARTatOSU/.

## FINE ARTS PRINT COLLECTION

Andrew Nigon, Acting Curator Website: http://oregondigital.org/sets/ fairbanks
The School of Arts and Communication's Fine Art Print Collection contains nearly 600 prints representing numerous countries and spanning several centuries. The collection's holdings includes work of various styles, including Japanese Ukiyoe, modern Japanese woodblock, 20th century Latin American, German Expressionism, and 20th century American prints. Artists include Max Beckmann, Francisco Goya, Hideo Hagiwara, Hiroshige Utagawa, William Hogarth, Kathe Kollwitz, Kunisada, Mauricio Lasansky, Otto Mueller, Max Pechstein, Robert Rauschenberg, Jun'Ichiro Sekino, Edward Weston, Yeizan and others.

Prints in the collection have been largely donated over the last seventy years from various sources, including patrons, faculty members, international donors, professional artists, and former students. The collection began in earnest under the direction of Gordon Gilkey. Formerly the chair of OSU's former Department of Art, Gilkey became the dean of the College of Liberal Arts, and later became the curator of the Vivian and Gordon Gilkey Center for Graphic Arts at the Portland Art Museum. While chairman of the Department of Art at OSU, he hired numerous faculty who were talented printmakers. Berk Chappell, John Rock, Paul Gunn, Shepard Levine, Nelson Sandgren, and Demetrios Jameson not only made prints, but helped collect and find donations to add to the collection.

A World Print Competition portfolio of twenty prints was added in 1973. Portfolios of Latin American artists were organized as Actualidad Gráfica Panorama Artístico, and OSU was a recipient in 1975 and 1976. Photographs are included in this collection. In 1974, photography students petitioned the OSU Foundation to fund the purchase of an edition of The Edward Weston Fiftieth Anniversary Portfolio.

A six-year rejuvenation project of preservation, cataloging, and digital photography has culminated in a new collection website. The collection now serves as an
educational resource for the students and faculty at OSU, and the prints are now also accessible via the Web for the general public and other educational institutions. The website also acts as a research center for art students, who can research prints and submit research papers to be Web published. The collection is housed in Valley Library, which offers important temperature and climate controls.

## CEOLOCICAL COLLECTIONS

Andrew Meigs, Geology Program Director
The Geological Collections include minerals, rocks, and fossils. The Edward Taylor Mineral Collections (F. Tepley, Curator) contain several thousand rare and fine specimens. Over 5,000 fossil specimens of Paleozoic, Mesozoic, and Cenozoic marine invertebrates comprise the outstanding John H. Howard and Earl L. Packard Collections in Paleontology (A.G Grunder, Curator). Location: Wilkinson Hall.

## THE HERBARIUM

## Aaron I. Liston, Director

Melanie A. Link-Perez, Curator
The Herbarium contains more than 450,000 named specimens of seed plants, ferns, mosses, algae, fungi, and lichens. Emphasis is on collections from western North America. The herbarium is the repository for the Morton E. Peck Herbarium of Willamette University, a research collection of Oregon flora consisting of more than 30,000 sheets, and the former University of Oregon herbarium. The mycological collections (J. Spatafora, Curator) consist of approximately 125,000 dried specimens of fungi and lichens, supplemented by microscope slides and a culture collection. These collections include the H.C. Gilbert Myxomycete Collection and the Forest Service Pathology Herbarium. The Herbarium is also the home of the Oregon Flora Project. Location: Cordley Hall. Website: http://oregonstate.edu/dept/botany/herbarium/.

## HERPETOLOCICAL COLLECTION

## Stevan J. Arnold, Curator

The herpetological research collection consists of more than 60,000 ethanolpreserved amphibians and reptiles, and approximately 24,000 frozen tissue samples. The collection has excellent representation for sites in the Pacific Northwest and includes the largest collection of garter snakes (Thamnophis) in the world. These and other aspects of the collection are described at the collec-
tion website http://people.oregonstate. edu/~arnoldst/herp\%20collection.htm. The collection is searchable online thru the VertNet portal at http://portal.vert-net.org/p/oregon-state-university. Location: Cordley Hall.

## THE J.C. BRALY MATURAL HISTORY COLLECTION

## Robert T. Mason, Curator

The Natural History Collection includes 550 mounts of birds and mammals in the J.C. Braly Collection. A collection of specimen skins on the first floor is used mainly for teaching. In addition, over 1,000 preserved specimens of amphibians and reptiles from the Pacific Northwest constitute a considerable part of the teaching collection. Location: Cordley Hall.

## THE LASELLS STEWART CENTER CALLERIES

Tina Green-Price, Curator and Associate Director of The LaSells Stewart Center
The LaSells Stewart Center 875 SW 26th Street (located directly across from Reser Stadium)
Corvallis, OR 97331
Oregon State University
The LaSells Stewart Center was constructed from patron-donor funds in 1981 and is the first performing arts venue and conference center on the campus of Oregon State University. The galleries at The LaSells Stewart Center offer visitors the opportunity to experience three distinct art galleries: Giustina Gallery, Murdock Gallery, and South Hall Display Case.
Giustina Gallery is located in the heart of The LaSells Stewart Center and is the largest art gallery in Willamette Valley. It proudly hosts 10 to 12 exhibits each year, featuring fine art of all mediums with over 450 local, regional and international artists represented. Giustina Gallery is recognized for cultivating creativity and building connections among the community and artists. Murdock Gallery provides art enthusiasts a more intimate art work experience-with nearly 64 linear feet of display area. South Hall Display Case features local artists in a two- and three-dimensional presentation case.

Collectively, the galleries provide the local and campus community diverse opportunities to view and display art work. Annual exhibits include: Vista and Vineyards, Art about Agriculture, Cultural Connections Exhibit, Community Art Exhibit, plus many more. Each exhibition is accompanied with a public art reception.
View upcoming exhibits, http://oregonstate.edu/lasells/gallery.

Sign-up to receive email notifications about upcoming art exhibits and receptions, performances and public sessions, http://oregonstate.edu/lasells/stay-informed. Also, like us on Facebook!
Standard Hours of Operation: Monday-Friday, 8 a.m. to 5 p.m., and evenings and weekends during events. To learn more about The LaSells Stewart Center or its galleries, visit, http://oregonstate.edu/lasells/.

## THE LITTLE GALLERY

Helen Wilhelm, Director
World Languages and Cultures
Oregon State University 210 Kidder Hall
Corvallis, Oregon 97331
helen.wilhelm@oregonstate.edu 541-737-2146
The Little Gallery, a space housed in The School of Languages, Cultures and Society, exhibits eclectic selections of art from well-established and emerging artists and visually advances different critical methods of seeing, crucial and transformative approaches to large intercultural questions. The gallery has a welcome place in an international language department, is bringing cultures together and has become a confluence of disciplines, a place for discussion and wonder. The Little Gallery hosts at least one exhibition per term with opening receptions with the artist present. The gallery is open M-F, 8 a.m. -5 p.m. and closed on the weekends and school holidays.

If you would like to be added to the email list to be notified of upcoming exhibitions, or would like to send in a submission for a possible exhibition opportunity, please contact Helen Wilhelm at helen.wilhelm@oregonstate.edu or call 541-737-2146.

## MEMORIAL UNHON ART COLLECTION

## Susan Bourque, Curator

541-737-6371
Website: http://mu.oregonstate.edu/ main/history
To see and interact with OSU Memorial Union Art Collection go to: http://www. facebook.com/pages/OSU-Memorial-Union-Art-Collection/17460794118 Throughout the Memorial Union are selections from its permanent art collection. The collection began in 1928 with a gift from the Board of Regents, but the foundation of the collection came in 1943 with a donation of fifty-three William Henry Price paintings. Currently among the 125 artists included in the collection are paintings and sculptures by J. Leo Fairbanks, works from the early nineteen hundreds by Carrie Gilbert de-
picting Native Americans, prints collected and donated by Gordon and Vivian Gilkey, and historic photographs of OSU (a number of which are on display in the mezzanine hall). Art work commissioned under the Oregon's Percentage for the Arts Programs includes murals by Hector Hernandez, Alex Hirsch, Henk Pender, Sherrie Wolf. The collection has over 300 works of art, half of which are on display at any one time throughout the building.

## MEMORIAL UNION CONCOURSE GALLERY

Susan Bourque, Exhibits Coordinator 541-737-6371
Website: http://mu.oregonstate.edu/ art-gallery/

The Memorial Union Concourse Gallery is one of the largest exhibition spaces on the OSU Campus. Several contemporary art exhibits reflecting a diversity of styles, media and cultural perspectives are scheduled throughout the year. These exhibits feature the artwork of international, regional, local recognized artists, and the art of talented OSU students. This program provides the public, campus, and student communities an opportunity to experience and engage their visual senses as they walk the long concourse or take a break in one of the many seating options available. Some exhibits have related gallery talks, lectures, and/or receptions, when offered, detailed information will be available from our website. The gallery is located at the heart of campus in the historic and beautiful Memorial Union, on 26th and Jefferson Streets.
Gallery hours during the academic year: Monday-Saturday, 8 a.m.-11 p.m.; Sunday, 10:30 a.m. -11 p.m. Term breaks and summer: Monday-Friday, 8 a.m.-5 p.m.

## ORECON STATE <br> ARTHROPOD COLLECTION

David R. Maddison, Director
Christopher J. Marshall, Curator and Collection Manager
Website: http://osac.oregonstate.edu/
The Oregon State Arthropod Collection is a valuable research collection of nearly three million insect and mite specimens, chiefly from the Pacific Northwest. Collection strengths include Coleoptera, Hemiptera, Lepidoptera, and Hymenoptera. Areas of specialization include the Melville Hatch Beetle Collection, mites associated with insects and marine habitats, sphecoid wasps and bees of the world, leaf hoppers and plant bugs of North America, aquatic insects, litter arthropods, butterflies, and moths of the Pacific Northwest. Specimens of historic importance include the Hopkins Collec-
tion of western forest insects and voucher material of the H.J. Andrews (LTER). Location: 4082 Cordley Hall.

## SPECIAL COLLECTIONS <br> AND ARCHIVES RESEARCH CENTER

## Lawrence A. Landis, Director

The University Libraries' Special Collections and Archives Research Center maintains and makes available the university's unique collections of manuscripts, archives, photographs, and books. Its holdings include collections pertaining to the history of science and technology; the historical records of OSU and papers of its prominent faculty members; collections documenting cultural and ethnic groups in Oregon; and collections documenting natural resources in the Pacific Northwest, especially agriculture and forestry. Also included are collections documenting Oregon's hops and craft brewing industries.
The Ava Helen and Linus Pauling Papers is the center's cornerstone history of science and technology collection. It is an archival research collection of more than 500,000 items which chronicles the life and work of OSU alumnus Dr. Linus Pauling, the only person in history to have received two unshared Nobel Prizes (Chemistry, 1954; Peace, 1962). The collection, donated by Dr. Pauling in 1986, includes the original manuscript for Pauling's seminal 1931 paper, The Nature of the Chemical Bond; the research notebooks and working manuscripts for a number of Pauling's over 1,100 journal publications and 13 books; and the original petition for nuclear disarmament presented to the United Nations in 1958, which contains the signatures of more than 9,000 scientists worldwide, including Nobel laureates Albert Schweitzer and Bertrand Russell. The archive also includes Dr. Pauling's numerous awards, over 100 hours of audiovisual material, his mammoth correspondence with many of the most prominent figures of the twentieth century, and a significant trove of molecular models constructed by Pauling. The collection serves the research interests of scholars from around the world. See http://scarc.library.oregonstate.edu/coll/pauling/index.html.

Another significant area within history of science and technology are the Atomic Energy and Nuclear History Collections. The collections include the first published account of the discovery of radioactivity in 1896, writings on the Manhattan project, the hearings of Robert Oppenheimer, and a formerly secret report of the effects of the atom bomb. It also features cultural aspects of the atomic age. See http://scarc.library.
oregonstate.edu/coll/energy/index.html.
The center is the official repository for the historical records created by OSU. The university archives component of the center was established in 1961 to collect, describe, preserve, make accessible to the public, and display historical records created or received in connection with the transaction of university affairs. Closely connected to the university records are the personal papers of several hundred OSU faculty, dating back to the 19th century. More than 300,000 historic photographs document campus buildings, university programs, special events, athletics, faculty, and students. A large collection of memorabilia consists of individual historical items such as programs, posters, brochures, and clippings. See http://scarc.library.oregonstate.edu/ university-history.html for information about collections and other resources pertaining to OSU's history.

The Oregon Multicultural Archives was established by the OSU Libraries in 2005 to assist in preserving the histories and sharing the stories that document the lives and activities of African American, Asian American, Latino/a, and Native American communities of Oregon. Significant collections and projects include the Urban League of Portland Records, the Braceros in Oregon Photograph Collection, the Japanese American Association of Lane County Oral Histories, and the 2012 Oregon Tribal Archives Institute. See http://scarc.library.oregonstate.edu/oma/index.html. The Oregon State University Queer Archives (OSQA) was established in 2014 to preserve and share the stories, histories, and experiences of LGBTQ+ people within the OSU and Corvallis communities. OSQA is committed to fostering intersectional community activism, resisting erasure of queer and trans narratives, and positioning the collection as a space to imagine alternative futures for LGBTQ+ communities. See http://scarc.library.oregonstate.edu/oma/osqa/index.html.

The center's holdings include numerous collections pertaining to natural resources in the Pacific Northwest. A core collection in this area is the Gerald $\mathbf{W}$.
Williams Collection, which includes the personal papers and collected historic photographs of Williams, former chief historian for the U.S. Forest Service. Other significant natural resources related collections include the papers of wildlife conservationist William L. Finley, the Pacific Northwest Stream Survey Records, and the Alderman Farms Films. See http://scarc.library.oregonstate.edu/natu-ral-resources.html for information about natural resources related collections.

The Oregon Hops and Brewing Archives, established in 2013, is the first in the U.S. dedicated to collecting, pre-
serving, and sharing materials that tell the story of hops farming and craft brewing in Oregon. It also highlights related research at OSU dating back to the 1890s. The archive includes oral histories with growers, brewers, and scientists; research reports; grower association records; photographs; and label art from breweries throughout the state. See http://scarc. library.oregonstate.edu/ohba.html.

The McDonald Collection is the university's premier collection of rare books. Fine examples of typography, incunabula, works of famous illustrators, numerous fine bindings, and several first editions are represented in the collection. See http://scarc.library.oregonstate.edu/ omeka/exhibits/show/mcdonald. Other significant rare book collections pertain to the history of the Pacific Northwest and the history of science. See http:// scarc.library.oregonstate.edu/rare-books. html for information on all of the center's rare book holdings.
The center's collections are open to students, faculty, staff, and the public for research from 10 a.m. to 6 p.m., Monday through Friday. The center encourages the use of its collections in undergraduate and graduate classes; instruction services range from general orientation sessions to more specialized sessions with hands-on examination of archival materials in a classroom setting. Tours of the center are available upon request. More information about the center's services and holdings is available at http://scarc. library.oregonstate.edu/. Location: Valley Library.

## VALLEY LIBRARY NW ART COLLECTION

## Ruth Vondracek, Librarian and

 ArchivistThe Valley Library NW Art Collection consists of over 140 contemporary artworks by Northwest artists. The majority of the works were selected in collaboration with the Oregon Arts Commission through the Oregon Percent for Art law; others were donated or commissioned. Located throughout the Valley Library, the collection includes paintings, sculptures, photographs, lithographs, prints and other media. A self-guided tour is available at the information desk. The website http://osulibrary.oregonstate. edu/nwart has images of most of the artworks and information about the artists. Location: Valley Library.

## VISITOR CENTER, OSU

MARINE SCIENCE CENTIER
William Hanshumaker, Public Marine Education Specialist
Extension Sea Grant Faculty
Hatfield Marine Science Center
2030 SE Marine Science Dr.
Newport, OR. 97365-5296
541-867-0167
Website: http://hmsc.oregonstate.edu/ visitor-center
The Visitor Center of the HMSC at Newport features aquariums, interactive exhibits, and hands-on displays that bring to life the marine research conducted by OSU scientists. Special events, educational programs, guided tours and walks are available on request to teach visitors about the ocean and its inhabitants, from undersea volcanoes to the tiniest tide pool creatures.

The Visitor Center serves as a social laboratory for OSU Sea Grant's "Freechoice Learning" initiative.

## THE XYLARIUM (WOOD

 COLLECTION)Barbara Lachenbruch, Curator 541-737-4213
Website: http://woodscience.oregonstate. edu/xylarium

The Xylarium (Wood Collection) contains approximately 2,500 species of wood, primarily from North and South America, Southeast Asia, and Africa.

## OSU ALUNIN ASSOCIATION

Kathy Bickel, Executive Director 725 SW 26th St.
Corvallis, OR 97331
541-737-2351 or 877-678-2837
Email: osualum@oregonstate.edu Website: http://www.osualum.com/
The OSU Alumni Association enriches the lives of alumni and friends by helping them establish lifelong relationships with the university and with each other. Memberships are available to all graduates, former students and friends of Oregon State University. Current students are welcome to join the affiliated OSU Student Alumni Ambassadors, which helps maintain OSU traditions and assists its members in making mentoring connections with alumni.
The OSUAA publishes and maintains the Oregon Stater magazine and an online alumni community at http://www.osualum.com/. It connects with alumni via Facebook, Twitter, Instagram and other social media platforms; organizes alumni gatherings around a variety of athletic, cultural and educational events as well as class reunions, and provides careerbuilding opportunities and education to Beavers before and after graduation.

The association operates the CH2M HILL Alumni Center as one of the showcase conference facilities in the mid-Willamette Valley, hosting events large and small for organizations on and off campus. An elected board of directors helps govern the OSUAA, which is a 501(c)(3) nonprofit organization.

## OBECON STATE UNIVERSITY FOUNDATION

J. Michael Goodwin, President and CEO

## Foundation Bldg.

850 SW 35th St. at Western Blvd. Corvallis, OR 97333
541-737-4218 or 800-354-7281
OSU Portland Center
Union Bank Bldg. 707 SW Washington St., Suite 500 Portland, OR 97205
503-553-3400 or 866-218-8930
Email: OSUFoundation@oregonstate.edu Website: http://osufoundation.org

The Oregon State University Foundation, a private, nonprofit organization, dedicates itself to garnering the resources that enable OSU to achieve excellence in education, research, and outreach. Legally separate from but closely aligned with the university, the foundation leads all fundraising efforts for OSU and manages the philanthropic investments of alumni and friends in the institution.

Private support deepens the university's impact and extends its reach across our state and around the world by helping to make an OSU education accessible to all qualified students, pushing the frontiers of knowledge, contributing to the state's prosperity, and addressing many of the most pressing challenges facing our planet and its people.

On December 31, 2014, the foundation concluded The Campaign for OSU, the university's first comprehensive fundraising campaign, in which more than 106,000 donors made gifts exceeding $\$ 1.1$ billion to advance university priorities. The powerful momentum generated by their support has fueled Oregon State's rise as an internationally recognized public research university. Fundraising efforts are now focused on targeted special initiatives that advance the university's Strategic Plan for creating transformative student learning experiences and building on its greatest strengths and areas of greatest potential impact, such as marine studies.

Annual fundraising totals have averaged more than $\$ 100$ million for the last five years, placing the foundation among top performing like organizations nationally. Governed by a 42 -member volunteer Board of Trustees, the foundation also manages the majority of OSU's composite endowment, valued at more than $\$ 510$ million, which supports Oregon State University and the people it serves.

## COVERNMENT RELATIONS

Jock Mills, Director
652 Kerr Administration Bldg. 541-737-0725
jock.mills@oregonstate.edu
Gabrielle Serra, Director of Federal Relations
626 Kerr Administration Bldg. 541-737-6320
gabrielle.serra@oregonstate.edu

## Karli Olsen, Government Relations

 Coordinator646 Kerr Administration Bldg. 541-737-4514
karli.olsen@oregonstate.edu
Website: http://oregonstate.edu/ government/
Located in the president's office, Government Relations coordinates the university's efforts with state, federal, and local governments. The office provides state and federal legislative information and services to the university community, including assistance in working with the Oregon Congressional delegation, other members of Congress, state legislators, legislative committees, and other lobbying groups. The office also works with the governor's office, state and federal agencies, and other universities.

## UNIVERSITY RELATIONS

 AND MARKETINGSteven J. Clark, Vice President for University Relations and Marketing 634 Kerr Administration Bldg. 541-737-4875
Website: http://communications.oregonstate.edu/
The Oregon State University Division of University Relations and Marketing serves as the communications interface between the university and its various publics. Our work helps our audiences better navigate through the organization. By creating credible, timely, authentic and confident communications opportunities that foster conversations, we heighten awareness and appreciation of OSU's distinctiveness and value. Comprised of the departments of News \& Research Communications, University Events, University Marketing, and Web Communications, each unit is focused on building relationships and advancing OSU's brand and reputation through development of marketing strategies that marry fact-based decision making, innovative practices and superior creativity. We measure success through a variety of metrics, including the quality and diversity of our students and faculty; OSU's reputation of distinction in the three defined signature areas; support from alumni, donors and the Legislature; pride for the institution from our various audiences; and the sense of community we foster on our campuses.

## NEWS AND RESEARCH COMMUNCATIONS

Annie A. Heck, Director 416A Kerr Administration Bldg. 541-737-0790

News and Research Communications serves as the university's primary office for media relations, research communications and internal communications. Promoting OSU's distinction and value through a communications focus on the university's strategic areas of strength, the department builds the university's reputation for excellence in research, education and service to the public. News and Research Communications is part of University Relations and Marketing, OSU's award-winning marketing communications division, which includes Events, Marketing, Trademark Licensing, Web Communications and the Office of the Vice President for University Relations and Marketing.

## ORECON STATE PRODUCTIONS

## David Baker, Director

## 102 Adams Hall

541-737-8323
david.baker@oregonstate.edu
Oregon State Productions is a team of producers who create content for the university from broadcast television to commercials, feature documentaries and web video. We believe every project deserves cinematic treatment and bold storytelling. We tell stories about amazing people who make a difference in the communities they serve. We believe our work advancing OSU, educating the public and bringing attention to the biggest issues of our time is a vital part of OSU's land-grant mission.

## UNIVERSTY EVENTS

Mealoha McFadden, Acting Director 205 Adams Hall 541-737-6522
Email: mealoha.mcfadden@oregonstate. edu

The office of University Events strategizes, plans and implements high-impact events and manages special projects that engage internal and external audiences. Through these activities, we provide outstanding experiences that enhance the understanding of the institution's brand, and help foster support and engagement in the mission and goals that define Oregon State as a leading 21st century land grant university.

## UNIVERSTY MARKETING

## Melody Oldfield, Director

102 Adams Hall
541-737-8956
melody.oldfield@oregonstate.edu
University Marketing creates and executes clear, consistent and engaging strategies that advance the brand reputation of Oregon State University. By sustaining a strong brand image for the university, we promote awareness, understanding and support among OSU students, faculty, alumni, donors and other communities. University Marketing also strives to enhance the university's name recognition and awareness, locally, regionally and nationally, through licensed merchandise bearing registered trademarks of the university.

0
regon State University
Conference Services delivers the highest level of quality standards for conferences, events, meetings and the performing arts. Through partnerships developed on- and off- campus, and from our two unique offerings, Conferences Management

Services (a professional conference managem (and Center (a state-of-the-art conference and

University performing arts venue), clients benefit from invaluable, extraordinary and innovative experiences.

Conference
Services 100 LaSells Stewart Center 875 SW 26th

Street (located across from Reser Stadium)
Oregon State
University
Corvallis, OR 97331
Website: http:// oregonstate.edu/ conferences
Website: http://
oregonstate.edu/ conferences

Administration
Donna Williams,
Associate Director,
Conference Services
Tina Green-Price,
Associate Director,
The LaSells Stewart
Center

## DIVISION OF EXTENDED <br> CAMPUS

Lisa L. Templeton, Associate Provost
for Extended Campus
Corvallis, OR 97331-4504
541-737-9204
Website: http://ecampus.oregonstate. edu/about/division

Oregon State University's Division of Extended Campus provides access to a variety of high-quality learning opportunities to students throughout the world. The division is home to Oregon State Ecampus, OSU Summer Session, Open Oregon State and the OSU Ecampus Research Unit, as well as OSU Professional and Continuing Education.

## OREGON STATE ECAMPUS

Lisa L. Templeton, Associate Provost for Extended Campus
4943 The Valley Library
Corvallis, OR 97331-4504
541-737-9204
800-667-1465
Email: ecampus@oregonstate.edu
Website: http://ecampus.oregonstate.edu
ECAMPUS - ONLINE DEGREES AND COURSES
Oregon State Ecampus provides adult learners with access to a high-quality education no matter where they live. Thousands of online and distance students enroll in Ecampus' nationally ranked degree programs and courses each year, all of which are developed by Oregon State University faculty. In the 2016-17 academic year, a total of 21,400 OSU students - nearly 70 percent of the university's student body - took at least one Ecampus class online.
OSU Ecampus is widely regarded as one of America's best providers of online education and has been ranked nationally by numerous publications in each of the last seven years. In January 2017, Oregon State's online bachelor's programs were ranked in the top 10 in the nation for the third consecutive year by U.S. News \& World Report. The recognition was based on student engagement; faculty credentials and training; student services and technology; and peer reputation.

Students interested in pursuing an Oregon State degree online can choose from more than 50 programs, including bachelor's degrees in business administration; fisheries and wildlife sciences; Spanish; computer science (post-baccalaureate); agricultural sciences; and various liberal arts disciplines. Oregon State's online and hybrid graduate-level offerings feature four MBA tracks that include organizational leadership and innovation management; master's programs in industrial engineering and data analytics; a Master of Natural Resources;
and a variety of education programs. Find a complete list of degree and certificate programs at http://ecampus.oregonstate.edu.
Ecampus delivers more than 1,100 courses online throughout the year. A complete list of classes is available online at http://ecampus.oregonstate.edu/soc.

Oregon State's distance learners include full- and part-time students, working and retired professionals, community college students, active-duty and retired military, high school students and individuals who want to further their education with a single college course. Ecampus students and graduates hail from all 50 states and more than 50 countries worldwide.

All curricula for Ecampus courses and degree programs are designed by Oregon State faculty and are held to the same rigorous academic standards as the university's on-campus classes. OSU is accredited by the Northwest Commission on Colleges and Universities, and all Ecampus students who complete degree requirements receive the same diploma and transcript as campus-based students.
Ecampus works closely with more than 700 OSU faculty members and department heads in order to provide students with enriching educational opportunities. Our current online offerings include courses in more than 100 subjects, from anthropology and chemistry to economics and public health.

Oregon State partners with 20 community colleges throughout the state and in Hawaii as a way to help students progress toward a four-year degree. The Degree Partnership Program allows students to take community college and OSU classes concurrently in order to meet the courseload requirement for financial aid and to access other OSU services, including advising. Learn more about taking Ecampus online classes with the Degree Partnership Program at http://partnerships. oregonstate.edu.

## SERVICES FOR STUDENTS

Oregon State Ecampus offers a multitude of support services that meet students' needs and helps them along the path to graduation. Once enrolled online, students have access to a team of Ecampus success counselors, who work with learners to identify strategies to support them in achieving their goals; a dedicated Ecampus librarian and 24/7 library support; free online tutoring and remote test proctoring; disability access services; career counseling; and live, around-theclock technical support on OSU's learning management system, Canvas.

Ecampus works to create a sense of community for its students by sharing news about OSU faculty and students online (http://ecampus.oregonstate. edu/news) and in a quarterly newsletter.

Ecampus also has a strong following on Facebook (http://facebook.com/osuecampus), Twitter (http://twitter.com/osuecampus), Instagram (http://instagram. com/osuecampus) and LinkedIn (http:// linkedin.com/company/oregon-stateecampus) where students can engage with fellow students, Beavers fans and ask questions of the Ecampus staff.

Ecampus also provides assistance by email (ecampus@oregonstate.edu), phone (800-667-1465) or in person to prospective and current students who are interested in taking Oregon State courses online and at a distance.

## SERVICES FOR FACULTY

The Ecampus staff provides an array of services for faculty, including course development training workshops, facility coordination and liaison activities with partnering community colleges and universities. Find a complete list of training sessions and workshops online at http://ecampus.oregonstate.edu/faculty/ training.
The Ecampus Faculty Forum is an annual showcase of excellence in online teaching that features interactive, wideranging discussions on how Oregon State applies its academic prestige to online education. Held each spring on campus, the event gives faculty the opportunity to hear colleagues discuss innovative teaching methods, best practices and relate their experiences in online course development. More than 250 OSU faculty, administrators and staff attend the event annually.
Ecampus operates a program called QM Online Course Design, which seeks to improve student success in online courses by focusing on continuously improving course design. Using the independent and research-based Quality Matters (QM) peer review process, the faculty-driven QM program examines course design, not the content itself or the teaching.

Having an online course peer reviewed is an ideal way for OSU faculty to receive fresh ideas from colleagues who can offer positive feedback to create more active learning. The Ecampus Course Development and Training team conducts training sessions year-round, and stipends are awarded when one reviews a peer's course. Learn more at http://ecampus. oregonstate.edu/faculty/qm.

## OSU SUMMER SESSION

Claire Cross, Director
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Corvallis, OR 97331-4504
541-737-1470
800-375-9359
Email: summer.session@oregonstate.edu Website: http://summer.oregonstate.edu
OSU Summer Session serves more than

7,000 students annually on the Corvallis campus and at the OSU Hatfield Marine Science Center on the Oregon coast. Attending summer term is an ideal way to expedite the journey to graduation. It allows students the ability to take classes that are difficult to get into during other terms, stay on track or jump ahead, and gives students the opportunity to improve their GPAs, perform research with faculty, and seek professional development or enrichment courses.

During the summer term, Oregon State offers more than 1,700 on-site and online courses in over 100 subjects, from agriculture to zoology. Courses range in length from one week to 11 weeks, with most courses running in three-, four- or eight-week sessions. Sequential courses (e.g., general chemistry, biology or Spanish) enable students to complete a full year's worth of a subject in one term.

OSU Summer Session courses are held to the same rigorous academic standards as courses offered during the rest of the school year. Among the benefits of enrolling in the summer term are the smaller class sizes and increased accessibility to instructors.

The full-time summer course load for undergraduates is 12 credits; for graduate students, it is 9 credits. Undergraduates may, however, take up to 19 credits, and graduate students up to 16 credits with advisor approval.

Nonresident students enjoy considerable tuition savings during summer term because all students pay in-state tuition (not eligible for OSU Ecampus, VetMed or PharmD classes or INTO students).

Summer classes are open to all students who meet course requirements. Students who have been academically suspended from the university are ineligible to enroll in Summer Session. For application details, call the OSU Office of Admissions at 800-291-4192.

The OSU Summer Session planning guide, available in December, is the primary summer publication and contains important information regarding summer admission, registration procedures and deadlines, the summer calendar, tuition and fees, financial aid and housing. For a free copy of the Planning Guide, stop by the Office of the Registrar in the Kerr Administration building or the OSU Summer Session office on the fourth floor of The Valley Library, or call 800-375-9359. For the most current information, go online to http://summer. oregonstate.edu.
Beginning in December, updated descriptions and schedule information for OSU Summer Session courses are available online at http://summer.oregonstate.edu. Please refer to this website often, as course availability and offerings are updated throughout the summer.

## OPEN OREGON STATE <br> Dianna Fisher, Director

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Open Oregon State works with OSU faculty to create open educational resources (OER) that can be shared in their oncampus and Ecampus courses and digital media collections around the world.

Open Oregon State aims to take advantage of OSU's national reputation in the field of online learning to establish a competitive OER program that focuses on reusable digital components. In partnership with OSU Libraries and Press, this unit also creates interactive, free, online textbooks for students.

Other examples of OERs include full courses, course modules, syllabi, lectures, homework assignments, quizzes, classroom activities, pedagogical materials, and games.

Learn how you and your department can partner with Open Oregon State at http://open.oregonstate.edu/ opportunities.

## ECAMPUS RESEARCH UNIT

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The Ecampus Research Unit makes research actionable through the creation of evidence-based resources related to effective online teaching, learning and program administration toward the fulfillment of the goals of Oregon State's mission.

Specifically, the research unit conducts original research, creates and validates instruments, supports full-cycle assessment loops for internal programs, and provides resources to encourage faculty research and external grant applications related to online teaching and learning.

Established in 2015, the Ecampus Research Unit procured more than $\$ 1.1$ million for university initiatives in its first year; launched a weekly podcast, "Research in Action," to address topics and issues facing researchers nationwide; and published a pair of joint studies on the positive effects closed captions and video transcripts have on student learning (http://ecampus.oregonstate.edu/ news/2016/closed-captions) and how many institutions are confused about how to implement captions (http:// ecampus.oregonstate.edu/news/2016/ higher-education-closed-captions).

With nationally ranked online programs delivered by Oregon State Ecampus, OSU can make significant contributions to the field of online teaching and
learning research in the following four areas: access, quality, administrative excellence; and adult learners.
The Research Unit houses a competitive award program to fund Oregon State faculty in their online learning research endeavors. Learn more about the Ecampus Research Fellows (ECRF) program, its goals, timeline and the materials you'll need to apply by visiting http://ecampus. oregonstate.edu/research/fellows/.

## OSU PROFESSIONAL AND CONTINUING EDUCATION (PACE) Melanie Mitchell, Director

541-737-4197
Website: https://pace.oregonstate.edu/
The OSU Professional and Continuing Education unit provides continuing education and training for professionals, organizations, associations and K-12 students throughout the state and beyond.

PACE works with colleges, businesses and professional associations to develop new on-site and online educational offerings in formats that include workshops, webinars, short courses, conferences and certificate programs. Services for businesses and government agencies include fully customized workforce training on a wide array of topics ranging from leadership and human resources to IT and much more.
Our list of renowned online and online offerings attracts learners from across Oregon and the nation, as well as around the globe. Featured course categories include:

- The Business of Craft Beer and Cider
- Our offerings for aspiring craft brewery entrepreneurs and brewing professionals draw on OSU's leading role in fermentation science education and research.
- Innovative Gardening and Permaculture Design Courses
- PACE's innovative online offerings attract enthusiasts and professionals from around the globe.
- Business and IT Professional Certificates
- PACE is partnering with OSU's College of Business to offer a complete array of training solutions for business, IT and marketing professionals, including certificate series such as Digital Brand Management, Business Analysis, Web Development and more.
- Farm and Agriculture Management Courses
- As part of PACE's proud affiliation with OSU Extension, we offer a variety of flexible management and development solutions that support Oregon's thriving farm and ranch industries.
- Our notable industry-specific partnerships include a series of
online workshops for pharmacists developed in partnership with OSU College of Pharmacy. These offerings include an innovative, first-in-thenation online training to prepare pharmacists in Oregon to prescribe hormonal contraceptives. A number of other states are following Oregon's lead in this area and are looking to our training as a national model.


## Services for Learners, Faculty/

 Colleges and Partner Agencies PACE works with works with OSU colleges, businesses and government agencies on instructional design and program development for specific audiences, as well as enrollment management, customer relationship management, event management and marketing. PACE also provides assistance with grant writing and often partners with colleges or departments to provide an outreach vehicle for research in the form of an online continuing education program.Contact us if you would like to discuss how your program might be adapted into an educational offering for professionals or lifelong learners.

0regon State University offers academic Pathway and English language training programs through the INTO OSU Center. Personalized support tailored to international students' educational, social and cultural needs prepares them to progress with confidence as degree-seeking students. INTO OSU provides international students with learning experiences and services that promote academic, professional and personal success.

INTO established its first partnership in the U.S. at Oregon State University in 2008. Located in the new International Living-Learning Center, INTO OSU offers outstanding academic programs, technology-assisted learning, a welcoming, interconnected community of students from across the U.S. and the world, strong student support programs and state-of-theart facilities. The innovative Pathway and English language programs offered at the INTO OSU Center are delivered by highly qualified OSU teaching faculty. INTO OSU also provides a breadth of academic preparation and support services designed specifically to meet the unique needs of its international students.

## FACILITIES

The International Living-Learning Center opened in September 2011 and is the home for INTO Oregon State University. This state-of-the-art building offers a world-class student experience where international and domestic students live and learn together in the heart of the OSU campus. This building includes residential accommodations for more than 300 international and domestic students, 26 classrooms, a large and spacious auditorium, computer labs, a café, market and comfortable open spaces where students can socialize. In the fall of 2015 , INTO OSU opened the newly renovated Cascade Hall. This modern building is just to the north of the ILLC and includes 11 classrooms, a computer lab, a large student lounge with stadium seating, and a quiet study room for students.

## STUDENT SERVICES

The INTO OSU Student Services team provides a range of co-curricular programs and services promoting social, personal and academic wellbeing. Upon arrival at OSU, the team helps students settle in to life in Corvallis, provide social opportunities and a variety of resources tailored to the specific needs of international students. Whether it's a question about making an appointment with a doctor, finding a place to live, renewing your visa or anything else, there will always be someone available to help you.

## INTERNATIONAL

STUDENT ORIENTATION
Orientation involves a variety of important events that prepare students to be successful at OSU, including information about maintaining your visa status, registering for OSU classes, health requirements and insurance coverage. Attendance at International Student Orientation is required of all international students, both direct and INTO OSU.

Other important activities during orientation include: opening an OSU email account, getting an OSU ID card, learning about OSU community expectations and taking a tour of the campus. It's also a great time to make new international and American friends and attend the many social events planned on campus.

## VISA AND

## IMMIGRATION SUPPORT

Upon arrival, the university's Office of International Services (OIS) office in the Division of International Programs, in conjunction with the INTO OSU Student Services team, will provide information, support and guidance on maintaining your immigration status while you are in the U.S. These can include questions about renewing a student visa, making sure your I-20 or DS-2019 status is always current, bringing your dependents, employment, traveling and more. During your program, in conjunction with the INTO OSU Academic Support and Finance teams, they will support you through your program and issue any documentation you may need to support your visa status. Students can come in for walk-in hours, or make individual appointments with an International Student Adviser or Sponsored Student Adviser at the Office of International Services (OIS). In addition, workshops are held throughout the year on topics such as employment, scholarships and travel.

## OSU OFFICE OF

 INTERNATIONAL ADMISSIONSThe OSU Office of International Admissions is housed in the INTO OSU Center. The Office of International Admissions works closely with prospective international students from inquiry to admission for a variety of programs including: General English, Academic English, Pathway Programs (Undergraduate and Graduate), Undergraduate, Post-Baccalaureate, Professional (MBA, PharmD, and DVM), and Non-degree Exchange Students. All other graduate programs (Master's and PhD) are served by the Graduate School. Visit the Office of International Admissions online at http://admissions.oregonstate.edu/ international.

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## Administration

Bob Gilmour,
Executive Director, into osu

Julianna
Betjemann,
Director of the Student Experience, into osu
Shain Panzeri, Director of International Admissions and Academic Support, into osu

## Elena Sapp,

Interim Director of Academic Programs, into osu

## SCHOLARSHIPS

Oregon State University and INTO Oregon State University are proud to offer a wide variety of scholarships for exceptional international students. Scholarships are available to undergraduate students, graduate students and Pathway students alike. For more information about these exciting scholarship opportunities, please visit http://admissions. oregonstate.edu/international/scholar-ships-international-students. Scholarships are available to undergraduate students, graduate students and Pathway and English language students.

## UNDERGRADUATE PATHWAY

Undergraduate Pathway programs combine intensive language study, academic skills development and academic course work in a carefully constructed program designed to prepare students for rigorous OSU degree programs.
Three types of Undergraduate Pathway programs are available:

- Standard 3-term Pathway: leads students through their first year and upon completion of all progression requirements, students will move on to their degree-seeking program as second-year, freshman students.
- 2-term Accelerated Pathway: This program is composed of two terms of Pathway programming which count toward the student's undergraduate degree.
- 1-term Accelerated Pathway: This program is composed of one term of Pathway programming which counts toward the student's undergraduate degree.
The Undergraduate Pathway programs are designed for students who:
- Want to study for an undergraduate degree in the U.S.
- Need to improve their English language skills
- May have lower GPAs than required of direct-entry students
- Desire additional academic, language, and cultural support in order to succeed during their first year at a U.S. university
- Any or all of the above

The Pathway program is for students who want to take the fast-track to success. Pathway students receive the highest level of support during their transition abroad, making it an ideal choice for international students who are driven to achieve high academic goals.

## Undergraduate Pathway

programs are available in:

- Business
- Engineering
- Science
- Computer Science
- Sustainable Planet
- Food Science and Technology
- Exercise and Sport Science
- General
- General - Liberal Arts Focus
- Public Policy
- Women and Gender Studies
- *Both the 1-term and 2-term Accelerated Pathway programs lead to any undergraduate major at OSU. No specific tracks are offered.


## Pathway Program

## Core Academic Courses

The Undergraduate Pathway program is comprised of OSU credit-earning courses in math, science and writing. From the first day of classes, INTO OSU Pathway students study alongside domestic students in many of the same courses.

For more information please visit http://www.intostudy.com/en-gb/ universities/oregon-state-university/ programs.

## GRADUATE PATHWAY <br> PROGRAM

The innovative Graduate Pathway program is a pre-Master's program that provides international students a direct path to various graduate degrees at the university. The program gives students the academic foundation, essential language skills and GMAT/GRE test preparation to successfully move on to the Master's degree.

Direct admission to the Graduate School and respective department-based graduate programs at Oregon State University is highly competitive with only the best and most prepared students being selected. Many students who meet all the minimum entry requirements are not admitted because of the highly competitive nature of the programs.

The Graduate Pathway program is designed for international students who:

- Require additional preparation to be admitted directly to the Graduate School
- Fall short of meeting the minimum GPA or test score requirements
- Need further English development
- Need to improve study skills for success in their chosen field of study
- Any or all of the above


## Graduate Pathway

Programs are available in:

- Master of Business Administration (MBA)
- Chemical Engineering
- Civil Engineering
- Comparative Health Sciences
- Computer Science
- Construction and Engineering Management
- Electrical and Computer Engineering
- Environmental Engineering
- Industrial Engineering
- Mechanical Engineering
- Mechanical Engineering with Materials Science Emphasis

Three types of Graduate Pathway Programs are offered:

- Standard 3-term Pathway (available for any track offered)
- 2-term Accelerated Pathway (available for the MBA Pathway)
- 1-term Accelerated Pathway (available for the MBA and all Engineering Pathway programs)


## CORE ACADEMIC COURSES

The academic courses included in the Graduate Pathway programs are carefully chosen to ensure success in graduatelevel studies. Students will be advised on which modules to follow during their academic orientation at the INTO OSU Center.
For more information please visit http://www.intostudy.com/en-gb/ universities/oregon-state-university/ programs.

## ACADEMIC ENGLISH

## Program Description

The Academic English program at INTO Oregon State University prepares international students for university study in the U.S. The academically rigorous program provides international students with high-quality English language instruction and the academic skills to succeed at OSU through development of:

- Listening
- Speaking
- Reading
- Writing
- Standardized test preparation
- Academic study skills

Program Highlights

- Intensive English to prepare for university study
- Academic advising throughout the program
- Small classes of 18-20 students
- Highly-trained and experienced instructors
- Participation in the Conversant Program
- Use of a fully-equipped Learning Center with state-of-the art technology


## Program Outcomes

After finishing this intensive program successful students will be able to:

- Interact comfortably in the U.S. classroom with professors and fellow students
- Understand U.S. values in an academic setting
- Present their spoken and written ideas accurately and effectively in English
- Write research papers with proper use of citations and references
- Use the Internet and OSU library databases to conduct academic research
- Read, understand, and critically
evaluate academic texts
- Understand and use vocabulary common to academic disciplines
- Take useful and accurate notes in academic lectures and presentations
- Develop and deliver oral presentations


## GENERAL ENGLISH PROGRAM

## Program Description

The General English program consists of 5 -week sessions designed for students of all levels of English who want to develop communication
skills in many social and professional situations while learning about American culture.

## Program Highlights

- English instruction for personal or employment motives
- Flexible entry dates
- Flexible duration of study
- Access to all OSU campus facilities and events
- Academic advising throughout the program
- Small classes of 18-20 students
- Use of a fully-equipped Learning Center with state-of-the art technology


## Program Outcomes

The General English program allows students to tailor their program to suit their personal, professional, and academic goals.

General English students will be able to:

- Improve general language proficiency in listening, speaking, vocabulary, reading and writing
- Expand career prospects by improving English language proficiency
- Develop conversation skills for realworld situations such as greeting, initiating a conversation, turn-taking, interrupting, asking for information
- Read and understand schedules, signs, ads and other authentic materials
- Understand basic cultural values and behaviors of Americans in order to interact appropriately
- Have the opportunity to interact with native speakers
- Progress to Academic English for further study at OSU


## STUDY ABROAD WITH INTO OSU

## Program Description

Study Abroad at INTO OSU is designed for students who want one or more terms of study abroad experience at a top US university. The program provides students with a classic American university experience while taking a variety of classes. Students will have access to all the support services available at the university and INTO OSU, including exceptional one-on-one tutoring, social and cultural trips and more.

The length of the Study Abroad program will vary depending on a student's needs. The program can be customized for different levels of English and for specific academic interests. There are fall, winter, spring and summer start dates available. Additional program and admission information can be found at http://admissions.oregonstate.edu/international/programs/ study-abroad-osu.

With prior approval from your home university, the academic courses you will study at OSU can be used to gain credits toward your undergraduate degree in your home country. This program is not designed as a route to degree-seeking OSU programs, though your credits may apply to an OSU degree if you seek admission.
This program consists of three parts:

## Study Abroad with English (SAWE)

## Part 1

Students study full-time in the Academic English program. Students have an opportunity to progress to Study Abroad with English Part 2 upon successful completion of Academic English level 4 and meeting internal progression criteria.

## Study Abroad with English (SAWE) Part 2

Students are able to select from OSU undergraduate credit bearing courses offered by the College of Liberal Arts and study alongside domestic and international students while continuing to take 6-12 hours of academic English classes. Students have an opportunity to progress to the Visiting International Students Program upon successful completion of Academic English core level 6 courses or ALS160/ALS162 and meeting internal progression criteria.

## Visiting International Students Program (VISP)

Students can select from a range of OSU credit-bearing courses offered by the College of Liberal Arts. Optional academic English courses are also available.

All OSU undergraduate College of Liberal Arts courses taken through the VISP and SAWE Part 2 program are transferrable with prior approval from the student's home university (except intensive English courses, if selected).

Departmental approval is required for students seeking to register for a course outside the College of Liberal Arts.

For a comprehensive list of all current youth programs at Oregon State University, please visit http://oregonstate.edu/ precollege/main_view.

## OFFICE OF PRECOLLECE PROCRAMS

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General Information: 541-737-9424
OSU's Precollege Programs offers a variety of on- and off-campus academic programs designed to enhance learning and introduce youth to the college community. During the summer months and throughout the academic year, K-12 students participate in programs that range from several hours to several weeks. Our Precollege Programs provide compelling experiences and stimulating learning environments for a diverse group of students.

## OREGON 4-H

Offers a variety of educational opportunities for youths in grades K through 12. The program is part of the OSU Extension Service and is active in all Oregon counties. Opportunities for leadership development, community service, and learning about topics as diverse as natural resource management, foods and fibers, animal science, and engineering abound. All 4-H educational activities are designed to help participants develop lifelong skills that will prepare them for future success. To learn more about local opportunities, contact the OSU Extension office in your county or call the State 4-H Office at 541-737-4444 (HHHH).

## TAG PROGRAMS

Specifically designed academic and social experiences for gifted, talented, and high-ability youth.

## Adventures in Learning

Combines stimulating academic and social opportunities in a fun-filled 10-day experience exposing participants to exciting and sophisticated areas of interest not usually available during the regular school year. The program is designed for gifted, talented and high-ability learners who have completed grades 5 or 6 and who are interested in fast-paced, challenging opportunities.

## Expeditions

Provides gifted, talented, and high-ability youth who have completed grades 3 or 4 a two-week, half-day educational experience with courses taught by experts in a variety of topics. Students are introduced to engaging, intriguing subjects in an enjoyable and nurturing environment.

## Outside the Box

Enables gifted, talented, and high-ability youth who have completed grades 7 or 8 to pursue topics of interest through a unique combination of in-depth, challenging academic explorations and social interaction with intellectual peers. Program participants can anticipate excitement, discovery, and challenge in the program's offerings which are designed specifically to address their interests and abilities.

## Winter Wonderings

Offers a variety of challenging Saturday courses designed specifically for gifted, talented, and high-ability 3rd, 4th, 5th and 6th graders. Participants discover new and exciting areas of study in a fastpaced learning environment with their social and intellectual peers

## OSU KIDSPIRIT SUMMER DAY CAMPS

Sponsored by the College of Public Health and Human Sciences, is an innovative youth summer day camp program, offered Monday-Friday for children grades K through 12 . Youth may attend morning, afternoon, or all day sessions. Programs are based on grade levels. All activities are coeducational. All abilities are welcome! Group leaders will help in classes and escort children to activity areas. Head instructors plan, organize and lead activities.

## Junior Beavers

Grades K through 2, have an established daily program with variations in class offerings from session to session, including skill development and supplementation in recreational sports, art and educational classes.

## Dam Builders

Grades 3 through 5, choose the groups of classes that they take from session to
session. Classes to choose from include athletics, drama, art, science, music, computers and lots more!

## Duck Busters

Grades 6 through 8, choose all of their classes from session to session. Their classes are designed for their age group and skills. Classes include biking, rock climbing, triathlon, art, inventions and lots more!

## Teen Leadership Camp

Grades 9 through 12, is for teens who want to develop their leadership skills by working with youth. They will be facilitated by a coordinator, become certified in First-Aid and Adult and Child CPR, and work directly with the KidSpirit campers by assisting group leaders and head instructors.

## Counselors in Training

Grades 9 through 12, "CIT" is for teens who want to develop their leadership skills by working with youth, but will work with group leaders and head instructors. CIT teens will have more responsibilities and will be given more leadership opportunities.

## Girls on the Run of

## the Willamette Valley

Girls on the Run, is a life-changing experiential learning program for girls in grades $3-5$ and $6-8$, that combines training for a 5 K event with self-esteem enhancing work-outs. The fun, interactive curriculum is designed to educate and prepare preteen girls for a lifetime of self-respect and healthy living.

## KIDSPIRIT SPORT PROGRAMS

KidSpirit offers a variety of recreation classes throughout the summer for participants ages $2-18$. Classes include gymnastics, archery, and tennis. Each of our programs focus on obtaining basic skill sets while learning to interact with other participants in a fun, safe, and supportive environment

## HIGH SCHOOL JOURNALISM INSTITUTE

Co-hosted by OSU and The Oregonian, this camp seeks to nurture budding journalists underrepresented in the field. With guidance from professionals in the field, participants use real journalism skills to report and photograph a 32-page newspaper, as well as blog and produce multimedia pieces for The Oregonian's website. They will learn the value of making a difference by covering multiple perspectives in the news. Students must apply and be selected to participate in the eight-day, no-cost institute.

## CAMPUS FIELD TRIPS PROGRAM

The Office of Precollege Programs hosts middle and high school visits to Oregon State University during the school year. Teachers and group leaders are encour-
aged to plan visits to explore careers, experience OSU, or enhance current curriculum. Register to request a visit using the Precollege website at http://precollege.oregonstate.edu.

## STEM ACADEMY@OSU

STEM Academy@OSU offers educational enrichment opportunities that provide youth a direct connection to the STEM (Science, Technology, Engineering, and Math) fields. Programs include afterschool girls' science and engineering clubs, summer day camps, workshops, and outreach programs. Classes are small, hands-on, informal, project-oriented, and open to all interested students. Tuition costs vary, depending on the program or activity.

For more information, contact catherine.law@oregonstate.edu or STEM. academy@oregonstate.edu

Website: http://stemacademy.oregonstate.edu/

## SUMMER EXPERIENCE IN SCIENCE AND ENGINEERING FOR YOUTH (SESEY)

SESEY is primarily for high school girls and ethnic minorities traditionally un-der-represented in science and engineering, and for science, math, or physics teachers who are interested in developing curricular materials to promote engineering activities in their classrooms.

Students come to the OSU campus for a one-week residential summer camp and are paired with a faculty mentor in engineering for a mini-research project in areas such as microscale technologies, plastics recycling, drug formulation and delivery, bioprocessing, microelectronics, and environmental engineering. There are also group learning activities (computer instruction, communication skills, field trips) and social activities. Students are exposed to science and engineering as viable and interesting career paths. Career counseling is provided by faculty mentors and OSU graduate and undergraduate students who work with the students throughout the week as research project advisors and friends. Students live in OSU housing, so they receive a complete college experience. For more information, contact Skip Rochefort, skip.rochefort@oregonstate.edu.

## SCIENCE AND MATH <br> INVESTIGATIVE LEARTNING EXPERIENCES (SMILE) PROCRAM

Kyle Cole, Director
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Website: http://smile.oregonstate.edu/
OSU's SMILE (Science and Math Investigative Learning Experiences) Program collaborates with 15 school districts and charter school partners in Oregon to increase the number of historically underrepresented minority, low-income, and other educationally underserved students who graduate from high school prepared to go on to college and pursue careers in math, science, engineering, health professions, and teaching. More than 600 students and 50 teachers in 34 schools across the state participated in SMILE last year. The program functions as a pipeline that takes students from 4th to 12th grade and on to postsecondary education in STEM programs and careers.

SMILE provides a comprehensive program of science and math enrichment and college readiness through weekly after-school clubs, field trips, on-campus college-connection challenge activities, a bridge-to-college summer program for SMILE graduates entering OSU, and professional development for classroom teachers serving as SMILE Club advisors.

## ADDITIONAL YOUTH <br> PROCRAMS

## BUG ZOO

The Oregon State University Bug Zoo is a student group interested in educating its members, other students and the public about the joys and importance of insects, other arthropods and reptiles and amphibians. Bug Zoo educates through live displays and hands-on activities. For more information, contact Sujaya Rao, 541-737-9038, email: sujaya@oregonstate.edu. Website: http://entomology. oregonstate.edu/content/bugzoo.

## DISCOVERY DAYS

Discovery Days is an outreach program involving many of the science departments at OSU as well as departments and schools from the College of Agricultural Sciences and the College of Engineering. This two-day event, held in both the fall and spring terms, features displays and hands-on activities from different departments that are suitable for all ages. For more information, contact Margie Haak, 541-737-6716, email: margie.haak@ oregonstate.edu. Website: http://www.science.oregonstate.edu/DiscoveryDays/.

## EDUCATION/K-12 OUTREACH/

 CHEMISTRY OUTREACHThe Department of Chemistry has an active program to bring chemistry to the local community. Through the Outreach Committee, opportunities are available to tour labs, do hands-on experiments, and have chemistry faculty and students to bring chemistry to schools. For more information, contact Margie Haak, 541-737-6716, email: margie. haak@oregonstate.edu. Website: http:// chemistry.oregonstate.edu/content/ service-profession-outreach-community

HEALTHY YOUTH PROGRAM AT THE LINUS PAULING INSTITUTE The Healthy Youth Program provides educational programs with hands-on activities to children (preschool-grade 12) highlighting the importance of healthful eating and physical activity. Our vegetable gardens provide fresh produce for all our programs, and link a healthy and active lifestyle with a sustainable environment. Contact: Casey Bennett, Program Coordinator, Healthy Youth Program, Linus Pauling Institute, 307 Linus Pauling Science Center, Corvallis OR 97331. Email: casey.bennett@oregonstate.edu; 541-737-8014. Website: http://lpi.oregonstate.edu/healthyyouth

## SUMIMER DAY CAMPS

Chefs in the Garden: Ages 6-8 years. Children learn how to grow their own food, explore new recipes and fun ways to eat healthful foods, cook and eat lunch together in the garden, and learn how a healthy environment is part of a healthy lifestyle. They also get involved in environmental science activities, arts \& crafts, and plenty of physical activities.

Junior Master Chefs: Ages 8-11 years. Children harvest fresh produce from the Pauling Pride Garden and engage all their senses as they explore and prepare a variety of recipes. They learn about kitchen safety, are exposed to various culinary techniques, eat lunch together, and engage in physical activity games outdoors.

Master Chefs: Grades 6th-8th. Youth explore and prepare recipes from around the world and end the week with a cooking competition. They harvest fresh produce from the nearby Pauling Pride Garden. Youth develop teambuilding skills, learn about kitchen safety, experiment with new foods, and learn various culinary techniques.

## CLASSES DURING

## THE SCHOOL YEAR

## Fresh Grown Cooking for Kids:

 Ages 6-11 years. Youth learn basic nutrition, cooking, and kitchen safety skills and engage all their senses as they explore nutritious recipes and prepare meals together. They work together insmall groups to prepare two to three recipes at each class. Recipes incorporate seasonal produce, often harvested from the nearby Spartan Garden.

Master Chefs: Grades 6th-8th. Middle school students explore and prepare recipes from different parts of the world. In the last class of the session, students participate in a cooking competition with a judging panel. Participants develop teambuilding skills, learn about kitchen safety, and experiment with new foods and various culinary techniques.

## Afterschool Garden Clubs:

 Grades K-12. Garden clubs are offered at Lincoln Elementary School, Linus Pauling Middle School, and Corvallis High School.Healthy Sprouts: Preschool children with their parent. Preschool children and their parents listen to stories, engage in fun educational games, learn about the world around them, and get involved with arts \& crafts and physical activity games to prepare them for kindergarten. During each class the children, together with their parents, prepare and enjoy a healthy and nutritious snack.

## INNER CITY YOUTH INSTITUTE (ICYI)

ICYI is a collaborative partnership among the OSU College of Public Health and Human Sciences, the US Forest Service and Pacific Northwest Research Station. The program encourages urban youth to explore careers in natural resources, attain higher education in natural resource careers and understand the interrelationships between the use of natural resources, the people who use them and the land that sustains their community. For more information, visit http://extension.oregonstate.edu/washington/4h// icyi or contact Stacey Sowders, Program 4-H ICYI Program Coordinator: 503-821-1125.

## OREGON WOOD MAGICTM

Oregon Wood Magic ${ }^{\mathrm{TM}}$ is a 2 hour 45 minute interactive experience designed to educate elementary school teachers and their students about the wonders of wood as a material. For more information, visit http://woodscience.oregon-state.edu/oregon-wood-magic or call Michelle Maller, 541-737-4259, Wood Magic Coordinator, michelle.maller@ oregonstate.edu.

## OSU SUMMER VETERINARY EXPERIENCE

The OSU Summer Veterinary Experience is a hands-on learning experience for academically talented, low-income and minority high school students interested in veterinary medicine. Mentors and instructors will work with each student to discover and explore her or his talents and understanding of the basic sciences, animal and human health, and social sciences. For more information, visit http://vetmed.oregonstate.edu/osu-summer-veterinary-experience or contact Tess Collins, 541-737-6985, tess.collins@ oregonstate.edu.

## PET DAY AND OPEN HOUSE

Pet Day and Open House provides outreach and information about veterinary science, and careers in veterinary science and animal care. It is open to the general public the first Saturday in May at Magruder Hall on campus. For more information, contact Lyn Smith-Gloria, lyn.smith-gloria@oregonstate.edu, 541-737-3844. Website: http://vetmed.or-egonstate.edu/pet-day.

## RECRUITMENT AND RETENTION OF WOMEN AND MINORITIES IN ENGINEERING

Committed to bringing more woman and minorities to OSU to become tomorrow's engineers through our three pronged approach of Recruitment, Retention and Research. Activities include K-12 school visits, sponsoring teacher/career counselor workshops, OSU Engineering tours, developing lesson plans for K-12 classes. For more information, contact Ellen Momsen, 541-737-9699, email: ellen.momsen@oregonstate.edu. Website: http://wme.engr.oregonstate.edu/.

## SCIENTISTS AND TEACHERS IN EDUCATION PARTNERSHIPS (STEPS)

Scientists and Teachers in Education Partnerships (STEPs) The STEPs program is a STEM outreach program at Oregon State University which strives to enhance 6-12 science, math, health, and engineering education by forging collaborative partnerships between Oregon scientists, teachers, and students. This goal is accomplished through activities such as teacher workshops, science events for students, and classroom equipment loans. Website: http://biochem.science. oregonstate.edu/content/steps-scientists-and-teachers-education-partnerships. For more information, Kari van Zee, vanzeek@science.oregonstate.edu; Dan Arp, Director, Dan.J.Arp@oregonstate.edu.

## SUITCASE OCEANOGRAPHY

Suitcase Lessons are portable modules for K-6 students based on the FOSS science curriculum. They are designed with complete materials and instructions so any member of the OSU oceanography faculty, graduate student, or a scientist working at an oceanography institute can go to a classroom and successfully present the lessons. These kits can be checked out from CEOAS. Outreach opportunities include developing more lessons or creating suitcase lessons of your own. For more information, contact Marta Torres, 541-737-2902, email: mtorres@coas.oregonstate.edu. Website: http://blogs.oregonstate.edu/suitcase/.

## WAVE RESEARCH LABORATORY TOURS

The O.H. Hinsdale Wave Research Laboratory (HWRL) strives to expose students to engineering and research through guided tours of the wave lab. The tours include an introduction to coastal engineering, demonstrations of the wave lab equipment and experiments being conducted in the laboratory, connecting these concepts to the State of Oregon Teaching standards for Middle and High school students. Tours can range from 30 to 60 minutes. For more information, contact Alicia Lyman-Holt, 541-737-3665, email: alicia.lyman-holt@ oregonstate.edu. Website:http://wave. oregonstate.edu/.

The College of Agricultural Sciences performs four vital servicesteaching, research, extension, and international agriculture-that are closely tied to the human and natural resources of the state of Oregon and that support the economic, environmental, and community welfare of the state, the Pacific Northwest, the nation, and the world.

$\square$he College of Agricultural Sciences offers educational programs to serve the needs of individuals interested in pursuing careers in agribusiness; agriculture; animal, plant and food systems; environmental economics and policy; fisheries and wildlife; food science; range and natural resource management; veterinary medicine; and more. The faculty realizes the importance of individual aims and abilities and, through course work, internships, advising, and extracurricular activities, tries to help each student discover and develop social, aesthetic, and ethical values as well as professional competence.

Undergraduate students may pursue the following bachelor of science degree programs through the College of Agricultural Sciences:

- Agricultural Business Management
- Agricultural Sciences
- Animal Sciences
- Bioresource Research
- Botany
- Crop and Soil Science
- Environmental Economics and Policy
- Fisheries and Wildlife Sciences
- Food Science and Technology
- Horticulture
- Rangeland Sciences
- Sustainability-Double Degree Graduate students may pursue the following degree programs:
- Agricultural Education (MS)
- Animal Science (MS, PhD)
- Applied Economics (MA, MS, PhD, MAIS)
- Applied Systematics in Botany (PSM)
- Biological and Ecological Engineering (MEng, MS, PhD)
- Botany and Plant Pathology (MA, MS, PhD)
- Crop Science (MS, PhD)
- Entomology (MA, MS, PhD)
- Fisheries and Wildlife Administration (PSM)
- Fisheries Management (Certificate)
- Fisheries Science (MS, PhD)
- Food Science and Technology (MS, PhD)
- Horticulture (MS, PhD)
- Interdisciplinary Studies (MAIS)
- Public Policy (MPP)
- Rangeland Ecology and Management (MS, PhD)
- Soil Science (MS, PhD)
- Toxicology (MS, PhD)
- Water Resources Engineering (MS, PhD)
- Water Resources Policy and Management (MS)
- Water Resources Science (MS, PhD)
- Wildlife Management (Certificate)
- Wildlife Science (MS, PhD)


## DOUBLE DEGREES

Undergraduates with majors in the College of Agricultural Sciences can earn a second degree in education, innovation management, international studies, or sustainability. See the College of Education, College of Business, International Programs or Department of Forest Ecosystems and Society sections of this catalog for more information.

## HIGH SCHOOL PREPARATION

Advances in the technology and sciences of agriculture and natural resources make the study of biological, physical, and social sciences and communications vital. High school agricultural science and technology (AST) courses also help prepare students for some fields of study. The following preparation in high school is strongly recommended for students who plan to enter a College of Agricultural Sciences degree program: English, 4 units; mathematics, 3 units; physics, chemistry, and biology, 1 unit each; social studies, 3 units; and foreign language, 2 units.

## INDIVIDUAL ADVISING

Each student is considered an important individual. His or her study program is developed in personal consultation with an advisor in the department of his or her major interest. As early as possible, each student is encouraged to select a subject area and become associated with instructors and other students with similar interests. Initial or early advising is based upon the student's high school record and placement test scores. When high school preparation is found to be inadequate, the student is encouraged to enroll in courses providing the education, training, and experience necessary to help assure success at the university level, even though such work may require the student to take one or more additional terms to complete a prescribed four-year curriculum. Students planning to transfer from a community college or another four-year institution are encouraged to contact an advisor to discuss their plan of study as far in advance of transferring as possible.

## INTERNSHIPS

College of Agricultural Sciences (CAS) departments offer academic credit for on-the-job learning experiences that connect to student learning objectives. Internships are available in all facets of agriculture and can be paid, unpaid, local, national or international. Details regarding specific departmental requirements are available from departmental advisors and the College Experiential Learning Coordinator. Industries, agencies and students interested in general internship information should contact the Experiential Learning Coordinator in the CAS Academic Programs Office.

## 147 Strand

Agricultural Hall Oregon State University Corvallis, OR 97331-2202 541-737-2211 Email: casstudy@ oregonstate.edu Website: http:// agsci.oregonstate. edu/

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## Katie Gaebel,

Experiential Learning Coordinator, katie. gaebel@oregonstate. edu

## Nick Fleury,

Head Advisor, nick. fleury@oregonstate. edu

## SCHOLARSHIPS

The College of Agricultural Sciences and its departments offer a variety of scholarships to deserving students. Several are reserved for incoming high school or transfer students. Additional information and application forms for collegelevel scholarships are available online at http://agsci.oregonstate.edu/scholarships. For information about departmental scholarships, contact each department directly. For more information about university-level scholarships, contact the Office of Financial Aid and Scholarships, 541-737-2241.

## INTERNATIONAL

The College of Agricultural Sciences (CAS) has a long tradition and strong presence in International Agriculture. CAS has International Exchange Agreements with numerous institutions spanning thirteen countries. Students may choose to study abroad via the exchange program with Lincoln University in New Zealand; learn about various regions across the globe by participating in the Exploring World Agriculture class and companion International Educational Tour; or encounter cultures and traditions through their peers in the International Agriculture Club.

## MINOR PROGRAMS

Minors are offered through most departments of the College of Agricultural Sciences. Students interested in pursuing a minor must first contact the key advisor in the area of interest. The minor must consist of a minimum of 27 designated credits of related course work, including 12 in upper-division courses.

## GRADUATION REQUIREMENTS

To be eligible for a bachelor of science (BS) degree, a student must complete a minimum of 180 credits including:

1. University Baccalaureate Core requirements
2. Courses in agricultural sciences: 36 credits including 24 credits at the upper-division level.

## AGRICULTURAL <br> EDUCATION AND CENERAL ACRICULTURE

D. Barry Croom, Department Head

108 Strand Agriculture Hall
Oregon State University
Corvallis, OR 97331-2204
541-737-2661
Email: barry.croom@oregonstate.edu
Website: http://agsci.oregonstate.edu/ag-ed

## FACULTY

Professor Croom
Associate Professor Velez
Assistant Professor Lambert
Instructors Mathewson, Stewart, Strawn, Woodside

## EMERITUS

Cole, Thompson

## Undergraduate Major

Agricultural Sciences (BS, CRED, HBS)
(Also available via Ecampus.)

## Minors

Agricultural Sciences
Comparative International Agriculture
Leadership (Also available via Ecampus.)
Graduate Major
Agricultural Education (MAIS, MS)
Graduate Areas of Concentration
Teacher Preparation, Leadership, and
Communication in Agriculture

## Graduate Minor

Agricultural Education
The Department of Agricultural Education and General Agriculture combines two programs: Agricultural Sciences and Agricultural Education.

The Agricultural Sciences Program is an undergraduate studies program that provides maximum flexibility in designing and structuring a course of study to meet the students' individual needs. Agricultural Sciences should be seriously considered by students desiring programs of study not currently available in any other agricultural subject matter department (such as those involving a minor in communications, recreation, or environmental studies in agriculture); students wishing to pursue two or more areas of specialization (such as students who are returning to farms or ranches and who need substantial background, for example, in animal science, crops, and agricultural business management); students preparing for leadership positions in agriculture that require excellent communication and leadership skills as well as breadth of agricultural background (such as agriculture teachers, lobbyists, commodity liaison persons or
extension staff); or students who have not selected a departmental major in the College of Agricultural Sciences but who know they are interested in an agricultural career.
The goal of the Agricultural Sciences Program is to help students identify the agricultural career in which they are most interested and build a course of study that will qualify each student for his or her chosen profession. Advising is of paramount importance in this process and major emphasis is placed on career advising.

The Agricultural Education Program offers course work serving teachers and leaders in agriculture. The MS and MAIS degrees may be pursued with an emphasis in leadership, communication, pedagogy, extension and/ or technical agriculture. Candidates work with an advisor to develop programs that meet their specific needs as indicated by their occupational objectives. The Agricultural Education MS degree aligns with an initial teaching license in Oregon.
Three undergraduate minors are available in the Department of Agricultural Education and General Agriculture.

1. The Agricultural Sciences minor is available for undergraduate students who have majored in an area that requires the addition of breadth in agriculture to their major program. The minor provides the appropriate technical agriculture background for students interested in agricultural management, communication, environmental studies, etc.
2. The Comparative International Agriculture minor provides students with formal instruction in international agricultural concepts and practical experiences through global awareness course work, language immersion via study/ research abroad, and/or international fieldwork. The 27 -credit curriculum prepares students for successful postbaccalaureate international careers, or those seeking graduate studies in international agriculture programs.
3. The Leadership minor is designed for all undergraduates interested in developing premier leadership, enhancing professional competencies, and fostering the skills necessary to meet the local, national, and international needs of our society. The Leadership minor is centered on leadership theory (education), trait/skill development (training), and application (development). It is designed to allow students to apply the course work in a relevant and relational manner.

This minor is also available via Ecampus.

## CAREER OPPORTUNITIES IN AGRICULTURAL SCIENCES

Career opportunities for general agriculture majors are unlimited because of the nature of the program structure. Students can return to home farms or ranches, move into agricultural middle management, become extension staff, move into political lobby positions, work in marketing or international agriculture, become high school teachers of agriculture, or teach agriculture in community colleges. Salaries vary depending on the position a student may strive to achieve.

## UNDERGRADUATE STUDIES CURRICULUM

High school and college transfer students who are admitted to Oregon State University as an undergraduate are eligible to participate in the Agricultural Sciences Program. Agricultural Sciences majors, in consultation with their departmental academic advisor, may plan elective course work to emphasize personal interests, abilities, and career objectives. A leadership and communication area of emphasis is available and is specially designed for those students who will need breadth in their technical agriculture background and excellence in communication and leadership skills. The intent of this area of emphasis within the Agricultural Sciences Program is to prepare agriculture's future leaders in extension, government, and business. A teacher preparation area of emphasis is available and allows for Initial Teacher Licensure within the baccalaureate degree.

## AGRICULTURAL SCIENCES

(BS, CRED, HBS)

## Also available via Ecampus.

## Agricultural Core

AEC 211. Agricultural and Food
Management (4)
AG 111. Information Technology in Agriculture (3)
AG 421. ${ }^{\wedge}$ Leadership Development (3)
SOIL 205. Soil Science (3)
or CSS 305. Principles of Soil Science (4)
EOU campus only.
Choose 7-10 credits from the following:
AED 313. Theory and Practicum III: Field (4)
AG 199. Special Topics [Orientation to Agricultural Sciences Major] (1)
AG 230. Introduction to Extension and Engagement (3)
AG 301. *Ecosystem Science of Pacific NW Indians (3)
AG 312. Engine Theory and Operation (3)
AG 318. Accessing Information for Agricultural Research (1)
AG 351. *Communicating Agriculture to the Public (3)
AG 391. Farm Implements (3)
AG 412. Ag Safety and Health (3)

AG 492. Technology Transfer in Agriculture (3)

AG 499. Special Topics (3)
AGRI 399. Special Topics [Navigating
International Experiences] (1)
Agricultural electives ( 60 credits required, may include above, 24 of which must be upper division)

## Business and Law

AEC 253. *Environmental Law, Policy, and Economics (4)
or AEC 388. Agricultural Law (4)
or BA 230. Business Law I (4)
BA 215. Fundamentals of Accounting (4)

## Communication

Communications/Speech Elective (3)

## Humanities, Arts and Social

## Sciences

AEC 250. *Introduction to Environmental Economics and Policy (3) or AEC 251. *Introduction to Agricultural and Food Economics (3)
or ECON 201. *Introduction to Microeconomics (4)

## Sciences-Physical and Biological

Physical science-chemistry (10-15)
CH 121. General Chemistry (5)
CH 122. General Chemistry (5)
Biological sciences-one-year series (12)

BI 101. *General Biology (4)
BI 102. *General Biology (4)
BI 103. *General Biology (4)
Or (preferred):
BI 211. *Principles of Biology (4)
BI 212. *Principles of Biology (4)
BI 213. *Principles of Biology (4)
Or:
BI 204. *Introductory Biology I (4)
BI 205. *Introductory Biology II (4)
BI 206. *Introductory Biology III (4)

## Leadership and Engagement

Choose 1 course from the following:
AG 230. Introduction to Extension and Engagement (3)
LEAD 242. Personal Leadership
Development (3)
LEAD 342. Team and Organizational Development (3)
LEAD 442. Leadership Skills for Career Success (3)
LEAD 443. Leadership through
Conversations (3)

## Math

MTH 111. *College Algebra (4)

## Electives (48-52)

A minimum of 45 of these elective credits must come from College of Agricultural Sciences. Remaining credits may be approved from other disciplines, to reach 60 total Ag Science electives.

## Total=180

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## FOUR-YEAR PLAN:

## AGRICULTURAL SCIENCES

## Year One

## Fall (12)

AG 199. *Special Studies: Orientation Ag Sci Major (1)
BI 211. *Principles of Biology (4)
MTH 111. *College Algebra (4)
WR 121. *English Composition (3)
Note: Biology series differ between campus and Ecampus. Campus students may take any biology in these series. Ecampus students will expect to take BI 204, 205, 206:
BI 101, 102, 103. *General Biology (4,4,4) or BI 211, 212, 213. *Principles of Biology (4,4,4)
or BI 204, 205, 206. *Introductory Biology I, II, III (4,4,4)

## Winter (15)

AG 111. *Information Technology in
Agriculture (3)
BI 212. *Introductory Biology I (4)
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
HHS 231. *Lifetime Fitness for Health (2)
ELECTIVE@CAS (3)

## Spring (15)

AGRI 399. Navigating International Experiences (1)
BI 213. *Introductory Biology I (4)
WR 222. *English Composition (3)
BACCORE@WIC (3)
ELECTIVE@for major (3)
PAC@ (1)

## Year Two

Fall (15)
AEC 251. *Introduction to Agricultural and
Food Economics (3)
CH 121. *General Chemistry (5)
SOIL 205. *Soil Science (3)
SOIL 206. *Soil Science Lab (1)
ELECTIVE@CAS (3)
Winter (15)
AEC 211. *Agricultural and Food
Management (4)
AG 230. *Introduction to Extension and Engagement (3)
AG 301. *Ecosystem Science of Pacific NW Indians (3)
CH 122. *General Chemistry (5)

## Spring (16)

LEAD 342. *Team and Organizational Leadership (3)
BACCORE@CD (3)
BACCORE@LA (3)
ELECTIVE@CAS (4)
WR/COMM ELECTIVE (3)

## Year Three

Fall (16)
AEC 388. Agricultural Law (4)
AG 499. Special Topics: Native American Agriculture (3)
BACCORE@SYNTH (3)
ELECTIVE@CAS (3)
ELECTIVE@CAS (3)

## Winter (15)

AG 351. *Communicating Agriculture to the Public (3)
BA 215. Fundamentals of Accounting (4)
ELECTIVE@CAS (4)
ELECTIVE@CAS (4)

## Spring (15)

AG 410. Internship (12) (Internship is optional)
or ELECTIVES@ (12)
BACCORE@SYNTH (3)

## Year Four

## Fall (16)

AG 391. Farm Implements (3)
UPPER DIV ELECTIVE@CAS (3)
UPPER DIV ELECTIVE@CAS (3)
UPPER DIV ELECTIVE@CAS (3)
UPPER DIV ELECTIVE@CAS (4)

## Winter (16)

AG 421. ^Leadership Development (3)
AGRI 438. Exploring World Agriculture (2)
UPPER DIV ELECTIVE@CAS (3)
UPPER DIV ELECTIVE@CAS (4)
UPPER DIV ELECTIVE@CAS (4)

## Spring (14)

ELECTIVE@ (3)
ELECTIVE@ (3)
ELECTIVE@ (4)
ELECTIVE@ (4)
Total credits=180
Major Code: 259

## UNDERGRADUATE MINORS

## AGRICULTURAL SCIENCES

## MINOR

The Agricultural Sciences minor is designed for students who have an interest in agricultural sciences. The minor is ideal for students who want to add more exposure and content (broadly) within agriculture to their primary major.

The minor requirements listed below are subject to the following:

- 27 credit minimum (15 required, 12 upper-division electives).
- Courses required for a major and taken in the major department may not count towards this minor.
- Students may not use variable credit courses toward the minor.
- Courses used to fulfill the requirements must be taken for a letter grade.
- Agricultural elective courses for this minor must be upper-division credits.


## Requirements ( 15 credits):

AG 111. Information Technology in Agriculture (3)
AG 301. *Ecosystem Science of Pacific NW Indians (3)
AG 351. *Communicating Agriculture to the Public (3)
AG 412. Agricultural Safety and Health (3)
LEAD 242. Personal Leadership
Development (3)
or LEAD 342. Team and Organizational Leadership (3)

## Electives (12 upper-division credits): <br> Choose 12 credits of upper-division courses, with a minimum of one course from three different areas of study in the College of Agricultural Sciences: <br> Animal Sciences <br> Applied Economics <br> Bioresource Research <br> Botany and Plant Pathology <br> Crop Science <br> Entomology <br> Environmental and Molecular Toxicology <br> Fisheries and Wildlife <br> Food Science and Technology <br> Horticulture <br> Leadership <br> Rangeland Ecology and Management Soil Science <br> Sustainability <br> Total=27 credits <br> Footnote: <br> * Baccalaureate Core Course (BCC)

Minor Code: 106
COMPARATIVE INTERNATIONAL AGRICULTURE MINOR
The minor provides students with formal instruction in international agricultural concepts and practical experiences through global awareness course work, language immersion via study/research abroad, and/or international fieldwork. The 27-credit curriculum prepares students for successful postbaccalaureate international careers, or those seeking graduate studies in international agriculture programs. Students critically examine current international agricultural issues and/or diversity and communications. To be eligible to apply for this minor, students must have a cumulative 2.0 GPA or higher and be in good standing with Oregon State University. Students must also be in a declared major. Participants in this minor program are able to:

1. Research the major agricultural themes and issues of another nation besides the United States of America.
2. Examine trade information to determine the key elements of agricultural trade agreements between the USA and another country.
3. Analyze the effectiveness of agricultural practices of another nation besides the USA.
4. Investigate the effect of broad social, economic, and environmental forces upon the agricultural industry of another nation besides the USA.

## Course Requirements

All 27 credits for the minor must be completed with a C or higher grade. Students can complete 12 to 18 upper-division credits and a maximum of 14 lower division-credits.

## Required for All Students:

AGRI 438. Exploring World Agriculture (2)
Global Core (9-12)
AG 301. *Ecosystem Science of Pacific NW Indians (3)
ANTH 210. *Comparative Cultures (3)
ANTH 330. *Evolution of People,
Technology, and Society (3)
ANTH 486. Anthropology of Food (4)
CROP 330. *World Food Crops (3)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 105. *Geography of the Non-Western World (3)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 431. Global Resources and
Development (3)
PHL 205. *Ethics (4)
PS 204. *Introduction to Comparative Politics (4)
PS 205. *Introduction to International Relations (4)

## External Learning Experience (3-6)

Projects and independent learning experiences in these courses require preapproval by the minor coordinator.
AG 401. Research (variable)
AG 402. Independent Studies (variable)
AG 406. Special Problems (variable)
AG 410. Internship (variable)

## Approved Electives (12 maximum)

Students may choose electives from the following areas of study in the College of Agricultural Sciences:
AEC Applied Economics, AG General Agriculture, AGRI College of Agricultural Sciences, ANS Animal Sciences, BOT Botany and Plant Pathology, CSS Crop and Soil Science, CROP Crop Science, ENT Entomology, FST Food Science Technology, FW Fisheries and Wildlife, HORT Horticulture, RNG Rangeland Ecology and Management, SOIL Soil Science, SUS Sustainability, TOX Toxicology

## Total=27

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 477

## LEADERSHIP MINOR

Also offered via Ecampus.
The Leadership minor is designed for all undergraduates interested in developing premier leadership, enhancing professional competencies, and fostering the skills necessary to meet the local, national, and international needs of our society. The Leadership minor is centered on leadership theory (education), trait/skill development (training), and application (development). It is designed to allow students to apply the course work in a relevant and relational manner.

Specifically, the course work focuses on major theories of leadership including contingency, path-goal, leader-member exchange theories as well as transfor-
mational, authentic, team, and servant leadership. Within each theory and type of leadership, students will be challenged to consider leadership ethics, leadership culture, gender in leadership, and integration of leadership into personal, civic, and social change. In addition, the elective courses allow students to pursue the development of trait and skill competencies necessary for employment in their chosen field. Students will then have the opportunity to directly apply their learning through a leadership internship, service learning project, or research opportunity.

## Leadership Theory (8 credits)

LEAD 242. Personal Leadership
Development (3) Available via Ecampus.
LEAD 342. Team and Organizational
Leadership (3) Available via Ecampus.
LEAD 444. Leadership Minor Capstone (2)
Available via Ecampus.
Trait/Skill Development ( 10 credits) Select 10 credits: no more than 2 courses from any single department:
AG 421. ${ }^{\text {^Leadership Development (3) }}$
Available via Ecampus.
AHE 499. Special Topics: Emerging Leaders
(2) Available via Ecampus.

ALS 295. Last Year Experience (2)
AS 311. Leadership Fundamentals, Team
Building and Problem Solving (3)
COMM 218. *Interpersonal
Communication (3)
COMM 316. Advanced Persuasion (3)
COMM 322. Small-Group Problem Solving
(3) Available via Ecampus.

IE 470. Management Systems Engineering (4)
KIN 230. Introduction to Adventure
Programs (3)
KIN 231. Human Group Dynamics (3)
KIN 299. Special Topics: Backcountry
Leadership (3)
LEAD 442. Leadership Skills for Career
Success (3) Available via Ecampus.
LEAD 443. Leadership Through
Conversations (3) Available via
Ecampus.
MS 211. Military Science II: Foundations of Leadership I (2)
NS 211. Leadership and Management (5)
PAC 299. Special Topics: Challenge Course Facilitation (1)
PHL 205. *Ethics (4) Available via Ecampus.
PHL 207. *Political Philosophy (4)
Available via Ecampus.
PHL 280. *Ethics of Diversity (4)
PHL 443. *World Views and Environmental
Values (3) Available via Ecampus.
PSY 370. Personality (4) Available via Ecampus.
PSY 437. Motivation (4) Available via Ecampus.
WGSS 224. *Women: Personal and Social Change (3) Available via Ecampus.

## Applied Leadership Development

## (10 credits)

Select 10 credits total, may include a mix of the following courses. All are available via Ecampus:
LEAD 401. Leadership Research (1-10)

LEAD 409. Practicum: Service Learning (1-10)
LEAD 410. Leadership Internship (1-10)
LEAD 442. Leadership Skills for Career
Success (3)
LEAD 443. Leadership Through
Conversations (3)

## Total=28

Footnotes

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 267

## AGRICULTURAL EDUCATION (MS, MAIS)

Graduate Areas of Concentration
Teacher preparation, leadership and communication in agriculture
The Department of Agricultural Education and General Agriculture offers course work that serves teachers and leaders in agriculture. The Master of Science and Master of Arts in Interdisciplinary Studies degrees may be pursued with an emphasis in leadership, communication, pedagogy, extension, and/ or technical agriculture. Candidates work with an advisor to develop programs that meet their specific needs as indicated by their occupational objectives. A person who completes an Agricultural Education master's degree is not solely locked into teaching. Potential occupations also include lobbyist, journalist, and Extension work.

## Major Code: 1050

## AGRICULTURAL EDUCATION GRADUATE MINOR

Develop a teaching, pedagogical, leadership development in agriculture minor by working with a departmental advisor.

## Minor Code: 1050 <br> ■ AGRICULTURAL EDUCATION COURSES

AED 313. THEORY AND PRACTICUM III: FIELD (4). Field based experience for students preparing to be agricultural teachers. Focus on teaching models. PREREQS: Advising and placement by AED staff.
AED 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
AED 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

AED 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

AED 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
AED 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
AED 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
AED 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
AED 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.
AED 510. PROFESSIONAL INTERNSHIP: AGRICULTURE EDUCATION (1-40). A field experience in which the intern will integrate
academic study with classroom teaching experience to learn specific competencies relating to functioning well in the context of the classroom and the school, and demonstrate this competency through the assessment of work by supervisors and by evidence collected and presented in work samples. This course is repeatable for a maximum of 40 credits.
AED 518. EXTENSION COURSE IN TEACHER
EDUCATION/PEDAGOGY (1-3). Enables present and prospective teachers of agriculture to continue their professional development on pedagogical topics of current importance. (This course is limited to 9 credits per term.) This course is repeatable for a maximum of 50 credits.
AED 533. RURAL SURVEY METHODS (3).
Technique; analyzing, interpreting, and using results of survey data; identifying and utilizing community resources; develop and organize agriculture programs to meet community needs.
AED 552. PROGRAM ORGANIZATION AND
MANAGEMENT (3). Explores the foundations of vocational education, essential learning skills, advisory committees, and development of a vocational education philosophy. Students will study the elements of educational reform as they apply to specific service areas. Resource analysis, student organizations, and school-to-work transitions will also be studied.

## AED 553. APPLIED INSTRUCTIONAL

STRATEGIES (3). Helps students in the
identification and development of goals, objectives and units. The course includes the development and application of subject area instructional strategies/models, including applied math, writing, communication skills, measurement and evaluation of achievement, and delivery of instruction to at-risk students. Safety is a primary focus.
AED 554. MICRO-TEACHING (3). Planning, presenting and evaluating lessons in a microteaching lab. It includes application of content pedagogy strategies, subject matter principles and media technology. Lessons presented on safety.

## AED 555. LABORATORY PEDAGOGY (3).

Applications of efficient planning, organizing, and teaching skills within the laboratory setting and utilization of laboratory facilities to optimize learning experiences. Laboratory facilities could include a shop, greenhouse, land laboratories/ outdoors, agriscience labs, aquaculture, computer lab, field trips, etc. PREREQS: Enrollment in Agricultural Education Master's program cohort.
AED 556. LINK RESEARCH, TEACHING, AND
PRACTICE (3). Links research to teaching.
Students will work with cooperating teachers to identify and apply research to teaching.

## AED 557. ISSUES AND TRENDS IN

CURRICULUM AND INSTRUCTION (3).
Emphasizes trends related to subject matter curriculum issues unique to agricultural education at the secondary level.
AED 558. IMPROVING AGRICULTURAL
SCIENCE AND TECHNOLOGY PROGRAMS (3).
Provides impetus toward evaluation and
improvement of local programs of agricultural science and technology (AST), such that they better reflect community, regional, and national needs.
AED 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
AED 603. DISSERTATION (1-16). Students engage in research and writing related to the completion of their dissertation to fulfill the requirements of the College of Education PhD program. This course is repeatable for a maximum of 999 credits.
AED 640. INSTRUMENTATION AND DATA
COLLECTION IN SOCIAL SCIENCE (3).
Addresses the selection, development, and analysis of various types of quantitative instruments and procedures for collecting research data. The course has a quantitative focus and is oriented toward social science research.

Lec/lab. PREREQS: SED 580 or equivalent introductory research methods course.

## ■ AGRICULTURE-GENERAL COURSES

AG 111. INFORMATION TECHNOLOGY IN AGRICULTURE (3). Using information technology in agriculture and agribusiness; practical experience with computer programs applicable to all agricultural disciplines.
AG 199. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.
AG 211. SURVEY AND CONSTRUCTION (3).
Land measurement and leveling as applied to agricultural uses. Concrete and agricultural building construction including the use of construction power tools, selection of materials and cost estimating.
AG 221. METALS AND WELDING (3). Practices of metal working including the use of metal working machines, metal identification, heat treating and metal properties. Fabrication of metals including arc and oxy-acetylene welding and cutting. Lec/lab.

## AG 230. INTRODUCTION TO EXTENSION AND

ENGAGEMENT (3). For students interested in pursuing a career with the OSU Extension Service. An introduction to the OSU Extension Service mission, philosophy, history, organization, structure, administration, program areas, Extension program development, Extension teaching and delivery methods, and the involvement and use of volunteers. This course is repeatable for a maximum of 6 credits.
AG 301. *ECOSYSTEM SCIENCE OF PACIFIC NW INDIANS (3). Designed and presented in partnership with Pacific Northwest Indians and Alaska Natives, focusing on natural ecosystems, differing views, power relationships, policymaking, and gender roles. (Bacc Core Course)

AG 312. ENGINE THEORY AND OPERATION
(3). Engine construction, operational theories and principles, lubrication, fuels and oils, emissions and preventive maintenance are taught through the process of small engine lab activities. Engine efficiency theories and measurement are presented.

## AG 318. ACCESSING INFORMATION FOR

 AGRICULTURAL RESEARCH (1). Designed for students at a distance to develop library skills and improve access to information used to conduct technical agricultural research.AG 351. *COMMUNICATING AGRICULTURE TO
THE PUBLIC (3). Students will explore various outlets for communicating with the public about agriculture using appropriate, professional writing. Additionally, students will articulate their thoughts on controversial issues as well as write feature and editorial pieces promoting positive agricultural practices and people in agriculture. (Bacc Core Course)
AG 391. FARM IMPLEMENTS (3). Power farming implements including operation, maintenance, adjustments, calibration and use are covered. Field trips may be required.
AG 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
AG 402. INDEPENDENT STUDIES (1-16). This course is repeatable for a maximum of 16 credits.

AG 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
AG 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
AG 406. SPECIAL PROBLEMS (1-16). This course is repeatable for a maximum of 16 credits.
AG 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

AG 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

AG 410. INTERNSHIP (1-16). A work internship to give students practical on-the-job preparation in any of the main facets of agriculture or related industries. This course is repeatable for a maximum of 16 credits. PREREQS: College and instructor approval.

AG 412. AG SAFETY AND HEALTH (3). An examination of various hazards associated with agriculture. Control strategies will be explored and prevention methods identified. Hazards examined include machinery, livestock, controlled spaces, pesticides, and other items common to the agricultural workplace. Lec/lab.
AG 421. ^LEADERSHIP DEVELOPMENT (3). Principles of leadership development, leadership analysis and style, record keeping procedures, youth organizations, and activities in leadership for youth. (Writing Intensive Course) PREREQS: Senior standing.
AG 425. DEVELOPMENTS IN AGRICULTURAL MECHANICS (3). Emphasis on the development of instructional units for agricultural instruction programs. Wide applications to agricultural mechanization and biotechnology. This course is repeatable for a maximum of 9 credits. PREREQS: Senior standing.

## AG 492. TECHNOLOGY TRANSFER IN

AGRICULTURE (3). Examination of processes by which formal and informal agricultural instruction programs influence the introduction and acceptance of technology in agriculture. An emphasis in the international arena will be maintained. The focus throughout the course will be on the role of a professional change agent working with technological change. PREREQS: Senior standing.
AG 499. SPECIAL TOPICS (1-4). Topics may vary from term to term and from year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 12 credits.

AG 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

AG 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

AG 518. EXTENSION COURSE IN TEACHER EDUCATION: TECHNICAL (1-3). Enables present and prospective teachers of agriculture to continue their professional development on technical topics of current importance. This course is repeatable for a maximum of 9 credits.

AG 521. LEADERSHIP DEVELOPMENT (3).
Principles of leadership development, leadership analysis and style, record keeping procedures, youth organizations, and activities in leadership for youth. PREREQS: Graduate standing.
AG 525. DEVELOPMENTS IN AGRICULTURAL MECHANICS (3). Emphasis on the development of instructional units for agricultural instruction programs. Wide applications to agricultural mechanization and biotechnology. This course is repeatable for a maximum of 45 credits. PREREQS: Graduate standing.
AG 541. COMMUNITY PROGRAMS IN AGRICULTURE (3). Evaluating agricultural education program effectiveness and technical appropriateness. Development of long-range plans for agricultural programs to meet the technical needs of a community. PREREQS: Teaching or Extension experience will be verified by the instructor for approval.

## AG 592. TECHNOLOGY TRANSFER IN

AGRICULTURE (3). Examination of processes by which formal and informal agricultural instruction programs influence the introduction and acceptance of technology in agriculture. An emphasis in the international arena will be maintained. The focus throughout the course will be on the role of a professional change agent working with technological change. PREREQS:

Graduate standing.
AG 808. WORKSHOP (1-4). This course is
repeatable for a maximum of 4 credits.

## ■ LEADERSHIP COURSES

LEAD 242. PERSONAL LEADERSHIP DEVELOPMENT (3). Examines content related to leadership traits, styles, and effective leadership tactics. An introductory course designed to create awareness and develop the employability skills necessary for participants to be productive contributors in their school, home, community and profession.

## LEAD 342. TEAM AND ORGANIZATIONAL

LEADERSHIP (3). Examines the planning, implementation and evaluation of organizations, and challenges students in the development of effective communication, group dynamics, conflict management, teambuilding and problem solving. Students will be challenged to examine their leadership role in their school, community and profession.
LEAD 401. LEADERSHIP RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
LEAD 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
LEAD 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
LEAD 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

LEAD 410. LEADERSHIP INTERNSHIP (1-16).
Students apply what they have learned through both the leadership theory and trait/skill development portion of the Leadership minor. This course is repeatable for a maximum of 16 credits.
LEAD 442. LEADERSHIP SKILLS FOR CAREER
SUCCESS (3). Focuses on the development and refinement of the following leadership skills: utilizing diversity, team building, project management, program planning models, working with difficult people, conflict management, leading change, establishing an effective network, organizational strategies, and emotional intelligence. PREREQS: Junior, senior, or graduate standing.

## LEAD 443. LEADERSHIP THROUGH

CONVERSATIONS (3). Engages students in the exploration of conversations as a component of leadership. Students will engage in topics related to developing effective conversations, listening, conversation styles, group dynamics, digital communication, meetings as conversations and interviewing skills.
LEAD 444. LEADERSHIP MINOR CAPSTONE
(2). Capstone course for students completing the Leadership minor. Students will reflect on what they have learned through the Leadership minor and how to apply that learning in the context of their future careers. PREREQS: (AG 242 or LEAD 242) and (AG 342 or LEAD 342)

LEAD 542. LEADERSHIP SKILLS FOR CAREER SUCCESS (3). Focuses on the development and refinement of the following leadership skills: utilizing diversity, team building, project management, program planning models, working with difficult people, conflict management, leading change, establishing an effective network, organizational strategies, and emotional intelligence. PREREQS: Junior, senior, or graduate standing.

## LEAD 543. LEADERSHIP THROUGH

CONVERSATIONS (3). Engages students in the exploration of conversations as a component of leadership. Students will engage in topics related to developing effective conversations, listening, conversation styles, group dynamics, digital communication, meetings as conversations and interviewing skills.


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## FACULTY

Professors Bohnert, Cherian, Downing, Estill, Filley, Killefer, Pirelli,
Associate Professors Bobe, Cooke, Deboodt, Hermes, Kutzler, MataGonzalez, Schreder, Williams
Assistant Professors Arispe, Ates, Bionaz, Bouska, Cruickshank, Dinkins, Duggan, Endress, Morris, Northway, Ochoa, Riggs, Schachtschneider, Udell Senior Instructors Ingham, Kennedy Instructors Gibson, Hazzard, Johnson, Lulay, Monaco, Mueller,Rosenlicht, Shaver, Sherwood, Younger
Senior Research Assistant Keller
Faculty Research Assistant
Brummer, Corder, Schroeder
Professionals Knudson, Reesman, Spencer
Emeritus Professors Borman, Cheeke, Gamroth, Froman, Johnson, Koong, Males, Menino, Peters,
Thompson, Weber
Distinguished Professor Emeritus Stormshak

## ADJUNCT FACULTY

Kiemnec

## COURTESY/AFFILIATE FACULTY

Associate Professor Stringham
Assistant Professors Bates, Boyd,
Davies, Ganskopp, George, James,
Louhaichi, McLean, Sheley, Svejcar

## Undergraduate Majors

Animal Sciences (BS, CRED, HBS)

## Options

Animal Behavior
Animal BioHealth/Pre-Professional
Animal Production
Equine
Rangeland Science
Rangeland Sciences (BS, CRED, HBS)

## Minors

Animal Sciences
Rangeland Ecology and Management

## Graduate Majors

Animal Science (MAIS, MS, PhD)
Graduate Areas of Concentration
Animal Nutrition
Dairy Production
Embryo Physiology
Endocrinology
Growth and Development
Livestock Management

## Nutritional Biochemistry

Reproductive Physiology
Rangeland Ecology and Management (MAIS, MS, PhD)
Graduate Areas of Concentration
Agroforestry
Ecology of Rangelands
Physiology of Range Plants
Range Improvement
Range Nutrition
Restoration Ecology
Riparian Zone Management
Watershed Management

## Graduate Minors

Animal Sciences
Rangeland Ecology and Management
Programs in animal sciences provide up-to-date information on methods of rearing livestock and poultry, that produce meat, milk, eggs, wool, and other animal products. In addition, the department addresses the care of animals that enhance human well-being through companionship, recreation, and human aid such as horses and companion animals. Essential to this information is knowledge generated from the fields of animal behavior/bioethics, genetics, nutrition, and physiology. The various teaching and research programs explore modern areas of animal biotechnology and data processing and how they apply to present day livestock and poultry production. Study in these areas provides the core around which various curricula leading to the BS degree in Animal Sciences can be developed. To allow students flexibility in course arrangement, three specialized program options are offered.

Increasing demands for livestock and poultry products by a rapidly expanding human population mean potential employment for well-trained individuals in such areas as farm, ranch, feedlot operation; meat, poultry, egg and milk processing, meat grading with the USDA; Federal Cooperative Extension Service, county and 4-H work; sales or technical employment with commercial feed, seed, and chemical companies and pharmaceutical houses; agricultural loan officer; government agency positions at local, state and federal levels; the Peace Corps; animal welfare auditing; as well as in journalism, mass media, and public policy. The expanding support structure for companion animals has created a growing job market for graduates in areas such as animal behavior consultant; veterinary technician (animal nurse); and business management. In addition, students become prepared to go on to advanced studies in animal sciences, veterinary medicine, and education.

Graduate students may pursue research projects through the Agricultural Experi-
ment Station as part of their programs for MS or PhD degrees. Graduate areas of concentration are offered in animal nutrition, dairy production, embryo physiology, endocrinology, ethology, growth and development, livestock management, muscle biology and meat science, nutritional biochemistry, reproductive physiology.

## COOPERATIVE PROGRAMS

Students transferring after one or two years at a community college should also be able to complete the requirements for a BS after three or two years, respectively.

## RANGELAND RESOURCE MANAGEMENT

Rangeland resource management is one of the family of natural resources professions important to the social, economic, and political development of Oregon, the nation, and the world. It is based upon ecological principles and is concerned with the restoration, improvement, conservation, and use of rangelands. Since range management is practiced on lands producing domestic and wild animals, timber, water, and recreation, concepts of integrated land use are included in the curriculum. A balance of soil, domestic animal, wildlife, ecology, and other biological sciences is realized in the educational program.

The curriculum below includes university and departmental requirements for the BS degree and provides emphasis either in science, management, ecology, or allied disciplines. The BS degree is also offered on the campus of Eastern Oregon University at La Grande through an extension of the OSU Department of Animal and Rangeland Sciences. Facilities for study include classroom and fieldoriented educational environments both on-campus and at locations throughout Oregon. Field trips are taken in conjunction with specific courses.
Graduate work leading to MAIS, MS, or PhD degrees may involve research on domestic or wild animals, rangeland nutrition, community ecology, physiology of rangeland plants, rangeland improvement, rangeland watershed, and riparian zone management, rangeland restoration, utilization and management, agroforestry and landscape ecology.
Summer employment with private industry, government agencies, and on range research projects makes possible learning experiences while earning a salary. Employment opportunities include resource management, research, Extension, ranch management, college and university teaching, business and industrial activities related to rangeland resources, and foreign agricultural and resource development assistance.
The Department of Animal and Rangeland Sciences is accredited by
the Society for Range Management. It is recognized throughout the country as one of the leading institutions of rangeland management.

## UNDERGRADUATE MAJORS WITH OPTIONS

ANIMAL SCIENCES (BS, CRED, HBS)

## Baccalaureate Core (51)

## Animal Sciences Core

ANS 100. Orientation to Animal Sciences (2)
ANS 121. *Introduction to Animal Sciences (4)

ANS 207. Sophomore Seminar (2)
ANS 251. Principles of Animal Foods Technology (3)
ANS 311. Principles of Animal Nutrition (3)
ANS 313. Applied Animal Nutrition: Feeds and Ration Formulation (4)
ANS 314. Animal Physiology (4)
ANS 316. Reproduction in Domestic Animals (4)
ANS 317. Reproduction in Domestic
Animals Laboratory (1)
ANS 378. Animal Genetics (4)
ANS 420. ${ }^{\wedge}$ Ethical Issues in Animal Agriculture (3)
Two animal industries courses from:
ANS 215. Beef/Dairy Industries (3)
ANS 216. Sheep/Swine Industries (3)
ANS 217. Poultry Industries (3)
ANS 220. Introductory Horse Science (3)
ANS 280. Companion Animal Management (3)

## Two production courses from:

ANS 430. Equine Systems I: Exercise Science (4)
or ANS 431. Equine Systems II: Nutrition (3)

ANS 433. Poultry Meat Production Systems (3)
or ANS 434. Egg Production Systems (3)
ANS 436. Sheep Production Systems (3)
ANS 439. Dairy Production Systems (4)
ANS 445. Beef Production Systems (4)
ANS 456. Companion Animal Production Systems (3)
ANS 460. Swine Production Systems (4)
+Select TWO courses from advanced ANS classes or electives (minimum of 6 credits).
AGRI 438. Exploring World Agriculture (2)
ANS 315. *Contentious Social Issues in
Animal Agriculture (3)
ANS 321. Avian Embryo (4)
ANS 323. Principles of Colt Training (3)
ANS 324. Advanced Colt Training (3)
ANS 327. Applied Physiology of Reproduction (5)
ANS 331. Advanced Livestock Evaluation (4)
ANS 333. Equine Stable Management (3)
ANS 351. Advanced Principles of Animal
Foods Technology (4)
ANS 401. Research (1-16)
ANS 410. Animal Science Internship (3 credits maximum will count toward the two-class requirement)
ANS 415. Livestock Judging Team (3)
ANS 435. Applied Animal Behavior (3)
ANS 441. Topics in Animal Learning (3)

ANS 452. Livestock Housing and Waste Management (3)
ANS/FES/FW/SOC 485. *Consensus and Natural Resource (3)
ANS 511. Digestive Physiology and Nutrition of Ruminant Animals (4)
ANS 512. Monogastric and Poultry Nutrition (3)
Additional ANS Production Systems Course (3)

Select 20 credits from the Agriculture Category (Choose any courses in agricultural field or natural resources area.)

## Physical and Biological Sciences

BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
CH 121. General Chemistry (5) and CH 122, CH 123 . *General Chemistry (5,5) or CH 231, CH 232, CH 233. *General Chemistry ( $4,4,4$ ) and CH 261, CH 262, CH 263. *Laboratory for Chemistry 231, 232, 233 (1,1,1)
CH 130. General Chemistry of Living Systems (4)
or CH 331. Organic Chemistry (4) or BB 331. *Introduction to Molecular Biology (3)
MB 230. *Introductory Microbiology (4) or MB 302. General Microbiology (3)
MTH 111. *College Algebra (4)

## Statistics

ST 201. Principles of Statistics (4)
or ST 351. Introduction to Statistical Methods (4)

## Business

## Choose one from below:

AEC 211. Management in Agriculture (4)
AEC 221. Marketing in Agriculture (3)
BA 215. Fundamentals of Accounting (4)
BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Major Code: 125


## OPTIONS

## ANIMAL BEHAVIOR OPTION

The Animal Behavior option will provide students with skills necessary to enter professions or graduate studies related to animal behavior and welfare, service and therapy with animals, or other animal care or industry positions that include a behavior management component. Courses chosen are consistent with accepted curriculum for animal behaviorists and provide a solid foundation to those working towards related certifications.

## Required Courses

ANS 341. Animal Behavior and Cognition (3)
ANS 435. Applied Animal Behavior (3)
ANS 441. Topics in Animal Learning (3)
PSY 201. *General Psychology (3)
PSY 202. *General Psychology (3)
PSY 301. Research Methods in Psychology (4) or WR 362. *Science Writing (3)

PSY 330. Brain and Behavior (4)
At least 6 credits from the following:
ANS 401. Research (1-3)**
ANS 410. Animal Science Internship (1-3)** FW/VMB 328. Wildlife Capture and
Immobilization (2)
FW 475. Wildlife Behavior (4)
FW 481. Wildlife Ecology (4)
PSY 340. Cognition (4)
PSY 432. Physiological Psychology (4)
PSY 454. Cognitive Development (4)
PSY 456. Social Development (4)
RNG 442. Rangeland-Animal Relations (4)
Z 350. Animal Behavior (3)

## Footnotes:

** Research and/or internship must be related
to the field of animal behavior

* Baccalaureate Core Course

Option Code: 707

## ANIMAL BIOHEALTH/PRE-

## PROFESSIONAL OPTION

The Animal BioSciences/Pre-Professional option prepares students for professional careers in veterinary medicine, and animal science teaching and research. Extensive training is provided in the biological and physical sciences, offering an excellent foundation for graduate study.
Requirements include the core curriculum and additional credits as required by the College of Veterinary Medicine. The Animal BioSciences/Pre-Professional option is designed for students interested in fulfilling requirements for admission to the OSU College of Veterinary Medicine. It allows students who are admitted to the college, upon completion of three years of undergraduate study, to apply credit earned during the first year of professional study toward the BS degree in Animal Sciences.
Students choosing not to attend veterinary school after the third year of this program may complete additional requirements to qualify for the BS degree in Animal Sciences.

## Required

BB 450, BB 451. General Biochemistry $(4,3)$
BB 314. Cell and Molecular Biology (4)
and MB 230. *Introductory Microbiology (4)
or MB 302. General Microbiology (3)
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
MTH 112. *Elementary Functions (4)
and MTH 241. *Calculus for
Management and Social Science (4)
or MTH 251. *Differential Calculus (4)
PH 201, PH 202. *General Physics $(5,5)$

## Total=44-45

Footnote:

* Baccalaureate Core Course

Option Code: 709
ANIMAL PRODUCTION OPTION
The Animal Production option will allow students to select a species or production industry that interests them most. This option is for students that want
to specialize in breeding, feeding, care, and welfare of animals. Animal production, nutrition, and management classes combined with business and/or applied economics courses provide a solid basis for a career in industry-level positions that pertain to animal management and production.

At least 15 credits in the option must be upper division.

## Required

ANS 231. Livestock Evaluation (3)
ANS 251. Principles of Animal Foods
Technology (3)

## Animal Industry

Select one of following courses:
ANS 215. Beef/Dairy Industries (3)
ANS 216. Sheep/Swine Industries (3)
ANS 217. Poultry Industries (3)

## Animal Learning

Select two of following:
ANS 341. Animal Behavior and Cognition (3)

ANS 435. Applied Animal Behavior (3)
ANS 441. Topics in Animal Learning (3)
RNG 442. Rangeland-Animal Relations (4)

## Animal Production

## Select one of following courses:

ANS 433. Poultry Meat Production Systems (3)

ANS 434. Egg Production Systems (3)
ANS 436. Sheep Production Systems (3)
ANS 439. Dairy Production Systems (4)
ANS 445. Beef Production Systems (4)
ANS 460. Swine Production Systems (4)

## Business

Select one of following courses:
BA 215. Fundamentals of Accounting (4)
BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)
Any AEC course applicable to production animal systems

## Diet/Nutrition Source

Select one of following courses:
CROP/HORT 300. Crop Production in
Pacific Northwest Agroesystems (4)
CROP 310. Forage Production (4)
RNG 341. Rangeland Ecology and
Management (3)

## Electives

Select one of following (3-4 credits):
Any upper-division ANS credit not taken above related to production animals
Any FST courses (FST 212 and FST 213 for dairy interest)
RNG 442. Rangeland-Animal Relations (4)
RNG 470. Pastoral Systems of the World (4)
RNG 490. Rangeland Management
Planning (4)
Total=25-28
Option Code: 708
EQUINE OPTION
The two areas of emphasis within the Equine option are designed to give students direction in regard to their future career and endeavors.

The Management or General Emphasis is designed to prepare those students wanting to not only own horses, but to manage equine facilities, event centers, or to go into areas such as nutrition, pharmaceuticals sales or marketing and promotion.

The Human or Animal Therapy Emphasis is designed to prepare students to go into the area of animal-assisted therapy. Using horses as therapy animals is becoming widely accepted and utilized. For this emphasis, the student not only needs to understand the horse itself but human nature as well.
27 credits with a minimum of 15 credits upper division are required.

## Required: $\mathbf{1 2}$ credits

ANS 220. Introductory Horse Science (3)
ANS 333. Equine Stable Management (3)
ANS 335. Equine Health and Disease (3)
ANS 341. Animal Behavior and Cognition (3)
or ANS 435. Applied Animal Behavior (3)
or ANS 441. Topics in Animal Learning (3)
Select two classes from the following
(you may take all):
ANS 430. Equine Systems I: Exercise Science (4)

ANS 431. Equine Systems II: Nutrition (3)
ANS 432. Equine Systems III: Reproduction (3)

Select a minimum of 9 credits from the following:
Management or General Emphasis:
ANS 223. Equine Marketing (2)
ANS 401. Research (Wild Horse Behavior) (2)
ANS 410. Animal Science Internship (3)1
BA 215. Fundamentals of Accounting (4)
BA 230. Business Law I (4)
or AEC 388. Agricultural Law (4)
BA 260. Introduction to Entrepreneurship (4)
RNG 442. Rangeland-Animal Relations (4)
or CROP 310. Forage Production (4)
RNG 470. Pastoral Systems of the World (3)
Or select a minimum of 9 credits
from the following:
Human or Animal Therapy Emphasis:
ANS 341. Animal Behavior and Cognition (3)

ANS 401. Research (Wild Horse Behavior) (2)
ANS 410. Animal Science Internship (3)1
ANS 435. Applied Animal Behavior (3)
ANS 441. Topics in Animal Learning (3)
BA 260. Introduction to Entrepreneurship (4)
COMM 218. *Interpersonal
Communication (3)
PHL 205. *Ethics (4)
PSY 201. *General Psychology (3)
PSY 202. *General Psychology (3)
PSY 330. Brain and Behavior (4)
PSY 381. Abnormal Psychology (4)
PSY 432. Physiological Psychology (4)

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
${ }^{1}$ Internships must be related to the field of
equine management or science
Option Code: 693


## RANGELAND SCIENCE OPTION

The Rangeland Sciences option provides students with foundational knowledge and skills relevant to rangeland ecology and management. This option is for students seeking to understand the structure and function of rangelands. Landscape dynamics, including the effects of stress and disturbance, are integral to course work which includes rangeland plant identification, rangeland ecosystem types, rangeland health assessment, hydrology, effects of fire and herbivory, resource inventory, restoration and management planning. Rangeland Sciences courses complement Animal Sciences courses to provide students with an integrated understanding of rangeland stewardship and livestock production.

28 credits are required for the option; 15 of which must be at the upper-division level.

## Required:

Animal Sciences (10 credits):
ANS 435. Applied Animal Behavior (3)
ANS 436. Sheep Production Systems (3)
ANS 445. Beef Production Systems (4)

## Rangeland Science (18 credits):

RNG 341. Rangeland Ecology and
Management (3)
RNG 355. Desert Watershed Management (4)
RNG 421. Wildland Restoration and Ecology (4)
or RNG 441. Rangeland Analysis (4)
RNG 442. Rangeland-Animal Relations (4)
RNG 490. Rangeland Management Planning (4)
Prerequisites and/or Other
Recommended Course Work:
ANS 215. Beef/Dairy Industries (3)
(Prerequisite for ANS 445)
ANS 216. Sheep/Swine Industries (3)
(Prerequisite for ANS 436)
RNG 353. Wildland Plant Identification (4)
RNG 455. Riparian Ecohydrology and
Management (4)
RNG 470. Pastoral Systems of the World (4)

## Total=28

Option Code: 712

## RANGELAND SCIENCES

(BS, CRED, HBS)

## Also available via Ecampus.

Departmental requirements may be utilized to satisfy baccalaureate core and non-departmental minor requirements.

## Baccalaureate Core (51) ${ }^{1}$

Skills Courses (15 credits)
Fitness (3)
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1)
or approved Physical Activity Course (PAC)
Mathematics (4)
Met with Rangeland Sciences General Sciences, Math and Statistics.
Speech (3)
COMM 111. *Public Speaking (3)
COMM 114. *Argument and Critical
Discourse (3)

COMM 218. *Interpersonal
Communication (3)

## Writing I

WR 121. *English Composition (3) (Must be taken in first 45 credits.)

## Writing II

WR 327. *Technical Writing (3)

## Perspective Courses ( $\mathbf{2 4}$ credits)

No more than two courses (or lecture/lab combinations) from any one department may be used by a student to satisfy the Perspectives category of the core. Please reference the baccalaureate core catalog for further clarification: http://catalog. oregonstate.edu/bcc.aspx.
Biological Science (Lecture/Lab)
Met with Rangeland Sciences General
Sciences, Math and Statistics.
Cultural Diversity (CD) (3)
Please reference the baccalaureate core course catalog for a list of approved courses: http://catalog.oregonstate.edu/ bcc.aspx.
Literature and the Arts (LA) (3)
Please reference the baccalaureate core course catalog for a list of approved courses: http://catalog.oregonstate.edu/ bcc.aspx.
Physical Science (Lecture/Lab or Lab) (1)
Met with Rangeland Sciences General Sciences, Math and Statistics.
Social Processes and Institutions (SPI) (3)
Met with Rangeland Sciences Economics and Natural Resources Section.
Western Culture (WC) (3)
Please reference the baccalaureate core course catalog for a list of approved courses: http://catalog.oregonstate.edu/ bcc.aspx.

## Difference, Power, and

Discrimination Courses (DPD) (3)
Please reference the baccalaureate core course catalog for a list of approved courses: http://catalog.oregonstate.edu/ bcc.aspx.

## Synthesis Courses (6 credits)

The two courses used to fulfill the Synthesis requirement may not be in the same department.
Contemporary Global Issues (CGI) (3)
Please reference Baccalaureate Core course catalog for approved courses: http://catalog.oregonstate.edu/bcc.aspx
Science, Technology, and Society (STS) (3)
Please reference Baccalaureate Core course catalog for approved courses: http://catalog.oregonstate.edu/bcc.aspx

## Writing Intensive Course (WIC) (3 cr)

Select one course from below (3 cr):
AG 421. ${ }^{\wedge}$ Leadership Development (3)
ANS 420. ${ }^{\wedge}$ Ethical Issues in Animal Agriculture (3)
ENSC 479. ^Environmental Case Studies (3)
FW 435. ^Wildlife in Agricultural
Ecosystems (3)
GEOG 323. ${ }^{\wedge}$ Climatology (4)

## Rangeland Sciences ( 32 credits)

RNG 341. Rangeland Ecology and Management (3)
RNG 351. Range Ecology I-Grasslands (3)
RNG 352. Range Ecology II-Shrublands (3)
RNG 353. Wildland Plant Identification (4)
RNG 355. Desert Watershed Management (4)
RNG 421. Wildland Restoration and Ecology (4)
RNG 441. Rangeland Analysis (4)
RNG 442. Rangeland-Animal Relations (4)
RNG 490. Rangeland Management Planning (4)
Plants, Soil and Animals (30 credits)
ANS 313. Applied Animal Nutrition: Feeds and Ration Formulation (4)
or ANS 312. *Feedstuffs and Ration Formula (4)
ANS 436. Sheep Production Systems (3)
or ANS 446. Grazing Livestock Production
(4) Ecampus only.
or ANS 445. Beef Production Systems (4)
BI 370. Ecology (3)
or BOT 341. Plant Ecology (4)
BOT 321. Plant Systematics (4)
BOT 331. Plant Physiology (4)
or BOT 488. Environmental Physiology of Plants (3)
BOT 414. Agrostology (4)
CROP 310. Forage Production (4)
FW 251. Principles of Fish and Wildlife Conservation (3)
SOIL 205. *Soil Science (3)
and SOIL 206. *Soil Science Laboratory for SOIL 205 (1)
or CSS 305. Principles of Soil Science (4)
SOIL 466. Soil Morphology and
Classification (4)
or SOIL 366. Ecosystems of Wildland Soils
(3) Ecampus only.

## Economics and Natural Resources

(10 credits)
FES 251. Recreation Resource Management (4)

FOR 111. Introduction to Forestry (3)
ECON 201. *Introduction to
Microeconomics (4)
or AEC 250. *Introduction to
Environmental Economics and Policy (3)
AEC 351. *Natural Resource Economics and Policy (3)
or AEC/ECON 352. *Environmental Economics and Policy (3)
General Science, Math and
Statistics (45 credits)
BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
or BI 204, BI 205, BI 206. *Introductory Biology I,II,III (4,4,4)
CH 121. General Chemistry (5)
CH 122. *General Chemistry (5)
CH 130. General Chemistry of Living Systems (4)
GEO 102. *The Surface of the Earth (4) or GEOG 102. *Physical Geography (4)
MTH 111. *College Algebra (4)
MTH 241. *Calculus for Management and Social Science (4)
Free electives (12 maximum)
Total Credits=180

Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course (WIC)
${ }^{1}$ Certain classes may be used to satisfy both the baccalaureate core and the rangeland ecology and management core.
Major Code: 292


## UNDERGRADUATE MINORS

## ANIMAL SCIENCES MINOR

## Required

Select a minimum of 12 credits from any lower-division ANS courses.
And select a minimum of 15 credits
from any upper-division ANS courses.
Total=27-28
Note: These courses should be taken in consultation with an academic advisor in the Department of Animal and Rangeland Sciences.
Minor Code: 125

## RANGELAND ECOLOGY AND <br> MANAGEMENT MINOR

Requirements
RNG 341. Rangeland Ecology and
Management (3)
RNG 351. Range Ecology I-Grasslands (3)
RNG 352. Range Ecology II-Shrublands (3)
RNG 421. Wildland Restoration and Ecology (4)
RNG 442. Rangeland-Animal Relations (4)
RNG 490. Rangeland Management Planning (4)
Select 7 additional credits from:
Any other RNG course
ANS 436. Sheep Production Systems (3)
ANS 443. Beef Production Systems (3)
BOT 341. Plant Ecology (4)

## Total=28

Note: Completion of the Rangeland Ecology and Management minor alone does not qualify students for rangeland conservationist positions with the U.S. Office of Personnel Management (OPM).
Minor Code: 622

## GRADUATE MAJORS

## ANIMAL SCIENCE (MS, PhD,

 MAIS)Graduate Areas of Concentration
Animal nutrition, dairy production (MS only), embryo physiology, endocrinology, growth and development, livestock management (MS only), nutritional biochemistry, reproductive physiology
The Department of Animal and Rangeland Sciences offers graduate work leading to Master of Science and Doctor of Philosophy degrees in Animal Science with concentrations listed above.
Major Code: 1250

## RANGELAND ECOLOGY AND MANAGEMENT (MS, PhD, MAIS)

Graduate Areas of Concentration
Agroforestry, ecology of rangelands, physiology of range plants, range
improvement, range nutrition,
restoration ecology, riparian zone
management, watershed management
The Department of Animal and Rangeland Sciences offers Master of Science and Doctor of Philosophy degrees.

The program integrates plant, soil, and animal sciences to prepare degree candidates for leadership in this professional field. Under the guidance of the rangeland faculty, graduate students study rangeland ecology, physiology of rangeland plants, rangeland nutrition, rangeland improvements, watershed management, restoration ecology, agroforestry, water quality, and riparian zone management. Through the Department of Animal and Rangeland Sciences, range management graduate students have access to greenhouse, field plot, pasture, range, and animal facilities on campus, and at the two Eastern Oregon Agricultural Research Center stations at Union and Burns.

Graduate students in rangeland ecology and management may select courses in complementary areas, including agricultural and resource economics, fisheries and wildlife, botany, soils, statistics, biology forestry, crop science, and animal science. The selection of these complementary areas depends on the interest of the students, their aptitude, and the thesis topic they have chosen. Minors are commonly elected in botany, soils, forage crops, animal nutrition, fisheries and wildlife, agricultural and resource economics, or in an integrated program of study.
Major Code: 6220

## GRADUATE MINORS

ANIMAL SCIENCE GRADUATE MINOR
For more details, see the departmental advisor.

## Minor Code: 1250

## RANGELAND ECOLOGY AND MANAGEMENT GRADUATE MINOR

For more details, see the departmental advisor.

## Minor Code: 6220

$\square$ ANIMAL SCIENCES COURSES
ANS 100. ORIENTATION TO ANIMAL AND RANGELAND SCIENCES (1). Orientation of incoming animal sciences students to college life with emphasis on faculty, facilities, services and curricula of the Department of Animal and Rangeland Sciences.
ANS 121. *INTRODUCTION TO ANIMAL
SCIENCES (4). Principles of breeding, physiology, nutrition, and management as they apply to
modern livestock and poultry production. Lec/lab. (Bacc Core Course)

ANS 121H. *INTRODUCTION TO ANIMAL
SCIENCES (4). Principles of breeding, physiology, nutrition, and management as they apply to modern livestock and poultry production. Lec/lab. (Bacc Core Course) PREREQS: Honors College approval required.
ANS 207. SOPHOMORE SEMINAR (2). Examination of career opportunities in animal sciences. PREREQS: Sophomore standing.

ANS 215. BEEF/DAIRY INDUSTRIES (3). Introduction to beef and dairy industries; history, current industry status, and demonstration and practice of basic husbandry skills. PREREQS: ANS 121
ANS 216. SHEEP/SWINE INDUSTRIES (3). Introduction to the sheep and swine industries including history, current status and production practices, with demonstration and handson experience of basic husbandry practices. PREREQS: ANS 121
ANS 217. POULTRY INDUSTRIES (3).
Familiarization of the organizational structure and marketing arrangement of poultry industries; hands-on managerial techniques, practices and procedures carried out by the poultry industries.
ANS 220. INTRODUCTORY HORSE SCIENCE
(3). Introduction to horses, their history, breeds,
form and function, performance evaluation, current industry status, and general management. PREREQS: ANS 121
ANS 223. EQUINE MARKETING (2). Course covers practical concepts of equine marketing. Emphasis on market assessment, targeting buyers, marketing and advertising strategies, hands-on experience in product preparation and presentation, marketing legalities. PREREQS: ANS 121 and ANS 220 and ANS 192 or instructor approval required.
ANS 231. LIVESTOCK EVALUATION (3). Focuses on an individual animal's economic merit as compared to a sample group. Visual appraisal, performance data, and carcass merit are stressed. Includes the evaluation of both market and breeding animals. The livestock species of concentration include beef cattle, swine, sheep, and meat goats. Lec/lab. PREREQS: Recommended: ANS 121
ANS 251. PRINCIPLES OF ANIMAL FOODS TECHNOLOGY (3). Processing of meat, milk and eggs into human food products. Lec/lab. PREREQS: ANS 121

ANS 280. COMPANION ANIMAL MANAGEMENT
(3). Care and management of companion animals, including dogs, cats, small mammals, reptiles, birds, and tropical fish. Responsibilities of pet ownership and the beneficial aspects of the human-animal relationship.

ANS 302. COMMON DISEASES OF
COMPANION ANIMALS (4). An introduction to common diseases of selected companion animals. Emphasis will be placed on identifying predisposing factors, clinical signs, common diagnostic procedures and potential implications for human health. A $\$ 10$ course fee will be required. Lec/rec. PREREQS: (BI 211 [D-] or BI 211 H [D-]) and (BI 212 [D-] or BI 212H [D-]) and (BI 213 [D-] or Bl 213 H [D-] ) and CH 121 [D-] and CH 122 [D-] and CH 123 [D-] and ANS 280 is recommended.

ANS 311. PRINCIPLES OF ANIMAL NUTRITION
(3). Classification, digestion, absorption, and metabolism of nutrients in animals; consequences of nutritional deficiencies and toxicities.
PREREQS: ((BI 211 [D-] or BI 211H [D-]) and (BI 212 [D-] or BI 212H [D-] ))
ANS 312. FEEDSTUFFS AND RATION
FORMULATION (4). Presents the feedstuffs utilized by domestic animals including their characteristics and processing. Provides
instruction in ration formulation and evaluation leading to development of the basic skills required to formulate and evaluate rations for domestic animals. Taught as a distance education course. PREREQS: ANS 121 and MTH 111 or equivalent or instructor approval.

ANS 313. APPLIED ANIMAL NUTRITION: FEEDS AND RATION FORMULATION (4).
Discusses topics relevant to feedstuff identification and nutrient analysis, feed processing and formulation of balanced animal diets based on nutrient requirements. Provides students handson experiences in identifying various feedstuffs and formulating rations based on the nutrient composition of those feedstuffs. PREREQS: MTH 111 [D] and junior standing
ANS 314. ANIMAL PHYSIOLOGY (4). Biological basis of animal performance; describes how networks of cells act cooperatively to enable locomotion, provide a stable internal environment, allocate resources, remove metabolic endproducts, and counteract microorganisms. PREREQS: General principles of biology equivalent to $\mathrm{BI} 211, \mathrm{BI} 212, \mathrm{BI} 213$; junior standing or higher or instructor permission.

ANS 315. *CONTENTIOUS SOCIAL ISSUES IN ANIMAL AGRICULTURE (3). Discussion of contentious issues including role of animal products and human health; use of hormones and antibiotics; new animal biotechnologies; animal rights/welfare; livestock grazing on public lands. (Bacc Core Course).

ANS 316. REPRODUCTION IN DOMESTIC ANIMALS (4). Anatomy and physiology of mammalian and avian reproductive systems; fertilization, embryonic and fetal development, placentation and parturition; reproductive technologies. Lec/rec. PREREQS: (BI 211 [D-] or Bl 211 H [D-] ) and (CH 121 [D-] or CH 221 [D-] or CH 231 [D-] or CH 231H [D-] ) and ANS 121 and sophomore standing or higher.

## ANS 317. REPRODUCTION IN DOMESTIC

ANIMALS LABORATORY (1). Gross and microscopic anatomy of the reproductive tract; semen collection, evaluation and extension; evaluation of fertilization, embryo and fetal development and placentation. Lec/lab. PREREQS: ANS 316* [D-]
ANS 320. PRINCIPLES OF COMPANION ANIMAL NUTRITION (3). Learn about nutrients, the digestive process, and the application of nutritional sciences to the health and welfare of companion animals. Introduction to the metabolic basis and practical preventative management for nutritional diseases in companion animals. PREREQS: ( Bl 211 [D-] or Bl 211 H [D-]) and (BI 212 [D-] or BI 212H [D-] )

ANS 321. AVIAN EMBRYO (4). Discussion and experimentation involving the development and the environmental requirements for the artificia incubation of avian embryos. Lec/lab. Offered even-numbered years. PREREQS: ANS 121 and ANS 217 and BI 211
ANS 323. PRINCIPLES OF COLT TRAINING (3).
Students acquire the technical and theoretical knowledge of starting and training colts in the stock seat style of riding. PREREQS: ANS 295 [D-] and /or instructor's approval. Departmental approval.
ANS 324. ADVANCED COLT TRAINING (3). Students acquire the technical and theoretical knowledge of advancing the training of young horses in the stock seat style of riding. Lec/lab. PREREQS: ANS 295 and ANS 323 or instructor approval required.
ANS 327. APPLIED PHYSIOLOGY OF REPRODUCTION (5). Principles, techniques and recent development in semen collection, evaluation, extension and preservation; artificial insemination, estrus detection and synchronization; pregnancy diagnosis and embryo transfer. PREREQS: (ANS 316 [D-] and ANS 317 [D-] )

ANS 331. ADVANCED LIVESTOCK
EVALUATION (4). Aspects of an individual animal's economic merit are compared to a sample group. Emphasis is placed on beef, swine and sheep. Visual appraisal, performance data and carcass merit are stressed. Designed to prepare students for the intercollegiate livestock judging team. This course is repeatable for a maximum of 12 credits. PREREQS: ANS 231 and sophomore standing or higher.
ANS 333. EQUINE STABLE MANAGEMENT (3). Discusses developing a business plan, financial statements, and ratios, budgeting, financial planning, taxation, and employment issues within the current equine industry. PREREQS: ANS 220 [D-] and ANS 222 or instructor's approval.
ANS 335. EQUINE HEALTH AND DISEASE
(3). Recognition of common diseases and disorders including their cause, treatment and prevention. Management of internal and external parasites. Recognizing common lameness issues. PREREQS: Junior standing.
ANS 341. ANIMAL BEHAVIOR AND COGNITION
(3). Survey, discuss, and explore principles of animal behavior and cognition from a comparative perspective, taking into account the interacting influences of biology, environment, and life experience on the individual and group behavior of animals across species. Aspects of animal cognition, including reasoning, perception, memory and personality, that play an important role in animal behavior will also be addressed. PREREQS: BI 102 [D] or BI 213 [D]
ANS 351. ADVANCED PRINCIPLES OF ANIMAL FOODS TECHNOLOGY (4). Provides in-depth coverage of both fresh and processed meats and eggs into products suitable for human consumption. PREREQS: ANS 251
ANS 378. ANIMAL GENETICS (4). Fundamentals of inheritance, principles of genetic segregation, population and quantitative genetics, response to natural selection and artificial manipulation of populations. PREREQS: BI 211 [D-] or BI 212 [D-] or BI 213 [D-] and ANS 121 or equivalent and ST 351 recommended.
ANS 380. PRINCIPLES OF ANIMAL ANATOMY AND PHYSIOLOGY (3). An introductory course in animal anatomy to provide a foundation for advanced courses in the Animal Science curriculum. Emphasis is on acquisition of a basic knowledge of minute and gross anatomical structures, their operation, and integration. Begins with anatomical nomenclature such as body planes and directional terms then covers the following tissues and organ systems: epithelium, connective tissue, blood and bone marrow, bone/cartilage, muscle tissue, nervous tissue, digestive system, circulatory system, reproductive system, urinary system, and respiratory system. PREREQS: (BI 211 [D] or BI 211 H [D]) and (BI 212 [D] or BI 212H [D] ) and (BI 213 [D] or BI 213H [D] )
ANS 385. FOUNDATIONS OF MAMMALIAN HISTOLOGY (3). Provides a basic knowledge of mammalian microscopic anatomy. Emphasis will be on the appearance, organization and function of minute anatomical structures that can only be observed with the help of a visual enhancer, such as a microscope. Covers basic histological techniques and histology and related functions of the following tissues and organ systems: epithelium, connective tissue, bone/ cartilage, blood, muscle tissue, nervous tissue, circulatory system, digestive system, reproductive system, urinary system, respiratory system, immune system, integument, eye and ear. Also covers gametogenesis, fertilization, and early development of the vertebrate embryo. Lec/rec. PREREQS: ( Bl 211 [C-] or BI 211 H [C-] ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213 H [C-] ) and (BI 314 [C-] or BI 314H [C-] )
ANS 390. GROSS ANATOMY OF DOMESTIC ANIMALS (4). Provides a foundation for advanced courses in the Animal Sciences
curriculum. Emphasis on gaining knowledge of mammalian anatomy. Lectures cover anatomical nomenclature, structure, operation, and integration of major organ systems. The dog is used as the general model while comparative domestic animal anatomy is also covered. Lec/lab. PREREQS: (BI 211 [D] or BI 211 H [D] ) and (BI 212 [D] or BI 212 H [D] ) and (BI 213 [D] or BI 213H [D] )
ANS 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANS 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANS 405. READING AND CONFERENCE (1-
16). Graded $P / N$. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ANS 407. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
ANS 410. ANIMAL SCIENCE INTERNSHIP (1-12). On- or off-campus, occupational work experience supervised by the department. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ANS 415. LIVESTOCK JUDGING TEAM (3).
Designed to train students for participation in the intercollegiate livestock judging team. This course is repeatable for a maximum of 9 credits. PREREQS: ANS 331
ANS 420. ^ETHICAL ISSUES IN ANIMAL AGRICULTURE (3). Students are provided with an opportunity to discuss, debate and write extensively about current, relevant, and controversial social issues dealing with modern animal agriculture. (Writing Intensive Course)
ANS 430. EQUINE SYSTEMS I: EXERCISE SCIENCE (4). Seniors and graduate students intensively explore and apply science to real-life situations regarding cardiorespiratory, muscle physiology, and bone physiology responses to exercise, climate, and altitude. Lec/lab. PREREQS: ANS 314
ANS 431. EQUINE SYSTEMS II: NUTRITION (3). Senior and graduate students intensively explore and apply science to real-life situations regarding starch, fiber, protein, and fat metabolism in performance horses, breeding stock, and growing horses. PREREQS: ANS 313
ANS 432. EQUINE SYSTEMS III:
REPRODUCTION (4). Senior and graduate students explore the fundamentals of equine reproduction and their application in horse breeding. Includes practical training of laboratory techniques. Lec/lab. PREREQS: (ANS 220 [D-] and ANS 316 [D-] ) and ANS 327
ANS 433. POULTRY MEAT PRODUCTION SYSTEMS (3). Fundamental applications and the analysis of management principles applied to brooding, rearing, feeding and housing meattype chickens and turkeys and their respective breeders. Decision case studies and practical management problems are incorporated into the course. Offered odd number years. PREREQS: ANS 217 and ANS 313 and ANS 316 and ANS 378 or instructor's approval
ANS 434. EGG PRODUCTION SYSTEMS (3). Applications and analyses of egg production systems for brooding, rearing, feeding and housing egg producing chickens. Decision case studies and practical management problems are incorporated into the course. Offered evennumbered years. PREREQS: ANS 217 and ANS 313 and ANS 316 and ANS 378 or instructor's approval
ANS 435. APPLIED ANIMAL BEHAVIOR (3).
Exploration of the fundamental processes of animal behavior and implications for animal management, production, housing and welfare. Examples provided in class will cover a range of
species, with emphasis on domestic animals. Lec/ lab. PREREQS: ANS 314 and BI 350 or Z 350 or equivalent.

ANS 436. SHEEP PRODUCTION SYSTEMS (3). Integration of nutrition, genetics, reproduction, behavior, and health principles into management systems for production and marketing of lamb and wool. PREREQS: ANS 216 and ANS 311 and ANS 316 and ANS 378

ANS 439. DAIRY PRODUCTION SYSTEMS (4). Fundamentals of nutrition, breeding, reproductive physiology and health programs and their applications in the care and management of dairy cattle. PREREQS: ANS 215 and ANS 313 and ANS 316 and ANS 378
ANS 440. DAIRY PRODUCTION SYSTEMS
(3). Decision case analysis or special topics in application of dairy management principles. PREREQS: ANS 439 [D-]
ANS 441. TOPICS IN ANIMAL LEARNING (3). Explore when and how the behavior of animals can be shaped by the environment, individual experiences, and interactions with other animals (including humans). PREREQS: BI 211 [D-] and B 212 [D-] and junior standing. Recommended: ANS 435 or ANS 535 and (BI 350 or Z 350) and BI 213

## ANS 443. BEEF PRODUCTION SYSTEMS:

COW/CALF (3). Fundamentals of nutrition, reproductive physiology and health programs and their applications in the care and management of beef cattle. Overnight field trip with extra fee charged. Lec/lab. Taught at EOU La Grande campus only. PREREQS: ANS 313 and ANS 315 and ANS 316 and ANS 378
ANS 444. BEEF PRODUCTION SYSTEMS:
STOCKER/FEEDLOT (3). Continuation of the study of beef cattle management. Students will practice decision-making processes using area beef cattle operations as case studies. Overnight field trip with extra fee charged. Taught at EOU La Grande campus only. PREREQS: ANS 443 or ANS 543
ANS 445. BEEF PRODUCTION SYSTEMS (4).
Students will be exposed to the fundamentals of nutrition, reproductive physiology, selection, health programs, and their applications in the care and management of beef cattle from conception through calving, weaning, stocker/back grounding and the feedlot. Students will practice decisionmaking processes using working case studies. Overnight field trip with extra fee charged. PREREQS: ANS 313 and ANS 316 and ANS 317 and ANS 378
ANS 446. GRAZING LIVESTOCK PRODUCTION
(4). Equips non-animal science majors with basic ruminant livestock (beef cattle, sheep and meat goat) production knowledge, so they may communicate and collaborate effectively with livestock producers. PREREQS: ANS 121 [D-]
ANS 452. LIVESTOCK HOUSING AND WASTE
MANAGEMENT (3). Basics in where, how, and why one would build, insulate, and ventilate livestock buildings. Manure and wastewater collection, treatment, storage, and utilization.
ANS 456. COMPANION ANIMAL PRODUCTION SYSTEMS (3). Fundamentals of dog and cat breeding stock selection, feeding and housing as well as biology and management from estrus through parturition to weaning. Due to the nature of this class, a variety of animals may be present during class session. Questions and interactions are encouraged but, while precautions are taken, any contact with animals carries some risk of injury or illness. PREREQS: (ANS 313 [D-] and ANS 316* [D-] and ANS 317* [D-] and ANS 378 [D-] ) and senior standing.
ANS 460. SWINE PRODUCTION SYSTEMS (4). Students will be exposed to the fundamentals of nutrition, reproductive physiology, selection, health programs, and their applications in the care and management of swine from conception through farrowing, weaning, and the growing/finishing
phases. Students will practice decision-making processes using working case studies. Overnight field trip with extra fee charged. PREREQS: ANS 121 and ANS 216 and ANS 311 and ANS 316 and ANS 378
ANS 485. *CONSENSUS AND NATURAL
RESOURCES (3). Students will use a working group approach. They will select a natural resource topic, study the team process and interaction as a method of learning, explore the issue using systems practice, and strive for consensus on solutions to their issue. CROSSLISTED as FES 485/FES 585, FW 485/ FW 585, SOC 485/SOC 585. (Bacc Core Course)

ANS 499. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

ANS 501. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANS 503. THESIS (1-16). Graded P/N. This course is repeatable for a maximum of 999 credits.
ANS 505. READING AND CONFERENCE (1-
16). Graded $P / N$. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ANS 507. GRADUATE SEMINAR (1). Section
1: Seminar/general for all graduate students. Preparation of effective visual aids. Practice explaining the validity or significance of experimental results to an informed audience. Section 2: Seminar/endocrinology, for graduate students interested in physiology. This course is repeatable for a maximum of 99 credits.

ANS 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

ANS 509. TEACHING PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

ANS 511. DIGESTIVE PHYSIOLOGY AND NUTRITION OF RUMINANT ANIMALS (4). Anatomy and physiology of the ruminant digestive tract including rumen microbiology and digestive processes. Nutritional biochemistry and physiology of ruminants. Feed chemistry, feed intake and principles of ration balancing. Theory of energy and protein metabolism. PREREQS: ANS 311 or ANS 313
ANS 512. MONOGASTRIC AND POULTRY
NUTRITION (3). Anatomical differences in digestive tracts of monogastrics; nutritional biochemistry of poultry; practical feeding of avian species; least-cost ration techniques; techniques for determining nutrient needs of monogastrics.
PREREQS: ANS 311 and ANS 313
ANS 515. REVIEW OF APPLIED RUMINANT NUTRITION RESEARCH TECHNIQUES (3). Review and discussion and applied techniques and methodology used for ruminant nutrition research.
ANS 530. EQUINE SYSTEMS I: EXERCISE
SCIENCE (4). Senior and graduate students intensively explore and apply science to real-life situations regarding cardiorespiratory, muscle physiology, and bone physiology responses to exercise, climate, and altitude. Lec/lab. PREREQS: ANS 314

ANS 531. EQUINE SYSTEMS II: NUTRITION (3). Senior and graduate students intensively explore and apply science to real-life situations regarding starch, fiber, protein, and fat metabolism in performance horses, breeding stock, and growing horses. PREREQS: ANS 313

## ANS 532. EQUINE SYSTEMS III:

REPRODUCTION (4). Designed for seniors and graduate students to explore the fundamentals of equine reproduction and their application in horse breeding. Includes practical training in laboratory techniques. Lec/lab. PREREQS: ANS 220 and ANS 316 and ANS 327

ANS 533. POULTRY MEAT PRODUCTION
SYSTEMS (3). Fundamental applications and
he analysis of management principles applied to brooding, rearing, feeding and housing meattype chickens and turkeys and their respective breeders. Decision case studies and practical management problems are incorporated into the course. Offered odd number years. PREREQS: ANS 217 and ANS 313 and ANS 316 and ANS 378 or instructor's approval
ANS 534. EGG PRODUCTION SYSTEMS (3). Applications and analyses of egg production systems for brooding, rearing, feeding and housing egg producing chickens. Decision case studies and practical management problems are incorporated into the course. Offered evennumbered years. PREREQS: ANS 217 and ANS 313 and ANS 316 and ANS 378 or instructor's approval
ANS 535. APPLIED ANIMAL BEHAVIOR (3).
Exploration of the fundamental processes of animal behavior and implications for animal management, production, housing and welfare. Examples provided in class will cover a range of species, with emphasis on domestic animals. Lec/ lab. PREREQS: ANS 314 and BI 350 or Z 350 or equivalent.

ANS 536. SHEEP PRODUCTION SYSTEMS (3).
Integration of nutrition, genetics, reproduction, behavior, and health principles into management systems for production and marketing of lamb and wool. PREREQS: ANS 216 and ANS 311 and ANS 316 and ANS 378

ANS 538. BIOLOGY OF LACTATION (3).
Physiological and environmental factors affecting mammary gland development and function. Offered alternate years. PREREQS: Z 431 or Z 531
ANS 539. DAIRY PRODUCTION SYSTEMS (4).
Fundamentals of nutrition, breeding, reproductive physiology and health programs and their applications in the care and management of dairy cattle. PREREQS: ANS 215 and ANS 313 and ANS 316 and ANS 378

ANS 540. DAIRY PRODUCTION SYSTEMS (3). Decision case analysis or special topics in application of dairy management principles. PREREQS: ANS 439
ANS 541. TOPICS IN ANIMAL LEARNING (3). Explore when and how the behavior of animals can be shaped by the environment, individual experiences, and interactions with other animals (including humans). PREREQS: BI 211 and BI 212 and junior standing. Recommended: ANS 435 or ANS 535 and (BI 350 or Z 350) and BI 213
ANS 543. BEEF PRODUCTION SYSTEMS:
COW/CALF (3). Fundamentals of nutrition, reproductive physiology and health programs and their applications in the care and management of beef cattle. Overnight field trip with extra fee charged. Lec/lab. Taught at EOU La Grande campus only. PREREQS: ANS 315 and ANS 313 and ANS 316 and ANS 378

ANS 544. BEEF PRODUCTION SYSTEMS: STOCKER/FEEDLOT (3). Continuation of the study of beef cattle management. Students will practice decision-making processes using area beef cattle operations as case studies. Overnight field trip with extra fee charged. Taught at EOU La Grande campus only. PREREQS: ANS 443 or ANS 543
ANS 545. BEEF PRODUCTION SYSTEMS (4). Students will be exposed to the fundamentals of nutrition, reproductive physiology, selection, health programs, and their applications in the care and management of beef cattle from conception through calving, weaning, stocker/back grounding and the feedlot. Students will practice decisionmaking processes using working case studies. Overnight field trip with extra fee charged. PREREQS: ANS 313 and ANS 316 and ANS 317 and ANS 378

ANS 552. LIVESTOCK HOUSING AND WASTE MANAGEMENT (3). Basics in where, how, and
why one would build, insulate, and ventilate livestock buildings. Manure and wastewater collection, treatment, storage, and utilization. Offered alternate years.

ANS 556. COMPANION ANIMAL PRODUCTION SYSTEMS (3). Fundamentals of dog and cat breeding stock selection, feeding and housing as well as biology and management from estrus through parturition to weaning. Due to the nature of this class, a variety of animals may be present during class session. Questions and interactions are encouraged but, while precautions are taken, any contact with animals carries some risk of injury or illness. PREREQS: (ANS 313 and ANS 316* and ANS 317* and ANS 378) and senior standing.
ANS 560. LIPID METABOLISM (3). Digestion, absorption and metabolism of lipids with emphasis on lipoprotein metabolism, regulation of lipid metabolism in various tissues and metabolism of eicosanoids. Offered alternate years. PREREQS: BB 452 and BB 492 or equivalent
ANS 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ANS 601. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANS 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
ANS 605. READING AND CONFERENCE (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ANS 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

ANS 607. GRADUATE SEMINAR (1). This course is repeatable for a maximum of 99 credits.

ANS 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

ANS 609. TEACHING PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

ANS 662. HORMONE ACTION (3). Mechanisms of action of peptide and steroid hormones and related compounds at the cellular level. Offered every other year, winter term. CROSSLISTED as BB 662, MCB 662. PREREQS: BB 551 [C] or BB 592 [C]

ANS 673. BIOLOGY OF MAMMALIAN
REPRODUCTION (4). Physiological,
neuroendocrine, endocrine and environmental
factors that regulate reproduction of mammals. Offered alternate years. PREREQS: ANS 316 or equivalent and BB 350

ANS 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## - RANGELAND ECOLOGY AND MAMAGEMENT COURSES

RNG 121. *INTRODUCTION TO WILDLAND ECOLOGY (4). Ecological principles will be applied to understand contemporary issues related to wildlands, specifically the rangeland biomes that comprises over 50\% of the Earthיs surface (FAO, SRM, USDA ERS). Topics to be covered fall into the following categories: Fundamentals of Ecology; Animals (wildlife \& livestock); Disturbance (e.g., invasive species, fire, mineral extraction, etc.); Ecosystem Goods \& Services (e.g., carbon sequestration, watersheds, biodiversity, recreation, etc.). The course will largely focus on U.S. wildlands, however a portion will examine the ecology and issues of international rangelands in Africa, Eurasia, Australia, and South America. (Bacc Core Course)

RNG 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

RNG 299H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

RNG 341. RANGELAND ECOLOGY AND MANAGEMENT (3). Nature and management of rangelands. Integrated land use with emphasis on plant-animal-soil interactions.
RNG 346. TOPICS IN WILDLAND FIRE (3). An interdisciplinary survey of concepts relating to fire science, ecology, management, and policy ncludes case studies of several representative ecosystems, ranging from west- and eastside forests of the Pacific Northwest to shrub steppe ecosystems of the Intermountain West and chaparral ecosystems of southern California. Distance and campus-based delivery using videos, website, and discussion. PREREQS: Course work in forest biology or ecology (e.g., FOR 240, FOR 341) or equivalent.

RNG 351. RANGE ECOLOGY I-GRASSLANDS (3). Principles and terminology of grassland ecology. Addresses the spatial-temporal dynamics of structure, function, and process in North American grassland ecosystems. Water, nutrient cycles and energy pathways are explored in context of the variable driving forces of climate (drought), herbivory, and fire. PREREQS: (BOT 313 [D-] and RNG 341 [D-] )

RNG 352. RANGE ECOLOGY II-SHRUBLANDS
(3). Introduces the ecology of shrublands using an autecological approach. Explores the effects of stressors such as temperature, drought, fire, and herbivory on plant morphology, physiology, reproduction, and growth. Covers life histories of common shrubs and descriptions of shrubland communities used to promote understanding of autecological principles. PREREQS: BOT 313 and RNG 341
RNG 353. WILDLAND PLANT IDENTIFICATION
(4). Students will learn how to identify approximately 100 plant species found in wildlands of North America and Mexico. Individual plant species ecology, basic plant anatomy and identification characteristics observable only through a microscope or dissecting scope, and how to use a dichotomous key for plant ID will also be covered.

RNG 355. DESERT WATERSHED
MANAGEMENT (3). A systems-based understanding of hydrologic processes in arid and semiarid landscapes. The class is focused on gaining knowledge of multiple ecological and hydrological interactions occurring in dryland watersheds and on discussing practical methodology aimed to enhance site productivity and ecosystem resilience. Emphasis is placed on land use effects on watershed function; monitoring of soil, water, and vegetation variables; and methods of rehabilitation of degraded landscapes. The course has a strong experiential learning component through a series of "hands-on" practicums and a field trip to a semiarid location in eastern Oregon. Lec/lab.

RNG 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

RNG 403. SENIOR THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

RNG 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
RNG 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
RNG 411. ADVANCED PLANT ID (2). Advanced rangeland plant taxonomy. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

RNG 421. WILDLAND RESTORATION AND ECOLOGY (4). Emphasis is placed on understanding the ecology of arid and semi-arid ecosystems through the study of ecological processes responsible for ecosystem function.
Range improvement practices for stabilizing and repairing degraded wildlands by directing autogenic recovery mechanisms are discussed.

This involves manipulating plants, soil, animals and microenvironments for improved ecosystem function. PREREQS: Course work in soils and ecology. Field trip required.
RNG 430. APPLIED GIS IN RANGELAND SCIENCE (4). Introducing the use of GIS and geospatial information (remote sensing for GIS, GPS, landscape ecology, and cartography principles) in rangeland sciences problem solving and analysis PREREQS: GEO 365 [D-] or GEOG 360 [D-]
RNG 436. WILDLAND FIRE SCIENCE AND MANAGEMENT (4). Principles and applications of fire as a natural resource management tool, the role of fire in conservation management, restoration, and preservation of ecosystems Covers basic techniques and current research used to describe fire behavior and spread, fuels and fuel manipulation, and fire effects on the biota. Focus will be on fire as a natural process in ecosystem dynamics. Lec/lab.

## RNG 441. RANGELAND ANALYSIS (4).

Techniques used to describe vegetation in shrub-lands, grasslands, and forests. Use of measurements in resource management. Course is field-oriented, emphasizing both theory and practice of wildland inventory methods. PREREQS: ST 351 or ST 351H

RNG 442. RANGELAND-ANIMAL RELATIONS (4). Domestic and wild animal use of rangelands as related to environmental factors, palatability, food habits, nutrition, physiography, and their effects on management of rangeland-animal resources.

RNG 455. RIPARIAN ECOHYDROLOGY AND MANAGEMENT (4). A systems approach to study ecological and hydrological relationships occurring in riparian ecosystems. The class is focused on gaining knowledge of multiple connections between soil, water, and terrestrial vegetation occurring in riparian systems. Emphasis is placed on land use effects on the riparian ecologic and hydrologic function, methods of rehabilitation, and theories of the proper use of riparian ecosystems under a multiple-use philosophy (i.e., fish, wildlife, livestock, aesthetics, recreation, and silviculture). PREREQS: RNG 355 [D-]
RNG 470. PASTORAL SYSTEMS OF THE WORLD (4). Description and evaluation of ecosystems which support grazing animals and pastoralists. Biology, ecology and management of these landscapes will be explored through climate, soils, and plant communities and humanlivestock interactions. The historic role of trade and contemporary challenges to the ecological, social and economic sustainability of pastoral systems will be examined.

RNG 477. *AGROFORESTRY (3). Theory and worldwide practice of multiple-crop low input sustainable systems involving concurrent production of tree and agricultural products. Biological, economic, social, and political factors that underlie the application of agroforestry technology. CROSSLISTED as FES 477/FES 577, NR 477. (Bacc Core Course) PREREQS: Introductory course in biology.
RNG 490. RANGELAND MANAGEMENT
PLANNING (4). Administration and management of rangelands; planning processes involving goal setting, inventories, personnel management, environment, conflict resolution, and other constraints necessary for decision-making. Use of data collected from field problems to support the execution of class plans. Field trip required. Lec/lab.

RNG 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

RNG 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.

RNG 503. MASTER׳S THESIS (1-16). This course is repeatable for a maximum of 999 credits.

RNG 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

RNG 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

RNG 507. SEMINAR (1-2). This course is repeatable for a maximum of 16 credits.
RNG 521. WILDLAND RESTORATION
AND ECOLOGY (4). Emphasis is placed on understanding the ecology of arid and semi-arid ecosystems through the study of ecological processes responsible for ecosystem function Range improvement practices for stabilizing and repairing degraded wildlands by directing autogenic recovery mechanisms are discussed. This involves manipulating plants, soil, animals and microenvironments for improved ecosystem function.

RNG 541. RANGELAND ANALYSIS (4).
Techniques used to describe vegetation in shrub-lands, grasslands, and forests. Use of measurements in resource management. Course is field-oriented, emphasizing both theory and practice of wildland inventory methods. PREREQS: ST 351

RNG 542. RANGELAND-ANIMAL RELATIONS (4). Domestic and wild animal use of rangelands as related to environmental factors, palatability, food habits, nutrition, physiography, and their effects on management of rangeland-animal resources. PREREQS: RNG 341

RNG 555. RIPARIAN ECOHYDROLOGY AND MANAGEMENT (4). A systems approach to study ecological and hydrological relationships occurring in riparian ecosystems. The class is focused on gaining knowledge of multiple connections between soil, water, and terrestrial vegetation occurring in riparian systems. Emphasis is placed on land use effects on the riparian ecologic and hydrologic function, methods of rehabilitation, and theories of the proper use of riparian ecosystems under a multiple-use philosophy (i.e., fish, wildlife, livestock, aesthetics, recreation, and silviculture). PREREQS: RNG 355

RNG 577. AGROFORESTRY (3). Theory and worldwide practice of multiple-crop low input sustainable systems involving concurrent production of tree and agricultural products. Biological, economic, social, and political factors that underlie the application of agroforestry technology. CROSSLISTED as FES 477/FES 577, NR 477. PREREQS: Introductory course in biology.
RNG 590. RANGELAND MANAGEMENT
PLANNING (4). Administration and management of rangelands; planning processes involving goal setting, inventories, personnel management, environment, conflict resolution, and other constraints necessary for decision-making. Use of data collected from field problems to support the execution of class plans. Field trip required. Lec/lab.

RNG 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

RNG 601. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.
RNG 603. PH.D. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
RNG 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
RNG 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

RNG 607. SEMINAR (1-2). This course is repeatable for a maximum of 16 credits.

RNG 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

## RNG 643. WILDLAND PLANT

ECOPHYSIOLOGY (4). Emphasizes the physiological ecology of plants living in arid and semi-arid ecosystems. Primary class emphasis will include photosynthesis, respiration, water stress and water use efficiency, stable isotopes, root structure and function, nutrient uptake and stress, and defoliation. Offered every other winter, odd years.
RNG 661. AGRICULTURAL RESEARCH
PERSPECTIVES (3). Planning and managing agricultural research projects, publishing research results, professional ethics, interactions of science, scientists, and society. Offered on alternate years.

## RNG 662. RANGELAND ECOLOGY (3).

 Studies ecological theory and related resource management implications in rangelands and arid wildlands. Topics include the history and development of rangeland ecology, plant demography, invasive species, plant population dynamics, disturbance theory, succession, vegetation classification and range condition assessments. Offered every other winter, even years. PREREQS: A course in basic ecology recommended.RNG 670. ECOLOGICAL INVASIVE PLANT MANAGEMENT (2). Logic of ecologically based invasive plant management. Ecological processes of invasion. Management of plant succession with emphasis on augmentive restoration. Adaptive management of weed invasions into natural ecosystems. Development of ecologically based management plans for natural ecosystems. Offered odd-numbered years only.
RNG 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## APPLIED ECONOMIGS

## Applied Economics

Larry Lev, Interim Department Head 213 Ballard Extension Hall
Oregon State University
Corvallis, OR 97331-3601
541-737-2942
Applied Economics Website: http://agsci. oregonstate.edu/appliedecon

## Applied Economics Graduate Program

Christian Langpap, Director
213 Ballard Extension Hall
Oregon State University
Corvallis, OR 97331-3601
541-737-1473
Applied Economics Graduate Program Website: http://agsci.oregonstate.edu/ applied-economics/aecgradprogram Applied Economics Graduate Program Email: applied.economics@oregonstate. edu

## FACULTY

Professors Antle, Boggess, Capalbo, Färe, Jaeger, Lev, Lewis, Seavert, Sylvia, Wu Associate Professors Chen, Diebel,
Durham, Langpap, Reimer, Riggs, Sterns Assistant Professors Dundas, Kling, Melesse, Streletskaya
Assistant Professors (Sr.
Researchers) Bell, Cross, Valdivia
Instructors Brekken, Egelkraut, Fisher, Fleming, Gow, Kerkvliet, King, Olen, Rahe

Senior Research Assistant Houston
Faculty Research Assistant Olen
Research Associate Brekken
Professional Faculty Radke, Richardson, Sandler
Adjunct Faculty D. Adams, Bernell, Elston, Landkamer
Courtesy Faculty Albers, Barkley, Barnhart, Doring, Kilkenny, Papenfus, Plantinga, Whittaker

## Affiliate Faculty Gwin

## AEC GRADUATE FACULTY

The Applied Economics Graduate Program currently has 41 faculty members, drawn from three departments and two schools in five colleges.

Albers, Alig, Antle, Bell, Bernell, Boggess, Buccola, Capalbo, Chen, Chi, Cross, Diebel, Dundas, Durham, Eleveld, Färe, Fisher, Harte, Jaeger, Kerkvliet, Kline, Kling, Langpap, Lev, Lewis, Maness, McMullen, Melesse, Meng, Montgomery, Plantinga, Pugatch, Reimer, Rosenberger, L. Schroeder, Seavert, Sessions, Sterns, Streletskaya, Sylvia, Weber, Wu, Yoon.

## Undergraduate Majors

Agricultural Business Management (BS, HBS)
Environmental Economics and Policy (BS, HBS)

## Minors

Agricultural Business Management
Food Economics and Policy
Natural Resource and Environmental Law and Policy
Resource Economics (Also available via Ecampus.)

## Graduate Major

Applied Economics (MA, MAIS, MS, PhD)

## Graduate Areas of Concentration

Resource and Environmental Economics
Trade and Development
Public Health Economics
Transportation Economics (MA/MS only)

## Graduate Minors

Applied Economics
International Agricultural Development
The Department of Applied Economics offers the Bachelor of Science degree in Agricultural Business Management and the Bachelor of Science degree in Environmental Economics and Policy. These degrees open doors to exciting careers in the traditional areas of commercial agriculture, agricultural business management, and agricultural policy, and in the newer career areas of natural resource and environmental management, marine resources, international trade and development, rural growth and change, and environmental and resource law.

The Agricultural Business Management (ABM) major prepares students for unique challenges and opportunities in agricultural business careers. It combines economic and business principles and their application to farms and ranches, companies processing and marketing farm products, and companies supplying goods and services to farmers and other businesses. The curriculum combines skills in marketing, business management, accounting, and economic analysis with a minor appropriate to a student's professional goals and interests.

## CAREER OPPORTUNITIES FOR UNDERGRADUATES

Graduates may pursue a number of attractive career opportunities. Agricultural Business Management (ABM) majors may move directly into professional jobs with agribusiness firms, financial and insurance institutions, or manage their own agribusinesses. Opportunities also exist for ABM majors to pursue graduate studies in food and agricultural management, agricultural cooperatives, and sustainable development. Environmental Economics and Policy (EEP) students can serve effectively as members of interdisciplinary teams involved in resource and environmental management, planning, and policy analysis. Government job opportunities include management, planning, and analysis positions with federal, state, and local government agencies. Private company opportunities include similar positions with utility companies, banks, consulting firms, and resource management companies. The EEP degree also provides an excellent foundation for graduate work in economics, as well as law, public policy, and urban planning.

## APPLIED ECONOMICS GRADUATE PROGRAM

The Applied Economics Graduate Program offers the MA, MS, and PhD degrees in Applied Economics. Graduates pursue academic, analytical, and policy careers in universities, consulting, trade associations, firms, and government. Core course work consists of microeconomic theory, econometrics, and other quantitative methods. Field (concentration) and elective courses include natural resources and the environment, energy, trade, economic development, marine and coastal resources, transportation, and health care. Program emphasis is on applications to real-world settings, institutions, and problems. Faculty are in the Applied Economics Department; the Colleges of Forestry, Agricultural Sciences, and Liberal Arts; the College of Earth, Ocean, and Atmospheric Sciences; and the School of Public Health and Human Sciences.

## UNDERGRADUATE MAJORS WITH OPTIONS

## AGRICULTURAL BUSINESS

MANAGEMENT (BS, HBS)
The BS in Agricultural Business Management (ABM) degree curriculum blends course work in agricultural economics, business, agricultural sciences, computer science, arts, and humanities so that graduates can respond to the unique challenges and opportunities in agribusiness vocations.

All ABM students must select a minor (minimum of 27 credits) appropriate to their professional goals and interests. An internship or project is required to integrate course work with business-oriented experiences.
AEC 211. Management in Agriculture (4)
AEC 221. Marketing in Agriculture (3)
AEC 250. *Introduction to Environmental Economics and Policy (3)
or ECON 201. *Introduction to
Microeconomics (4)
BA 211. Financial Accounting (4)
BA 213. Managerial Accounting (4)
ECON 202. *Introduction to
Macroeconomics (4)
MTH 111. *College Algebra (4)
MTH 241. *Calculus for Management and Social Science (4)
ST 351. Introduction to Statistical Methods (4)

WR 121. *English Composition (3)
WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)
Note: Students must receive a C- or above in the courses above. If a student receives below a " $\mathrm{C}-$ " he or she must retake the course.

## BS Degree Requirements (180)

Baccalaureate Core (48)
Applied Economics Core Courses
AEC 121. Discovering Agricultural and Resource Economics (1)
AEC 211. Management in Agriculture (4)
AEC 221. Marketing in Agriculture (3)
AEC 250. *Introduction to Environmental Economics and Policy (3)
or ECON 201. *Introduction to
Microeconomics (4)
AEC 300. Applied Economic Analysis (3)
AEC 406. Projects (6)
or AEC 410. Internship (6)
AEC 442. Agricultural Business Management (4)
AEC 461. ${ }^{\wedge}$ Agricultural and Food Policy Issues (4)
AEC 465. Agricultural and Food Financial Management (3)

## Quantitative Courses

Choose two courses from the following list:
AEC 447. Agricultural Price and Market Analysis (4)
ECON 424. Introduction to Econometrics (4)

ST 352. Introduction to Statistical Methods (4)

## Upper-Division Business Courses

Choose two from the following list:
BA 347. International Business (4)
BA 351. Managing Organizations (4)
BA 390. Marketing (4)
BA 463. Family Business Management (4)
FIN 441. Financial Institutions (4)
MRTK 492. Consumer Behavior (4)
MRKT 493. Advertising Management (4)
MRKT 495. Retail Management (4)
MRKT 497. Global Marketing (4)
Choose a minimum of 12 credits
from upper-division AEC or ECON courses or others as approved by advisor.

## Business Administration

BA 211. Financial Accounting (4)
BA 213. Managerial Accounting (4)
BA 233. Legal Environment of Business (2)
BA 360. Introduction to Financial Management (4)

## Computers and Technology

Choose one course from below:
AG 111. Information Technology in Agriculture (3)
CS 101. Computers: Applications and Implications (4)

## Social Sciences

ECON 202. *Introduction to Macroeconomics (4)

## Communications

WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## Mathematics

MTH 111. *College Algebra (4)
MTH 241. *Calculus for Management and Social Science (4)

## Statistics

ST 351. Introduction to Statistical Methods (4)

Required Minor (27)
Appropriate to student's professional goals and interests.

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: 104

ENVIRONMENTAL ECONOMICS AND POLICY (BS, HBS)
Also available via Ecampus.
The BS degree in Environmental Economics and Policy focuses on the development of strong economic and statistical skills and their use in the analysis while providing flexibility to incorporate interests in the biological, physical or social sciences. They also will focus on course work in environmental sciences, political sciences, and related subject areas with a greater focus on the socioeconomic dimensions of environmental sciences.

## Grade Requirements

All EEP majors must complete the core list of courses with a grade of C - or higher.

## Core Requirements

A grade of C-or higher must be earned in all core requirements.
AEC 250. *Introduction to Environment. Economics and Policy (3) or ECON 201. *Introduction to Microeconomics (4)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 311. Intermediate Applied Economics
I: Producers and Consumers (4)
AEC 313. Intermediate Applied Economics
II: Markets, Welfare \& Policy (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 432. Environmental Law (4)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ECON 202. *Introduction to Macroeconomics (4)
Upper-Division Electives
Choose 5 or more from the list below; two must be AEC courses:
AEC 310. Exploring Experiential Learning
Opportunities (2)
AEC 388. Agricultural Law (4)
AEC 444. Commodity Futures and Options Market (4)
AEC 447. Agricultural Price and Market Analysis (4)
AEC 448. Advanced Topics in Environmental and Resource Economics (3)

AEC 452. Marine Economics (3)
AEC 454. Rural Development Economics and Policy (3)
ECON 411. Advanced Microeconomic Theory (4)
ECON 423. Econometrics I (4)
ECON 424. Introduction to Econometrics (4)

ECON 427. Econometrics II (4)
ECON 435. Public Economics (4)
ECON 439. ^Public Policy Analysis (4)
ECON 461. Law, Economics, and Regulation (4)

ECON 466. ^Economics of Traditional and Renewable Energy (4)
FOR 330. Forest Resource Economics I (4)
FOR 331. Forest Resource Economics II (4)
FOR 462. Natural Resource Policy and Law (3)

PS 475. Environmental Politics and Policy (4)

PS 476. *Science and Politics (4)
PS 477. International Environmental Politics and Policy (4)

## Experiential Learning

Select from one of the areas below:
AEC 401. Research and Scholarship (2-6)
AEC 406. Projects [Development, Analysis or Service Project] (2-6)
AEC 410. Internship (2-6)

## Computer Course (3-4 credits)

AG 111. Information Technology in Agriculture (3)
or CS 101. Computer Applications and Implications (4)

## GIS Course (3-4 credits)

FW 303. Survey of Geographic Information

Systems in Natural Resource (3)
or GEO 365. Introduction to Geographic Information Systems (4) or GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
or HORT 414. Precision Agriculture (4)

## Mathematics (8 credits)

Must earn a grade of $C$ - or higher.
MTH 111. *College Algebra (4)
MTH 241. *Calculus for Management and Social Science (4)
or MTH 251. *Differential Calculus (4)

## Statistics (8 credits)

ST 351. Introduction to Statistical Methods (4) Must earn a grade of $\mathbf{C}$ - or higher.
ST 352. Introduction to Statistical Methods (4)

## Additional Writing Course (3

## credits)

Must earn a grade of $C$ - or higher.
WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course (WIC)
Major Code: 237
UNDERGRADUATE MINORS


## AGRICULTURAL BUSINESS MANAGEMENT MINOR

## Also available via Ecampus.

The Agricultural Business Management minor offers students an opportunity to expand their skill sets and business acumen as they prepare for careers in production agricultural and related industries. This minor emphasizes the development of general skills in business administration and economic analysis relevant to the operations of farms, ranches, nurseries and the businesses that provide inputs, services and market outlets for them. The Agricultural Business Management minor is available to students who are not pursuing the ABM major. Business Administration majors planning to minor in Agricultural Business Management must see both a College of Business advisor and a Department of Applied Economics advisor to discuss certain course restrictions in the minor. Business majors must choose alternate courses to replace the credits that are also in the Business Administration major.

Each minor in the Applied Economics Department is created to provide students within and outside the discipline the opportunity to study a secondary area. Each minor requires 27 credits of course work in addition to the student's major. At least 12 of the 27 credits must be upper division. No credits counted toward the minor can be courses also counted toward the student's major.

- Agricultural Business Management
(ABM) majors may not elect to
complete an Agricultural Business Management.
- Environmental Economics and Policy (EEP) majors may not elect to complete a Resource Economics or Natural Resource and Environmental Law and Policy minor.


## Required Courses (14-15 credits)

AEC 211. Agricultural and Food
Management (4)
AEC 221. Agricultural and Food Marketing (3)
AEC 250. *Introduction to Environmental
Economics and Policy (3)
or AEC 251. *Introduction to Agricultural and Food Economics (3)
or ECON 201. *Introduction to
Microeconomics (4)
AEC 311. Intermediate Applied Economics
I: Producers and Consumers (4)
Students will work with the academic advisor in the Department of Applied Economics to select additional courses for a total of 27 credits.
Total $=27$
Footnote:

* Baccalaureate Core Course (BCC)


## Minor Code: 104

## FOOD ECONOMICS AND POLICY MINOR

The Food Economics and Policy minor offers students an opportunity to expand their understanding of the economic and political foundations of contemporary agricultural and food systems. This minor emphasizes the complexity and interconnectedness of consumer demand and the food system's ability to supply agricultural and food products that meet this demand.

The Food Economics and Policy minor is available to all OSU students except for those who are pursuing the Agricultural Business Management (ABM) major.

Each minor in the Applied Economics Department is created to provide students within and outside the discipline the opportunity to study a secondary area. Each minor requires 27 credits of course work in addition to the student's major. At least 12 of the 27 credits must be upper division. No credits counted toward the minor can be courses also counted toward the student's major.

## Required Courses ( 15 credits)

AEC 311. Intermediate Applied Economics
I: Producers and Consumers (4)
AEC 440. The Economics of Business
Organization in the Food System (4)
AEC 466. Agricultural and Food Marketing Management (4)
AGRI 411. *Introduction to Food Systems: Local to Global (3)
Students will work with the academic
advisor in the Department of Applied
Economics to select additional courses for a total of 27 credits.

## Footnote:

* Baccalaureate Core Course (BCC)

Minor Code: 790

## NATURAL RESOURCE AND ENVIRONMENTAL LAW AND <br> POLICY MINOR

The Natural Resource and Environmental Law and Policy minor is available to students who are not pursuing the EEP major.

Each minor in the Applied Economics Department is created to provide students within and outside the discipline the opportunity to study a secondary area. Each minor requires 27 credits of course work in addition to the student's major. At least 12 of the 27 credits must be upper division. No credits counted toward the minor can be courses also counted toward the student's major.

- Agricultural Business Management (ABM) majors may not elect to complete an Agricultural Business Management minor.
- Environmental Economics and Policy (EEP) majors may not elect to complete a Resource Economics or Natural Resource and Environmental Law and Policy minor.


## Required Courses (12 credits)

AEC 253. *Environmental Law, Policy and Economics (4)
AEC 388. Agricultural Law (4)
AEC 432. Environmental Law (4)
Students will work with the academic advisor in the Department of Applied Economics to select additional courses for a total of 27 credits.
Footnote:

* Baccalaureate Core Course (BCC)


## Minor Code: 670

## RESOURCE ECONOMICS MINOR

## Also available via Ecampus.

The Resource Economics minor is available to students who are not pursuing the EEP major.

Each minor in the Applied Economics Department is created to provide students within and outside the discipline the opportunity to study a secondary area. Each minor requires 27 credits of course work in addition to the student's major. At least 12 of the 27 credits must be upper division. No credits counted toward the minor can be courses also counted toward the student's major.

- Agricultural Business Management (ABM) majors may not elect to complete an Agricultural Business Management minor.
- Environmental Economics and Policy (EEP) majors may not elect to complete a Resource Economics or Natural Resource and Environmental Law and Policy minor.


## Required Courses (16-17 credits) <br> AEC 250. *Introduction To Environmental

Economics and Policy (3)
or ECON 201. *Introduction to
Microeconomics (4)
AEC 311. Intermediate Applied Economics

1: Producers and Consumers (4)
AEC 313. Intermediate Applied Economics
II: Markets, Welfare \& Policy (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
ECON 202. *Introduction to
Macroeconomics (4)
Students will work with the academic advisor in the Department of Applied Economics to select additional courses for a total of 27 credits.

## Total=27

Footnote:

* Baccalaureate Core Course (BCC)

Minor Code: 103

## GRADUATE MAJORS

## APPLIED ECONOMICS (MA, MS,

 PhD, MAIS)Graduate Areas of Concentration
Resource and environmental economics, trade and development, public health economics, and transportation economics (MA, MS only)
The Applied Economics Graduate Program provides students with a strong foundation in economic theory, and quantitative methods while preserving sufficient flexibility to specialize in their areas of interest. The core curriculum includes courses in microeconomic and macroeconomic theory, in quantitative methods, and includes a set of qualifying examinations. Additional course work is required in the areas of concentration, which include: research and environmental economics, trade and development, public health economics, transportation economics, and an open area of concentration. The open area can accommodate students' interests in applied economic policy, sustainable development, food and climate policy, and marine issues. The hallmark of the Applied Economics Graduate Program is the training of students to understand and utilize economic theories, principles, and methods to examine real-world problems with significant attention to data, institutions, and context.

Since faculty from across campus are members of the graduate faculty in Applied Economics and are potential research advisors, the Applied Economics Graduate Program allows students to work with faculty who most closely match their interests.

These faculty reside in many academic departments at Oregon State University, including the Department of Applied Economics, the School of Public Policy, the Department of Forest Ecosystems and Society, the Department of Forest Resources, Engineering and Management, and the College of Public Health and Human Sciences. Many students are
supported by graduate teaching or graduate research assistantships. The Graduate School website also provides information related to financing your graduate education.

For detailed information on the Applied Economics Graduate Program, please review the web page at http:// appliedecon.oregonstate.edu/appliedeconomics/aecgradprogram or contact Dr. Christian Langpap, Director of Admissions, Applied Economics Graduate Program, 213 Ballard Extension Hall, OSU, Corvallis, OR 97331 or phone: 541-737-1473, or email: applied.economics@ oregonstate.edu.
Major Code: 1290

## GRADUATE MINORS

## APPLIED ECONOMICS GRADUATE MINOR

For detailed information on the Applied Economics Graduate Program, please review the web page at http://appliede-con.oregonstate.edu/applied-economics/ aecgradprogram or contact Dr. Christian Langpap, Director of Admissions, Applied Economics Graduate Program, 213 Ballard Extension Hall, OSU, Corvallis, OR 97331 or phone:541-737-1473, or email: applied.economics@oregonstate.edu.
Minor Code: 1290

## INTERNATIONAL AGRICULTURAL DEVELOPMENT GRADUATE MINOR

## Requirements

AG 521. Leadership Development (3)
Language competency
Technical electives in agriculture ( 5 for
master's, 9 for doctorate)
Social, cultural and economic electives (5)
Minimum of 21 credits for master's, 25 for doctorate.
Note: The graduate minor in International Agricultural Development is not available to students who took the undergraduate minor in Comparative International Agriculture at Oregon State University.

## Minor Code: 1070

## RURAL STUDIES GRADUATE <br> \section*{MINOR}

Rural communities-both in the U.S. and globally-face an extraordinarily complex set of challenges due to sparse settlements and geographic isolation, exacerbated by globalization and technological change in an interdependent urban-rural system. Addressing these challenges requires both the theoretical insights of multiple disciplines and the practical wisdom that derives from engagement in solving actual problems in rural places. Emerging approaches to the study of rural people and places offer opportunities to examine rural issues from the perspec-
tive of multiple disciplines and diverse research methods that can capture the complexities at the intersections of place and space. Yet graduate training programs in these new approaches to rural studies are scarce.
Offered through campus and fieldbased experiential education, the graduate minor in Rural Studies provides students with the skills and competencies needed to understand economic, social, political and cultural dynamics of rural places.

The Rural Studies minor complements and supports other programs at OSU including the Master of Public Policy's concentration in rural policy and other graduate programs where students and faculty engage in rural issues such as applied economics, anthropology, forest ecosystems and society, geosciences, and human development and family sciences.

## Required Core (7 credits)

RS 511, RS 611 X . Communities and Natural Resources (5) [Pending submission and approval of curriculum proposal.]
RS 512. Introduction to Rural Studies (2)
RS 513. Contemporary Rural Issues (2)
Electives (Minimum 11 credits)
AEC 554. Rural Development Economics and Policy (3)
ANTH 571. Cash, Class and Culture: Hunter-Gatherers to Capitalism (4)
ANTH 581. Natural Resources and
Community Values (4)
ANTH 582. Anthropology of International Development (3)
ANTH 584. Wealth and Poverty (3)
ANTH 586. Anthropology of Food (4)
ANTH 599. Special Topics: Ethnographic
Field School 1-16
ANTH 599. Special Topics: Rural Anthropology (3)
ENG 582. Studies in American Literature, Culture, and the Environment (3)
ES 544. Native American Law: Tribes, Treaties, and the United States (4)
ES/PHL 548. Native American Philosophies (4)

GEO 520. Resilience-Based Natural Resource Management (3)
or GEOG 530. Resilience-Based Natural Resource Management (3)
GEO 523/GEOG 550. Land Use in the American West (3)
GEO 526/GEOG 531. Global Resources and Development (3)
GEOG 551. Planning Principles and
Practices for Resilient Communities (3)
H 520. Health Disparities (3)
HDFS 547. Families and Poverty (3)
PS 575. Environmental Politics and Policy (4)
RS 502. Independent Study (1-16)
SNR 520. Social Aspects of Sustainable
Natural Resources (3) Ecampus only.
SOC 526. Social Inequality (4)
SOC 554. Leisure and Culture (4)
SOC 556. Science and Technology in a
Social Context (4)
SOC 560. Comparative Societies (4)

SOC 566. International Development: Gender Issues (4)
SOC 575. Rural Sociology (4)
SOC 580. Environmental Sociology (4)
SOC 581. Society and Natural Resources (4)

## Total=18 credits

Minor Code: 1080
■ APPLIED ECONOMICS COURSES
AEC 121. DISCOVERING AGRICULTURAL AND RESOURCE ECONOMICS (1). Explore issues, opportunities, and challenges in the dynamic and diverse employment field of agricultural and resource economics. PREREQS: Freshman or sophomore standing and/or interest in exploring a new major or minor in either Agricultural Business Management or Environmental Economics and Policy.
AEC 199. SPECIAL TOPICS (1-4). Targeted courses that focus on specific topics in agricultural and resource economics. Topics may vary from term to term and from year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 8 credits.

## AEC 211. AGRICULTURAL AND FOOD

MANAGEMENT (4). Economic and business principles applied to the management of firms in agricultural and food industries, including farms, ranches and nurseries, agricultural input suppliers, packers, shippers, processors and food manufacturers and distributors; firm-level goal setting, information management and financial analysis. PREREQS: AEC 250 [C-] or AEC 251 [C-] or AREC 250 [C-] or ECON 201 [C-] or ECON 201H [C-]

## AEC 221. AGRICULTURAL AND FOOD

MARKETING (3). Organization and functions of agricultural and food markets both domestic and international; market channels and supply chains for various agricultural commodities and food products; role of agribusiness, cooperatives, and government in marketing decisions. PREREQS: AEC 250 [D-] or AEC 251 [D-] or AREC 250 [D-] or ECON 201 [D-] or ECON 201H [D-]

## AEC 240. *RURAL ECONOMICS OF PLACE

 AND PEOPLE (3). Provides perspective on issues influencing rural communities and economic development in rural America. People, places and natural resources of rural communities play a vital role in economic vitality of the West, yet rural landscapes are changing faster than many urban counterparts. (Bacc Core Course)
## AEC 250. *INTRODUCTION TO

ENVIRONMENTAL ECONOMICS AND POLICY
(3). Examines how economic forces and social institutions cause environmental degradation and help build management solutions. Explains key economic concepts for valuing environmental resources and evaluating the trade-offs of alternative management approaches from private markets to regulation. Applies the concepts and theories to topical environmental issues such as water pollution and conserving biodiversity. (Bacc Core Course) PREREQS: MTH 111 or equivalent is recommended.
AEC 251. *INTRODUCTION TO AGRICULTURAL AND FOOD ECONOMICS (3). An introductory applied microeconomics course focused on the unique challenges of agricultural and food systems. Topics include rational choice theory, models of supply and demand, and price formation, with particular attention on markets for agricultural and food products. Additional topics include market interdependencies, government policy, the behavior of firms, and market structure within agricultural and food systems. (Bacc Core Course) PREREQS: MTH 111 or equivalent is recommended.
AEC 253. *ENVIRONMENTAL LAW, POLICY, AND ECONOMICS (4). A general introduction to
federal environmental law and policy in the U.S. Familiarizes students with basic legal institutions and concepts of the American legal system, outlines the transition of environmental policy from its common law roots to its modern administrative law form, and gives an overview of the major federal environmental statutes. Relationships among legal theory and process and economic principles are emphasized. (Bacc Core Course)
AEC 299. SPECIAL TOPICS (1-4). Targeted courses that focus on specific topics in agricultural and resource economics. Topics may vary from term to term and from year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 8 credits.

## AEC 310. EXPLORING EXPERIENTIAL

 LEARNING OPPORTUNITIES (2). Provides background and preparation for students' experiential learning (EL) activities. Students will be shown examples of appropriate EL, how to find and compete for opportunities, and how to establish and define their learning objectives for EL. Resume writing, appropriate conduct in the workplace, as well as writing and oral presentation skills will be covered. A proposal for an EL activity will be prepared and presented to classmates. Graded P/N. PREREQS: WR 121, sophomore standing, or Applied Economics advisor approval.
## AEC 311. INTERMEDIATE APPLIED

ECONOMICS I: PRODUCERS AND
CONSUMERS (4). An examination of the theories of consumer behavior and demand, production cost, the firm, supply, and competitive and monopoly market structures. PREREQS: (AEC 250 [C-] or AREC 250 [C-] or ECON 201 [C-] or ECON 201H [C-] ) and (MTH 241 [C-] or MTH 251 [C-] or MTH 251H [C-] )
AEC 313. INTERMEDIATE APPLIED ECONOMICS II: MARKETS, WELFARE \& POLICY (4). Complementing the private-decision focus in AEC 311, the present course focuses on the intermediate microeconomic theory of social welfare and public decision-making. Topics include exchange, monopoly, game theory, social welfare, externalities, public goods and choice, asymmetric information, uncertainty, and costbenefit analysis. Substantial attention will be given to the implications of these theories for real-world problems, especially regarding resource and environmental issues. PREREQS: MTH 241 [C-] or (AEC 311 [C-] or AREC 311 [D-] or ECON 311 [C-])
AEC 351. *NATURAL RESOURCE ECONOMICS AND POLICY (3). Application of principles of economics to identify the causes, consequences, and ways of dealing with natural resource problems, including problems associated with fisheries, forests, water resources, and land. Conceptual topics and policy applications. Emphasis is on developing students, skill in applying an economic way of thinking about natural resource management. (Bacc Core Course) PREREQS: (AEC 250 [D-] or AREC 250 [D-] or ECON 201 [D-] or ECON 201H [D-] ) and MTH 111
AEC 352. *ENVIRONMENTAL ECONOMICS
AND POLICY (3). Provides an overview of the interrelationships between economic activity, the environment, and public policy. Through case studies, discussion groups, readings, and group activities, students learn how economists define and analyze environmental problems and the types of policies they advocate for managing environmental quality. CROSSLISTED as ECON 352. (Bacc Core Course) PREREQS: AEC 250 [D-] or AREC 250 [D-] or ECON 201 [D-] or ECON 201H [D-]
AEC 353. *INTRODUCTION TO COASTAL AND MARINE RESOURCE ECONOMICS (3). Introduces tools of economic analysis for understanding coastal and marine resource management. Surveys a selection of current topics in the field, emphasizing innovation in production and stewardship, institutions, and sustainability. (Bacc Core Course) PREREQS: MTH 111 [C-]
and (AEC 250 [C-] or AREC 250 [C-] or ECON 201 [C-] or ECON 201H [C-] )
AEC 371. TOPICS IN GLOBALIZATION (1). Surveys current economic issues associated with globalization.
AEC 372. AGRICULTURAL COOPERATIVES (3).
An introduction to and in-depth examination of the agricultural cooperative. Students will gain a working knowledge of the concepts, principles, and terminology of agricultural cooperatives through reference materials, lectures, presentations by guest speakers and a cooperatives tour. Students will consider the strengths and weaknesses of the agricultural cooperative as well as the unique management and operational challenges inherent to this form of business operation. PREREQS: AEC 211 [D-] or AREC 211 [D-]
AEC 388. AGRICULTURAL LAW (4). Application of legal principles to business decision making in farming, ranching, and the agricultural support industry. Consideration of the obligations arising out of contract, tort, property, water, public land, and natural resource law.
AEC 399. SPECIAL TOPICS (1-4). Targeted courses that focus on specific topics in agricultural and resource economics. Topics may vary from term to term and from year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 8 credits.
AEC 399H. SPECIAL TOPICS (1-4). Targeted courses that focus on specific topics in agricultural and resource economics. Topics may vary from term to term and from year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 8 credits. PREREQS: Honors College approval required.
AEC 401. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
AEC 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

AEC 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Senior standing, departmental approval required.
AEC 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
AEC 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

AEC 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
AEC 407H. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
AEC 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
AEC 410. INTERNSHIP (1-6). Practical on-thejob training in agricultural business, marketing, commercial agricultural production, or related private or public organizations. Graded P/N. This course is repeatable for a maximum of 6 credits. PREREQS: Junior or senior standing. Submission and approval of pre-internship work plans. Internship program coordinator approval required.
AEC 421. ECONOMICS OF RURAL POVERTY AND THE U.S. SOCIAL SAFETY NET (4).
Examines the geography of poverty in the United States and the "social safety net" that the U.S. has constructed to reduce poverty and its negative effects. Understand the geographical consequences of federal policies and the challenges of providing social safety net programs in rural areas. CROSSLISTED as RS 421.

AEC 432. ENVIRONMENTAL LAW (4). Legal relationships arising out of rights to air, water, and land. The impact of federal and state regulation on pollution control and on the production, use, and disposal of hazardous materials. PREREQS: Junior standing.
AEC 434. ^MEASURING RESOURCE AND ENVIRONMENTAL IMPACTS (4). Examines economic perspectives on the allocation of natural resources and the management of environmental quality, emphasis on the use of economic concepts in the design and evaluation of public policies. (Writing Intensive Course) PREREQS: AEC 313 [D-] or AREC 313 [D-]

## AEC 440. THE ECONOMICS OF BUSINESS

 ORGANIZATION IN THE FOOD SYSTEM (4). Application of economic analysis to questions related to the choice of an appropriate form of business organization for a wide variety of food system enterprises. Topics include costs of contracting, costs of ownership, enterprise scope and scale, and the dynamics of business ownership and structure. Particular emphasis is given to entrepreneurial enterprises and cooperative businesses in the food system. PREREQS: AEC 311 [D-] or ECON 311 [D-] and / or instructor consent
## AEC 442. AGRICULTURAL BUSINESS

MANAGEMENT (4). Application of economic, financial, and strategic management principles to agricultural business with a focus on a case-study framework for analysis and business decision making for alternative business management strategies.

## AEC 444. COMMODITY FUTURES AND

OPTIONS MARKETS (4). Provides an overview of the basic concepts needed to use commodity futures and options markets to successfully manage price risk. To address the increasingly global economy in which commodity transactions occur, the course also includes financial futures such as interest rates and currencies. Specific topics covered include contract standardization, speculation and hedging, opening and closing of positions, and basis, i.e. the relationship between cash and futures markets, input-output hedges, and spreads. Students also gain hands-on experience through a trading simulation.

## AEC 446. INTRODUCTION TO APPLIED

ECONOMETRICS (4). Introduces students to applied econometrics: the use of statistical techniques to estimate and test economic relationships. Topics include multiple regression models, multicollinearity, and simultaneous equations. The applications and labs will focus on econometric analysis of real world problems pertaining to issues in environmental, food, and resource economics and policy. Lec/lab.
PREREQS: AEC 311 [D-] and ST 351 [D-]

## AEC 447. AGRICULTURAL PRICE AND

MARKET ANALYSIS (4). Price determination for agricultural commodities and factors; quantitative analysis of prices, factors and markets; agricultural market structures, performance, and roles of institutions. Lec/lab. PREREQS: (AEC 300 or AEC 311 or AREC 300 or AREC 311 or ECON 311) and (AEC 370 or AREC 370) and ST 351

## AEC 448. ADVANCED TOPICS IN

## ENVIRONMENTAL AND RESOURCE

ECONOMICS (3). Explores advanced applications of environmental and resource economics to selected policy and management concerns in the PNW and globally. Attention will be directed to the methodological underpinnings of environmental and resource policies and instruments using case studies on real world management issues. PREREQS: AEC 311 [D-] and AEC 351 [D-] and AEC 352 [D-] and /or permission of the instructor.

AEC 452. MARINE ECONOMICS (3). Economic
aspects of marine resource utilization and management will be analyzed. Topics include open access aspect of marine resources; conflict and allocation of marine resources, marine resource markets, marine recreation, pollution, and
aquaculture, with special emphasis on commercial fisheries. PREREQS: AEC 351 [D-] or AEC 352 [D-] or AREC 351 [D-] or AREC 352 [D-]
AEC 453. CONSERVATION ON PRIVATE LAND
(3). Explore and experience the increasingly popular phenomenon of conservation on private land. This exploration includes the explosive growth of land trusts and the use of conservation easements to restrict the use of private land and often promote ecological goals.
AEC 454. RURAL DEVELOPMENT ECONOMICS AND POLICY (3). Theories of economic change in developed and less-developed economies; natural resource sectors and the development of rural regions, with emphasis on growth, diversification, and instability; resource mobility and the spatial aspects of development; poverty and inequality; rural development policy. PREREQS: AEC 300 [D-] or AREC 300 [D-] or AEC 311 [D-] or AREC 311 [D-]
AEC 460. CAPITAL INVESTMENT ANALYSIS USING AGBIZ LOGIC (3). Learn and understand the important factors in measuring the impacts of implementing technologies and/or conservation practices, adding value to products, or changing cropping systems or livestock enterprises. The AgBiz LogicTM software programs will be used to apply financial and economic principles to better understand and reduce the financial, production, marketing, and human resource risks facing agribusinesses.
AEC 461. ^AGRICULTURAL AND FOOD
POLICY ISSUES (4). Principles of agricultural and food policy formulation; agricultural adjustment processes; agricultural price and income policies in relation to land use, water, and rural development policies; interrelationships among U.S. and foreign agriculture and trade policies. (Writing Intensive Course) PREREQS: (AEC 250 [D-] or AREC 250 [D-] or ECON 201 [D-] or ECON 201H [D-] ) and (AEC 300 [D-] or AREC 300 [D-] or AEC 311 [D-] or AREC 311 [D-] or ECON 311 [D-] )
AEC 465. AGRICULTURAL AND FOOD
FINANCIAL MANAGEMENT (3). Reviews basic financial reporting statements, details accounting and financing practices specific to agricultural and food enterprises, and links these topics to both operational and strategic management decisions for these enterprises. PREREQS: AEC 211 [D-] and AEC 311 [D-]

## AEC 466. AGRICULTURAL AND FOOD

MARKETING MANAGEMENT (4). Principles, trends, issues, barriers, policies, strategies and decisions involved in domestic and international marketing of perishable and storable agricultural commodities and food products from the point of production to the point of consumption. Topics include firm-level marketing concepts, the integration of marketing with firmsâ TM overall strategic management goals, as well as comparative studies across multiple outlets for agricultural and food products, to include local, regional, and global markets. PREREQS: AEC 221 [D-] and (AEC 250 [D-] or AEC 251 [D-] or ECON 201 [D-] )
AEC 475. WRITING BUSINESS PLANS: AGRICULTURE/FOOD-RELATED
ENTERPRISES (2). Students choose an enterprise and write a comprehensive business plan that describes the business vision, marketing plan, financial projections, risk anagement, and implementation strategy. At the end of term selected students present their plan to a commercial lender. PREREQS: AEC 211 and AEC 221
AEC 499. SPECIAL TOPICS (1-16). Various topics in agricultural and resource economics of special and current interest not covered in other courses. This course is repeatable for a maximum of 16 credits.

AEC 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum
of 16 credits.
AEC 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits.
AEC 503. THESIS (1-16). This course is
repeatable for a maximum of 999 credits.
AEC 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

AEC 506. SPECIAL PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

AEC 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

AEC 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
AEC 512. MICROECONOMIC THEORY I (4).
Fundamental topics in microeconomic theory. Topics include utility maximization and consumer demand, profit maximization and the theory of the firm, and labor and capital markets. PREREQS: AREC 312 and MTH 252 or equivalent.

AEC 513. MICROECONOMIC THEORY II (4). Emphasizes principles for microeconomic theory at the master's level. Builds upon the foundations covered in AEC 512, and extends the theory and principles to cover uncertainty, game theory, competitive market equilibrium and welfare analysis, imperfect competition, and market failures. Primary emphasis is on understanding microeconomic theory and the underlying assumptions, and how it is applied to real world settings. PREREQS: AEC 512 [C]

AEC 515. MACROECONOMIC THEORY (4). Macroeconomic theory and policy that covers the historical foundations and evolution of modern macroeconomic thought. Topics include the equilibrium determination of output, employment, prices, wages, and interest rates; the causes and consequences of economic fluctuations; monetary and fiscal policies; micro-foundations; and the role of expectations. PREREQS: ECON 315 and MTH 251 or equivalent.
AEC 521. ECONOMICS OF RURAL POVERTY AND THE U.S. SOCIAL SAFETY NET (4).
Examines the geography of poverty in the United States and the «social safety net» that the U.S. has constructed to reduce poverty and its negative effects. Understand the geographical consequences of federal policies and the challenges of providing social safety net programs in rural areas. CROSSLISTED as RS 521.

AEC 523. PRELIMINARIES FOR QUANTITATIVE
METHODS (4). Examines mathematical and statistical topics essential for subsequent courses in graduate-level econometric analysis and quantitative methods. The course focuses on matrix algebra, probability and distribution theory (emphasizing joint and conditional distributions), statistical inference, properties of estimators, and iterative methods for solving non-linear systems. PREREQS: (ST 351 or ST 352 or ECON 424 or ECON 524) and MTH 253

AEC 525. APPLIED ECONOMETRICS (4).
General principles of applied econometric research are emphasized, including model building, data analysis, hypothesis testing, and evaluation and interpretation of results. A variety of estimators are applied to real data, including least squares, panel data, simultaneous equations, discrete choice, and limited dependent variable models.
AEC 532. ENVIRONMENTAL LAW (4). Legal relationships arising out of rights to air, water, and rights to air, water, and land. The impact of federal and state regulation on pollution control and on the production, use, and disposal of hazardous materials. PREREQS: Junior standing.
AEC 534. ENVIRONMENTAL AND RESOURCE ECONOMICS (3). Examines environmental and natural resource issues emphasizing the role of economics in understanding their causes,
consequences, and potential solutions (e.g., air, water, fish, forests, climate change, biodiversity) Reviews welfare economics, market failures, externalities, property rights. Covers non-market valuation, innovative market and regulatory policies. PREREQS: AEC 311 or AREC 311 or instructor permission.

AEC 540. THE ECONOMICS OF BUSINESS ORGANIZATION IN THE FOOD SYSTEM (4). Application of economic analysis to questions related to the choice of an appropriate form of business organization for a wide variety of food system enterprises. Topics include costs of contracting, costs of ownership, enterprise scope and scale, and the dynamics of business ownership and structure. Particular emphasis is given to entrepreneurial enterprises and cooperative businesses in the food system. PREREQS: AEC 311 or ECON 311 or instructor consent

AEC 543. INTERNATIONAL TRADE (4), Introduction to the major theories of international trade and to models that are useful for applied policy and regional analysis. Effects of trade and trade policy on consumers, workers, and firms are emphasized. PREREQS: AEC 513 [C]

## AEC 544. COMMODITY FUTURES AND

 OPTIONS MARKETS (4). Provides an overview of the basic concepts needed to use commodity futures and options markets to successfully manage price risk. To address the increasingly global economy in which commodity transactions occur, the course also includes financial futures such as interest rates and currencies. Specific topics covered include contract standardization, speculation and hedging, opening and closing of positions, and basis, i.e. the relationship between cash and futures markets, input-output hedges, and spreads. Students also gain hands-on experience through a trading simulation.
## AEC 546. INTRODUCTION TO APPLIED

ECONOMETRICS (4). Introduces students
to applied econometrics: the use of statistical techniques to estimate and test economic relationships. Topics include multiple regression models, multicollinearity, and simultaneous equations. The applications and labs will focus on econometric analysis of real world problems pertaining to issues in environmental, food, and resource economics and policy. Lec/lab. PREREQS: AEC 311 and ST 351

## AEC 548. ADVANCED TOPICS IN

 ENVIRONMENTAL AND RESOURCEECONOMICS (3). Explores advanced applications of environmental and resource economics to selected policy and management concerns in the PNW and globally. Attention will be directed to the methodological underpinnings of environmental and resource policies and instruments using case studies on real world management issues. PREREQS: AEC 311 and AEC 351 and AEC 352 or permission of the instructor.
AEC 550. ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS (4). Presents concepts, theories, and methods used in the economic analysis of environmental and natural resource issues. The emphasis is on the economics of environmental policies and the development of decision rules regarding the efficient use of natural resources. PREREQS: AEC 512 [C]

## AEC 551. APPLICATIONS OF

ENVIRONMENTAL AND NATURAL RESOURCE ECONOMICS (4). Applies and expands upon concepts, theories, and methods in environmental and natural resource economics introduced in AEC 550. Topics include non-market valuation, discounting, and benefit-cost analysis, as well as the role and importance of institutions, appropriate research methods, and the philosophical basis for normative judgments in economics. Not offered every year. PREREQS: AEC 550 [C] or AREC 550 [C]

AEC 552. MARINE ECONOMICS (3). Economic aspects of marine resource utilization and management will be analyzed. Topics include open access aspect of marine resources; conflict and allocation of marine resources, marine resource markets, marine recreation, pollution, and aquaculture, with special emphasis on commercial fisheries. CROSSLISTED as MRM 552 PREREQS: (AEC 351 or AEC 352 or AREC 351 or AREC 352)
AEC 553. CONSERVATION ON PRIVATE LAND (3). Explore and experience the increasingly popular phenomenon of conservation on private land. This exploration includes the explosive growth of land trusts and the use of conservation easements to restrict the use of private land and often promote ecological goals.
AEC 554. RURAL DEVELOPMENT ECONOMICS AND POLICY (3). Theories of economic change in developed and less-developed economies; natural resource sectors and the development of rural regions, with emphasis on growth, diversification, and instability; resource mobility and the spatial aspects of development; poverty and inequality; rural development policy. PREREQS: AEC 300 or AREC 300 or AREC 311 or AEC 311

## AEC 560. CAPITAL INVESTMENT ANALYSIS

 USING AGBIZ LOGIC (3). Learn and understand the important factors in measuring the impacts of mplementing technologies and/or conservation practices, adding value to products, or changing cropping systems or livestock enterprises. The AgBiz LogicTM software programs will be used to apply financial and economic principles to better understand and reduce the financial, production, marketing, and human resource risks facing agribusinesses.AEC 565. AGRICULTURAL AND FOOD FINANCIAL MANAGEMENT (3). Reviews basic financial reporting statements, details accounting and financing practices specific to agricultural and food enterprises, and links these topics to both operational and strategic management decisions for these enterprises. PREREQS: AEC 211 and AEC 311

AEC 566. AGRICULTURAL AND FOOD MARKETING MANAGEMENT (4). Principles, trends, issues, barriers, policies, strategies and decisions involved in domestic and international marketing of perishable and storable agricultural commodities and food products from the point of production to the point of consumption. Topics include firm-level marketing concepts, the integration of marketing with firms' overall strategic management goals, as well as comparative studies across multiple outlets for agricultural and food products, to include local, regional, and global markets. PREREQS: AEC 221 and (AEC 250 or AEC 251 or ECON 201)
AEC 599. SPECIAL TOPICS (0-16). Various topics in applied economics of special and current not covered in other courses. May be repeated for credit when topics differ. This course is repeatable for a maximum of 16 credits.
AEC 601. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.
AEC 602. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits.
AEC 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits
AEC 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

AEC 606. SPECIAL PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

AEC 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

AEC 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

AEC 611. ADVANCED MICROECONOMIC
THEORY I (4). A rigorous development of the theory of consumption and production, with emphasis on duality. PREREQS: (AEC 512 [C] and AEC 513 [C] ) and MTH 254 or equivalent.

## AEC 612. ADVANCED MICROECONOMIC

THEORY II (4). A rigorous extension of the theory of the consumer and firm to aggregate and heterogeneous populations, decision making under uncertainty, and related game theory concepts. PREREQS: AEC 611 [C]
AEC 613. ADVANCED MICROECONOMIC THEORY III (4). A rigorous development of the theory of competitive equilibrium, market power, public goods, and information. PREREQS: AEC 612 [C]

## AEC 615. ADVANCED MACROECONOMIC

THEORY (4). Introduction to modern macroeconomic theory on economic growth and fluctuations, including a review of Keynesian theory, optimal control theory and dynamic programming, exogenous and endogenous growth models, government budget deficit and debt, and unemployment theories. PREREQS: Intermediate macroeconomics or equivalent.
AEC 625. ADVANCED ECONOMETRICS I (4). Emphasizes the basic theory underlying the main types of estimators used in econometrics, as well as their application in empirical research ncludes derivation, properties, and application of method of moments, maximum likelihood, ordinary and generalized least squares, and instrumental variables estimators, statistical inference and hypothesis testing, and model building and specification analysis. Provides the necessary oundation for estimation techniques covered in AEC 626. Lec/lab. PREREQS: AEC 525 [C]
AEC 626. ADVANCED ECONOMETRICS II (4).
Extensions to the generalized linear regression model are considered: discrete choice, limited dependent variable, panel data, and simultaneous equations models, and new solutions to identification problems. Strong applied orientation, emphasizing problems of data measurement, model selection and specification. PREREQS: AEC 625 [C]

AEC 627. COMPUTATIONAL ECONOMICS
(4). Covers the numerical analysis of static optimization models and stochastic dynamic models in resource and development economics, emphasizing formulation, solution, and simulation of dynamic optimization, rational expectations, and arbitrage pricing models. Lec/lab.

## AEC 640. SUSTAINABLE DEVELOPMENT (3).

 Surveys research on the quantitative economic analysis of sustainable development, with an emphasis on integrated assessment methods and models and their application to agriculture and rural development policy, agricultural technology mpact assessment, and climate change impact assessment.AEC 643. TRADE AND DEVELOPMENT (4). Introduction to advanced topics in modern trade theory, including technology and trade, distributional effects of trade with emphasis on regional development, trade and the environment, and multilateral trade negotiations. Applications of the above theories to specific industries are emphasized. PREREQS: (AEC 543 [C] or AREC 543 [C] ) and AEC 612* [C] and AEC 625* [C] and or equivalent.

AEC 651. ADVANCED NATURAL RESOURCE ECONOMICS (3). Dynamic allocation of scarce exhaustible and renewable natural resources, social versus private decisions; market and nonmarket considerations; technological change; regulation; dynamics and uncertainty. PREREQS: AEC 513

AEC 652. ADVANCED ENVIRONMENTAL ECONOMICS (3). Interrelationships of natural resource use and the environment; applied welfare and benefit-cost analysis; externalities and pollution abatement; non-market valuation
of resources; property rights; legal and social constraints; policy approaches. PREREQS: (AEC 513 [C] or AREC 513 [C] ) and (AEC 525 [C] or AREC 525 [C] )
AEC 653. EMPIRICAL ENVIRONMENTAL
AND RESOURCE ECONOMICS (3). Introduces empirical methods at the current frontiers of research in environmental and resource economics. General topics may include the identification of non-market values, revealed and stated preference methods, environmental policy evaluation, equilibrium sorting models, and climate econometrics. PREREQS: AEC 513 [C] and AEC 525 [C]

AEC 699. SPECIAL TOPICS (1-16). Various topics in applied economics of special and current interest not covered in other courses. This course is repeatable for a maximum of 16 credits.

## RURAL STUDIES COURSES

RS 421. ECONOMICS OF RURAL POVERTY AND THE U.S. SOCIAL SAFETY NET (4). Examines the geography of poverty in the United
States and the "social safety net» that the U.S. has constructed to reduce poverty and its negative effects. Understand the geographical consequences of federal policies and the challenges of providing social safety net programs in rural areas. CROSSLISTED as AEC 421.
RS 499. SPECIAL TOPICS (1-5). This course is repeatable for a maximum of 9 credits.
RS 502. INDEPENDENT STUDY (1-6). This course is repeatable for a maximum of 9 credits.
RS 512. INTRODUCTION TO RURAL STUDIES
(2). Introduces students to the emerging
theoretical perspectives, methodologies, and critical themes that define rural studies in the U.S. and elsewhere. It draws primarily from the disciplines of sociology, economics, anthropology, human development and geography, examining how each discipline understands and analyzes rural households and communities.

RS 513. CONTEMPORARY RURAL ISSUES
(2). The focus will be on issues confronting rural Oregon. The class will also explore broader U.S. and international rural issues and examine commonalities and differences across cultures and development contexts. Weekly lecturers are drawn from the OSU community and beyond, including public policy makers, rural stakeholders, and nonprofit organizations.
RS 521. ECONOMICS OF RURAL POVERTY AND THE U.S. SOCIAL SAFETY NET (4). Examines the geography of poverty in the United States and the "social safety net" that the U.S. has constructed to reduce poverty and its negative effects. Understand the geographical consequences of federal policies and the challenges of providing social safety net programs in rural areas. CROSSLISTED as AEC 521.

RS 599. SPECIAL TOPICS (1-5). This course is repeatable for a maximum of 9 credits.

## BOTANY AND PLANT PATHOLOGY

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## FACULTY

Professors Arp, Behrenfeld, Ciuffetti, Dolja, Fowler, Ingham, Johnson, Liston, McCune, McEvoy, Mundt, Pscheidt, Sayavedra-Soto, Spatafora, Stone, Tyler, Wolpert
Associate Professors Chang, Jaiswal, Milligan, Ocamb, Parke
Assistant Professors Anderson, Busby, Dung, Filichkin, Frost, Goyer, Hagerty, Hardison, Jones, KC, LeBoldus, Luh, Megraw, Santamaria, Westberry
Senior Instructor Putnam
Instructors Curtis, Link-Perez

## COURTESY FACULTY

Professors Carrington, Grunwald, Loper, Martin, Rothwell, Stockey
Associate Professors Gent, Hansen, Kentula, Mahaffee, Pyke, Stockwell, Zasada
Assistant Professors Cronn, Grevstad, Kaye, Meinke, Reichman, Weiland

ADJUNCT FACULTY
Associate Professor Freitag

## Undergraduate Major

Botany (BS, CRED, HBS)

## Minor <br> Botany

## Graduate Majors

Applied Systematics in Botany (PSM)
Botany and Plant Pathology (MA, MS, PhD)
Graduate Areas of Concentration Ecology
Genetics
Genomics and Computational Biology
Molecular and Cellular Biology
Mycology
Plant Pathology
Plant Physiology
Systematics

## Graduate Minor

Botany and Plant Pathology

## UNDERGRADUATE STUDIES

Botany and plant pathology are concerned with the study of plants at all levels of biological organization, from molecular and cellular processes to the global ecosystem. This breadth of field
reflects the wide range of issues and problems that confront plant biologists. In addition to addressing fundamental questions in plant biology, plant scientists in the 21st century will be called upon to provide information useful for producing food, fiber, and medicine for an increasing population, and for increasing our understanding of the diversity of plant and ecological systems and their interactions with humans. Students studying botany and plant pathology at OSU receive the basic science background necessary for such contributions, and may choose to focus in a particular area within plant science.
The undergraduate program in the Department of Botany and Plant Pathology is designed for students who wish to receive a BS in Botany degree and for students pursuing degrees in other fields that require a knowledge of plant biology. For example, students who have an undergraduate major in biology or environmental sciences may wish to emphasize botany courses in their upperdivision course work.
Completion of the undergraduate curriculum in botany can qualify students for graduate work in various areas of plant biology and plant pathology, and for positions in state and federal agencies, and industries concerned with plants and their products.

Prospective botany majors should obtain a strong background in the biological and physical sciences at the high school level. Specifically recommended are a minimum of three years of high school mathematics, including algebra, geometry, and some exposure to trigonometry, one year of chemistry, one year of biology, one year of physics, and courses designed to develop computer and writing skills. Students without an adequate background in mathematics and science may make up these deficiencies early in their college careers.

## GRADUATE STUDIES

The Department of Botany and Plant Pathology offers graduate programs in the following areas of concentration: ecology, genetics, genomics and computational biology, molecular and cellular biology, mycology, plant pathology, plant physiology, and systematics.

Students with majors in any one area may incorporate into their programs minors in other areas within the department or in other departments and colleges. Integrated minors, and interdisciplinary programs in plant physiology, molecular and cellular biology, genetics, and environmental sciences are also available.

The MS and PhD degrees offered by the Department of Botany and Plant Pathology require, in addition to course work, research resulting in presentation
and defense of a thesis. A nonthesis MS degree also is available. PhD candidates must pass a written and oral preliminary examination upon completion of their course work. In addition, PhD students are required to be a teaching assistant for two quarters.
Inquiries concerning graduate studies can be forwarded to the chairperson of the department's graduate studies committee (john.fowler@oregonstate.edu). Additional details available at http://bpp. oregonstate.edu/graduate-programs.

## UNDERGRADUATE MAJORS WITH OPTIONS

## BOTANY (BS, CRED, HBS)

The required curriculum meets the course requirements of the university and the College of Agricultural Sciences and provides an opportunity for specialized study in one or more principal areas of plant science. The undergraduate major, in regular consultation with a faculty advisor, prepares an academic program that meets university requirements, provides adequate scientific background, and fulfills individual goals and interests.

Required courses are listed below according to a suggested schedule. The order in which particular courses are taken may vary in individual cases.

All Botany undergraduate students are required to complete a focus area and its corresponding course work as part of the Botany undergraduate major. A student may choose more than one focus area; course work for focus areas should commence by the junior year. Course work delivered in these areas provides students with advanced knowledge and skills related to the study of plants and plantlike organisms in natural and managed ecosystems and in the laboratory.

## Freshman Year

BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
CH 121. General Chemistry (5) and CH
122, CH 123. *General Chemistry $(5,5)$
or CH 231, CH 232 , CH 233 . *General
Chemistry ( $4,4,4$ ) and CH 261, CH 262,
CH 263. *Laboratory for Chemistry 231, 232, 233 (1,1,1)
WR 121. *English Composition (3)
Approved Speech (COMM) course (3)
Perspective courses (6)
Select 8 credits of Mathematics from

## the list below:

MTH 111. *College Algebra (4)
MTH 112. *Elementary Functions (4)
MTH 231. Elements of Discrete Mathematics (4)
MTH 241. *Calculus for Management and Social Science (4)
MTH 245. *Mathematics for
Management, Life, and Social Sciences (4)

MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)

## Sophomore Year

BB 314. Cell and Molecular Biology (4)
BOT 220. Introduction to Plant Biology (4)
BOT 321. Plant Systematics (4)
CH 331, CH 332. Organic Chemistry $(4,4)$
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC course (1-2)
Additional approved writing (WR II) course (3)

Perspectives courses (6)
Additional electives (9-10)

## Junior Year

BB 350. Elementary Biochemistry (4)
or BB 450. General Biochemistry (4) and
BB 451. General Biochemistry (3)
BI 311. Genetics (4)
or PBG 430. Plant Genetics (3) and PBG
431. Plant Genetics Recitation (1)

BOT 313. Plant Structure (4)
BOT 341. Plant Ecology (4)
ST 351. Introduction to Statistical Methods (4)

Perspectives courses (6)
Synthesis courses (6)
Additional electives including botany area
of concentration credits (10-13)

## Senior Year

BOT 331. Plant Physiology (4)
BOT 332. Laboratory Techniques in Plant Biology (3)
Select one Non-Vascular Plant Course:
BOT 461. Mycology (4)
BOT 465. Lichenology (4)
BOT 466. Bryology (4)
Additional Quantitative Skills
Courses (select a minimum of two courses):
CS 161. Introduction to Computer Science I (4)
CS 162. Introduction to Computer Science II (4)
PH 201. *General Physics (5)
PH 265. Scientific Computing (3)
ST 352. Introduction to Statistical Methods (4)

ST 411. Methods of Data Analysis (4)
Others by approval of advisor.
Select one Writing Intensive Course from below:
BB/BI 317. ^Scientific Theory and Practice (3)

BI 371. ^Ecological Methods (3)
BOT 323. ^Flowering Plants of the World (3)

HSTS 415. *^Theory of Evolution and Foundation of Modern Biology (4)
HSTS 419. *^Studies in Scientific
Controversy: Methods and Practices (4)
HSTS 425. *^History of the Life Sciences (4)

MB 311. ^Molecular Microbiology Lab: A Writing Intensive Course (3)
Additional upper-division biological science courses other than BOT courses (4)
Perspectives courses (6)
Additional electives (11-14)
Botany Focus Area Requirements
Ecology, Evolution and Conservation (13)
BI 445. Evolution (3)
BOT 442. Plant Population Ecology (3)

BOT 488. Environmental Physiology of Plants (3)
FW 320. Introductory Population Dynamics (4)

Molecular, Cellular, and Genomic (13)
BI 445. Evolution (3)
BB 451. General Biochemistry (3)
BB 494. Biochemistry Laboratory Molecular Techniques 2 (3)
or BOT 480. Photosynthesis and
Photobiology (3)
BOT 475. Comparative Genomics (4)
Plant Pathology (13)
BOT 350. Introductory Plant Pathology (4)
ENT 311. Introduction to Insect Pest
Management (3)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

## Total=180

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: 515

## BOTANY MINOR

BI 311. Genetics (4) or HORT/PBG 430. Plant Genetics (3)
BOT 321. Plant Systematics (4)
BOT 331. Plant Physiology (4)
BOT 341. Plant Ecology (4)
Additional upper-division BOT courses (11-12)
[Excluding BOT 101 but may include BOT 401, BOT 405, BOT 407, BOT 410]

## Total=27

The minor requirements listed above are subject to the following constraints:

Courses required for a major and taken in the major department may not count toward a minor. An individual course may not count toward more than one minor. At least 12 credits of the minor must be upper division.

## Minor Code: 515

## GRADUATE MAJORS

## APPLIED SYSTEMATICS IN

 BOTANY (PSM)Aaron Liston, Director
Department of Botany and Plant
Pathology
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The worlds of science and business are increasingly interconnected, creating strong demand for individuals who can bridge these two disciplines. Systematics is the science devoted to the discovery, description, and classification of the earth's biological diversity. The need for an accurate and comprehensive knowledge of biological diversity is now recognized by a broad array of interests in
the public and private sectors. Plants and fungi are the focus of current initiatives in the conservation of endangered species, the restoration of native ecosystems, and the control of invasive weeds. Industry, private environmental consulting firms, and government agencies have an increasing need for individuals with expertise in plant identification and experience in survey techniques.

The Professional Science Master's (PSM) in Applied Systematics in Botany at OSU is the first program of its kind in the Pacific Northwest and was created with the help of professional affiliates employed in leadership roles in plant biology and conservation. The objective of this degree is to train students to be able to function effectively in a variety of work environments. Special training in business management, communications, and ethics complement core science curriculum, and students are required to complete an internship in lieu of thesis research.

The PSM program can usually be completed in two years, based on full-time study and at least 54 credit hours. Courses in plant and fungal diversity form the foundation of this program (BOT 516, BOT 561, BOT 514, BOT 565 or BOT 566, and BOT 525). Approved elective options (e.g., plant ecology, biological conservation, statistics) give students the flexibility to create their program of study based on career interests. Professional courses are required in communication, research ethics, and business management (PSM 513, PSM 565, PSM 566, PSM 567, COMM 550 and PHL 547). These courses are designed to be taken in sequence during the first academic year. Students are required to complete a 3 - to 6 -month internship (6-12 credits) in lieu of thesis research (BOT 510).

For general information about PSM programs, contact the PSM Director, 2082 Cordley Hall, Corvallis OR 97331, 541-737-5259; email: kirstin.carroll@ oregonstate.edu.
Degree Requirements (50 credits)
Core science courses (19)
Approved electives (7)
Professional courses (18)
Internship (6)
Major Code: 4501

## BOTANY AND PLANT PATHOLOGY (MA, MS, PhD)

Graduate Areas of Concentration
Ecology, genetics, genomics and computational biology, molecular and cellular biology, mycology, plant pathology, plant physiology, systematics
The Department of Botany and Plant Pathology offers graduate programs leading to the Master of Science, and Doctor of Philosophy degrees in the field of botany and plant pathology.

Within this major field, students may elect to specialize in one of the approved areas of concentration.
The selection of an area of concentration is optional. Students may major in botany and plant pathology without selecting an area of concentration. The approved areas of concentration are described below.

- Ecology includes physiological, population, community, ecosystem and global studies in ecology.
- Genetics includes molecular, classical and population studies of the genetics of plants, fungi, and plant-associated microorganisms.
- Genomics and computational biology include the functional, comparative and structural study of plant, fungal, viral and bacterial genomes and the development and application of bioinformatic algorithms and tools used in the analysis of genomic data.
- Molecular and cellular biology include studies of molecular and cellular mechanisms active during plant development, molecular aspects of plant-pathogen interactions, and various aspects of gene regulation, signal transduction, and the cytoskeleton.
- Mycology includes the systematics, ecology, and population genetics of lichenized and nonlichenized fungi.
- Plant pathology includes studies in the areas of bacteriology, nematology, virology, forest pathology, epidemiology of plant diseases, the physiology of parasitism, and the molecular and biochemical basis of plant hostpathogen interactions.
- Plant physiology includes investigations of the regulation of plant growth and development, the molecular and physiological basis of plant-microbe interactions, nitrogen metabolism and the nitrogen cycle, and problems in environmental and stress physiology in plant systems.
- Systematics includes investigations of the taxonomy, phylogeny, and biogeography of plants, fungi, and lichens.
Students majoring in any one area of concentration may incorporate into their programs minors in other areas within the department or minors in other departments and colleges. Integrated minors, and interdisciplinary programs in plant physiology, molecular and cellular biology, genetics, and environmental sciences are also available.
The MS and PhD degrees offered by the Department of Botany and Plant Pathology require, in addition to course work, research resulting in the presentation and defense of a thesis. A nonthesis

MS degree also is available for students with specific career goals. PhD candidates must pass a preliminary examination upon completion of their course work. In addition, PhD students are required to be a teaching assistant for two quarters.
Inquiries concerning graduate studies may be forwarded to the chair of the department's graduate studies committee (john.fowler@oregonstate.edu). Additional details available at http://bpp.oregon-state.edu/graduate-programs.

## Major Code: 5160

## BOTANY AND PLANT

## PATHOLOGY GRADUATE MINOR

Courses required for a Botany and Plant Pathology graduate minor are determined in consultation with the minor advisor.

## Minor Code: 5160 <br> BOTANY AND PLANT PATHOLOGY COURSES

BOT 101. *BOTANY: A HUMAN CONCERN (4). introductory botany for non-majors, emphasizing the role of plants in the environment, agriculture and society. Includes molecular approaches to the study of plant function and genetic engineering. Lec/lab. (Bacc Core Course)

## BOT 220. *INTRODUCTION TO PLANT

BIOLOGY (4). Introduction to plant biology including an overview of major groups of plants, plant cells and cell types, plant anatomy and architecture, physiology and function, and ecology and the roles of plants in the environment. Laboratory exercises build on lecture themes and provide hands-on learning experiences including field trips. Lec/lab. (Bacc Core Course)

BOT 313. PLANT STRUCTURE (4). The structural components of vascular plants and how plant structure relates to function, development, environment, evolution, and human use of plants. Field trip. Lec/lab. PREREQS: BI 213 or BI 213 H
BOT 321. PLANT SYSTEMATICS (4). Vascular plant classification, diversity, and evolutionary relationships. Lab emphasizes the collection and identification of ferns, gymnosperms, and flowering plants in Oregon. Field trips. Lec/lab. PREREQS: BI 213 or BI 213H
BOT 322. ECONOMIC AND ETHNOBOTANY:
ROLE OF PLANTS IN HUMAN CULTURE
(3). Economic and cultural (ethnobotanical) uses of plants and fungi by humans, including domesticated cultivated plants as well as wildgrowing plants, and uses of plants and fungi by indigenous cultures. Ecampus course only.
BOT 323. ^FLOWERING PLANTS OF THE
WORLD (3). Global perspective of plant biodiversity with a focus on evolutionary origins, classification, and evolutionary relationships of the major groups of plants. Development and application of scientific writing and utilization of online information resources in plant evolutionary biology. (Writing Intensive Course) PREREQS: One year of college biology or departmental approval required.

BOT 324. *FUNGI IN SOCIETY (3). Explores the diverse roles played by fungi in relation to human civilization and the natural environment. (Bacc Core Course) PREREQS: One course in biological sciences.
BOT 331. PLANT PHYSIOLOGY (4). Survey of physiological processes in plants, including photosynthesis and plant metabolism, mineral nutrition and ion uptake processes, plant cell/ water relations, regulation of plant growth and development, and transpiration and translocation.

Lec/rec. PREREQS: (BI 213 or BI 213H) and ((CH 123 or (CH 233 and CH 263))
BOT 332. LABORATORY TECHNIQUES IN PLANT BIOLOGY (3). Laboratory experiences in the manipulation and observation of physiological processes in plant systems. Analysis and interpretation of physiological data generated in experimentation with plant systems. Training in basic laboratory skills, including the principles and procedures involved in the use of common items of laboratory instrumentation. Lab. PREREQS: BOT 331 or BI 314 or equivalent.
BOT 341. PLANT ECOLOGY (4). Study of higher plants in relation to their environment. The relationship of plant physiology and reproduction to environmental factors; competition and other species interactions; the structure, dynamics and analysis of vegetation. Field trips. Lec/ lab. PREREQS: BI 213 or BI 213H. BOT 321 is recommended.
BOT 350. INTRODUCTORY PLANT
PATHOLOGY (4). Symptoms, causal agents, diagnosis, and prevention of plant diseases, with emphasis on fungi, bacteria, nematode, and virus pathogens. Lec/lab. PREREQS: BI 213 or BI 213H
BOT 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
BOT 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
BOT 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

BOT 407. SEMINAR (1). Section 1: Departmental seminar. Section 2: Lichens and Bryophytes Research (1). Weekly one-hour meetings for reporting and discussion of active research projects, discussion of proposal research, review and discussion of recent literature, and miniworkshops on particular problems. Normally graded $P / N$. This course is repeatable for a maximum of 16 credits.
BOT 407H. SEMINAR (1). Section 1: Departmental seminar. Section 3: Lichens and Bryophytes Research (1). Weekly one-hour meetings for reporting and discussion of active research projects, discussion of proposal research, review and discussion of recent literature, and mini-workshops on particular problems. Normally graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
BOT 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
BOT 410. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Instructor approval required.
BOT 413. FOREST PATHOLOGY (3). Effects of diseases on forest ecosystems. Recognition of important groups, prediction of pathogen responses to environmental changes, and management strategies for protection of forest resources. Field trips. Lec/lab. CROSSLISTED as FOR 413. PREREQS: BI 204 [C] or BI 212 [C] or BI 212 H [C] or BI 213 [C] or BI 213H [C] and /or equivalent.

BOT 414. AGROSTOLOGY (4). Classification and identification of grasses, with emphasis on the modern system of grass classification; laboratory practice in keying grass specimens to genus and species. Lec/lab. PREREQS: BOT 321
BOT 416. AQUATIC BOTANY (4). Taxonomy and ecology of aquatic vegetation, emphasizing freshwater and marine algae and the submergent vascular plants. Morphology, physiology, and classification of the algae; morphological and physiological adaptations of aquatic vascular plants; and primary production in aquatic ecosystems. Laboratory practice in the identification of local taxa. Field trips. Lec/lab. PREREQS: BI 213 or BI 213H

BOT 425. FLORA OF THE PACIFIC
NORTHWEST (3). Vascular plant identification, terminology, and diagnostic characteristics of plant families. Lab emphasizes the use of keys for identification to the species level and ability to recognize by sight those plant families found in the Pacific Northwest. Field trips. Lec/lab. PREREQS: BOT 321 or equivalent.

## BOT 440. FIELD METHODS IN PLANT

ECOLOGY (4). Concepts and tools for describing, monitoring, and experimenting on vegetation. Combines Web-based material, field experience at the student;s location, and student projects. PREREQS: Course in ecology and a course in statistics.
BOT 442. PLANT POPULATION ECOLOGY (3).
Ecological aspects of plant form and reproduction; demography and population modeling; species interactions, including competition, mutualism, and herbivory. Lec/lab. PREREQS: BOT 341 or equivalent.

BOT 460. FUNCTIONAL GENOMICS (3).
Functional genomics describes a set of conceptual approaches and associated laboratory techniques that rely on large-scale DNA sequence datasets to investigate the function of, and interactions between, genes as well as their RNA/protein products. This course will provide an overview of these techniques, including a) approaches to predicting protein function based on sequence analysis, b) large-scale genetic approaches to identifying novel genotype-phenotype associations, and c) transcriptomic, proteomic and metabolomic approaches that reveal gene functions by measuring changes in abundance/ modification of associated RNA transcripts, proteins and metabolites. PREREQS: (BI 311 [C-] or BI 311H [C-] ) and (BI 314 [C-] or BI 314H [C-] ) and permission by instructor
BOT 461. MYCOLOGY (5). A broad taxonomic survey of the fungi. Topics include life
histories, systematics, ecology, genetics, and ethnomycology. Participation on field trips and the submission of a specimen collection are required. Lec/lab. PREREQS: (BI 211 or BI 211 H ) and (BI 212 or BI 212H) and (BI 213 or BI 213H)
BOT 465. LICHENOLOGY (4). Biology of lichens; includes structure, life histories, classification, and ecology. Field trip fee. Lec/lab. Offered alternate years. PREREQS: (BI 213 or BI 213 H ) and two botany courses.

BOT 466. BRYOLOGY (4). Biology of bryophytes; includes structure, life histories, classification, and ecology. Field trip fee. Lec/lab. Offered alternate years. PREREQS: (BI 213 or BI 213 H ) and two botany courses.
BOT 475. COMPARATIVE GENOMICS (4).
Principles of comparative genomics. Methods for genome assembly and annotation. Genomic approaches for the study of structural change, whole genome duplication, gene family evolution, gene networks, gene regulation and epigenetics. Lab topics include the analysis of next generation sequencing data and conducting comparative genomic analyses. Lec/lab. PREREQS: ((BI 311 [D-] or CSS 430 [D-] ) and BI 314 [D-] ) and students will require a basic working knowledge of cell and molecular biology and genetics.
BOT 476. INTRODUCTION TO COMPUTING
IN THE LIFE SCIENCES (3). Introduction to management of large datasets (e.g., nucleic acids, protein), computer programming languages, application of basic mathematical functions, and assembly of computational pipelines pertinent to life sciences. PREREQS: Cell and molecular biology or genetics, or by approval of instructor. Familiarity with text editing software and unix/linux operating system is advantageous.

## BOT 480. PHOTOSYNTHESIS AND

PHOTOBIOLOGY (3). Explores the diverse use of light in biological systems, with particular emphasis on photosynthesis. Lectures will discuss the nature of light, light in the natural environment,
light absorption in biological systems, use of light energy for photosynthesis, communication, defense, motility, and vision, as well as deleterious effects of light and its use for global monitoring satellite systems. PREREQS: One course in plant physiology, ecology, or the equivalent, or by permission of instructor.

BOT 488. ENVIRONMENTAL PHYSIOLOGY OF PLANTS (3). Introduces students to mechanisms of plant responses to environmental change caused by humans, including atmospheric, nutrient, water, and global climate factors. Concepts are built around principles of plant environment relations. Lec/lab. PREREQS: One course in plant physiology or one course in ecology.
BOT 499. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.
BOT 499H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
BOT 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
BOT 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
BOT 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

BOT 507. SEMINAR (1-16). Section 1:
Departmental seminar (F, W, S). Section 2: Communication in Ecology (F). Section 3: Community and Habitat Analyses (W). Section 4: Lichens and Bryophytes Research (S). Weekly one-hour meetings for reporting and discussions of proposal research, review and discussion of recent literature, and mini-workshops on particular problems. Graded P/N. This course is repeatable for a maximum of 16 credits.
BOT 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
BOT 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.
BOT 513. FOREST PATHOLOGY (3). Effects of diseases on forest ecosystems. Recognition of important groups, prediction of pathogen responses to environmental changes, and management strategies for protection of forest resources. Field trips. Lec/lab. CROSSLISTED as FOR 513. PREREQS: BI 204 or BI 212 or BI 212H or BI 213 or BI 213 H or equivalent.

BOT 514. AGROSTOLOGY (4). Classification and identification of grasses, with emphasis on the modern system of grass classification; laboratory practice in keying grass specimens to genus and species. Lec/lab. PREREQS: BOT 321
BOT 516. AQUATIC BOTANY (4). Taxonomy and ecology of aquatic vegetation, emphasizing freshwater and marine algae and the submergent vascular plants. Morphology, physiology, and classification of the algae; morphological and physiological adaptations of aquatic vascular plants; and primary production in aquatic ecosystems. Laboratory practice in the identification of local taxa. Field trips. Lec/lab.

## PREREQS: BI 213 or BI 213 H

## BOT 525. FLORA OF THE PACIFIC

NORTHWEST (3). Vascular plant identification, terminology, and diagnostic characteristics of plant families. Lab emphasizes the use of keys for identification to the species level and ability to recognize by sight those plant families found in the Pacific Northwest. Field trips. Lec/lab. PREREQS: BOT 321 or equivalent.
BOT 540. FIELD METHODS IN PLANT
ECOLOGY (4). Concepts and tools for describing, monitoring, and experimenting on vegetation. Combines Web-based material, field experience at the students location, and student projects. PREREQS: Course in ecology and a course in statistics.

BOT 542. PLANT POPULATION ECOLOGY (3).
Ecological aspects of plant form and reproduction; demography and population modeling; species interactions, including competition, mutualism, and herbivory. Lec/lab. PREREQS: BOT 341 or equivalent.
BOT 543. PLANT COMMUNITY ECOLOGY
(3). The structure, diversity, and successional dynamics of terrestrial plant communities; methods of analysis. Lec/lab. PREREQS: BOT 341 or equivalent.
BOT 547. NUTRIENT CYCLING (3). Reviews and discusses ecosystem-level biogeochemical concepts for terrestrial and freshwater ecosystems, primarily by reading and discussing classic and current literature to determine the state-of-knowledge and uncertainties associated with it. Topics will include root nutrient uptake mechanisms, soil chemical and biochemical transformations in different soil and ecosystems, measuring soil solution and watershed fluxes, soil organic matter formation and structure, the meaning of sustainability, the concept of N saturation in terrestrial ecosystems, and the use of natural abundance and tracer isotopes in ecosystem biogeochemistry. While forest biogeochemical processes will be emphasized, desert, aquatic, wetland, and prairie ecosystems will also be explored. CROSSLISTED as SOIL 547. PREREQS: College-level chemistry and biology and one class in ecology (BI 370 or equivalent) and/or soils (e.g., SOIL 205).
BOT 550. PLANT PATHOLOGY (5). Causal agents of plant disease, diagnosis, pathogenesis, epidemiology, and disease management principles and strategies. Field trip. Lec/lab/rec. PREREQS: BI 213 or Bl 213 H

BOT 552. PLANT DISEASE MANAGEMENT (4).
Analysis of host, pathogen, and environmental factors influencing the increase and spread of plant disease. Epidemiological theory will be used as a basis for developing and evaluating principles and concepts of plant disease management. Lec/ lab/rec. Offered alternate years. PREREQS: BOT 350 or BOT 550

BOT 553. PLANT DISEASE DIAGNOSIS (3). Diagnosis of plant diseases and identification of causal agents. Laboratory practice in identification techniques. Observation of symptoms exhibited by diseased plants in greenhouse and field locations. Field trips. Lec/lab. Offered alternate years in summer term. PREREQS: BOT 350 or BOT 550 BOT 554. PLANT PATHOGENIC NEMATODES
(2). Survey of nematodes that cause plant disease. Includes taxonomy, identification, life cycles, symptomology, interactions with other plant pathogens, and how nematodes cause plant disease. Lec/lab. Offered alternate years. PREREQS: BOT 550 and 6 credits of upperdivision biology.
BOT 556. PHYLOGENETICS (4). Explores the theory and practice of modern phylogenetic analysis. Emphasis placed on tree reconstruction algorithms, assessment of statistical support, and contemporary issues in phylogenetics. Lab will focus on the use of phylogenetic software and the analysis of molecular data sets. Lec/lab. PREREQS: ST 511
BOT 560. FUNCTIONAL GENOMICS (3).
Functional genomics describes a set of conceptual approaches and associated laboratory techniques that rely on large-scale DNA sequence datasets to investigate the function of, and interactions between, genes as well as their RNA/protein products. This course will provide an overview of these techniques, including a) approaches to predicting protein function based on sequence analysis, b) large-scale genetic approaches to identifying novel genotype-phenotype associations, and c) transcriptomic, proteomic and metabolomic approaches that reveal gene functions by measuring changes in abundance/ modification of associated RNA transcripts, proteins and metabolites. PREREQS: (BI 311 or

BI 311H) and (BI 314 or BI 314 H ) and permission of instructor

BOT 561. MYCOLOGY (5). A broad taxonomic survey of the fungi. Topics include life histories, systematics, ecology, genetics, and ethnomycology. Participation on field trips and the submission of a specimen collection are required. Lec/lab. PREREQS: (BI 211 or BI 211 H ) and (BI 212 or BI 212 H ) and (BI 213 or BI 213 H )

BOT 565. LICHENOLOGY (4). Biology of lichens; includes structure, life histories, classification, and ecology. Field trip fee. Lec/lab. Offered alternate years. PREREQS: (BI 213 or BI 213 H ) and two botany courses.
BOT 566. BRYOLOGY (4). Biology of bryophytes; includes structure, life histories, classification, and ecology. Field trip fee. Lec/lab. Offered alternate years. PREREQS: (BI 213 or BI 213 H ) and two botany courses.

## BOT 570. COMMUNITY STRUCTURE AND

ANALYSIS (4). Quantitative methods for the analysis of biotic communities, including community concepts, estimation of community composition parameters, theoretical aspects of multivariate methods of analyzing speciesimportance data, and overview of multivariate tools; hands-on computer analysis of data sets. Lec/lab.
BOT 575. COMPARATIVE GENOMICS (4).
Principles of comparative genomics. Methods for genome assembly and annotation. Genomic approaches for the study of structural change, whole genome duplication, gene family evolution, gene networks, gene regulation and epigenetics. Lab topics include the analysis of next generation sequencing data and conducting comparative genomic analyses. Lec/lab. CROSSLISTED as MCB 575. PREREQS: Students will require a basic working knowledge of cell and molecular biology and genetics. BI 314 and (BI 311 or CSS 430)

BOT 576. INTRODUCTION TO COMPUTING IN THE LIFE SCIENCES (3). Introduction to management of large datasets (e.g., nucleic acids, protein), computer programming languages application of basic mathematical functions, and assembly of computational pipelines pertinent to life sciences. CROSSLISTED as MCB 576. PREREQS: Cell and molecular biology or genetics, or by approval of instructor. Familiarity with text editing software and unix/linux operating system is advantageous.

## BOT 580. PHOTOSYNTHESIS AND

PHOTOBIOLOGY (3). Explores the diverse use of light in biological systems, with particular emphasis on photosynthesis. Lectures will discuss the nature of light, light in the natural environment, light absorption in biological systems, use of light energy for photosynthesis, communication, defense, motility, and vision, as well as deleterious effects of light and its use for global monitoring satellite systems. PREREQS: One course in plant physiology, ecology, or the equivalent, or by permission of instructor.

BOT 588. ENVIRONMENTAL PHYSIOLOGY OF PLANTS (3). Introduces students to mechanisms of plant responses to environmental change caused by humans, including atmospheric, nutrient, water, and global climate factors. Concepts are built around principles of plant environment relations. Lec/lab. PREREQS: One course in plant physiology or one course in ecology.
BOT 590. SELECTED TOPICS IN MYCOLOGY
(1-3). Advanced topics in mycology through analysis of current literature. Detailed study of an aspect of mycology beyond those covered in regular classes. Seminar and discussion format. This course is repeatable for a maximum of 16 credits. PREREQS: BOT 461 or BOT 561
BOT 599. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

BOT 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

BOT 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

BOT 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
BOT 607. SEMINAR (1). Section 1. Departmental seminar This course is repeatable for a maximum of 16 credits.
BOT 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
BOT 651. MOLECULAR BASIS OF PLANT
PATHOGENESIS (3). Analysis of current concepts in the physiology, biochemistry, and genetics of host-parasite interactions. Topics covered include specificity, recognition, penetration, toxin production, altered plant metabolism during disease, resistance mechanisms and regulatory aspects of gene expression during host-parasite interactions. Offered alternate years. CROSSLISTED as MCB 651. PREREQS: BOT 550
BOT 668. PLANT DISEASE DYNAMICS (4). Evaluation of processes affecting the dynamics of plant disease and pathogen populations through analysis of current literature. Students will be expected to conduct extensive reading and analysis of literature and to meet with the instructor for small group discussions. Offered alternate years. PREREQS: BOT 550 and ST 412

## BOT 691. SELECTED TOPICS-PLANT

ECOLOGY (1-3). Recent advances and developing problems in plant ecology, with critical evaluation of current literature. Topics vary from year to year. This course is repeatable for a maximum of 99 credits. PREREQS: Graduatelevel ecology.
BOT 692. SELECTED TOPICS: PLANT
PATHOLOGY (1-3). Selected topics concerning plant pathogens and plant disease processes, emphasizing current literature and theory. Topics vary from year to year. This course is repeatable for a maximum of 99 credits. PREREQS: BOT 550 or equivalent.
BOT 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## CROP AND SOLL SCIENCE

## Jay Noller, Head

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3017 Ag and Life Sciences
Oregon State University
Corvallis, OR 97331
541-737-2821
Email: jay.noller@oregonstate.edu Website: http://cropandsoil.oregonstate. edu/

## FACULTY

Professors Bottomley, Butler
(emeritus), Corp, Dragila, Hannaway, Hayes, Karow (emeritus), Kling (sr. research), Lajtha, Machado, Macnab, Mallory-Smith, Myrold, Noller, Rao, Reitz, Ross, Shock, Stephenson, Tuck, Young (emeritus), Zemetra
Associate Professors Angima, Baham (emeritus), Bohle, Chastain, Elias (sr. research), Felix, Flowers, Hulting, Kleber, Lutcher, Nonogaki, Parke (sr. research), Rondon, Roseberg, Schrumpf (seed certification, emeritus), D. Sullivan, Walenta, Wysocki
Assistant Professors N. Anderson, Dreves (sr. research), Leonard (sr. research), Pett-Ridge, C. Sullivan, Townsend (sr. research)
Senior Instructors Cassidy, Charlton, Fery, McMorran (seed certification)
Instructors Buhrig, Burr (seed
certification), A. Hunt, Japhet, Maley, Shafa (seed certification), S. Smith (seed certification), Zielinski (seed certification)

## COURTESY FACULTY

Professors Brilman, Brown, Griffith, Olszyk, Peterson
Associate Professors Henning, Mueller-Warrant, Riera-Lizaraz, Vales Assistant Professors M. Johnson, M. Rogers, Weisbrod

## PROFESSIONAL FACULTY

Curry, Garay, Lewis, Lundeen

## Undergraduate Major

Crop and Soil Science (BS, CRED, HBS)

## Options

Agronomy
Plant Breeding and Genetics
Soil Science

## Minors

Crop Science
Soil Science

## Graduate Majors

Crop Science (MAIS, MS, PhD)
Graduate Areas of Concentration
Crop Breeding, Genetics and
Cytogenetics (cereals, oilseeds, potatoes)
Forage and Pasture Management
Grain Crop Production
Post-Harvest Seed Technology
Seed Biology

Seed Crop Physiology
Seed Production
Weed Biology
Weed Management
Graduate Options
Entomology
Plant Breeding and Genetics
Soil Science (MAIS, MS, PhD)
Graduate Areas of Concentration
Environmental Soil Science
Forest Soils
Nutrient Cycling
Soil Geochemistry
Soil Conservation and Land Use
Soil Fertility and Plant Nutrition
Soil Genesis and Classification
Soil Microbiology
Soil Physics
Affiliated Interdisciplinary
Graduate Major
Water Resources Science (MS, PhD) (See
Graduate School)

## Graduate Minors

Crop Science
Soil Science
The discipline of crop science provides the knowledge and understanding of technologies that contribute directly to improvements in production and quality of food, feed, fiber, seed, energy, and nutraceutical crops for the world. The art and science of plant improvement are key elements in efforts to feed, clothe and provide energy for the world's evergrowing population. Conventional and molecular tools assist in the development of new genetic strains of food and energy crops. Crop plants play an important role in the future of sustainable food and energy production.

The discipline of soil science provides the basic understanding of the physical, chemical, and biological properties of this important natural resource. Why is soil important? Soil is the fundamental substrate for life on terrestrial landscapes. Soil plays a vital role in sustaining human welfare and assuring future agricultural productivity and environmental stability. An understanding of global and local ecology depends on an awareness of the soil and its properties. Global information and mapping systems are essential tools for characterizing the landscape and its constituent soils.
Agronomists are crop and soil scientists who work to improve crops and agricultural productivity while effectively managing pests and weeds. Students in crop and soil science explore important contemporary issues faced by our society, including water quality and management, sustainability of different types of crop production, organic crop produc-
tion, erosion and sedimentation, growing crops for biofuel production, land use and reclamation, genetic modification of crop plants, and soil quality and sustainability. An array of careers is available.

## CAREER OPPORTUNITIES

Careers for crop scientists are available in business, industry, farming, research, agricultural chemical industries, seed production, seed technology, communications, conservation, and education. Positions are available in agricultural experiment stations and extension services, state departments of agriculture, food processing companies, insurance agencies, lending institutions, and commercial firms, both domestic and international, dealing in the processing and sale of farm products, chemicals, and seed.

Careers for soil scientists are available in agriculture, forestry, education, state and federal resource agencies, private consulting, and research. Farms, ranches, and agricultural supply companies employ soil scientists as managers or field representatives. Soil scientists may become teachers of vocational agriculture or environmental education, or they may become county extension agents in agriculture or natural resources. The U.S. Department of Agriculture's Forest Service and Natural Resources Conservation Service often employ soil scientists, as do private consulting firms in environmental engineering and land use planning.

## ACADEMIC ADVISING

Undergraduate curricula in crop and soil science are flexible enough to provide for the student's individual professional needs and interests and for a broad-based general education by allowing electives in other colleges throughout the university. Undergraduate advising is a vital part of the program, and the department is well known for excellence in advising. The department has a head advisor who meets with all students each term. Advisors and faculty provide curricular guidance and aid in professional extracurricular activities, career decisions, and job placement.

## SCHOLARSHIPS

The Department of Crop and Soil Science administers a number of scholarships available only to students majoring in the department. Over $\$ 40,000$ is given to students each year.

## STUDENT CLUBS

The department supports a Crop Science Club that provides valuable co-curricular professional development, a collegiate Soil Judging Team that participates in both regional and national competitions, the OSU Organic Growers Club that provides hands-on experience in organic production of vegetable crops, and the

OSU Bug Club, a student club whose members are actively engaged in insect education outreach to local schools and communities. Graduate students in soil science also have a student club.

## CROP AND SOIL SCIENCE (BS, CRED, HBS)

The Bachelor of Science degree in Crop and Soil Science requires the choice of one of three options:

## 1. Agronomy

2. Plant Breeding and Genetics
3. Soil Science

Major Code: 120

## OPTIONS

## AGRONOMY OPTION

Students in the Agronomy option will gain the knowledge and skills necessary to be active participants in producing food, feed, fiber, and energy crops for our world. Increased production of field crops-wheat, corn, rice, sorghum, soybeans, forages, cotton, etc.-will be essential to meet the basic needs of the world's ever-growing population and such production will need to be accomplished in a world of diminishing soil, water, mineral, and petrochemical resources. As an agronomic professional, you will have the knowledge and skill to access the potentials of a given production system and to choose plant materials and plant production practices that will optimize production while minimizing environmental impact. Maximum sustainable production will be your goal and you will need in-depth knowledge of plants, plant genetics, plant pests, soils, soil fertility, production equipment, economics, and politics to achieve this goal. Agronomists work for field crop production companies, as managers of small to large farms and ranches, and as managers of their own farming operations. Agronomists also work for federal, state, or local government agencies as educators, researchers, or field technicians. Others hold teaching, research, or extension positions in universities. Some work for private research laboratories, environmental service companies, insurance companies, or land appraisal firms.

## Major Core

## General Science Core

BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
or BI 204, BI 205, BI 206. *Introductory Biology I, II, III $(4,4,4)$
CH 231, CH 232, CH 233. *General Chemistry $(4,4,4)$
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233

## (1,1,1)

Choose one of the following math classes (4):
MTH 241. *Calculus for Management and Social Science (4)

MTH 245. *Mathematics for
Management, Life, and Social Sciences (4)

MTH 251 *Differential Calculus (4)

## Orientation

CROP/ENT/HORT/SOIL 101. Introduction to Horticulture, Crop, Soil, and Insect Science (1)

## Agricultural Science

BOT 331. Plant Physiology (4)
BOT 350. Introductory Plant Pathology (4)
CROP 440. Weed Management (4)
ENT 311. Introduction to Insect Pest Management (4)
SOIL 205. *Soil Science (3) and SOIL 206.
*Soil Science Laboratory for Soil 205 (1)

## Experiential Learning

Take 3 or more credits of the following:
CROP 401. Research (3)
CROP 403. Thesis (3)
CROP 410. Internship (3) and CROP 407. Seminar (1)

## Ecology

Select 1 of the following courses:
BI 370. Ecology (3)
BOT 341. Plant Ecology (4)
RNG 341. Rangeland Ecology and Management (3)

## Technology

CROP 414. Precision Agriculture (4)

## Writing Intensive Course (WIC)

CROP/SOIL 325. ${ }^{\wedge}$ Ag and Environmental
Predicaments: A Case Study Approach (3)

## Capstone

CROP/HORT 480. Case Studies in Cropping Systems Management (4)

## Option Requirements

## Agronomy Core

CROP 200. Crop Ecology and Morphology (3)

CROP 280. Introduction to the Complexity of Oregon Cropping Systems (4)
CROP 319. Principles of Field Crop
Production (3)
CROP 330. *World Food Crops (3)
PBG 430. Plant Genetics (3)
PBG 431. Plant Genetics Recitation (1)
SOIL 316. Nutrient Cycling in
Agroecosystems (4)
ST 351. Introduction to Statistical Methods (4)
or ST 411. Methods of Data Analysis (4)

## Agronomy Electives

Choose at least 7-8 credits from the following courses:
BEE 439. Irrigation Principles and Practices (4)

BOT 313. Plant Structure (4)
CROP 310. Forage Production (4)
CROP 420. Seed Science and Technology (3)

## Ecampus only

CROP 460. Seed Production (3)
HORT 316. Plant Nutrition (4)

## General Electives

Choose at least 7-8 credits from the following courses:
BB 350. Elementary Biochemistry (4)
BOT 321. Plant Systematics (4)
BOT 414. Agrostology (4)

BOT 442. Plant Population Ecology (3)
BOT 480. Photosynthesis and Photobiology
(3)

BOT 488. Environmental Physiology of Plants (3)
CH 331. Organic Chemistry (4)
CH 332. Organic Chemistry (4)
CH 337. Organic Chemistry Laboratory (4)
CROP 199. Special Studies: Issues in
Sustainable Agriculture (1) Repeatable
CROP/HORT 300. Crop Production in
Pacific Northwest Agroecosystems (4)
CROP 418. Toxic Plants in PNW Pastures (1)
Ecampus only.
CSS 320. Principles of Oil and Fiber Crop
Production (1) EOU only.
CSS 321. Principles of Cereal Crop
Production (1) EOU only.
CSS 322. Principles of Potato Production (1) EOU only.
FES 365. *Issues in Natural Resources
Conservation (3) Cascades \& Ecampus only.
GEOG 340. *Introduction to Water Science and Policy (3)
or SOIL 335. *Introduction to Water
Science and Policy (3)
HORT/CROP 433. Systematics and
Adaptation of Vegetable Crops (4)
HORT/CROP 463. Seed Biology (3)
MB 230. *Introductory Microbiology (4)
PBG 441. Plant Tissue Culture (4)
PBG 450. Plant Breeding (4)
PH 201. *General Physics (5)
SOIL 395. *World Soil Resources (3)

## Ecampus only.

SOIL 435. Environmental Soil Physics (3)
SOIL 445. Environmental Soil Chemistry (3)
SOIL 455. Biology of Soil Ecosystems (4)
SOIL 466. Soil Morphology and
Classification (4)
SOIL 475. Soil Resource Potentials (4)
WR 327. *Technical Writing (3)

## Business and Economics

AEC 211. Management in Agriculture (4)
AEC 221. Marketing in Agriculture (3)
AEC 250. *Introduction to Environmental Economics and Policy (3)
or ECON 201. *Introduction to
Microeconomics (4)
Electives in Business
Choose a minimum of 4 credits from the following courses:
AEC 311. Intermediate Applied Economics
I: Producers and Consumers (4)
AEC 372. Agricultural Cooperatives (3)
AEC 388. Agricultural Law (4)
AEC 442. Agricultural Business
Management (4)
AEC 444. Commodity Futures and Options Markets (4)
AEC 460. Capital Investment Analysis Using Agbiz Logic (3)
BA 463. Family Business Management (4)

## Experiential Learning Track

(optional):
10 or more credits of a structured internship (CROP 410) can be substituted for 6 of the 7-8 General Electives credits and four credits of Electives in Business. This would allow a student to use an entire term for internship work.

## Research Track (optional):

Suggested classes, select courses most relevant to your intended graduate school program:
BB 350. Elementary Biochemistry (4)
BI 211, BI 212, BI 213. *Principles of Biology series $(4,4,4)$
BOT 321. Plant Systematics (4)
BOT 341. Plant Ecology (4)
BOT 414. Agrostology (4)
CH 331. Organic Chemistry (4)
CH 332. Organic Chemistry (4)
CH 337. Organic Chemistry Laboratory (4)
MB 230. *Introductory Microbiology (4)
MTH 251. *Differential Calculus (4)
PH 201. *General Physics (5)
WR 327. *Technical Writing (3)

## Grade Requirements

Students pursuing the Agronomy option under the Crop and Soil Science major are required to receive a grade of C or better in all CROP, CSS, ENT, HORT, PBG, and SOIL courses required within their major and option.

## Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course (WIC)
Option Code: 784


## PLANT BREEDING AND <br> GENETICS OPTION

The Plant Breeding and Genetics (PBG) option at Oregon State University embodies the Land Grant mission of integrated research, teaching and extension in the context of cultivar development and fundamental genetics. Plant breeding is a collaborative discipline spanning everything from classical field approaches to gene manipulation at the molecular level. Breeders regularly cooperate with pathologists, entomologists, soil scientists, physiologists, food scientists, genomicists, molecular biologists and experts in other fields.

Students in the Plant Breeding and Genetics option will learn an interdisciplinary approach to applied plant breeding by taking courses across a broad spectrum of disciplines. The option may be tailored to meet students' career goals including graduate school, as well as directly entering public or private sector breeding programs. After completing their degree, students will have gained fundamental knowledge in plant breeding that may be applied in a range of crops including annual and perennial horticultural crops, agronomic food and feed crops, and forestry products.

This option is under both the Crop and Soil Science major and the Horticulture major. The option uses the new horticulture major core.

## Option Requirements

## Plant Materials

Select 2 of the following courses:
BOT 313. Plant Structure (4)
BOT 321. Plant Systematics (4)

BOT 425. Flora of the Pacific Northwest (3)
CROP 200. Crop Ecology and Morphology (3)

HORT 226. Landscape Plant Materials I:
Deciduous Hardwoods and Conifers (4)
HORT 228. Landscape Plant Materials II:
Spring Flowering Trees and Shrubs (4)
HORT 251. Temperate Tree Fruit, Berries,
Grapes, and Nuts (2)
HORT 255. Herbaceous Ornamental Plant
Materials (3)
HORT/CROP 433. Systematics and
Adaptation of Vegetable Crops (4)

## Ecology

Select 1 of the following courses:
BI 370. Ecology (3)
BOT 341. Plant Ecology (4)
HORT 318. ^Applied Ecology of Managed Ecosystems (3)

## Technology

PBG 441. Plant Tissue Culture (4)

## Agricultural Communication

CROP 407. Seminar (1)
or HORT 407. Seminar (1)
HORT 411. Horticulture Book Club (1)
Select 1 of the following Writing

## Intensive Courses:

BOT 323. ${ }^{\wedge}$ Flowering Plants of the World (3)
CROP/SOIL 325. ^Ag and Environmental Predicaments: A Case Study Approach (3)
HORT 318. ^Applied Ecology of Managed Ecosystems (3)

## Capstone

PBG 450. Plant Breeding (4)

## Science and Technology

CROP/HORT 463. Seed Biology (3)
PBG 430. Plant Genetics (3)
ST 351. Introduction to Statistical Methods (4)

Production and Technology
Select 4 of the following courses, for a minimum of 12 credits:
BOT 332. Laboratory Techniques in Plant Biology (3)
CROP 199. Special Studies: Issues in Sustainable Agriculture (1)
CROP 280. Introduction to the Complexity of Oregon Cropping Systems (4)
CROP 310. Forage Production (4)
CROP 330. *World Food Crops (3)
CROP 460. Seed Production (3)
CROP 499. Special Topics [Advanced Organic Farming] (2) or HORT 499. Special Topics [Advanced Organic Farming] (2)
CROP 590. Experimental Design in Agriculture (4)
CSS 320. Principles of Oil and Fiber Crop Production (1)
CSS 321. Principles of Cereal Crop Production (1)
CSS 322. Principles of Potato Production (1)
ENT 499. Special Topics [Insect Agroecology] (3)
or HORT 499. Special Topics [Insect Agroecology] (3)
HORT 260. Organic Farming and Gardening (3)

HORT/CROP 300. Crop Production in

Pacific Northwest Agroecosystems (4)
HORT 351. Floriculture and Greenhouse
Systems (4)
HORT 360. Irrigation and Drainage (4)
HORT 361. Plant Nursery Systems (4)
HORT 452. Berry and Grape Physiology and Culture (4)
HORT 453. Grapevine Growth and
Physiology (3)
HORT 454. Principles and Practices of Vineyard Production (3)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)
PBG 513. Plant Genetic Engineering (3)
SOIL 316. Nutrient Cycling in Agroecosystems (4)

## Plant Synthesis

HORT/CROP 480. Case Studies in Cropping Systems Management (4)

## Ecology and Sustainability <br> Ecosystems Courses

Meets Synthesis Requirements. Each course must be from a different department.

## Contemporary Global Issues

## Select 1 of the following courses:

AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
CROP 330. *World Food Crops (3)
FES 365. *Issues in Natural Resources Conservation (3)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 300. *Sustainability for the Common Good (3)
GEOG 330. *^Geography of International
Development and Globalization (3)
HORT/ENT 331. *Pollinators in Peril (3)
SUS 350. *Sustainable Communities (4)
Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)

## Science, Technology and Society <br> Select 1 of the following courses:

ANS 315. *Contentious Social Issues in Animal Agriculture (3)
ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 348. *Human Ecology (3)
BOT 324. *Fungi in Society (3)
CH 374. *Technology, Energy, and Risk (3)
ENGR 350. *Sustainable Engineering (3)
ENGR 363. *Energy Matters (3)
ENSC 479. *^Environmental Case Studies (3)
FES/TOX 435. *Genes and Chemicals in
Agriculture: Value and Risk (3)
FES/NR/RNG 477. *Agroforestry (3)
FST 421. *Food Law (3)
FW/HSTS 470. *Ecology and History:
Landscapes of the Columbia Basin (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 340. *Introduction to Water Science
and Policy (3)
HORT 330/ENT 300. *Plagues, Pests, and
Politics (3)

HST 481. *Environmental History of the United States (4)
HSTS 421. *Technology and Change (4)
NUTR 312. *Issues in Nutrition and Health (3)

PH 313. *Energy Alternatives (3)
PHL 325. *Scientific Reasoning (4)
PS 476. *Science and Politics (4)
SOIL 395. *World Soil Resources (3)
SUS 304. *Sustainability Assessment (4)

## Total credits=44-55

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)


## Option Code: 785

## SOIL SCIENCE OPTION

The study of soil as a science provides students with a basic understanding of the physical, chemical, and biological properties of this essential natural resource. Soil is the fundamental substrate for life in terrestrial systems. Our food, fiber, and renewable energy are dependent on soils. Our understanding of soils is critical in the successful siting of buildings and construction of roadways and other transportation infrastructure. Our understanding of global and local ecology depends on an awareness of soil and its properties. Soils are the filters of our water and play active roles in storing carbon and other materials that are essential in human existence. As a soil science student, you will explore issues including water quality and management, organic crop production, erosion and sedimentation, land use and reclamation, and soil quality and sustainability. As a soil science professional you will be able to use your knowledge and skills to solve real-world, sustainable living problems in urban, agricultural, forest, rangeland, and other natural systems. Many soil scientists work for the Natural Resource Conservation Service. Some work for other federal, state, or local government agencies as extension educators, researchers, or surveyors. Others hold teaching or research positions in colleges and universities. Soil scientists also work for fertilizer companies, private research laboratories, environmental service companies, insurance companies, and land appraisal firms.

## Major Core

## General Science Core

BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
Choose 1 of the following chemistry series:
CH 121. General Chemistry (5) and CH 122, CH 123. *General Chemistry $(5,5)$

## OR:

CH 231, CH 232, CH 233. *General
Chemistry $(4,4,4)$ and CH 261, CH 262, CH 263. *Laboratory for Chemistry 231, 232, 233 (1,1,1)
MTH 111. *College Algebra (4)

## Orientation

SOIL 101. Introduction to Horticulture, Crop, Soil, and Insect Science (1)

## Agricultural Sciences

ENT 311. Introduction to Insect Pest Management (4)
SOIL 205. *Soil Science (3)
Select 1 of the following courses:
BOT 331. Plant Physiology (4)
CROP 200. Crop Ecology and Morphology (3)
HORT 301. The Biology of Horticulture (3)

Select 1 of the following courses:
HORT 316. Plant Nutrition (4)
SOIL 316. Nutrient Cycling in Agroecosystems (4)

## Experiential Learning

SOIL 401. Research (3)
or SOIL 403. Thesis (3)
or SOIL 410. Internship (3)
SOIL 407. Seminar (1)

## Ecology

Select 1 of the following courses:
BI 370. Ecology (3)
BOT 341. Plant Ecology (4)
HORT 318. ^Applied Ecology of Managed
Ecosystems (3)
RNG 341. Rangeland Ecology and Management (3)

## Technology

SOIL 468. Soil Landscape Analysis (4)

## Writing Intensive Course (WIC)

CROP/SOIL 325. ${ }^{\wedge} \mathrm{Ag}$ and Environmental
Predicaments: A Case Study Approach (3)

## Capstone

SOIL 475. Soil Resource Potentials (4)

## Option Requirements

## Soils Research Track

GEO 201. *Physical Geology (4)
or GEO 202. *Earth Systems Science (4)
or GEO 203. *Evolution of Planet Earth (4)
MTH 251. *Differential Calculus (4)
PH 201, PH 202. *General Physics $(5,5)$
SOIL 435. Environmental Soil Physics (3)
SOIL 445. Environmental Soil Chemistry (3)
SOIL 455. Biology of Soil Ecosystems (4)
SOIL 466. Soil Morphology and
Classification (4)
ST 351. Introduction to Statistical Methods (4)

## OR

## General Soils Track

GEO 201. *Physical Geology (4) or GEO 202. *Earth Systems Science (4) or GEO 203. *Evolution of Planet Earth (4)
MTH 112. *Elementary Functions (4) or MTH 241. *Calculus for Management and Social Science (4)
or MTH 245. *Calculus for Management, Life, and Social Sciences (4)
SOIL 466. Soil Morphology and Classification (4)
ST 351. Introduction to Statistical Methods (4)

Select 1 of the following courses:
SOIL 366. Ecosystems of Wildland Soils (3)
SOIL 435. Environmental Soil Physics (3)
SOIL 445. Environmental Soil Chemistry (3)

SOIL 455. Biology of Soil Ecosystems (4)
Soil Science Electives
Select a minimum of 12 credits from the following:
Nutrient Cycling
AEC 211. Management in Agriculture (4)
AEC 250. *Introduction to Environmental
Economics and Policy (3)
BOT 331. Plant Physiology (4)
BOT 547. Nutrient Cycling (3)
CH 130. General Chemistry of Living Systems (4)
CROP 199. Special Topics: Issues in Sustainable Agriculture (1)
FES 365. *Issues in Natural Resources Conservation (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
HORT 316. Plant Nutrition (4)
RNG 341. Rangeland Ecology and
Management (3)
SOIL 395. *World Soil Resources (3)
Ecampus only
SOIL 525. Mineral-Organic Matter Interactions (3)
TOX 430. Chemical Behavior in the Environment (3)

## Soil Biology/Ecology

ATS 564. Interactions of Vegetation and Atmosphere (3)
BB 314. Cell and Molecular Biology (4)
BI 311. Genetics (4)
BI 370. Ecology (3)
BOT 331. Plant Physiology (4)
BOT 332. Lab Techniques in Plant Biology (3)

BOT 341. Plant Ecology (3)
CH 331. Organic Chemistry (4)
CH 332. Organic Chemistry (4)
FES 341. Forest Ecology (3)
FES/TOX 435. *Genes and Chemicals in
Agriculture: Value and Risk (3)
MB 302. General Microbiology (3)
MB 303. General Microbiology Lab (2)
MB 448. Microbial Ecology (3)
SOIL 366. Ecosystems of Wildland Soils (3)

## Soil Hydrology

CE 412. Hydrology (4)
CE 413. GIS in Water Resources (3)
FE 430. Watershed Processes (4)
FE 434. Forest Watershed Management (4)
GEO 487. Hydrogeology (4)
GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 441. International Water Resources
Management (3)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
PH 202. *General Physics (5)

## Spatial Analysis/Land Use

AEC 250. *Introduction to Environmental Economics and Policy (3)
FE 434. Forest Watershed Management (4)
FES 141. Tree and Shrub Identification (3)
[Terminated winter 2017]
FES 365. *Issues in Natural Resources
Conservation (3)
GEO 432. Applied Geomorphology (3)
GEOG 201. *Foundations of Geospatial
Science and GIS (4)

GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 450. Land Use in the American West (3)

HORT 414. Precision Agriculture (4)
PH 201. *General Physics (5)
PH 202. *General Physics (5)
RNG 341. Rangeland Ecology and
Management (3)
SOIL 366. Ecosystems of Wildland Soils (3)

## Sustainable Systems

AEC 250. *Introduction Environmental Economics and Policy (3)
BI 301. *Human Impacts on Ecosystems (3)
BOT 350. Introductory Plant Pathology (4)
CROP 199. Special Topics: Issues in
Sustainable Agriculture (1)
CROP 300. Crop Production in Pacific
Northwest Agroecosystems (4)
CROP 330. *World Food Crops (3)
CROP 440. Weed Management (4)
CROP 460. Seed Production (3)
CROP 480. Case Studies Cropping Systems Management (4)
GEOG 300. *Sustainability for the Common Good (3)
HORT 260. Organic Farming and Gardening (3)

SOIL 499. Special Topics (1)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)

## Water/Watershed Management

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 351. *Natural Resource Economics and Policy (3)
FE 430. Watershed Processes (4)
FE 434. Forest Watershed Management (4)
FES 365. *Issues Natural Resources
Conservation (3)
FW 326. Integrated Watershed Management (3)

GEO 322. Surface Processes (4)
GEOG 340. *Introduction to Water Science and Policy (3)
PS 475. Environmental Politics and Policy (4)
RNG 355. Desert Watershed Management (4)
RNG 455. Riparian Ecohydrology and
Management (4)
SOIL 366. Ecosystems of Wildland Soils (3)

## Footnotes

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 160
UNDERGRADUATE MINORS


## CROP SCIENCE MINOR

To earn the Crop Science minor, students must complete the courses listed below to total 27 credits.

## Requirements

CROP 200. Crop Ecology and Morphology (3)

CROP/HORT 300. Crop Production in Pacific Northwest Agroecosystems (4)
SOIL 205. *Soil Science (3) and SOIL 206.
*Soil Science Laboratory for SOIL 205 (1)
or CSS 305. Principles of Soil Science (4) and CSS 306. Problem Solving: Soil

Science Applications (1) EOU campus only.
Select a minimum of 15-16 credits from below:
AGRI 438. Exploring World Agriculture (2)
CROP 199. Special Studies: Issues in
Sustainable Agriculture (1-16)
CROP 310. Forage Production (4)
CROP 319. Principles of Field Crop
Production (3)
CROP 330. *World Food Crops (3)
CROP 407. Seminar (1)
CROP/HORT 433. Systematics and
Adaptation of Vegetable Crops (4)
CROP 440. Weed Management (4)
CROP 460. Seed Production (3)
CROP 463. Seed Biology (3)
CROP/HORT 480. Case Studies in Cropping Systems Management (4)
CROP 499. Special Topics in Crop Science and Soil Science (1-16)
CSS 320. Principles of Oil and Fiber Crop Production (1) EOU campus only.
CSS 321. Principles of Cereal Crop Production (1) EOU campus only.
CSS 322. Principles of Potato Production (1)

## EOU campus only.

ENT 311. Introduction to Insect Pest Management (4)
PBG 430. Plant Genetics (3)
PBG 450. Plant Breeding (4)
SOIL 316. Nutrient Cycling in
Agroecosystems (4)
or other CROP or PBG or SOIL or ENT
courses approved by the CSS Advisor

## Total=27

Minimum Grade Requirement: Students pursuing a minor in Crop Science are required to receive a grade of C or better in all CROP, CSS, ENT, HORT, PBG, and SOIL courses taken to complete the minor.

## Footnote:

* Baccalaureate Core Course (BCC)

Minor Code: 119

## SOIL SCIENCE MINOR

To earn the Soil Science minor, students must complete the courses listed below to total 27 credits.

## Soil Core

SOIL 205. *Soil Science (3)
or CSS 305. Principles of Soil Science
(4) and CSS 306. Problem Solving: Soil

Science Applications (1) CSS taught at

## EOU campus only.

CROP/SOIL 325. ^Agricultural and
Environmental Predicaments: A Case
Study Approach (3)
or SOIL 316. Nutrient Cycling in
Agroecosystems (4)
or CSS 315. ^Nutrient Management and Cycling (4) EOU campus only.

## Biological and Physical Sciences

Select 4 credits of biological science upper-division elective(s) in BB, BI, BOT, ENT, FES 240, FES 241, MB or Z
Select 5 credits of physical science upper-division elective(s) in ATS, CH, GEO, GPH, OC, or PH

## Soil Electives

Select a minimum of 9-11 credits from below:
BOT 547. Nutrient Cycling (3)
CROP/SOIL 325. ${ }^{\wedge}$ Agricultural and
Environmental Predicaments: A Case
Study Approach (3)
SOIL 316. Nutrient Cycling in
Agroecosystems (4)
SOIL 366. Ecosystems of Wildland Soils (3)
SOIL 395. *World Soil Resources (3)
SOIL 435. Environmental Soil Physics (3)
SOIL 445. Environmental Soil Chemistry (3)
SOIL 455. Biology of Soil Ecosystems (4)
SOIL 466. Soil Morphology and
Classification (4)
SOIL 468. Soil Landscape Analysis (4)
SOIL 475. Soil Resource Potentials (4)
SOIL 523. Principles of Stable Isotopes (3)
SOIL 525. Mineral-Organic Matter
Interactions (3)
SOIL 536. Vadose Zone Hydrology
Laboratory (1)
or a CSS, CROP or SOIL course approved by the advisor.

## Total=27

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 160

## GRADUATE MAJORS

## CROP SCIENCE (MS, PhD, MAIS)

## Graduate Areas of Concentration

Crop breeding, genetics and cytogenetics
(cereals, oilseeds, potatoes); forage
and pasture management; grain crop production; post-harvest seed technology; seed biology; seed crop physiology; seed production; weed biology; weed management
Specific areas of crop science in which a student can prepare for his or her thesis include cereal breeding and genetics, grass breeding and genetics, forage and pasture management, seed production and technology, seed crop physiology, seed biology, post-harvest seed technology, and weed science.

## Graduate Level Courses in Crop

## Science

CROP 540. Weed Management (4)
CROP 560. Seed Production (3)
CROP 580. Case Studies in Cropping
Systems Management (4)
CROP 590. Experimental Design in Agriculture (4)
CROP 660. Herbicide Science (4)
CROP 670. Physiology of Crop Yield (3)
PBG 550. Plant Breeding (4)
PBG 620. DNA Fingerprinting (1)
PBG 621. Genetic Mapping (1)
PBG 622. Mapping Quantitative Trait Loci (1)
PBG 650. Advanced Plant Breeding and
Quantitative Genetics (3)

## Major Code: 1200

## GRADUATE OPTIONS

## ENTOMOLOGY OPTION

The Entomology (ENT) option at Oregon State University embodies the Land Grant mission of integrated research, teaching, and extension in the context of understanding the basic biology of insects and, with this knowledge, then working with insects in natural and/or managed environments. The discipline of entomology at Oregon State University covers behavior, ecology, evolution, physiology, systematics, molecular biology, chemical ecology, plant-insect interactions, pollination by honey bees and native bees, biological control, integrated pest management, and insecticide toxicology. Oregon State Entomology addresses insect-related issues in aquatic and terrestrial systems in natural, agricultural, forested, and urban environments. Entomologists collaborate with plant scientists, physiologists, pathologists, soil scientists, geneticists, molecular biologists, and experts in other fields.
Students in the Entomology option will conduct thesis research related to insects under the supervision of an entomologist associated with the graduate faculty in Crops or Horticulture, and take courses that provide knowledge and understanding about insects. After completing their degree, students will have gained fundamental knowledge in entomology that may be applied in agricultural, aquatic, forested, natural, and urban environments.

## Requirements

## Thesis Credits (3)

ENT 503. Thesis (3)
Course Credits (9)
Select 9 credits from the following:
ENT 507. Seminar (1)
ENT 520. Insect Ecology (3)
ENT 540. Issues in Insect Toxicology (3)
ENT 599. Special Topics (3)
Z 540. Insect Physiology (3)
Z 575. Insect Biodiversity Survey (4)
Z 577. Aquatic Entomology (4)

## Total=12 Credits

Option Code: 5333

## PLANT BREEDING AND GENETICS OPTION

The Plant Breeding and Genetics (PBG) graduate option at Oregon State University embodies the Land Grant mission of integrated research, teaching and extension in the context of cultivar development and fundamental genetics. Plant breeding is a collaborative discipline spanning everything from classical field approaches to gene manipulation at the molecular level. Breeders regularly cooperate with pathologists, entomologists, soil scientists, physiologists, food scientists, genomicists, molecular biologists and experts in other fields.

Students in the Plant Breeding and Genetics graduate option will learn an interdisciplinary approach to applied plant breeding by taking courses across a broad spectrum of disciplines. The option may be tailored to meet students' career goals including further graduate study, as well as direct entry into public or private sector breeding programs. After completing the degree, students will have the fundamental knowledge of plant breeding that may be applied to a range of crops including annual and perennial horticultural crops, agronomic food and feed crops, and forestry products.

## Additional Requirements

Select 12 credits from the following: BOT/MCB 575. Comparative Genomics (4) CROP 590. Experimental Design in Agriculture (4)
PBG 507. Seminar (1-2)
PBG/HORT 519. Current Topics in Plant
Breeding and Genetics (2)
PBG 530. Plant Genetics (3)
PBG/MCB 541. Plant Tissue Culture (4)
PBG 550. Plant Breeding (4)
PBG/MCB 620. DNA Fingerprinting (1)
PBG/MCB 621. Genetic Mapping (1)
PBG/MCB 622. Mapping Quantitative Trait Loci (1)
PBG 650. Advanced Plant Breeding and Quantitative Genetics (3)
Option Code: 1210

## SOIL SCIENCE (MS, PhD, MAIS)

Graduate Areas of Concentration Environmental soil science, forest soils, nutrient cycling, soil geochemistry, soil conservation and land use, soil fertility and plant nutrition, soil genesis and classification, soil microbiology, soil physics
Faculty research specializations in soil science include ecosystem services, forest soils, management of soil nutrients, mineral-organic matter interactions, soil archeology, soil biogeochemistry, soil microbial ecology, sustainable cropping systems, soil geomorphology, soil genesis, and soil hydrology. Amongst research institutions worldwide, Oregon State campus lands present the most soil diversity for the study of associated problems.

## Graduate Level Courses in Soil <br> Science

SOIL 513. Properties, Processes, and
Functions of Soils (4)
SOIL 523. Principles of Stable Isotopes (3)
SOIL 525. Mineral-Organic Matter
Interactions (3)
SOIL 535. Soil Physics (3)
SOIL 536. Vadose Zone Hydrology Laboratory (1)
SOIL 545. Geochemistry of Soil Ecosystems (4)

SOIL 555. Biology of Soil Ecosystems (4)
SOIL 566. Soil Morphology and
Classification (4)
SOIL 568. Soil Landscape Analysis (4)

SOIL 645. Soil Microbial Ecology (3)
Major Code: 1600

## GRADUATE MINORS

## CROP SCIENCE GRADUATE MINOR

For more details, see the major professor.
Approximately two-thirds (30 graduate credits) of the 45 -credit total required for a graduate degree should be listed in the major field and one-third (15 graduate credits) in the minor field. The student's advisory committee must include a member from the minor department.

## Minor Code: 1200

SOIL SCIENCE GRADUATE MINOR For more details, see the major professor.

Approximately two-thirds (30 graduate credits) of the 45 -credit total required for a graduate degree should be listed in the major field and one-third (15 graduate credits) in the minor field. The student's advisory committee must include a member from the minor department.

## Minor Code: 1600

## - CROP SCIENCE COURSES

CROP 101. INTRODUCTION TO
HORTICULTURE, CROP, SOIL, AND INSECT
SCIENCE (1). Introduces students with interests in horticulture, crop, soil, and insect sciences to educational and professional opportunities in these disciplines. Speakers will discuss opportunities in research and academia as well as in the applied professional job market. Open to all students. CROSSLISTED as ENT 101, HORT 101, SOIL 101.
CROP 199. SPECIAL STUDIES: ISSUES IN SUSTAINABLE AGRICULTURE (1-16). Invited speakers present seminars on specific aspects of agriculture relating to sustainability. Topics vary from term to term and year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 16 credits.
CROP 200. CROP ECOLOGY AND
MORPHOLOGY (3). An introduction to the concepts and principles of crop ecology and morphology and a foundation for other crop science courses. Examines the dynamics and function of crop communities, and the biotic and environmental interactions that influence productivity. Fundamentals of the developmental morphology of crop seeds, seedlings, and plants. Morphological features of seeds and plants in relation to the identification of crop families and species of economic importance.
CROP 280. INTRODUCTION TO THE
COMPLEXITY OF OREGON CROPPING
SYSTEMS (4). An introduction to field cropping systems of western Oregon. Provides students with a broad overview of the complexity of cropping systems and the knowledge required to grow and produce a crop--plant physiology, seed biology, plant pathology, soil fertility, entomology, and weed science. Students will observe a crop under different management strategies to enhance understanding of management approaches.
CROP 300. CROP PRODUCTION IN PACIFIC NORTHWEST AGROECOSYSTEMS (4).
Relation of crop production to human culture and the natural environment. Origins of agriculture and the processes of agricultural change, and productivity and sustainability of specific crop production systems in the Pacific Northwest. History, geography, resource requirements, and key challenges faced are presented. Fundamental
crop production practices in relation to productivity and sustainability. Lec/lab/rec. CROSSLISTED as HORT 300. PREREQS: One year of general biology or equivalent.
CROP 310. FORAGE PRODUCTION (4). Importance of, and current production practices for, forage crops. Lec/lab. PREREQS: (CSS 300 or CROP 300 or HORT 300) and (CSS 305 or CSS 205 or SOIL 205) or equivalent

CROP 319. PRINCIPLES OF FIELD CROP PRODUCTION (3). Provides students with an understanding of the basic principles of field crop production--tillage, soil testing, fertilization, variety selection, planting, and in-season crop management. Management practices for wheat, corn and soybean as PREREQS: CROP 280 or equivalent and SOIL 205
CROP 325. ^AG AND ENVIRONMENTAL
PREDICAMENTS: A CASE STUDY APPROACH
(3). Evaluation of controversial agricultural and environmental problems. Production of clear oral and written documents describing and analyzing problems and specific courses of action utilizing team-building skills. (Writing Intensive Course) CROSSLISTED as SOIL 325. PREREQS: (CSS 305 [D-] or CSS 205 [D-] or SOIL 205 [D-] )
CROP 330. *WORLD FOOD CROPS (3).
Origin, production, utilization, and improvement of the world's major food crops. The role of crop production in global economic and social development; food security and worldwide nutritional requirements. (Bacc Core Course) PREREQS: CSS 200 or CROP 200 recommended.

CROP 340. *PENS AND PLOWS: WRITINGS OF WORKING THE LAND (3). A survey of literature from ancient Greece to the twentieth century focusing on the significance of agricultural life and/ or the natural world. Students read and discuss writings considered critical in the development of Western culture and receive input on the literary significance and the accuracy of agriculture presented within the readings. (Bacc Core Course) Taught via Ecampus only.
CROP 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
CROP 403. THESIS (1-16). Independent, original study and preparation of a senior thesis. This course is repeatable for a maximum of 16 credits. PREREQS: Senior standing.
CROP 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
CROP 405H. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

CROP 407. SEMINAR (1). Senior seminar intended to instruct students on proper techniques for presentation of scientific material. Each student is expected to prepare and present a scientific seminar and to submit written documentation supporting that seminar.
CROP 410. INTERNSHIP (1-6). Professional work experience previously approved and supervised by the department, written report required. This course is repeatable for a maximum of 12 credits. PREREQS: Junior standing.
CROP 414. PRECISION AGRICULTURE (4). Provides insight into the technology available to support precision agriculture and data management planning applications. Examines the concepts and applications of precision agriculture to teach practical use of hardware, equipment and software. An overview of current technology including autonomous vehicles, GPS, soil and crop proximal sensors, imagery and mapping, variable rate control systems, and yield monitors. Lec/lab. CROSSLISTED as HORT 414 PREREQS: Junior standing.

CROP 418. TOXIC PLANTS IN PNW PASTURES
(1). Identifying and understanding ecology and biology of harmful weeds and poisonous plants found in Pacific Northwest pastures and rangelands and determining best management and control options. Taught via Ecampus only. PREREQS: College-level plant biology and/or taxonomy courses.

## CROP 420. SEED SCIENCE AND

TECHNOLOGY (3). Seed formation and factors affecting their development and maturation. Seed structure and chemical composition. Physiological and biochemical aspects of seed germination, dormancy, deterioration and storability. The concept of seed quality, its importance in agriculture, its attributes and impact on field performance. Methods of measuring seed quality of conventional and genetically modified seeds. Taught via Ecampus only. PREREQS: Biology, plant anatomy and/or physiology courses are recommended.
CROP 433. SYSTEMATICS AND ADAPTATION OF VEGETABLE CROPS (4). Covers the botanical and taxonomic relationships, breeding systems and adaptation of vegetable crops. Fresh material is used to illustrate varietal differences and traits of importance. Lec/lab. Offered even years. CROSSLISTED as HORT 433/HORT 533. PREREQS: (BI 102 [D-] or BI 213 [D-] or BI 311 [D-] or HORT 430 [D-] or CSS 430 [D-] or PBG 430 [D-] or HORT 450 [D-] or CSS 450 [D-] or PBG 450 [D-] )
CROP 440. WEED MANAGEMENT (4). Principles of weed control by cultural, biological, and chemical means; weed identification; introduction to herbicides and factors influencing their use. Lec/ lab/rec. PREREQS: One year biological science and one course in organic chemistry.
CROP 460. SEED PRODUCTION (3). An introduction to principles and practices of seedbased genetic delivery systems. Fundamentals of seed crop biology, cultivar maintenance and production methods are stressed. Concepts are illustrated using Pacific Northwest seed crops.
PREREQS: CROP 200 or CSS 200 or equivalent.
CROP 463. SEED BIOLOGY (3). Information about reproductive development of plants such as pollination and fertilization, which is important for the initiation of seed formation, will be provided. Embryo and endosperm development as well as accumulation of seed storage materials, which are major events during seed development, will be covered, as well as the dormancy and germination mechanisms in mature seeds. Lectures and discussions (presentations required for graduate students). Offered even years. CROSSLISTED as HORT 463/HORT 563. Lec/lab.

## CROP 480. CASE STUDIES IN CROPPING

 SYSTEMS MANAGEMENT (4). Decision cases involving the production of field and horticultural crops; individual and group activities; discussion of the decision-making process. Multiple field trips required. A field trip fee will be charged CROSSLISTED as HORT 480/HORT 580. PREREQS: CROP 300 or HORT 300 and senior standing in agriculture.CROP 499. SPECIAL TOPICS IN CROP
SCIENCE AND SOIL SCIENCE (1-16). Technical knowledge and skills development courses offered in a wide array of course formats. Topics vary from term to term and year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 16 credits.
CROP 499H. SPECIAL TOPICS IN CROP
SCIENCE AND SOIL SCIENCE (1-16). Technical knowledge and skills development courses offered in a wide array of course formats. Topics vary from term to term and year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required

CROP 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

CROP 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Master's-level graduate students.
CROP 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
CROP 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
CROP 507. SEMINAR (1). Graded P/N. This course is repeatable for a maximum of 99 credits.
CROP 509. PRACTICUM IN TEACHING
(1-3). Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. CROSSLISTED as ENT 509, PBG 509, SOIL 509. This course is repeatable for a maximum of 9 credits.

## CROP 520. SEED SCIENCE AND

TECHNOLOGY (3). Seed formation and factors affecting their development and maturation. Seed structure and chemical composition. Physiological and biochemical aspects of seed germination, dormancy, deterioration and storability. The concept of seed quality, its importance in agriculture, its attributes and impact on field performance. Methods of measuring seed quality of conventional and genetically modified seeds. Taught via Ecampus only. PREREQS: Biology, plant anatomy and/or physiology courses are recommended.

CROP 533. SYSTEMATICS AND ADAPTATION OF VEGETABLE CROPS (4). Covers the botanical and taxonomic relationships, breeding systems and adaptation of vegetable crops. Fresh material is used to illustrate varietal differences and traits of importance. Lec/lab. CROSSLISTED as HORT 433/HORT 533. PREREQS: BI 102 or B 213 or BI 311 or HORT 430 or CSS 430 or PBG 430 or HORT 450 or CSS 450 or PBG 450
CROP 540. WEED MANAGEMENT (4). Principles of weed control by cultural, biological, and chemical means; weed identification; introduction to herbicides and factors influencing their use. Lec/ lab/rec. PREREQS: One year biological science and one course in organic chemistry.
CROP 560. SEED PRODUCTION (3). An introduction to principles and practices of seedbased genetic delivery systems. Fundamentals of seed crop biology, cultivar maintenance and production methods are stressed. Concepts are illustrated using Pacific Northwest seed crops.
PREREQS: CROP 200 or CSS 200 or equivalent.
CROP 563. SEED BIOLOGY (3). Information about reproductive development of plants such as pollination and fertilization, which is important for the initiation of seed formation, will be provided. Embryo and endosperm development as well as accumulation of seed storage materials, which are major events during seed development, will be covered, as well as the dormancy and germination mechanisms in mature seeds. Lectures and discussions (presentations required for graduate students). Offered even years. CROSSLISTED as HORT 463/HORT 563. Lec/lab.
CROP 580. CASE STUDIES IN CROPPING SYSTEMS MANAGEMENT (4). Decision cases involving the production of field and horticultural crops; individual and group activities; discussion of the decision-making process. Multiple field trips required. A field trip fee will be charged CROSSLISTED as HORT 480/HORT 580. PREREQS: CROP 300 or HORT 300 and senior standing in agriculture.

CROP 590. EXPERIMENTAL DESIGN IN
AGRICULTURE (4). Field layout, analysis, and interpretation of basic experimental designs used in agronomy and plant breeding and including field plot techniques such as optimum plot size and shape, factorial arrangement, replication, subsampling, randomization, and blocking. Recitation provides practical experience with SAS. Lec/rec.

PREREQS: ST 351 or equivalent.
CROP 599. SPECIAL TOPICS IN CROP
SCIENCE AND SOIL SCIENCE (1-16). Technical
knowledge and skills development courses offered in a wide variety of course formats. Topics vary from term to term and year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 16 credits.

CROP 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

CROP 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
PREREQS: PhD-level graduate students.
CROP 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
CROP 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
CROP 607. SEMINAR (1). Graded P/N. This course is repeatable for a maximum of 99 credits.
CROP 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
CROP 609. PRACTICUM IN TEACHING (1-3).
Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 9 credits.
CROP 660. HERBICIDE SCIENCE (4).
Absorption, movement, and mechanism of action in plants; behavior of herbicides in soil. Offered alternate years. PREREQS: BOT 331 and (CSS 440 or CSS 540 or CROP 440 or CROP 540)
CROP 670. PHYSIOLOGY OF CROP YIELD (3).
Concepts of crop growth and production in relation to environmental and physiological factors and their interactions; current literature. PREREQS: BOT 331 or equivalent.
CROP 699. SPECIAL TOPICS IN CROP SCIENCE AND SOIL SCIENCE (1-16). This course is repeatable for a maximum of 16 credits.

## ■ CROP AND SOIL SCIENCE COURSES

CSS 205. *SOIL SCIENCE (4). Introduction to the chemical, physical and biological nature of soils. Examines the functions of soil as a medium for plant growth, a recycling system for nutrients and wastes, a modifier of atmospheric chemistry, a habitat for soil organisms, a system for water purification, and an engineering medium. Field and laboratory projects provide an understanding of fundamental soil science principles and the impact of human activities on soil quality and sustainability. Lec/lab. (Bacc Core Course) Taught via Ecampus only.
CSS 305. PRINCIPLES OF SOIL SCIENCE (4). Origin, formation, classification, physical, chemical, and biological characteristics; ecosystem functions of soils; effects of soil management on agricultural and forest crop production. Field trips. Taught at EOU LaGrande campus only. PREREQS: Two quarters of college chemistry or equivalent. CSS 306 recitation is recommended.
CSS 306. PROBLEM SOLVING: SOIL SCIENCE APPLICATIONS (1). Problem solving for, and in-depth exploration of, Principles of Soil Science (CSS 305). Real-world problems requiring knowledge of soil physical, chemical, and biological properties. Taught at EOU LaGrande campus only. COREQS: CSS 305
CSS 315. ^NUTRIENT MANAGEMENT AND CYCLING (4). Nutrient forms, transformations, and plant availability as influenced by chemical and biological reactions in soils; soil pH and management of acid and alkaline soils; characteristics and use of fertilizers, soil
amendments and organic wastes. Labs include routine soil testing procedures, computer applications for soil fertility management, and field trips. Lec/lab. (Writing Intensive Course) Taught at EOU LaGrande campus only. PREREQS: CSS 305 [D-] and CH 122. Courses in computers are recommended.

CSS 320. PRINCIPLES OF OIL AND FIBER CROP PRODUCTION (1). An overview of production practices and characteristics of oil seed, essential oil, and fiber crops. Taught at EOU LaGrande campus only. PREREQS: CSS 300 or equivalent and CSS 305
CSS 321. PRINCIPLES OF CEREAL CROP
PRODUCTION (1). An overview of the principles underlying small grain production practices in the Pacific Northwest. Taught at EOU LaGrande campus only. PREREQS: CSS 300 or equivalent and CSS 305

## CSS 322. PRINCIPLES OF POTATO

PRODUCTION (1). Principles and practices governing all aspects of potato production, storage and use. Taught at EOU LaGrande campus only. PREREQS: CSS 300 or equivalent and CSS 305

## - PLANT BREEDING AND GENETICS COURSES

PBG 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PBG 199H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
PBG 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PBG 299H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
PBG 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PBG 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
PBG 403. THESIS (1-16). Graded P/N. This course is repeatable for a maximum of 99 credits.
PBG 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
PBG 405H. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

PBG 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

PBG 409. TEACHING PRACTICUM (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
PBG 410. INTERNSHIP (1-12). This course is repeatable for a maximum of 12 credits.
PBG 430. PLANT GENETICS (3). Introduction to the principles of plant genetics with an emphasis on the structure and function of economically important plant genomes. PREREQS: One year of biology and chemistry.
PBG 431. PLANT GENETICS RECITATION (1). Review and demonstration of plant genetics principles.
PBG 441. PLANT TISSUE CULTURE (4). Principles, methods, and applications of plant tissue culture. Laboratory is important part of course. Topics include callus culture, regeneration, somaclonal variation, micropropagation, anther culture, somatic hybridization, and transformation. Lec/lab. PREREQS: (BI 311 and BOT 331) or PBG 430 or CSS 430
PBG 450. PLANT BREEDING (4). An introduction to the genetic improvement of self-pollinated, cross-pollinated, and asexually propagated species and the genetic principles on which
breeding methods are based. Examples are drawn from a wide range of crops, including cereal grains, grasses, fruits, nuts, and vegetables; guest lecturers discuss their breeding programs. Additional topics include crop evaluation, germplasm preservation, disease resistance, and biotechnology. Lec/lab. PREREQS: BI 311 or PBG 430

PBG 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PBG 499H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
PBG 501. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
PBG 503. THESIS (1-16). Graded P/N. This course is repeatable for a maximum of 999 credits.
PBG 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
PBG 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

PBG 507. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
PBG 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
PBG 509. PRACTICUM IN TEACHING (1-3). Developing skills and competence in teaching under staff supervision; organization and presentation of instructional materials by assisting in laboratory, recitation, and lectures. CROSSLISTED as ENT 509, CROP 509, SOIL 509. This course is repeatable for a maximum of 9 credits.
PBG 510. INTERNSHIP (4). This course is repeatable for a maximum of 12 credits.
PBG 513. PLANT GENETIC ENGINEERING (3). Principles, methods, and recent developments in the genetic engineering of higher plants. Offered alternate years. PREREQS: (BI 311 and BOT 331) or (CSS 430 or CSS 530) or (HORT 430 or HORT 530) or (PBG 430 or PBG 530)

PBG 519. CURRENT TOPICS IN PLANT BREEDING AND GENETICS (2). Provides an advanced understanding of plant breeding and genetics and their relationship to other disciplines through critical analysis of the scientific literature. Students practice synthesizing information and presenting findings to peers. Instructors, topics, and specific learning objectives vary from term to term. CROSSLISTED as HORT 519. This course is repeatable for a maximum of 12 credits.
PBG 530. PLANT GENETICS (3). Introduction to the principles of plant genetics with an emphasis on the structure and function of economically important plant genomes. PREREQS: One year of biology and chemistry.
PBG 541. PLANT TISSUE CULTURE (4). Principles, methods, and applications of plant tissue culture. Laboratory is important part of course. Topics include callus culture, regeneration, somaclonal variation, micropropagation, anther culture, somatic hybridization, and transformation. Lec/lab. CROSSLISTED as MCB 541. PREREQS: (BI 311 and BOT 331) or PBG 430
PBG 550. PLANT BREEDING (4). An introduction to the genetic improvement of self-pollinated, cross-pollinated, and asexually propagated species and the genetic principles on which breeding methods are based. Example are drawn from a wide range of crops, including cereal grains, grasses, fruits, nuts, and vegetables; guest lecturers discuss their breeding programs. Additional topics include crop evaluation, germplasm preservation, disease resistance, and biotechnology. Lec/lab. PREREQS: BI 311 or PBG 430 or PBG 530
PBG 551. BREEDING CLONAL CROPS (1). The overall goal of the course is to gain fundamental
knowledge of breeding methods for clonal crops these methods are different from those used for seed-propagated crops. Specific examples from a wide array of plant species (tree fruits, berries, tree nuts, potato, sweet potato, cassava, cacao) will be provided to illustrate application of the fundamental knowledge. PREREQS: PBG 450 [C] or PBG 550 [C] and the instructor will waive the enforced prerequisite requirement for students with comparable experience and a desire to learn more about plant breeding.
PBG 591. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PBG 598. PLANT CHROMOSOME BIOLOGY
(3). Exploration of the relationship between chromosome number, structure, and behavior to gene inheritance, organization, and expression. Discussion of chromosome manipulation strategies for genomics research, genetic analysis and plant breeding. PREREQS: 6 credits of genetics or equivalent.

PBG 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

PBG 601. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

PBG 603. DISSERTATION (1-16). Graded P/N. This course is repeatable for a maximum of 999 credits.
PBG 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
PBG 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
PBG 609. PRACTICUM INTEACHING (1-3).
Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 9 credits.
PBG 620. DNA FINGERPRINTING (1). Principles and methods for producing and analyzing DNA fingerprints. Offered even years. CROSSLISTED as MCB 620. PREREQS: BI 311 or CSS 430 or CSS 530 or PBG 430 or PBG 530 or HORT 430 or HORT 530 or equivalent.
PBG 621. GENETIC MAPPING (1). Principles and methods for constructing genetic maps comprised of molecular and other genetic markers. Offered even years. CROSSLISTED as MCB 621
PREREQS: BI 311 or CSS 430 or CSS 530 or PBG 430 or PBG 530 or HORT 430 or HORT 530 or equivalent.
PBG 622. MAPPING QUANTITATIVE TRAIT
LOCI (1). Principles and methods for mapping genes underlying phenotypically complex traits. Offered even years. CROSSLISTED as MCB 622. PREREQS: CROP 590 or CSS 590 or ST 513 or equivalent.
PBG 650. ADVANCED PLANT BREEDING AND QUANTITATIVE GENETICS (3). Pedigree, bulk, single-seed-descent, doubled haploid, backcross, testcross, mass, and half-sib, S~1~, and S~2~ family breeding methods; breeding hybrids and selecting sources of alleles for developing superior hybrids; the nature and consequences of genotype by environment interactions; markerassisted backcross and inbred line breeding; quantitative trait locus mapping; random linear models; designing and analyzing cultivar, line, and family selection experiments. Offered odd years. PREREQS: (CSS 430 or CSS 530 or PBG 430 or PBG 530 or HORT 430 or HORT 530) and (CSS 450 or CSS 550 or PBG 450 or PBG 550 or HORT 450 or HORT 550) and (ST 411 or ST 511) and (ST 412 or ST 512) and (ST 413 or ST 513)
PBG 691. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PBG 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## SOIL SCIENCE COURSES

SOIL 101. INTRODUCTION TO HORTICULTURE, CROP, SOIL, AND INSECT SCIENCE (1).
Introduces students with interests in horticulture, crop, soil, and insect sciences to educational and professional opportunities in these disciplines. Speakers will discuss opportunities in research and academia as well as in the applied professional job market. Open to all students. CROSSLISTED as CROP 101, ENT 101, HORT 101.

SOIL 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 199H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
SOIL 205. SOIL SCIENCE (3). Introduction to the chemical, physical and biological nature of soils. Examines how soils function in terms of plant growth, nutrient supply, the global carbon cycle, ecological habitat, and water purification. Community-based learning projects provide hands-on experience with fundamental soil science principles and the impact of human activities on soil quality and sustainability. Lec. (Bacc Core Course if taken with SOIL 206 or FOR 206) PREREQS: SOIL 206* [D-] or FOR 206* [D-]

SOIL 206. *SOIL SCIENCE LABORATORY FOR SOIL 205 (1). Students will gain handson experience with soil science concepts and applications. Laboratory exercises and field trips will help students develop proficiency in the methods/tools for analyzing soil chemistry, biology, morphology, physical properties, and soil forming factors. Skills will be taught in the context of soils; social, economic, and environmental importance. (Bacc Core Course if taken with SOIL 205) COREQS: SOIL 205
SOIL 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 299H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
SOIL 316. NUTRIENT CYCLING IN
AGROECOSYSTEMS (4). Nutrient forms, transformations, and cycling. Diagnosis and correction of nutrient deficiencies, pH and salinity. Impact of nutrient management practices on crop production, soil health, nutrient use efficiency, and environmental quality. Organic and inorganic fertilization. Labs include soil sampling and testing procedures, data collection on soil and plants, computer applications for soil fertility management, and field trips. Lec/lab. PREREQS: CH 121 [D-] and (SOIL 205 [D-] or CSS 205 [D-] or CSS 305 [D-] )
SOIL 325. ^AG AND ENVIRONMENTAL PREDICAMENTS: A CASE STUDY APPROACH (3). Evaluation of controversial agricultural and environmental problems. Production of clear oral and written documents describing and analyzing problems and specific courses of action utilizing team-building skills. (Writing Intensive Course) CROSSLISTED as CROP 325. PREREQS: (CSS 305 [D-] or CSS 205 [D-] or SOIL 205 [D-] )
SOIL 366. ECOSYSTEMS OF WILDLAND SOILS (3). Focuses on soils that occur in relatively undisturbed ecosystems such as forests and rangelands. Topics covered include properties and processes specific to understanding and managing the soil resource in these areas. An overview of US Soil Taxonomy will also be given. PREREQS: (SOIL 205 [D-] or CSS 205 [D-] or CSS 305 [D-] ) and an understanding and appreciation of environmental chemistry, biology, ecology, and physics is needed for this course.
SOIL 388. SOIL SYSTEMS AND PLANT GROWTH (4). Introduces soils as providers of critical resources for plant growth. Explains how soils supply water, air, thermal energy and nutrients to plants. Shows that sustainable management of soil resources requires substantial
understanding of their role in the functioning of natural, forest, and agricultural systems. Explains controls on stocks and availabilities of individual soil resources and mechanisms making these resources plant-available. PREREQS: ((SOIL 205 [D-] and (SOIL 206 [D-] or FOR 206 [D-] )) or CSS 205 [D-] ) and (CH 121 [D-] or CH 231 [D-] ) and (BOT 220 [D-] or (BI 204 [D-] or BI 205 [D-] or BI 206 [D-] ) or (BI 211 [D-] or BI 212 [D-] or BI 213 [D-] ))
SOIL 395. *WORLD SOIL RESOURCES (3). The properties, global distribution, and agricultural productivity of major world soil groups are described. Potentials for human-accelerated soil degradation are introduced for each soil group, and reasons for conflicting assessments of degradation are discussed. (Bacc Core Course) Offered via Ecampus only. PREREQS: CH 121 [D-] and /or equivalent.

SOIL 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

SOIL 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

SOIL 403. THESIS (1-16). Independent, original study and preparation of a senior thesis. This course is repeatable for a maximum of 16 credits. PREREQS: Senior standing.
SOIL 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing.
SOIL 405H. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing and Honors College approval required.
SOIL 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing.
SOIL 408. WORKSHOP (1-16). Evaluation and judging of soils in Oregon and other states; directed studies of soil morphology, soil survey, soil fertility, soil physics, soil chemistry, soil biology, and soil information systems. This course is repeatable for a maximum of 16 credits.
SOIL 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 410. INTERNSHIP (1-6). Professional work experience previously approved and supervised by the department, written report required. This course is repeatable for a maximum of 12 credits. PREREQS: Junior standing.
SOIL 435. ENVIRONMENTAL SOIL PHYSICS
(3). Covers principles of soil physical properties and processes as they relate to agricultural, hydrological and environmental problems. Lec/lab. Offered odd years. PREREQS: (CSS 205 [D-] or CSS 305 [D-] or SOIL 205 [D-] ) and CH 123 and MTH 241 and PH 201 or equivalent.

SOIL 445. ENVIRONMENTAL SOIL CHEMISTRY (3). Structural chemistry of clay minerals and organic matter, cation and anion exchange, and soil solution equilibria of soils. Ion exchange, mineral-solution equilibria, and adsorption reactions of silicate clays, oxides, and organic matter are emphasized. Covers the sorption behavior of environmental contaminants and the weathering reactions that govern the transport of reactive solutes through soils. Lec/rec. Offered odd years.

SOIL 455. BIOLOGY OF SOIL ECOSYSTEMS (4). A detailed study of the organisms that live in the soil and their activities in the soil ecosystems, soil as a habitat for organisms, taxonomy and biology of soil organisms, fundamentals of nutrient cycles, special topics in soil biology, review basis of soil microbial and ecological principles. Lec/ rec/lab. PREREQS: (CSS 305 or CSS 205 or SOIL 205). Courses in chemistry, physics, and microbiology are recommended.
SOIL 466. SOIL MORPHOLOGY AND
CLASSIFICATION (4). Observation and
description of soil properties in the field; writing soil profile descriptions; evaluating criteria that define features used to classify soils; using soil classification keys. Lec/lab. PREREQS: (SOIL 205 [D-] or CSS 205 [D-] or CSS 305 [D-] )

## SOIL 468. SOIL LANDSCAPE ANALYSIS

(4). Principles of soil geomorphology, soil stratigraphy, and surficial processes as applied to understanding the soil system and landscape scales. Emphasis on field observations of soils, geomorphic surfaces, and environment. Field project entails design of soil survey map units, field mapping and GIS cartographic techniques. Lec/lab. Offered even years. PREREQS: (SOIL 466* [D-] or CSS 466* [D-] )
SOIL 475. SOIL RESOURCE POTENTIALS (4). Course builds on knowledge from introductory pedology, soil chemistry, soil physics and soil biology to practice the evaluation of nutrient availability and soil moisture storage in the rooting space. Results from the application of pedotransfer functions to observations at the pit wall are translated into quantitative, numerical expressions of soil resource potentials. Lec/lab. PREREQS: (SOIL 435 [D-] and SOIL 455 [D-] and SOIL 466 [D-] )

SOIL 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing
SOIL 499H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing and Honors College approval required
SOIL 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.

SOIL 503. THESIS/DISSERTATION (1-16). This course is repeatable for a maximum of 999 credits.

SOIL 505. READING AND CONFERENCE (1-16)
This course is repeatable for a maximum of 16 credits.
SOIL 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 508. WORKSHOP (1-16). Evaluation and judging of soils in Oregon and other states; directed studies of soil morphology, soil survey, soil fertility, soil physics, soil chemistry, soil biology, and soil information systems. This course is repeatable for a maximum of 16 credits.

SOIL 509. PRACTICUM IN TEACHING (1-3). Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. CROSSLISTED as ENT 509, CROP 509, PBG 509. This course is repeatable for a maximum of 9 credits.
SOIL 510. INTERNSHIP (1-6). Professional work experience previously approved and supervised by the department, written report required. This course is repeatable for a maximum of 6 credits.

SOIL 511. SOIL: A NATURAL AND SOCIETAL
RESOURCE (3). Serves degree- and non-degree-seeking graduate learners wanting soil science knowledge but having minimal science background. Understanding soil physical, chemical, and biological properties promotes informed soil management while supporting individual to global societal values. Established curriculum facilitates graduate degrees or certificates, continuing education, professional certification, and self-improvement goals. A highly interactive social media framework supports weekly student-student and instructor-student learning interactions. PREREQS: Graduate standing: a 4-year degree from any accredited university.

SOIL 513. PROPERTIES, PROCESSES, AND FUNCTIONS OF SOILS (4). Physical, chemical, biological, and landscape properties; processes of fluid retention and movement, weathering and cation exchange, decomposition and $\mathrm{C}-\mathrm{N}$ dynamics, erosion and sedimentation; functions of hydrologic regulation, nutrient cycling, environmental protection, ecological habitat. PREREQS: CH 223 or CH 233 or CH 233 H or equivalent
SOIL 515. SOIL FERTILITY MANAGEMENT
(3). Management of plant nutrients in agronomic systems; diagnosis of nutrient availability and prediction of crop response to fertilizers; interactions between nutrient response and chemical, physical and biological properties of soils. PREREQS: CSS 315 and courses in statistics, chemistry and plant physiology.
SOIL 523. PRINCIPLES OF STABLE ISOTOPES
(3). An introduction to the theory and use of stable isotopes. Applications of stable isotopes to soil science, plant physiology, hydrology, and ecosystem studies. Offered even years.
SOIL 525. MINERAL-ORGANIC MATTER INTERACTIONS (3). Studies the fundamental properties of the mineral-organic interface and the mechanisms of interaction between mineral and organic soil properties. PREREQS: CSS 305 or CSS 205 or SOIL 205 or equivalent.

SOIL 535. SOIL PHYSICS (3). Theoretical elements of soil physical properties and processes related to agricultural, hydrological and environmental problems. Offered fall term in even years. PREREQS: Recommended are CSS 305, CSS 205, SOIL 205, MTH 241, CH 123, PH 201 or equivalent.

## SOIL 536. VADOSE ZONE HYDROLOGY

LABORATORY (1). Experimental elements of soil physical properties and processes allowing practical experience in the measurement and analysis of soil physical processes related to agricultural, hydrological and environmental problems. Weekly laboratory. Offered even years. PREREQS: CH 123 and PH 201 or equivalent.
SOIL 545. ENVIRONMENTAL SOIL CHEMISTRY (3). Structural chemistry of clay minerals and organic matter, cation and anion exchange, and soil solution equilibria of soils. Ion exchange, mineral-solution equilibria, and adsorption reactions of silicate clays, oxides, and organic matter are emphasized. Covers the sorption behavior of environmental contaminants and the weathering reactions that govern the transport of reactive solutes through soils. Lec/rec. Offered odd years.
SOIL 547. NUTRIENT CYCLING (3). Reviews and discusses ecosystem-level biogeochemical concepts for terrestrial and freshwater ecosystems, primarily by reading and discussing classic and current literature to determine the state-of-knowledge and uncertainties associated with it. Topics include root nutrient uptake mechanisms, soil chemical and biochemical transformations in different soil and ecosystems, measuring soil solution and watershed fluxes, soil organic matter formation and structure, the meaning of sustainability, the concept of N saturation in terrestrial ecosystems, and the use of natural abundance and tracer isotopes in ecosystem biogeochemistry. While forest biogeochemical processes will be emphasized, desert, aquatic, wetland, and prairie ecosystems will also be explored. CROSSLISTED as BOT 547 PREREQS: College-level chemistry and biology and one class in ecology (BI 370 or equivalent) and/or soils (e.g., SOIL 205).
SOIL 555. BIOLOGY OF SOIL ECOSYSTEMS (4). A detailed study of the organisms that live in the soil and their activities in the soil ecosystems, soil as a habitat for organisms, taxonomy and biology of soil organisms, fundamentals of nutrient cycles, special topics in soil biology, review basis of soil microbial and ecological principles. Lec/ rec/lab. PREREQS: CSS 305 or CSS 205 or

SOIL 205. Courses in chemistry, physics, and microbiology are recommended.

SOIL 566. SOIL MORPHOLOGY AND
CLASSIFICATION (4). Observation and description of soil properties in the field; writing soil profile descriptions; evaluating criteria that define features used to classify soils; using soil classification keys. Lec/lab. PREREQS: CSS 305 or CSS 205 or SOIL 205

SOIL 568. SOIL LANDSCAPE ANALYSIS
(4). Principles of soil geomorphology, soil stratigraphy, and surficial processes as applied to understanding the soil system at landscape scales. Emphasis on field observations of soils, geomorphic surfaces, and environment. Field project entails design of soil survey map units, field mapping and GIS cartographic techniques. Lec/lab. Offered odd years. PREREQS: (CSS 566* [C] or SOIL 566* [C] )
SOIL 591. SELECTED TOPICS (1-16). Course content and title will change with each offering. This course is repeatable for a maximum of 16 credits.

SOIL 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

SOIL 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 603. THESIS/DISSERTATION (1-16). This course is repeatable for a maximum of 999 credits.
SOIL 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 609. PRACTICUM IN TEACHING (1-3).
Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 9 credits.
SOIL 635. ADVANCED SOIL PHYSICS (3). Explores theoretical development of a key topic in soil physics. Topics may include evaporation from porous media, multiphase fluid movement, soil deformation, and soil salinization, with respect to either historical development, present day understanding or future needs of the field. Course structure incorporates lectures and discussion requiring intensive student participation. Offered odd years. PREREQS: (CSS 535 [C] or SOIL 535 [C] ) and a working knowledge of soil physics and a passing grade in a graduate-level soil physics course.

SOIL 645. SOIL MICROBIAL ECOLOGY (3). An advanced treatment of current topics in soil microbiology, with an emphasis on the ecology of soil microorganisms. Topics include the size, composition, diversity, and activity of soil microbial communities, linkage of microbial community structure to ecosystem functions, and applications of molecular biology to soil microbiology. Offered even years. PREREQS: Recommend SOIL 455 or CSS 455 or MB 448.
SOIL 684. GLOBAL BIOGEOCHEMICAL
CYCLES (4). An in-depth treatment of global biogeochemical cycles, focusing on cycles of carbon, oxygen, nitrogen, phosphorus, and sulfur in the atmosphere, hydrosphere, and lithosphere. CROSSLISTED as GEO 684. PREREQS: One year of college-level physics and chemistry, including introductory biology or equivalent. One year of graduate course work in soil, earth, ocean, atmospheric, or forest science or equivalent or consent of instructor

SOIL 691. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

SOIL 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## ■ SUSTAINABILITY COURSES

## SUS 102. *INTRODUCTION TO

ENVIRONMENTAL SCIENCE AND
SUSTAINABILITY (4). An introduction to the science behind critical environmental issues and the biological basis of creating and maintaining sustainable ecosystems. Focus on such questions as: how do we decide what to believe about environmental issues? How do we quantify, restore, and value biodiversity? What is valid science in the global warming debate? Lec/lab. (Bacc Core Course)
SUS 103. *INTRODUCTION TO CLIMATE
CHANGE (4). An introduction to the principles of climate change science with an emphasis on the empirical evidence for climate change. Students will learn critical thinking skills to assess such questions as: How do we determine the processes controlling global warming? How do we predict trends in climate change? How do we calculate and understand uncertainty in these predictions? What is valid science in the global warming debate? Lec/lab. (Bacc Core Course)
SUS 304. *SUSTAINABILITY ASSESSMENT (4). Explores theories and application of sustainability assessment techniques and analysis methods.
Practical application of globally recognized assessment protocol, including checklists, footprinting, life-cycle analysis and the indicators used to conduct these analyses. Emphasis on ecological and social indicators, although economic indicators are explored. (Bacc Core Course)

SUS 350. *SUSTAINABLE COMMUNITIES
(4). Introduction to the concept of sustainable communities from a multidisciplinary perspective. Instructors from a broad array of disciplines and professions. Development of holistic thinking skills and innovative solutions to complex problems. (Bacc Core Course)

SUS 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SUS 410. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.
SUS 420. SOCIAL DIMENSIONS OF
SUSTAINABILITY (3). Focuses on the social aspects of sustainability, including how the environment, the economy, social life interact to create the world we live in. Explores how social institutions (school, government, business, family) contribute to sustainability and promote or discourage social and environmental justice at local and global scales. Offered at OSU-Cascades and via Ecampus.

SUS 499. SPECIAL TOPICS (3). This course is repeatable for a maximum of 15 credits.

SUS 512. TOPICS IN THE SCIENCE OF SUSTAINABILITY (4). Provides a graduatelevel introduction to key concepts and issues in environmental science and sustainability, targeted at business-oriented graduate and post-bacc students who do not have a science background. The course is a core requirement of the Sustainable Business certificate program offered jointly by the College of Business (COB) and the College of Agricultural Sciences» (CAS) Sustainability Double-Degree (SDD) Program.
SUS 514. SUSTAINABILITY PLANNING AND ASSESSMENT (4). Sustainability is fundamentally about balancing social, economic and ecological systems. This course examines a range of different methodologies for measuring and evaluating performance towards established sustainability criteria and indicators. Students will critically evaluate tools for making sustainable decisions and understand the limitations of
individual assessment approaches in different contexts. Specific assessment techniques to be explored include ecological footprinting, sustainable community indicators, greenhouse gas emissions inventories, sustainability checklists, environmental management systems (ISO standards), life-cycle analysis, and business sustainability reporting. Students will leave the course with the fundamental skills required to complete sustainability assessments via globally relevant approaches.
SUS 599. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

## ENTOMOLOCY PROCRAM

## W. Daniel Edge, Program Contact

College of Agricultural Sciences
430E StAg
Oregon State University
Corvallis, OR 97331
541-737-2910
Email: daniel.edge@oregonstate.edu Website: http://entomology.oregonstate. edu/

## FACULTY

Botany and Plant Pathology McEvoy
Crop and Soil Science Dreves, Reitz, Rao, Rondon
Environmental and Molecular Toxicology Jepson
Fisheries and Wildlife DeBano, Wooster
Forest Ecosystems and Society Ross
Horticulture Choi, Hooven, Lambrinos, Langellotto-Rhodaback, Lee, Miller, Rosetta, Sagili, Shearer, Walton, Wiman
Zoology Giebultowicz, Lytle, Maddison, Marshall

Graduate students have the option of obtaining their degree in the specific academic department of their major professor.

## Undergraduate Minor

Entomology (Administered by the Department of Horticulture in the College of Agricultural Sciences.)

## Graduate Major

Entomology (MA, MS, PhD)
Graduate Area of Concentration Entomology
Graduate Option
Entomology

## Graduate Minor

Entomology

## GRADUATE AREA OF CONCENTRATION

Graduate students pursuing an entomology area of concentration have the opportunity to study and conduct research within a number of graduate programs across the university in the Departments of Horticulture, Crop and Soil Science, Fisheries and Wildlife, and Forest Eco-
systems and Society. Graduate students obtain their degree within the academic department of their major professor.

Entomologists continue to be at the forefront of basic and applied research in molecular biology, ecology, evolutionary biology, biodiversity, and pest management. The modern fields of physiology, ecology and systematics have their origins in research originally undertaken with insects, and entomologists help lead these disciplines today. Given the unique importance of insects in biodiversity and ecosystem processes, their roles in crop production and public health, and their value as model organisms for the exploration of basic scientific questions, there is demand for graduates who have acquired entomological expertise.

The Entomology Program is a component of the Agricultural Experiment Station, which has many research facilities for students and staff, including farms, greenhouses, an aquatic insect laboratory, and a forest insect research laboratory. In addition to OSU faculty, state and federal entomologists stationed across the state are available for consultation in their fields of specialization. The Oregon State Arthropod Collection has nearly $3,000,000$ specimens of insects and mites and is a recognized center for research in insect systematics and biodiversity.

## ENTOMOLOGY MINOR

The Entomology minor is available to all OSU students. A minimum of 27 credits is required, at least 12 of which must be upper-division credits.
Select one course from the following:
ENT 311. Introduction to Insect Pest Management (4)
Z 365. Biology of Insects (4)
Select the remaining 23 credits from the following:
ENT 101. Introduction to Horticulture, Crop, Soil, and Insect Science (1)
ENT 300/HORT 330. *Plagues, Pests, and Politics (3)
ENT 311. Introduction to Insect Pest Management (4)
ENT 322. Honey Bee Biology and Beekeeping (3)
ENT 401. Research (1-6) ${ }^{\mathbf{1}}$
ENT 405. Reading and Conference (1-6)
ENT 407. Seminar (1)
ENT 410. Internship (1-6) ${ }^{\mathbf{1}}$
ENT 420. Insect Ecology (3)
ENT 440. Issues in Insect Toxicology (3)

## Ecampus only.

ENT 499. Special Topics (variable credits)
Z 365. Biology of Insects (4)
Z 440. Insect Physiology (3)
Z 477. Aquatic Entomology (4)
And entomology and life sciences courses approved in advance by the Entomology minor advisor.

## Total=27 minimum credits

Footnotes:
${ }^{1}$ A maximum of 6 credits can be counted toward the minor from ENT 401 and ENT 410.

## Minor Code: 472

ENTOMOLOGY (MA, MS, PhD)

## Graduate Areas of Concentration Entomology

The Entomology Graduate Program offers qualified candidates opportunities for graduate study and research leading to the Master of Arts, Master of Science, and Doctor of Philosophy degrees. In keeping with traditional areas of strength at the university, a number of major research programs in entomology deal with problems in agriculture, forestry, and environmental quality. Integrated pest management techniques are emphasized in the solution of many of these problems.

There are no specific course requirements for entomology graduate degrees. Each student will work with their major professor and/or graduate committee to establish a program of study.

For additional information on the Entomology Graduate Program, see the program website at http://entomology. oregonstate.edu/.

## Major Code: 5350

## ENTOMOLOGY GRADUATE

 MINORFor more details, see the departmental advisor.

## Minor Code: 5350

## - ENTOMOLOGY COURSES

ENT 101. INTRODUCTION TO HORTICULTURE, CROP, SOIL, AND INSECT SCIENCE (1). Introduces students with interests in horticulture, crop, soil, and insect sciences to educational and professional opportunities in these disciplines. Speakers will discuss opportunities in research and academia as well as in the applied professional job market. Open to all students. CROSSLISTED as CROP 101, HORT 101, SOIL 101.

ENT 300. *PLAGUES, PESTS, AND POLITICS (3). Integration and interaction of agricultural and public health aspects of entomology in society and history. CROSSLISTED as HORT 330. (Bacc Core Course)
ENT 311. INTRODUCTION TO INSECT PEST MANAGEMENT (4). Identification, biology and management of injurious and beneficial insects. Concurrent laboratory is designed to provide hands-on experience with identification of insect groups of relevance to agricultural cropping systems. Lec/lab. PREREQS: Entomology course work or one year college biology.
ENT 322. HONEY BEE BIOLOGY AND
BEEKEEPING (3). In this introduction to the fascinating honey bee and its biology, honey bees are used as model organisms to illustrate general principles of biology, entomology, and sociobiology. Students will learn the basics of beekeeping, have an opportunity to manipulate honey bee colonies, and gain hands-on experience, prevailing winter weather permitting.
ENT 331. *POLLINATORS IN PERIL (3).
Pollinators, human influences on pollination systems, and the potential consequences of pollinator decline. An introduction to the skills needed to investigate media reports and multidisciplinary scientific research. Effects of pesticides, habitat fragmentation, climate change, invasive species, pests, pathogens, and other threats to pollinators in critical
natural and agricultural systems around the world. CROSSLISTED as HORT 331. (Bacc Core Course) PREREQS: Completion of a Baccalaureate Core biological science course.
ENT 401. RESEARCH (1-16). Work on approved problems carried on in the library, laboratory or field. This course is repeatable for a maximum of 16 credits. PREREQS: Instructor approval required.

ENT 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing.
ENT 405. READING AND CONFERENCE (1-16). Reading and discussions on special topics. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENT 407. SEMINAR (1-2). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ENT 410. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Instructor approval required.
ENT 420. INSECT ECOLOGY (3). Insect ecology, evolution, and management. Biophysical ecology; foraging and feeding; life cycles; population dynamics, regulation, and control; species interactions including herbivore-plant, predatorprey, parasite-host, competition, and mutualism; diversity, food web structure, agricultural ecology, exercises merge models, experiments, and sampling. Offered on even years. PREREQS: BI 370 or equivalent

ENT 440. ISSUES IN INSECT TOXICOLOGY
(3). Introduction to concepts and mechanisms associated with molecular toxicology as it relates to insects, including interactions with naturally occurring and synthetic compounds. Overview of current research in insect toxicology including resistance to pesticides, protection of non-target species, and use of insects as model organisms. Discussion of laboratory and field approaches and potential strategies to address issues in insect toxicology. PREREQS: A background in basic chemistry and biology is recommended.
ENT 444. INSECT AGROECOLOGY (3).
Agroecology incorporates ecological concepts and principles to the design and management of sustainable agricultural systems. Topics include: the role of insects in sustainable agricultural systems; application of the principles of insect ecology to better manage insect pests and maximize crop yield; conserving beneficial insects and other natural resources in agroecosystems and the surrounding landscape. CROSSLISTED as HORT 444. PREREQS: General background or previous course work in entomology.
ENT 499. SPECIAL TOPICS (1-6). This course is repeatable for a maximum of 6 credits.

ENT 501. RESEARCH (1-16). Work on approved problems carried on in the library, laboratory or field. This course is repeatable for a maximum of 16 credits. PREREQS: Instructor approval required.
ENT 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
ENT 505. READING AND CONFERENCE (1-16).
Reading and discussions on special topics. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENT 507. SEMINAR (1-2). Graded P/N. This course is repeatable for a maximum of 16 credits.
ENT 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
ENT 509. PRACTICUM IN TEACHING (13). Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. CROSSLISTED as CROP 509, PBG 509, SOIL 509. This course is repeatable for a maximum of

9 credits.
ENT 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.
ENT 518. CURRENT TOPICS IN ENTOMOLOGY
2). This is a core course of the Horticulture graduate program. Provides an advanced understanding of entomology and its relationship to other disciplines through critical analysis of the scientific literature. Students practice synthesizing information and presenting findings to peers. Instructors, topics, and specific learning objectives vary from term to term. CROSSLISTED as HORT 518 . This course is repeatable for a maximum of 12 credits.
ENT 520. INSECT ECOLOGY (3). Insect ecology, evolution, and management. Biophysical ecology; foraging and feeding; life cycles; population dynamics, regulation, and control; species interactions including herbivore-plant, predatorprey, parasite-host, competition, and mutualism; diversity, food web structure, agricultural ecology, exercises merge models, experiments, and sampling. Offered even years. PREREQS: BI 370 and Z 365 or equivalent
ENT 540. ISSUES IN INSECT TOXICOLOGY (3). Introduction to concepts and mechanisms associated with molecular toxicology as it relates to insects, including interactions with naturally occurring and synthetic compounds. Overview of current research in insect toxicology including resistance to pesticides, protection of non-target species, and use of insects as model organisms. Discussion of laboratory and field approaches and potential strategies to address issues in insect toxicology. PREREQS: A background in basic chemistry and biology is recommended.
ENT 542. PRINCIPLES OF INTEGRATED PEST MANAGEMENT: SYSTEMS DESIGN (4).
Principles of integrated pest management design focusing on the use of systems analysis as a means to integrate management tactics, environmental and biological monitoring, pest control models, and implementation elements into a cohesive whole. Introduction to integrated pest management on websites. Students will design a hypothetical crop-pest management system. Lec/ lab. PREREQS: ENT 311
ENT 544. INSECT AGROECOLOGY (3). Agroecology incorporates ecological concepts and principles to the design and management of sustainable agricultural systems. Topics include: the role of insects in sustainable agricultural systems; application of the principles of insect ecology to better manage insect pests and maximize crop yield; conserving beneficial insects and other natural resources in agroecosystems and the surrounding landscape. CROSSLISTED as HORT 544. PREREQS: General background or previous course work in entomology.
ENT 599. SPECIAL TOPICS (1-16). Important topics of current interest in the areas of systematics, insect physiology and toxicology, ecology and behavior, and pest management. Course content and title will change with each offering. This course is repeatable for a maximum of 16 credits.
ENT 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Instructor approval required.
ENT 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
ENT 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Instructor approval required.

ENT 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

ENT 609. PRACTICUM IN TEACHING (1-3). Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of

9 credits.
ENT 699. SPECIAL TOPICS (1-16). Important topics of current interest in the areas of systematics, insect physiology and toxicology, ecology and behavior, and pest management. Course content and title will change with each offering. This course is repeatable for a maximum of 16 credits.

## ENVIRONMENTAL AND <br> MOLECULAR TOXICOLOCY

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## FACULTY

Professors Baird, Dashwood, Field, Hays, Jenkins, Jepson, Kerkvliet, Miller, Williams
Associate Professors Anderson, Buermeyer, Simonich, Sudakin, Tanguay
Assistant Professors Bennett, Harper, Kolluri, Stone
Senior Research Assistants
Hoffman, Johnson, Siddens

## ADJUNCT/COURTESY/AFFILIATE FACULTY

Allen, Fairbrother, Gold, Ho, Iversen, Kisby, Koop, Lein, Proteau, Simon, Stubblefield, Turker

## Undergraduate Minor

Toxicology
Graduate Major
Toxicology (MS, PhD)
Graduate Areas of Concentration
Environmental Chemistry and Ecotoxicology
Mechanistic Toxicology
Molecular and Cellular Toxicology
Neurotoxicology

## Graduate Minor <br> Toxicology

The Department of Environmental and Molecular Toxicology offers courses leading to MS, and PhD degrees in toxicology.

Training in toxicology prepares students for careers in industry, government, and academic institutions. Biochemical, chemical, and molecular research approaches are emphasized, focusing on the following areas: analytical and exposure assessment, aquatic, biochemical, comparative, environmental, food, immuno- and neurotoxicology.

Research is promoted by the faculty's close ties to the National Institute of Environmental Health Sciences (NIEHS), which supports the Environmental

Health Sciences Center at OSU. The center contributes additional research and training opportunities for students. Opportunities in the area of neurotoxicology are provided by scientists of the Oregon Institute of Occupational Health Sciences (formerly CROET) at Oregon Health and Sciences University.

Financial support is available to most students in the program through graduate research assistantships or from an NIEHS environmental health predoctoral training program. Completing the application by the end of January assures full consideration for funding for fall of that year.
Students who wish to enter the program should have a BS degree (or equivalent) in a science related field and are expected to select an MS or PhD curriculum related to their own area of specialization. Students will take a core set of courses and will attend and participate in the toxicology seminar class. Courses in toxicology also may be taken by students in engineering or the basic sciences.

## PhD PRELIMINARY EXAM GUIDELINES

## Objective

The overall objective of the preliminary examination for advancement to PhD candidacy should assess whether a graduate student has the capacity and promise to:

1. understand the basic science of environmental and molecular toxicology;
2. be a creative and critical thinker;
3. understand the scientific literature;
4. conduct original and independent research; and
5. communicate the ideas and results of experiments.
Thus, the ideal examination format would select from these characteristics and prepare the student for the selective pressures that will be encountered upon completing the Environmental and Molecular Toxicology PhD degree program. In order to maintain high standards and produce quality graduate students, the examination must be rigorous and challenging. In addition, the exam format should set specific limits on the amount of time that the student dedicates to this process.

## Exam Format

The preliminary examination format outlined below consists of both oral and written elements. This examination must be completed no later than the end of the eighth academic term (not including summer terms) after entering the program. In most cases, the student would schedule the exam in the fall term of the third year of residence although students may take the exam earlier, after completing at least one year in the program. The
examination consists of a written and oral presentation of a research proposal that cannot be closely related to the student's thesis project. As outlined, the student's ability to develop, research, and defend original scientific ideas would be evaluated. The student is expected to demonstrate a capacity for critical thinking and a command of the specific field of focus. In addition, the student's general knowledge of environmental and molecular toxicology would be evaluated.

## PROCEDURAL OUTLINE

Research Proposal (written/oral)

1. Student submits outline descriptions (required elements listed below) of two potential research projects. The subject of each project must be chosen by the student based on their knowledge and review of the literature, and must describe original, hypothesis-driven research. The proposed projects cannot have been defined previously in published or unpublished form (i.e., manuscript, abstract, database of funded projects, submitted grant application, etc.), or cannot be known to be in progress. Proposed research also must not be closely related to the thesis research of the student. "Closely related" is defined as any research that conceivably could be part of the student's thesis or that conceivably might be initiated by the student's major professor.

## Project outlines (limited to

 one page each) must include: 1. Description of an unresolved question relevant to the field of environmental and molecular toxicology. (1-3 sentences)2. Statement of specific hypothesis to be tested. (1-2 sentences)
3. Description of an experimental approach designed to test the hypothesis, including a minimum of two specific aims, and a statement of the rationale (justification) for the proposed approach. (2-6 sentences)
4. Statement of the significance of the proposed research. (1-2 sentences)
5. The student's graduate committee reviews both outlines and approves one topic to be developed into a written proposal. The research topic is chosen based on originality, quality, potential significance, and the likelihood of expanding the student's education and training. Approval of the topic would occur within one week after the outlines are submitted. During this period, the outlines would be returned to the student, and the student would receive feedback from the committee
concerning the quality and design of the outlined projects. Major strengths and weaknesses in the experimental design or rationale would be identified.
6. The student develops a written research proposal using the format and topic guidelines of application for the EPA, NIH, NSF, or other appropriate granting agency. The written proposal must be completed and returned to the committee within four weeks after the topic was approved. The scope of the project will be equivalent to that of a "pilot project" proposal and if conducted would be expected to take approximately one year of research time. The proposal is limited in length to 10 pages of double-spaced text ( 12 point font with 0.5 -inch margins), and must include the following elements:
7. Specific Aims. State concisely and realistically what the research described in this application is intended to accomplish and what hypothesis is to be tested. Do not exceed one page.
8. Background and Significance. Briefly describe the background to the present proposal, critically evaluating the existing literature and specifically identifying gaps, which the project is intended to fill. State concisely the importance of the research described in this application, and relate the specific aims to the long-term objectives. Limited to two pages.
9. Research Design and Methods. Discuss in detail the experimental design and procedures to be used to accomplish the specific aims of the project. Describe the protocols to be used and the tentative sequence of investigation. Include the means by which the data will be analyzed and interpreted. Discuss the potential difficulties and limitations of the proposed research and alternative approaches to achieve the aims. Point out any procedures, situations, or materials that may be hazardous to personnel and the precautions to be exercised. Limited to seven pages.
10. Literature Cited. Do not scatter literature citations throughout the text. List them at the end of the proposal. All papers cited in the text must be listed in the reference list and vice versa. The list of literature citations at the end of the
proposal does not count toward the 10-page limit.
11. Appendix. Students may include additional figures in an appendix, limited to five pages. The appendix may not be used to circumvent the page limits of the proposal.
12. The oral exam should be scheduled within two weeks of completion of the written proposal. This deadline can be extended with the approval of the student's graduate committee.
13. During the exam, the student would present the research plan and defend the experimental approach. The presentation would involve a seminar format with slides/overheads and would be expected to last no longer than 30 minutes. Following the presentation, the student would be judged on the soundness of the hypothesis, their understanding of the subject matter, their ability to defend the proposed experimental design, and their general knowledge of the field of environmental and molecular toxicology. The exam is expected to last approximately two hours and is limited in length to three hours.

## Examination Committee

The examination committee is the graduate student's doctoral committee. The doctoral committee consists of a minimum of five members of the graduate faculty, including at least two members of the major department and a representative of the Graduate Council. If a minor is declared, the committee must include a member from the minor department. All committee members must be on the graduate faculty with appropriate authorization to serve on the student's committee. The major professor would serve as the chairperson of the committee to oversee the exam. The decision concerning whether the student merits advancement to PhD candidacy would be the responsibility of the examination committee.

## Evaluation

The basic question for the committee is whether or not they believe the student is adequately prepared to conduct doctoral level research and has a good chance of successfully completing such research. Following a discussion of the student's performance on the examination, each committee member is then asked to vote on the basic question. It is appropriate for secret ballots to be used, and secret ballots must be used if requested by any committee member.

If there is one negative vote on this question, the student will pass. If there are two or more negative votes on this question, the student will not pass.

If the committee decision is that the
student has not passed the examination, the committee must then decide whether or not to allow the student to take a re-examination. If the majority of the committee votes in favor of a re-examination, the recommendation for re-examination should be recorded. In addition, the committee must set a time interval that must elapse before the re-examination is permitted. If the majority of the committee votes against a re-examination, the recommendation to terminate the student's work toward this degree should be recorded.

## TOXICOLOGY MINOR

The Toxicology minor provides basic and applied science majors sufficient background for technical work in toxicology.

## Required

BB 450. General Biochemistry (4)
or BB 490. Biochemistry 1: Structure and Function (3)
CH 334. Organic Chemistry (3)
ST 351. Introduction to Statistical Methods (4)

TOX 411. Fundamentals of Toxicology (3)
Select five courses from the following or two courses plus undergraduate research:
BB 314. Cell and Molecular Biology (4)
TOX 401. Research (9)
TOX 413. Environmental Toxicology and Risk Assessment (3)
TOX 429. Toxic Substances in Food (3)
TOX 430. Chemical Behavior in the Environment (3)
TOX 455. Ecotoxicology: Aquatic Ecosystems (3)
TOX 490. Environmental Forensic Chemistry (3)

## Total=28

Minor Code: 618

## TOXICOLOGY (MS, PhD)

Graduate Areas of Concentration Environmental chemistry and ecotoxicology, mechanistic toxicology, molecular and cellular toxicology, neurotoxicology
The Department of Environmental and Molecular Toxicology provides students with a fundamental knowledge of toxicology that prepares them for responsible positions in research and development, academia, government, professional services, or research foundations.

The graduate faculty includes scientists with a special interest in the application of chemistry, biochemistry, molecular biology, pharmacology, pathology, neuroscience, immunology and ecology to problems in toxicology. The concentration in neurotoxicology is an interinstitutional alliance with Oregon Health and Science University (OHSU). Students will be affiliated with and advised by associated faculty.

For the MS, and PhD degrees, students are required to take a core curriculum
plus elective courses connected with their particular area of specialization. In addition to completing appropriate course work, students will undertake a thesis research project related to some aspect of toxicology. Participation in the seminar program (a one-hour per week seminar) is mandatory.
Minimal prerequisites for admission include one year each of biology, organic chemistry, physics, and statistics. Students who do not meet all of these requirements may be admitted if their academic record is otherwise outstanding.

## Major Code: 9930

TOXICOLOGY GRADUATE MINOR
For more details, see the departmental advisor.

## Minor Code: 9930

## ■ TOXICOLOGY COURSES

TOX 360. *THE WORLD OF POISONS (3).
Provides a basic understanding of how we are exposed and respond to chemicals, examples of human diseases associated with toxic insult, the role of technology and the interface of society and toxicology in risk perception and legislation. (Bacc Core Course) PREREQS: One 3-credit course in chemistry or one 3-credit course in biology.

TOX 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

TOX 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

TOX 411. FUNDAMENTALS OF TOXICOLOGY
(3). Introduction to the discipline of toxicology.

Examination of the basic concepts that define how chemicals are absorbed, distributed, metabolized, and eliminated by the body. Overview of associated dose/response relations. PREREQS: (BB 350* [D-] or BB 450* [D-] or BB 490* [D-] )
TOX 413. ENVIRONMENTAL TOXICOLOGY AND RISK ASSESSMENT (3). Procedures for defining exposure and the use of toxicological data in defining risk assessment. Recent application of mechanistic concepts are reviewed. PREREQS: TOX 411 [D-]

TOX 429. TOXIC SUBSTANCES IN FOOD (3) Toxicology and epidemiology of human exposures to pesticides and food toxicants. PREREQS: (BB 350* [D-] or BB 450* [D-] or BB 490* [D-] )
TOX 430. CHEMICAL BEHAVIOR IN THE ENVIRONMENT (3). Applications of chemical concepts in the definition and solution of pollution problems; analytical considerations, thermodynamic factors influencing movement of chemicals, physical and metabolic transformations occurring in the environment. PREREQS: (CH 123 [D-] or CH 331 [D-] ) and senior standing
TOX 435. *GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK (3). A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. Lec/rec. CROSSLISTED as BI 435/BI 535, BI 435H, FES 435/FES 535, MCB 535. (Bacc Core Course) PREREQS: One quarter each of biology and chemistry helpful but not essential.
TOX 435H. *GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK (3). A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. Lec/rec. CROSSLISTED as B

435H, FS 435H. (Bacc Core Course) PREREQS: One quarter each of biology and chemistry helpful but not essential. Honors College approval required.
TOX 455. ECOTOXICOLOGY: AQUATIC
ECOSYSTEMS (3). Focuses on transport, fate, and effects of toxic substances in freshwater ecosystems. There is special emphasis on impacts on fish. PREREQS: CH 331 [D-]

TOX 490. ENVIRONMENTAL FORENSIC CHEMISTRY (3). Principles of Good Laboratory Practice Standards, methodology, utility and imitations of chemical forensic methods as applied to real investigations. PREREQS: One year of college chemistry and one term of organic chemistry.

TOX 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

TOX 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

TOX 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits

TOX 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
TOX 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
TOX 511. FUNDAMENTALS OF TOXICOLOGY
(3). Introduction to the discipline of toxicology. Examination of the basic concepts that define how chemicals are absorbed, distributed, metabolized, and eliminated by the body. Overview of associated dose/response relations. PREREQS: (BB 550* [C] or BB 590* [C] )
TOX 512. TARGET ORGAN TOXICOLOGY (3).
Examination of toxicological effects of chemicals at organ level. Normal physiology of the organ system is received. PREREQS: TOX 511 [C]

TOX 513. ENVIRONMENTAL TOXICOLOGY AND RISK ASSESSMENT (3). Procedures for defining exposure and the use of toxicological data in defining risk assessment. Recent application of mechanistic concepts are reviewed. PREREQS: TOX 511 [C]
TOX 529. TOXIC SUBSTANCES IN FOOD (3)
Toxicology and epidemiology of human exposures to pesticides and food toxicants. PREREQS: BB $350^{*}$ or BB 450* or BB 490*
TOX 530. CHEMICAL BEHAVIOR IN THE ENVIRONMENT (3). Applications of chemical concepts in the definition and solution of pollution problems; analytical considerations, thermodynamic factors influencing movement of chemicals, physical and metabolic transformations occurring in the environment. PREREQS: CH 106 and CH 331 and graduate standing.
TOX 535. GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK (3). A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. Lec/rec. CROSSLISTED as BI 435/BI 535, BI 435H, FES 435/FES 535, MCB 535. PREREQS: One quarter each of biology and chemistry helpful but not essential.
TOX 554. GENOME ORGANIZATION, STRUCTURE, AND MAINTENANCE (4). How diverse organisms store their individual sets of genetic information (genomes). Evolution of genomes and gene families. Structures of DNA and chromosomes. Biochemical and regulatory pathways that protect cellular genomes agains environmental and endogenous damage and ensure transmission of faithful copies to progeny. Remodeling of genomes by recombination and transposition. CROSSLISTED as MCB 554. PREREQS: BI 311 (genetics or equivalent) and (BB 450 and BB 451 and BB 452) or (BB 490 and BB 491 and BB 492) or equivalent.

TOX 555. ECOTOXICOLOGY: AQUATIC
ECOSYSTEMS (3). Focuses on transport, fate, and effects of toxic substances in freshwater ecosystems. There is special emphasis on impacts on fish. PREREQS: CH 331

## TOX 575. ADVANCED XENOBIOTIC

 METABOLISM AND DISPOSITION (2). Course will focus on structure, function and regulation of specific proteins that function in uptake, distribution, metabolism, and excretion of drugs and other chemicals that are foreign to the body (xenobiotics). The course will focus on proteins which are termed Phase I and Phase II xenobiotic metabolizing enzymes and xenobiotic transporters. There will be an emphasis on Cytochrome P450 enzymes and hepatic and renal xenobiotic transporter proteins and their key roles in xenobiotic metabolism and excretion PREREQS: Graduate or professional pharmacy student standing, TOX 512, or consent of instructor.TOX 590. ENVIRONMENTAL FORENSIC CHEMISTRY (3). Principles of Good Laboratory Practice Standards, methodology, utility and limitations of chemical forensic methods as applied to real investigations. PREREQS: One year of college chemistry and one term of organic chemistry.
TOX 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

TOX 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
TOX 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
TOX 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

TOX 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

TOX 611. TESTING FOR GENOTOXICITY (4) A lab-based course geared toward toxicology, biochemistry, biology, food science, nutrition, pharmacy and MCB students. Introduces principles and methods of several key assays used to screen for DNA damage and mutation. These tests will include the following: (i) Salmonella mutagenicity assay ('Ames test'), (ii) single cell gel electrophoresis ('comet') assay, (iii) micronucleus assay, and (iv) PCR-based single strand conformation polymorphism (SSCP) screening for oncogene/tumor suppressor gene mutation in cancers. This 2 -week, intensive lab/ lecture class runs Mon-Fri in the LPSC during the first session of summer term. Each day includes laboratory work and a 2-hour lecture covering basic principles of the assays, as well as technical details of the experiment for the day. PREREQS: TOX 514 [C] and BB 400 series, prior course work on DNA repair and mutagenesis, and/or instructor approval.

TOX 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

TOX 808. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

## FISHERIES AND WILDLIFE

## Selina Heppell, Head

104 Nash Hall
Oregon State University
Corvallis, OR 97331-3803
541-737-4531
Email: selina.heppell@oregonstate.edu
Website: http://fw.oregonstate.edu/

## FACULTY

Professors Baker, Banks, Bartholomew, Brandt, Edge, Se. Heppell, Kauffman, Kennedy, Herlihy, Hughes, Langdon, Mate, Noakes, Robinson, Sampson

## Associate Professors Burris,

B. Dugger, DeBano, Epps, Ford, Friedlaender, Garcia, Giannico, Hagen, Sc. Heppell, Horning, Miller, Sanchez, Sidlauskas, Suryan, Wooster
Assistant Professors Armstrong, Arismendi, Biedenweg, Ellsworth, Gladics, Hutchinson, Klink, Levi, Lyons, O'Malley, Palacios, Torres, Warren
Senior Instructors Duplaix,

## Hanschumaker

Instructors Albertson, Allen, Arbuckle, Campbell, Diebel, S. Dunham, Goggans, Kelly, Konstantinidis, Moore, Painter, Paoletti, Reese, Shinderman, Snyder

## COURTESY FACULTY

Professors Haig, Lackey, Power, Roby, Schreck
Associate Professors K. Dugger, Kaufmann, Landers, Peterson, Rosenberg, Stein, Thompson
Assistant Professors Antolos, Brodeur, Burnett, Camarra, Chapman, Chan, Davison, Dumbauld, J. Dunham, Eagle-Smith, Ebersole, Fitzpatrick, Forsman, Gervais, Haig, Hurst, Jackson, Johnson, Jorden, Landys, McIntosh, Reeves, Rogers, Ryer, Schumaker, Sellinger, Tomas Nash, Van Sickle

## ADJUNCT FACULTY

Professors Kent (Microbiology),
McComb (Graduate School), Smith (Anthropology), Sylvia (Applied Economics), Rempel (OSU Library)
Associate Professor Betts (Forest
Ecosystems and Society)
Assistant Professor, Sr. Research:
Rivers (Forest Ecosystems and Society)

## Departmental Faculty Page:

http://fw.oregonstate.edu/content/
faculty-department-fisheries-and-wildlife

## Undergraduate Major

Fisheries and Wildlife Sciences (BS, CRED, HBS)
(See specializations section below.)

## Minor

Fisheries and Wildlife Sciences

## Graduate Majors

Fisheries and Wildlife Administration (PSM)
Fisheries Science (MAIS, MS, PhD)
Graduate Areas of Concentration
Aquaculture
Conservation Biology
Fish Genetics
Ichthyology
Limnology
Parasites and Diseases
Physiology and Ecology of Marine and Freshwater Fishes
Stream Ecology
Toxicology
Water Pollution Biology
Wildlife Science (MAIS, MS, PhD)
Graduate Areas of Concentration
Animal-Habitat Relationships
Behavior
Biology of Big Game and Small Mammals
Conservation Biology
Community Studies
Ecology of Avian and Mammalian Predators
Ecology of Waterfowl and Upland Gamebirds
Effects of Parasites, Diseases, and Environmental Contaminants
Nutrition
Population
Population Dynamics
Reproductive Biology
Toxicology of Pesticides
Wildlife Ecology
Wildlife-Forestry Interactions
Wildlife Science

## Graduate Minors

Fisheries Science
Wildlife Science

## Graduate Certificate <br> Fisheries Management <br> Wildlife Management

Fisheries and wildlife prepares students for professional careers in fisheries and wildlife as research scientists, biologists, managers, educators, and administrators. Oregon State University is strategically located for the study of fisheries and wildlife, surrounded by diverse ecosystems including the Pacific Ocean and coastal estuaries, many small and large rivers, lowland valleys, mountains and the high desert. Courses include traditional classroom experiences and laboratories, often enriched by field trips to nearby state fish hatcheries, national forests and wildlife refuges. We also offer experiential learning opportunities at the Hatfield Marine Science Center on the coast in Newport. In addition to our full-time faculty, FW students benefit from courses and mentoring provided by scientists with the Oregon Cooperative

Fish and Wildlife Research Unit, Oregon Department of Fish and Wildlife, and several federal research centers.
The undergraduate curriculum is designed to develop a solid background in biology and ecology for our students as the basis for careers in resource science, conservation and management. However, FW is not simply a biological discipline. Professionals must weigh social considerations when formulating conservation and management strategies and policies. Consequently, biological, social, economic, and political science courses are integrated into the curriculum. The undergraduate curriculum is composed of core courses and a specialization. The core represents the educational foundation for fish and wildlife conservation while the specialization provides each student with an opportunity to build a curriculum to meet specific goals. Our capstone courses emphasize critical thinking in natural resource science and management, as well as science communication and outreach. Students planning to transfer to FW should focus on courses in general biology, general chemistry, physical science, and mathematics during their freshman and sophomore years.

## TRANSFER STUDENTS

Because of the technical and professional nature of the college's curricula, the college reserves the right to determine whether courses taken at another institution satisfy the college's curricular requirements. In general, equivalent col-lege-level courses successfully completed at an accredited college or university are accepted. OSU students requesting a transfer to the College of Agricultural Sciences' Department of Fisheries and Wildlife must be a student in good academic standing at the university. Please contact the departmental head advisor at 541-737-1941 for additional information.

## GRADUATE PROGRAM

Graduate programs leading to the PSM, MS, or PhD (and participation in the MAIS degree program) permit intensive study in special areas of interest under the guidance of nationally known scientists. Advanced study in fisheries science may be pursued in stream ecology, aquaculture, population dynamics in response to exploitation, ecology of marine and freshwater fishes, taxonomy and systematics, genetics, toxicology, and parasites and diseases of fish. Advanced study in wildlife science can involve almost any invertebrate or vertebrate species, biotic community or habitat. Research emphasis may be placed on population dynamics and utilization, life history and ecology, conservation biology, habitats, nutrition, physiology, behavior, and organization of animal communities. Op-
portunities exist for work in terrestrial, marine and aquatic systems.

## FISHERIES AND WILDLIFE SCIENCES (BS, HBS)

## Also available via Ecampus.

The undergraduate curriculum for the Fisheries and Wildlife Sciences BS degree ( 180 credits) is composed of core courses as well as specializations of 24 credits. The core represents the educational foundation of fish and wildlife conservation, and the specializations provide students with an opportunity to build their curriculum to meet specific goals. Working with faculty in formal and informal settings, students are encouraged to become engaged in designing their own education. The core courses required of all students seeking the BS degree are listed below.

For further information, see the Fisheries and Wildlife website at http:// fw.oregonstate.edu/.

## Specializations

Through the specialization, undergraduate students are encouraged to become engaged in designing their own education. Students work with faculty in formal and informal settings to define career and life goals and then develop a course of study to achieve those goals. Specialization plans should be developed during the junior year and will be presented to the faculty for review and comment. Specializations must contain at least 24 credits and must be upper division with four lower-division credits allowed. No courses included may be taken for a satisfactory/unsatisfactory $(\mathrm{S} / \mathrm{U})$ grade. A maximum of two courses may be completed prior to approval of the specialization. Additional upper-division credits taken prior to approval of the specialization may be allowed through petition to advisor. Double counting (when credit is given twice for a course) is not permitted between the specialization and other university or departmental course work except in the following circumstances:
The writing intensive courses (WIC) may double count with the OSU Baccalaureate Core requirements;

Students completing their first BS degree may apply 12 credits from the minor towards the specialization (requires approval by advisor in minor department and FW advisor);

Postbaccalaureate students who are completing their second degree may use a maximum of 12 credits from their first degree towards their specialization (approved by FW advisor).
Specializations are given titles to reflect their content, but titles must not substantially duplicate titles of existing degree programs. Examples of specializations include forest wildlife management,
stream ecology, fish and wildlife law enforcement, marine fisheries, aquaculture, avian conservation and management, conservation education and extension, fisheries business, human dimensions of resource management, conservation biology, and many others. Specializations may include typical on-campus courses, special field courses (when college credit is earned), a full term of course work at the Hatfield Marine Science Center in Newport, Oregon, or one or more terms of international exchange. A maximum of 12 credits in any combination of FW 401 Research and FW 410 International Internship can be used towards the specialization. Combined with required internships and a capstone course, fisheries and wildlife sciences graduates will be well-prepared to begin professional careers in fish and wildlife conservation, or to continue their education in graduate school. For those students unsure of their professional goals or seeking diversity in course work, a broad specialization may be declared.

Specialization guidelines may be viewed at http://fw.oregonstate.edu/ department-fisheries-and-wildlife/ undergraduate/curricula-course-offerings.

## Internships

One of the best avenues to a permanent job in fisheries and wildlife is through a strong internship and temporary employment or volunteer positions. Students are required to complete a minimum of two internships or other approved alternative experiences (one of each type) for their degree. There are two types of internships: exploratory (1-2 credits) and intensive (3-6 credits). Students are encouraged to start gaining professional experience by volunteering or interning with a natural resource agency as early as possible, and no later than their junior year. This requirement is listed as FW 410, Internship (2 required) (4-6), under the Fisheries and Wildlife Core below.

## Baccalaureate Core

## Skills Courses (16 credits)

Fitness
HHS 231 *Lifetime Fitness for Health (2)
HHS 241 *Lifetime Fitness (1)
or approved Physical Activity Course (PAC)

## Mathematics

Met with Fisheries and Wildlife Core.

## Speech

Met with Fisheries and Wildlife Communications.

## Writing I

Met with Fisheries and Wildlife
Communications.

## Writing II

Met with Fisheries and Wildlife Communications.

## Perspective Courses (24 credits)

No more than two courses (or lecture/lab
combinations) from any one department may be used by a student to satisfy the Perspectives category of the core. Please reference the baccalaureate core catalog for further clarification: http://catalog. oregonstate.edu/bcc.aspx.

## Biological Science (Lecture/Lab)

Met with Fisheries and Wildlife Core
Cultural Diversity (CD)
Please reference the baccalaureate core course catalog for a list of approved courses: http://catalog.oregonstate.edu/ bcc.aspx.

## Literature and the Arts (LA)

Please reference the baccalaureate core course catalog for a list of approved courses: http://catalog.oregonstate.edu/ bcc.aspx.

## Physical Science (Lecture/Lab or Lab)

Met with Fisheries and Wildlife Physical and Earth Sciences section

## Social Processes and Institutions

 (SPI)Please reference the baccalaureate core course catalog for a list of approved courses: http://catalog.oregonstate.edu/ bcc.aspx.

## Western Culture (WC)

Please reference the baccalaureate core course catalog for a list of approved courses: http://catalog.oregonstate.edu/ bcc.aspx.
Difference, Power, and

## Discrimination Courses (DPD) (3

 credits)Met with Fisheries and Wildlife Human Dimensions section

## Synthesis Courses (6 credits)

The two courses used to fulfill the Synthesis requirement may not be in the same department.

## Contemporary Global Issues (CGI)

Please reference Baccalaureate Core course catalog for approved courses: http://catalog.oregonstate.edu/bcc.aspx

## Science, Technology, and Society

(STS)
Please reference Baccalaureate Core course catalog for approved courses:
http://catalog.oregonstate.edu/bcc.aspx

## Writing Intensive Course (WIC) (3-4

 credits)Select one course from below:
FW 435. ^Wildlife in Agricultural
Ecosystems (3)
FW/FES 439. ^Human Dimensions of
Fisheries and Wildlife Management (3)
FW 454. ^Fishery Biology (4)
FW 497. ^Aquaculture (3)

## Communications (9 credits)

COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical
Discourse (3)
or COMM 211. *Communicating Online (3)
WR 121. *English Composition (3)

WR 222. *English Composition (3) or HC 199. *Honors Writing-Science (3) or WR 327. *Technical Writing (3)
or WR 362. *Science Writing (3)
Fisheries and Wildlife Core (69-71

## credits)

BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
or BI 204, BI 205, BI 206. *Introductory
Biology I, II, III $(4,4,4)$
BI 370. Ecology (3)
CH 121. General Chemistry (5) and CH 122, CH 123. *General Chemistry $(5,5)$ or CH 231, CH 232, CH 233. *General Chemistry $(4,4,4)$ and CH 261 , CH 262 , CH 263. *Laboratory for Chemistry 231, 232, 233 (1,1,1)
FW 107. Orientation to Fisheries and Wildlife (1)
FW 209. Career Skills in Fisheries and Wildlife Sciences (1)
FW 251. Principles of Fish and Wildlife Conservation (3)
FW 255. Field Sampling of Fish and Wildlife (3)

FW 289. Communication Skills for Fisheries and Wildlife Professionals (4)
FW 307. Specialization Development (1)
FW 320. Introductory Population Dynamics (4)

FW 321. Applied Community and Ecosystem Ecology (3)
FW 410. Internship (2 required) (4-6)
FW 488. Problem Solving in Fisheries and Wildlife Science (3)
MTH 241. *Calculus for Management and Social Science (4)
or MTH 245. *Mathematics for
Management, Life, and Social Sciences (4)
or MTH 251. *Differential Calculus (4)
ST 351, ST 352. Introduction to Statistical Methods $(4,4)$

## Vertebrate Biology (7-11 credits)

Select one of the following (3-4 credits):
BI/FW 302. Biology and Conservation of Marine Mammals (4)
FW 311. Ornithology (3)
FW 315. Ichthyology (3)
FW 317. Mammalogy (3)
FW 331. Ecology of Marine and Estuarine Birds (4)
Z 473. Herpetology (3)
Select one of the following (2-3 credits):
FW 312. Systematics of Birds (2)
FW 316. Systematics of Fishes (3)
FW 318. Systematics of Mammals (2)
Z 474. Systematic Herpetology (2)
Select one additional course from the preceding two lists (2-4 credits)

## Advanced Core (18-26 credits)

Choose one course from each of the following categories, and one additional course from any category. ${ }^{\wedge}$ WIC courses may double count.

## Genetics and Evolution, select one

from below (3-5 credits):
ANS 378. Animal Genetics (4)
BI 311. Genetics (4)
BI 345. *Introduction to Evolution (3)
FW 370. Conservation Genetics (4)

PBG 430. Plant Genetics (3)
Behavior and Physiology, select one

## from below (3-4 credits):

ANS 311. Principles of Animal Nutrition (3)
ANS 314. Animal Physiology (4)
FW 469. Methods in Physiology and
Behavior of Marine Megafauna (3)
FW 471. Environmental Physiology of Fishes (4)
FW 474. Early Life History of Fishes (4)
FW 475. Wildlife Behavior (4)
FW 476. Fish Physiology (4)
Z 350. Animal Behavior (3)
Z 423. Environmental Physiology (3)
Z 431. Vertebrate Physiology I (3)
Z 432. Vertebrate Physiology II (3)
Habitats and Ecosystems, select one
from below (3-5 credits):
BI 351. Marine Ecology (3)
FES 341. Forest Ecology (3)
FES 342. Forest Types of the Northwest (3)
FES 440. Wildlife Fire Ecology (3)
FW 345. *Global Change Biology (CGI) (3)
(Pending Approval)
FW 426. Coastal Ecology and Resource Management (5)
FW/OC 434. Estuarine Ecology (4)
FW 435. ${ }^{\wedge}$ Wildlife in Agricultural
Ecosystems (3)
FW/FES 445. Ecological Restoration (4)
FW/FES 452. Biodiversity Conservation in
Managed Forests (3)
FW 456. Limnology (5)
FW 462. Ecosystem Services (3)
FW 467. Antarctic Science and
Conservation (4)
FW 479. Wetlands and Riparian Ecology (3)
RNG 341. Rangeland Ecology and
Management (3)
Species Conservation and
Management, select one from below
(3-4 credits):
FW 419. The Natural History of Whales and Whaling (3)
FW 427. Principles of Wildlife Diseases (4)
FW 451. Avian Conservation and
Management (3)
FW 454. ${ }^{\wedge}$ Fishery Biology (4)
FW 458. Mammal Conservation and
Management (4)
FW/BI 464. Marine Conservation Biology (3)
FW 465. Marine Fisheries (4)
FW 473. Fish Ecology (4)
FW 481. Wildlife Ecology (3)
FW/MB 491. Fish Diseases in Conservation Biology and Aquaculture (3)
Botany, select one from below (3-4 credits):
BOT 313. Plant Structure (4)
BOT 321. Plant Systematics (4)
BOT 323. ${ }^{\wedge}$ Flowering Plants of the World (3)

BOT 331. Plant Physiology (4)
BOT 341. Plant Ecology (4)
BOT 416. Aquatic Botany (4)
BOT 440. Field Methods in Plant Ecology (4)
BOT 442. Plant Population Ecology (3)
BOT 488. Environmental Physiology of Plants (3)
RNG 353. Wildland Plant Identification (4)

## Physical and Earth Sciences (9-14 credits):

Choose three courses from the two categories below. No more than two courses may be selected from one category. (CGI) and (STS) courses can double count with baccalaureate core. (CGI) and (STS) courses cannot be from the same department.
Physics, Math, and Chemistry
Select no more than two from below,
cannot double count with FW Core:
CH 130. General Chemistry of Living Systems (4)
CH 331. Organic Chemistry (4)
CH 332. Organic Chemistry (4)
CH 390. Environmental Chemistry (3)
MTH 241. *Calculus for Management and
Social Science (4)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
OC 450. Chemical Oceanography (3)
PH 201. *General Physics (5)
PH 202. *General Physics (5)
PH 205. *Solar System Astronomy (4)
PH 206. *Stars and Stellar Evolution (4)
PH 207. *Galaxies, Quasars, and Cosmology (4)

PH 211. *General Physics with Calculus (4)
PH 212. *General Physics with Calculus (4)
PH 331. *Sound, Hearing, and Music (STS) (3)

PH 332. *Light, Vision, and Color (STS) (3)

## Earth Sciences

Select no more than two from below:
ATS 201. *Climate Science (4)
GEO 201. *Physical Geology (4)
GEO 202. *Earth Systems Science (4)
GEO 203. *Evolution of Planet Earth (4)
GEO 221. *Environmental Geology (4)
GEO 305. *Living with Active Cascade Volcanoes (STS) (3)
GEO 306. *Minerals, Energy, Water, and the Environment (STS) (3)
GEO 307. *National Park Geology and Preservation (STS) (3)
GEO 308. *Global Change and Earth
Sciences (CGI) (3)
OC 201. *Oceanography (4)
OC 332. Coastal Oceanography (3)
SOIL 205. *Soil Science (3) and SOIL 206
*Soil Science Laboratory for SOIL 205 (1)
Corvallis campus only.
or CSS 205. *Soil Science (4) Ecampus only.
or CSS 305. Principles of Soil Science (4)
EOU campus only.
Human Dimensions (9-11 credits)
Select one course from each of the lists
below. (CGI), (STS), (WC), (SPI), and
(DPD) courses can double count as baccalaureate core. (CGI) and (STS) courses cannot be from the same department.

## Difference, Power and

Discrimination-select one:
AG 301. *Ecosystem Science of Pacific NW
Indians (DPD) (3)
FW 340. *Multicultural Perspectives in
Natural Resources (DPD) (3)
GEO 309. *Environmental Justice (DPD) (3)

## Environmental Law, Policy and

## Economics-select one:

AEC 250. *Introduction to Environmental

Economics and Policy (SPI) (3)
AEC 253. *Environmental Law, Policy, and Economics (WC) (4)
AEC 351. *Natural Resource Economics and Policy (CGI) (3)
AEC/ECON 352. *Environmental
Economics and Policy (CGI) (3)
AEC 432. Environmental Law (4)
FOR 462. Natural Resource Law and Policy (3)

FW 350. *Endangered Species, Society and Sustainability (STS) (3)
FW 415. Fisheries and Wildlife Law and Policy (3)
FW 422. Introduction to Ocean Law (3)
PS 475. Environmental Politics and Policy (4)
PS 477. International Environmental Politics and Policy (4)
Other-select one:
ANTH 477. Ecological Anthropology (4)
ANTH 481. *Natural Resources and Community Values (STS) (3)
BOT 322. Economic and Ethnobotany: Role of Plants in Human Culture (3)
FES 354. Communities, Natural Areas, and Sustainable Tourism (3)
FES 355. Management for Multiple Resource Values (3)
FES 360. Collaboration and Conflict Management (3)
FES 422. Research Methods in Social Science (4)

FES/ANS/FW/SOC 485. *Consensus and Natural Resources (STS) (3)
FES 493. Environmental Interpretation (4)
FW 324. *Food from the Sea (CGI) (3)
FW 325. *Global Crises in Resource Ecology (CGI) (3)
FW/FES 439. ^Human Dimensions of Fisheries and Wildlife Management (WIC) (3)

FW 360. *Origins of F\&W ManagementEvolution, Genetics, and Ecology (STS) (3)
GEOG 340. *Introduction to Water Science and Policy (STS) (3)
HST 481. *Environmental History of the United States (STS) (4)
PHL 440. *Environmental Ethics (CGI) (3)
PHL/REL 443. *World Views and
Environmental Values (CGI) (3)
PS 461. Environmental Political Theory (4)
PS 476. *Science and Politics (STS) (4)
SOC 480. *Environmental Sociology (CGI)
(4)

SOC 481. *Society and Natural Resources (STS) (4)

## Specialization (24 credits) <br> Total Minimum Credits=180

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Major Code: 733

FISHERIES AND WILDLIFE SCIENCES MINOR

## Also available via Ecampus.

A sequence in general biology equivalent to BI 211, BI 212, BI 213, *Principles of Biology $(4,4,4)$ or BI 204, BI 205, BI 206, ${ }^{*}$ Introductory Biology $(4,4,4)$ is a prerequisite to the Fisheries and Wildlife Sciences minor.

A minimum of 27 credits is required with a combination of the following courses. Double counting restrictions, when applicable, are listed for each section. Double counting towards baccalaureate core is permitted.

## Required:

Double counting is allowed in this section.
BI 370. Ecology (3)
FW 251. Principles of Fish and Wildlife Conservation (3)
Select a minimum of three courses 7-10 credits from the following: One course may not be double counted.
FW/BI 302. Biology and Conservation of Marine Mammals (4)
FW 311. Ornithology (3)
FW 312. Systematics of Birds (2)
FW 315. Ichthyology (3)
FW 316. Systematics of Fishes (3)
FW 317. Mammalogy (3)
FW 318. Systematics of Mammals (2)
FW 331. Ecology of Marine and Estuarine Birds (4)
Z 473. Herpetology (3)
Z 474. Systematic Herpetology (2)
Select a minimum of 11-14 credits

## from the following:

None of these courses may be double counted.
FW 301. Field Techniques for Marine Mammal Conservation (1)
FW 303. Survey of Geographic Information Systems in Natural Resources (3)
FW 320. Introductory Population Dynamics (4)

FW 321. Applied Community and Ecosystem Ecology (3)
FW 323. Management Principles of Pacific Salmon in the Northwest (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society and Sustainability (3)
FW 356. *Citizen Science (3)
FW 360. *Origins of F\&W Management-
Evolution, Genetics, and Ecology (3)
FW 370. Conservation Genetics (4)
FW 415. Fisheries and Wildlife Law and Policy (3)
FW 419. The Natural History of Whales and Whaling (3)
FW/BI 421. Aquatic Biological Invasions (4)
FW 426. Coastal Ecology and Resource Management (5)
FW 427. Principles of Wildlife Diseases (4)
FW 431. Dynamics of Marine Biological Resources (4)
FW/OC 434. Estuarine Ecology (4)
FW 435. ^Wildlife in Agricultural
Ecosystems (3)
FW 439. ^Human Dimensions of Fisheries and Wildlife Management (3)
FW/FES 445. Ecological Restoration (4)
FW 451. Avian Conservation and Management (3)

FW/FES 452. Biodiversity Conservation in Managed Forests (3)
FW 454. ^Fishery Biology (4)
FW 456. Limnology (5)
FW 462. Ecosystem Services (3)
FW 465. Marine Fisheries (4)
FW 467. Antarctic Science and
Conservation (4)
FW 469. Methods in Physiology and
Behavior of Marine Megafauna (3)
FW/HSTS 470. *Ecology and History:
Landscapes of the Columbia Basin (3)
FW 471. Environmental Physiology of
Fishes (4)
FW 472. Advanced Ichthyology (3)
FW 473. Fish Ecology (4)
FW 474. Early Life History of Fishes (4)
FW 475. Wildlife Behavior (4)
FW 476. Fish Physiology (4)
FW 479. Wetland and Riparian Ecology (3)
FW 481. Wildlife Ecology (4)
FW/ANS/FES/SOC 485. *Consensus and
Natural Resources (3)
FW/MB 491. Fish Diseases in Conservation
Biology and Aquaculture (4)
FW 493. Field Methods for Marine Research (3)

FW/MB 496. Fish Diseases in Conservation
Biology and Aquaculture Lab (2)
FW 497. ^Aquaculture
FW 498. Aquaculture Laboratory (3)
FW 499. Special Topics in Fisheries and
Wildlife (1-4)
RNG 346. Topics in Wildland Fire (3)
[Terminated summer 2017]
RNG 446. Wildland Fire Ecology (3)
[Terminated summer 2017]

## Total=27

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Minor Code: 734


## GRADUATE MAJORS

FISHERIES AND WILDLIFE ADMINISTRATION (PSM)
Also available via Ecampus.
Bruce Dugger, Associate Department
Head of Academic Affairs, Professional
Science Master's in Fisheries and Wildlife

## Administration Program Director

Department of Fisheries and Wildlife
104 Nash Hall
Corvallis, OR 97331
541-737-2465
Email: bruce.dugger@oregonstate.edu
Website: http://
fw.oregonstate.edu/content/
psm-fisheries-wildlife-administration
The Professional Science Master's degree in Fisheries and Wildlife Administration (PSMFWA) provides advanced training for early- and mid-career professionals employed by natural resources agencies, non-government organizations, and other entities with a need for expertise in fisheries and wildlife science. Applicants must have at least 5 years of experience working in a natural resource field.

The PSMFWA degree will help employers meet workforce planning goals and contribute to self-improvement goals of current employees.

It is taught primarily as a distance, online curriculum via Ecampus, although some students may choose to work toward the PSMFWA degree while in residence at OSU or at the Hatfield Marine Science Center.

The PSMFWA degree is offered as a non-thesis program only. Students have an advisor and graduate committee to review their program of study, provide career and internship advice, and evaluate a final report based on the internship experience.

For general information about the FW PSM program, email fw.gradadvising@ oregonstate.edu or contact the Associate Department Head of Academic Programs, Bruce Dugger, at 541-737-2465.

The 45 -credit PSMFWA curriculum is organized into five main sections:

1. Biophysical sciences core ( 20 credits)
2. Social sciences core ( 12 credits)
3. Business communication and management skills core (6 credits)
4. Ethics (1 credit)
5. Internship (6 credits)

Course substitutions must be approved by the program coordinator.

Most of our courses are offered through Ecampus, but some may be offered through Corvallis, Cascades or Hatfield Marine Science Center. Please check course offerings through the online catalog and schedule of classes or consult with the program advisor.

## Biophysical Sciences Core Courses

 (20 credits minimum):
## Including at least 1 Quantitative <br> \section*{Skills Course}

Fisheries and Wildlife-Related Science
BOT 540. Field Methods in Plant Ecology (4)
FES/MCB/TOX 535. Genes and Chemicals
in Agriculture: Value and Risk (3)
FES 536. Carbon Sequestration in Forests (2)
FES 548. Biology of Invasive Plants (3)
FW 519. The Natural History of Whales and Whaling (3)
FW 521. Aquatic Biological Invasions (4)
FW 526. Coastal Ecology and Resource
Management (5) can count as FW Core -
or- Human Dimensions
FW 527. Principles of Wildlife Diseases (4)
FW 535. Wildlife in Agricultural Ecosystems (3)

FW/FES 545. Ecological Restoration (4)
FW 551. Avian Conservation and
Management (3)
FW/FES 552. Forest Wildlife Habitat
Management (4)
FW 554. Fishery Biology (4)
FW 556. Limnology (5)
FW 558. Mammal Conservation and Management (4)
FW 562. Ecosystem Services (3)
FW 563. Conservation Biology of Wildlife (3)

FW/BI 564. Marine Conservation Biology (3)
FW 565. Marine Fisheries (4)
FW/HSTS 570. Ecology and History:
Landscapes of the Columbia Basin (3)
FW 573. Fish Ecology and Conservation(4)
FW 575. Wildlife Behavior (4)
FW 576. Fish Physiology (4)
FW 579. Wetlands and Riparian Ecology (3)
FW 580. Stream Ecology (3)
FW 581. Wildlife Ecology (3)
FW 597. Aquaculture (3)
FW 599. Special Topics in Fisheries and Wildlife (2-4)
MNR 530. Tropical Forest Ecology and
Management: A Global Perspective (3)
NSE 588. Radioecology (3)
SNR 530. Ecological Principles of
Sustainable Natural Resources (3)
SNR 540. Global Environmental Change (3)
Quantitative Skills in FW Science (1 course
minimum)
BEE 511. Global Environmental Change:
Using Data to Inform Decisions (3)
CH 584. Instruments and Online
Interactions in the Sciences (3)
CH 590 Computer Programming for Scientists (3)
FES/MNR 522. Research Methods in Social Science (4)
FW 524. Introduction to Fisheries Assessment (3)
FW 531. Dynamics of Marine Biological Resources (4)
FW 538. Structured Decision Making in
Natural Resource Management Lab (2) FW 540. Vertebrate Population Dynamics (4) GEO 544. Remote Sensing (4)
or GEOG 580. Remote Sensing I:
Principles and Applications (4)
GEO 565. Geographic Information Systems and Science (4)
or GEOG 560. GIScience I: Introduction
to Geographic Information Science (4)
MCB/VMB 671. Molecular Tools (3)
ST 511. Methods of Data Analysis (4)
(Continues as ST 512, ST 513)

## Social Sciences Core Courses (12

credits minimum)

## Required (5 credits):

FW 537. Structured Decision Making in
Natural Resource Management (2)
FW 620. Ecological Policy (3)
or FW 515. Fisheries and Wildlife Law and Policy (3)
Plus 7 additional credits, with at least one course from each group:

## Policy Courses

AEC 532. Environmental Law (4)
FES/HORT 555. Urban Forest Planning,
Policy and Management (4)
FW 522. Introduction to Ocean Law (3)
GEO 523/GEOG 550. Land Use in the American West (3)
PS 555. The Politics of Climate Change (4)
PS 575. Environmental Politics and Policy (4)
PS 576. Science and Politics (4)
PS 577. International Environmental Politics and Policy (4)
WRP 523. Environmental Water Transactions (3)
Human Dimensions Courses
AEC 534. Environmental and Resource

Economics (3)
AEC 544 Commodity Futures and Options
Markets (4)
AEC/MRM 552. Marine Economics (3)
FES/MCB/TOX 535. Genes and Chemicals
in Agriculture: Value and Risk (3)
FES 554. Managing at the Wildland-Urban
Interface (3)
FES/ANS/FW/SOC 585. Consensus and
Natural Resources (3)
FW 526. Coastal Ecology and Resource Management (5) can count as FW Core -or- Human Dimensions
FW 549. History of Fisheries Science (3)
FW 583. Species Recovery Planning and Restoration (3)
GEO 524/GEOG 541. International Water Resources Management (3)
GEO 525/GEOG 540. Water Resources
Management in the United States (3)
PHL 543. World Views and Environmental Values (3)
SNR 511. Sustainable Natural Resource Development (1)
SNR 520. Social Aspects of Sustainable Natural Resources (3)
SNR 521. Economics of Sustainable Natural Resource Management (3)
SNR 535. Sustainable Management of
Aquatic and Riparian Resources (3)
SNR 540. Global Environmental Change (3)
SOC 580. Environmental Sociology (4)
SOC 581. Society and Natural Resources (4)
WGSS 540. Women and Natural Resources (3)

## Business, Communication, and Management Skills Core Courses (6 credits minimum)

AG 521. Leadership Development (3)
AHE 534. Organizations and Systems
Theory (4)
COMM 550. Communication and the
Practice of Science (3)
FES 593. Environmental Interpretation (4)
FW 514. Professional Development:
Meeting Communications (1)
PS 579. Topics in Public Policy and Public
Administration (4)
WR 525. Advanced Scientific and Technical Writing (4)
WRP 521. Water Conflict Management and Transformation (3)

## Ethics (1 credit minimum)

GRAD 520. Responsible Conduct of Research (1)
PHL 540. Environmental Ethics (3)
PHL 547. Research Ethics (3)
SNR 522. Basic Beliefs and Ethics in Natural Resources (3)

## Internship (6 credits minimum)

FW 510 Professional Internship (1-16) or FW 506. Projects (1-6)

## Total Credits=45 minimum

All courses on these lists are available online. Students taking on-campus or hybrid courses may find logical substitutions that can be approved by the program director.
Major Code: 1331

## FISHERIES SCIENCE (MS, PhD, MAIS)

Graduate Areas of Concentration
Aquaculture, conservation biology, fish genetics, ichthyology, limnology, parasites and diseases, physiology and ecology of marine and freshwater fishes, stream ecology, toxicology, water pollution biology
The Department of Fisheries and Wildlife offers graduate work leading to the Master of Science and Doctor of Philosophy degrees (and participation in the MAIS degree program) with majors in fisheries science.

Fisheries research in graduate studies involves quantitative analyses of marine and freshwater fish populations, water quality, fish systematics, fish and invertebrate physiology, stream ecology, modeling of aquatic ecosystems, land use interactions, endangered species, conservation biology, and aquaculture.

The Oregon Cooperative Fish and Wildlife Research Unit has active research programs funded in part by the Oregon Department of Fish and Wildlife and U.S. Geological Survey. The Agricultural Experiment Station, the Sea Grant program, Forest Science Laboratory and other organizations fund major research projects. The department maintains extensive collections of vertebrate species, which are curated by Doctors Sidlauskas (fish), Epps (mammals), and Dugger (birds).
For more information, visit
http://fw.oregonstate.edu, or email:
fw.gradadvising@oregonstate.edu.

## Major Code: 1300

## WILDLIFE SCIENCE (MS, PhD, MAIS)

## Graduate Areas of Concentration

Animal-habitat relationships; behavior; biology of big game and small mammals; conservation biology; community studies; ecology of avian and mammalian predators; ecology of waterfowl and upland gamebirds; effects of parasites, diseases, and environmental contaminants; nutrition; population; population dynamics; reproductive biology; toxicology of pesticides; wildlife ecology; wildlife-forestry interactions; wildlife science
The Department of Fisheries and Wildlife offers graduate work leading to the Master of Science and Doctor of Philosophy degrees (and participation in the MAIS degree program) with majors in wildlife science.

The wildlife graduate program in the Department of Fisheries and Wildlife includes wildlife research concerning the interaction of wildlife with land uses, migratory waterfowl, upland game birds, forest bird communities, endangered species, population dynamics, and conservation biology.

The Oregon Cooperative Fish and Wildlife Research Unit has active research
programs funded in part by the Oregon Department of Fish and Wildlife and U.S. Geological Survey. The Agricultural Experiment Station, the Sea Grant program, Forest Science Laboratory and other organizations fund major research projects. The department maintains extensive collections of vertebrate species, which are curated by Doctors Sidlauskas (fish), Epps (mammals), and Dugger (birds).

For more information, visit http://fw.oregonstate.edu, or email: fw.gradadvising@oregonstate.edu.
Major Code: 1750
GRADUATE MINORS
FISHERIES SCIENCE GRADUATE MINOR
For more details, see the departmental advisor.
Minor Code: 1300

## WILDLIFE SCIENCE GRADUATE

 MINORFor more details, see the departmental advisor.
Minor Code: 1750

## CERTIFICATES

## FISHERIES MANAGEMENT

 GRADUATE CERTIFICATE
## Also available via Ecampus.

Fisheries management is facing unprecedented challenges. Scientists, decision makers, and stakeholders must work together to rebuild over-fished stocks, implement ecosystem-based approaches, design global fisheries agreements, sustain coastal fishing communities, reduce over-capacity and increase the cost-effectiveness of research and management.

Oregon State University's Graduate Certificate in Fisheries Management integrates diverse approaches and perspectives to find effective solutions for complex fisheries management problems at all levels, local to international.

## Certificate Overview:

The graduate certificate is available for completion online or on-campus and is designed to accommodate the needs of private, agency and NGO professionals, decision-makers and graduate students in the U.S. and other nations.

Current Graduate Students: You must notify the Department of Fisheries and Wildlife of your intention to pursue this certificate. Upon consultation with the certificate program directors, you will be given instructions regarding listing courses on your program of study and obtaining the required signature for that form.

For more information, please see our program site on the Ecampus website at http://ecampus.oregonstate.edu/online-
degrees/graduate/fisheries-management/ and our departmental website at http:// fw.oregonstate.edu or contact the program coordinator at fw.gradadvising@ oregonstate.edu.
Professionals and other students: You must notify the Department of Fisheries and Wildlife of your intention to pursue this certificate.

Please contact Certificate Program Director Dr. Bruce Dugger, bruce.dugger@ oregonstate.edu, or Graduate Program Coordinator fw.gradadvising@oregonstate.edu.

## The certificate requires:

- 18 credits of total course work, taken online and/or on-campus,
- A capstone project (applying knowledge and skills to a fisheries management issue), equivalent in time and effort to a 3-credit course;
- A minimum of two courses from the human dimensions area;
- A minimum of two courses from the fisheries science and ecology area;
- For further information, please see our website or email: fw.gradadvising@oregonstate.edu.
Courses are offered on-campus, at the Hatfield Marine Science Center, and/ or online. Check the course catalog and schedule of classes for location and term offered.


## Capstone project

FW 506. Projects (3 credits)

## Human Dimensions Subject Area

 Select at least 2 courses for a minimum 6 credits from below:AEC 534. Environmental and Resource Economics (3)
AEC/MRM 552. Marine Economics (3)
ANTH 581. Natural Resources and
Community Values (4)
COMM 540. Theories of Conflict and
Conflict Management (3)
COMM 542. Bargaining and Negotiation Processes (3)
COMM 544. Third Parties in Dispute
Resolution: Mediation/Arbitration (3)
COMM 546. Communication in
International Conflict and Disputes (3)
FES/FW/SOC 585. Consensus and Natural Resources (3)
FW 514. Professional Development: Meeting Communications (1)
FW 515. Fisheries and Wildlife Law and Policy (3)
FW 522. Introduction to Ocean Law (3)
FW 537. Structured Decision Making in
Natural Resource Management (2)
FW 549. History of Fisheries Science (3)

## Ecampus only.

FW 620. Ecological Policy (3)
MRM 521. Ocean Law (3)
MRM 530. Principles and Practice of Marine Resource Management (3)
MRM 535. Rights-Based Fisheries
Management (3)
PS 575. Environmental Politics and Policy (4)
PS 576. Science and Politics (4)
PS 577. International Environmental

Politics and Policy (4)
SOC 580. Environmental Sociology (4)
SOC 581. Society and Natural Resources (4) Fisheries Science and Ecology Subject Area:

## Select at least 2 courses for a

minimum 6 credits from below:
FE 530. Watershed Processes (4)
FW 519. The Natural History of Whales and Whaling (3)
FW 520. Ecology and Management of Marine Fishes (3)
FW 521. Aquatic Biological Invasions (4)
FW 524. Introduction to Fisheries
Assessment (3)
FW 531. Dynamics of Marine Biological Resources (4)
FW 538. Structured Decision Making in Natural Resource Management Lab (2) Ecampus only.
FW/FES 545. Ecological Restoration (4)
FW 554. Fishery Biology (4)
FW 556. Limnology (5)
FW 562. Ecosystem Services (3)
FW/BI 564. Marine Conservation Biology (3)
FW 565. Marine Fisheries (4)
FW 571. Environmental Physiology of Fishes (4)
FW 573. Fish Ecology and Conservation (4)
FW 574/OC 574. Early Life History of Fishes (4)

FW 576. Fish Physiology (4)
FW 579. Wetlands and Riparian Ecology (3)
FW 580. Stream Ecology (3)
FW 597. Aquaculture (3)
FW 599. Special Topics in Fisheries and Wildlife (2 or 4)
FW 620. Ecological Policy (3)
OEAS 540. The Biogeochemical Earth (4)
TOX 555. Ecotoxicology: Aquatic Ecosystems (3)

## Total=18 credits

Other courses may be substituted upon approval of the certificate director.
Major Code: CG08

## WILDLIFE MANAGEMENT GRADUATE CERTIFICATE

## Also available via Ecampus.

All courses listed are offered online through Ecampus, and this graduate certificate is designed primarily for online students.

Please contact Certificate Program Director Dr. Bruce Dugger, bruce.dugger@ oregonstate.edu, or Graduate Program Coordinator fw.gradadvising@oregonstate.edu.

## Curriculum

FW 506. Projects: Capstone Project (3)

## Wildlife Sciences Core

## Select at least two courses from

## below:

FW 519. The Natural History of Whales and Whaling (3)
FW 521. Aquatic Biological Invasions (4)
FW 527. Principles of Wildlife Diseases (4)
FW 535. Wildlife in Agricultural Ecosystems (3)

FW 538. Structured Decision Making in
Natural Resource Management Lab (2)

FW 540. Vertebrate Population Dynamics
(4) Ecampus only.

FW/FES 545. Ecological Restoration (4)
FW 551. Avian Conservation and Management (3)
FW/FES 552. Forest Wildlife Habitat Management (4)
FW 558. Mammal Conservation and Management (4)
FW 562. Ecosystem Services (3) counts as FW core OR Human Dimensions
FW 563. Conservation Biology of Wildlife (3)

FW 575. Wildlife Behavior (4)
FW 579. Wetlands and Riparian Ecology (3)
FW 581. Wildlife Ecology (3)
SNR 530. Ecological Principles of Sustainable Natural Resources (3) Ecampus only.
SNR 540. Global Environmental Change (3) Ecampus only.

## Human Dimensions Core

Select at least two courses from below:
AEC 532. Environmental Law (4)
AEC 534. Environmental and Resource Economics (3)
ANS/FES/FW/SOC 585. Consensus and Natural Resources (3)
ANTH 581. Natural Resources and Community Values (4)
FW 515. Fisheries and Wildlife Law and Policy (3)
FW 537. Structured Decision Making in
Natural Resource Management (2)
FW 562. Ecosystem Services (3) Counts as FW core OR Human Dimensions
FW 583. Species Recovery Planning and Restoration (3)
FW 620. Ecological Policy (3)
PHL 540. Environmental Ethics (3)
PHL 543. World Views and Environmental Values (3)
PS 575. Environmental Politics and Policy (4)
PS 577. International Environmental Politics and Policy (4)
SNR 520. Social Aspects of Sustainable Natural Resources (3) Ecampus only.
SNR 521. Economics of Sustainable Natural Resource Management (3) Ecampus only.
SNR 522. Basic Beliefs and Ethics in Natural Resources (3) Ecampus only.
SOC 580. Environmental Sociology (4)
SOC 581. Society and Natural Resources (4) WRP 599. Special Topics (3)

## Skills Courses

Select at least one course from below (recommended):
BOT 540. Field Methods in Vegetation Science (4)
FW 514. Professional Development: Meeting Communications (1)
GEO 544. Remote Sensing (4) or GEOG 580. Remote Sensing I: Principles and Applications (4)
GEO 565. Geographic Information Systems and Science (4)
or GEOG 560. GIScience I: Introduction
to Geographic Information Science (4)
ST 511. Methods of Data Analysis (4)
(Continues as ST 512, ST 513)

## Major Code: CG12

## ■ FISHIERES AND WILDLIFE COURSES

FW 107. ORIENTATION TO FISHERIES AND WILDLIFE (1). Information relevant to academic pathways and career planning in the fields of fisheries and wildlife. Graded P/N.
FW 112. SCIENCE OF FLY FISHING TROUT (1).
Uses fly fishing as a window into the larger world of science, art, and conservation, and more specifically into the structure and function of freshwater ecosystems. This class requires students to be concurrently registered for The Literature of Fly Fishing for Trout through English (ENG 225), and the Art of Fly Fishing through Physical Activity Courses (PAC 331). COREQS: ENG 225, PAC 331
FW 113. INTRODUCTION TO MARINE LIFE IN THE SEA-MARINE BIRDS AND MAMMALS (1). Introduces first- and second-year undergraduates, teachers and non-degree students to the breadth of marine science course offerings and research at Oregon State University's Hatfield Marine Science Center located in Newport, Oregon. Using an experiential based format, students collect field data to better understand marine mammals (whales, dolphins and porpoises), seabirds, and their interactions with their environment. Lec/lab. Graded P/N.
FW 199. SPECIAL STUDIES (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
FW 199H. SPECIAL STUDIES (1-16). Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
FW 209. CAREER SKILLS IN FISHERIES AND
WILDLIFE SCIENCES (1). A foundation for lifelong career development in fisheries and wildlife sciences. Practice the skills needed to search, apply, and attain internships and jobs. Graded P/N. PREREQS: FW 107 [P]
FW 251. PRINCIPLES OF FISH AND WILDLIFE CONSERVATION (3). History of conservation and natural resource use; ecological principles, and social and economic limitations of conservation; principles and practices of wildlife and fisheries management; role of research in management. PREREQS: Recommend one course in introductory biology.
FW 255. FIELD SAMPLING OF FISH AND
WILDLIFE (3). Introduction to sampling populations and communities of vertebrate animals emphasizing sampling design, collection and management of data, and communication of results. PREREQS: WR 121 and familiarity with personal computers.
FW 289. COMMUNICATION SKILLS FOR
FISHERIES AND WILDLIFE PROFESSIONALS
(4). Introduces students to the theoretical and practical dimensions of interpersonal and public communication in a natural resource management field. Lec/rec. PREREQS: FW 251

## FW 301. FIELD TECHNIQUES FOR MARINE

MAMMAL CONSERVATION (1). A laboratory and hands-on experience covering field techniques, computer software for data organization and analyses, and understanding the practical management conservation application for students who are taking or have taken FW/BI 302, Biology and Conservation of Marine Mammals. Taught summer term at HMSC, Newport, OR. PREREQS: BI 302* [D-] or FW 302* [D-]
FW 302. BIOLOGY AND CONSERVATION OF MARINE MAMMALS (4). An examination of the biology of whales, pinnipeds, and other marine mammals, including general adaptations to a marine existence; systematics and biogeography; reproduction; diving physiology; communication and echolocation; feeding and migratory behavior; and marine mammal/human interactions; including conservation issues. CROSSLISTED as BI 302. Taught at Hatfield Marine Science Center OR
online through Ecampus. PREREQS: One year of introductory biology is mandatory.
FW 303. SURVEY OF GEOGRAPHIC INFORMATION SYSTEMS IN NATURAL RESOURCE (3). Concepts underlying geographic information systems, global positioning system, and remote sensing; application to management and research, data quality issues, and case studies. Not a lab/skills class.

FW 307. SPECIALIZATION DEVELOPMENT (1). Students will examine career alternatives, develop career goals, learn what knowledge, skills, and abilities are important for diverse careers in fisheries and wildlife conservation, and develop an academic and lifelong plan for achieving their career goals. This course is intended to assist students in developing a specialization in fisheries and wildlife sciences. Graded P/N. PREREQS: Recommend FW 209
FW 311. ORNITHOLOGY (3). Survey of the adaptations of birds to a diverse array of habitats. Topics include origins, anatomy, reproductive strategies, migration, flight, behavior, physiology, nutrition, and conservation. PREREQS: One year introductory biology.
FW 312. SYSTEMATICS OF BIRDS (2). External anatomy, classification of birds of the world, and field identification of birds by sight and song. Field trips required. PREREQS: One year introductory biology.
FW 315. ICHTHYOLOGY (3). A survey of the diversity of biological adaptations of fishes. Topics include physiological and zoogeographical adaptations, reproduction, evolution, cladogenesis, morphology, behavior, and genetics. PREREQS: One year introductory biology.

FW 316. SYSTEMATICS OF FISHES (3). Phylogenetic diversity, evolution, relationships and identification of the world's fishes, with particular focus on Oregon fishes. Includes identification, anatomy, use of keys, introduction to the comparative method, systematic theory, taxonomy, field collection and specimen curation. Lec/lab.
PREREQS: (BI 211 [D-] or BI 211H [D-] or BI 204 [D-] ) and (BI 212 [D-] or BI 212H [D-] or BI 205 D-] ) and (BI 213 [D-] or BI 213H [D-] or BI 206 [D-] ) and Recommended pre- or co-requisite: FW 315 Ichthyology.

FW 317. MAMMALOGY (3). A survey of the origins, evolution, diversity, and adaptations of mammals to diverse environments. Topics include taxonomy, reproduction, sensory perception, herbivory, population cycles and behavior. PREREQS: One year introductory biology.

FW 318. SYSTEMATICS OF MAMMALS
(2). A survey of the phylogenetic diversity of the mammals in Oregon from a habitat/ community perspective. Identifying, using keys, and measuring specimens will be stressed. PREREQS: One year introductory biology.
FW 320. INTRODUCTORY POPULATION DYNAMICS (4). Principles and concepts of population dynamics related to fish and wildlife populations; methods of estimating abundance, mortality, sustainable harvest levels and extinction risk; hands-on introduction to models for population analysis. Lec/lab. PREREQS: (B 370* [D-] or BI 370H* [D-] or BI 371* [D-] ) and Recommended: mathematics equivalent to MTH 245 or higher, introductory statistics.

## FW 321. APPLIED COMMUNITY AND

ECOSYSTEM ECOLOGY (3). Perspectives in community and ecosystem ecology, and their use in management of fisheries and wildlife resource systems. PREREQS: FW 320* [D-]
FW 323. MANAGEMENT PRINCIPLES OF PACIFIC SALMON IN THE NORTHWEST (3). Explores the nature of the salmon problem in the Northwest. Experts from diverse disciplines describe principles of salmon biology, habitat ecology and management, socioeconomics of direct and indirect users, and government policies.

FW 325. *GLOBAL CRISES IN RESOURCE
ECOLOGY (3). Historical and contemporary implications of the impacts of burgeoning human populations on rates and patterns of global ecological change. Changes in ecosystem processes and crises of species extinction in the context of cultural and political institutions. (Bacc Core Course)

## FW 326. INTEGRATED WATERSHED

MANAGEMENT (3). A comprehensive approach to watershed management, one that includes biophysical, socioeconomic, planning and education related topics. Intended for students interested in the sustainable management of natural resources. PREREQS: FW 251

## FW 328. WILDLIFE CAPTURE AND

IMMOBILIZATION (2). Manual and chemical restraint methods are covered with an emphasis on darting equipment, animal and human safety, drug pharmacology and species specific recommendations. CROSSLISTED as VMB 328. Lec/lab. This course is repeatable for a maximum of 4 credits.
FW 331. ECOLOGY OF MARINE AND ESTUARINE BIRDS (4). Focusing on how marine and estuarine birds are adapted for life at sea. Topics include morphology, physiology, foraging ecology, and biogeography as well as introductory oceanography. Field trips. PREREQS: One year introductory biology.
FW 340. *MULTICULTURAL PERSPECTIVES IN NATURAL RESOURCES (3). Explores multicultural influences on development of natural resources in the American West. Effects of diverse social values on changes in the physical landscape and biodiversity. (Bacc Core Course)
FW 341. FISH AND WILDLIFE LAW
ENFORCEMENT (2). Introduction to the
philosophy, purposes, and methods of enforcing natural resource laws, emphasizing fish and wildlife laws.

FW 350. *ENDANGERED SPECIES, SOCIETY AND SUSTAINABILITY (3). Provides a general background to endangered species biology, and the social and economic implications of the legislation enacted to conserve endangered species (Endangered Species Act, CITES Treaty). (Bacc Core Course) PREREQS: FW 251

FW 356. *CITIZEN SCIENCE (3). Citizen science involves non-specialists in scientific studies addressing large challenges best solved through collaboration. Citizens contribute data scientists may not otherwise be able to obtain, while improving their understanding of the scientific process, integrating technology into the learning process, and generating new knowledge for society. (Bacc Core Course)
FW 360. *ORIGINS OF F\&W MANAGEMENTEVOLUTION, GENETICS, AND ECOLOGY (3). Examines genetics and human interactions with fisheries and wildlife from an ecological and evolutionary perspective. Basic principles of environmental interactions, and how humans interact with other species and their environments in the disciplines commonly recognized as fisheries, wildlife and conservation sciences (Baccalaureate Core Course) PREREQS: Two terms of course work at OSU or equivalent.
FW 366. ENVIRONMENTAL CONTAMINANTS IN FISH AND WILDLIFE (3). Environmental contamination is an important threat to many fish and wildlife populations and the habitats and prey upon which they rely. The field of ecotoxicology links the ecology of fish and wildlife with toxicology of environmental contaminants, and so spans political, scientific, and public relations realms. Through the pairing of introductory concepts with key case studies, this course provides students with a preparatory framework for understanding toxicological issues of importance for those focused on studying, managing or conserving fish and wildlife populations. PREREQS: (BI 204 [D-] or BI 211 [D-] or BI 211 H [D-] ) and (BI 205 [D-] or

BI 212 [D-] or BI 212H [D-] ) and /or equivalent
FW 370. CONSERVATION GENETICS (4). A
foundational course in preparation for a degree in Fisheries and Wildlife or other degrees focused on conservation of natural resources. Covers a broad range of topics associated with issues surrounding genetics that working professionals in the biological sciences should be conversant about. One of the most important aspects of the course is the development of problem-solving and critical-thinking skills. PREREQS: (BI 211 [D-] or BI 204 [D-] ) and (BI 212 [D-] or BI 205 [D-] ) and (BI 213 [D-] or BI 206 [D-] ) and /or 1 year introductory biology.

FW 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

FW 403. THESIS (1-16). This course is repeatable for a maximum of 32 credits. PREREQS: Departmental approval required.
FW 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
FW 407. SEMINAR (1-16). Graded P/N. Taught at Hatfield Marine Science Center. This course is repeatable for a maximum of 16 credits.

FW 407H. SEMINAR (1-16). Graded P/N. Taught at Hatfield Marine Science Center. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
FW 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
FW 410. INTERNSHIP (1-6). This course is repeatable for a maximum of 99 credits.
FW 415. FISHERIES AND WILDLIFE LAW
AND POLICY (3). Provides students with an understanding of the key legal frameworks within which they will work to conserve fish and wildlife resources. Examines federal law and policy relating to allocation and conservation of fish and wildlife resources. PREREQS: PS 201 or other introductory political science course.
FW 419. THE NATURAL HISTORY OF WHALES AND WHALING (3). Addresses the natural history of whales as a unique example of adaptation in an evolutionary lineage, and the history of whaling as a general example of the failings of international resource management. PREREQS: Some background in vertebrate ecology and evolution or genetics is recommended.
FW 421. AQUATIC BIOLOGICAL INVASIONS (4). An overview of the background, theory, evolution, ecology, politics and conservation of invasions by introduced species in aquatic environments. CROSSLISTED as BI 421. Taught at Hatfield Marine Science Center OR online through Ecampus. PREREQS: One year of university-level biology.
FW 422. INTRODUCTION TO OCEAN LAW (3). Examination of US law and primary international law focused on fisheries management with coverage of regulation of other ocean resources including energy, marine mammals, endangered species, pollution, and protected areas. Final project is intended to provide students with handson exposure to real-world fisheries and ocean management issues.
FW 426. COASTAL ECOLOGY AND RESOURCE MANAGEMENT (5). Study of the ecology and management of coastal marine and freshwater ecosystems as well as natural resources, emphasizing experimental (participatory) learning in a field station setting. Lec/lab.
FW 427. PRINCIPLES OF WILDLIFE DISEASES
(4). Ecological aspects of important diseases affecting North American wildlife will be discussed Demonstrations will mainly cover migratory birds, carnivores and ruminants. Lec/lab. Ecampus sections do not use lab demonstrations.
PREREQS: Junior standing or instructor approval required.

FW 431. DYNAMICS OF MARINE BIOLOGICAL RESOURCES (4). Strategies of marine fishery management. A synthesis of the principles of population dynamics for single- and multi-species systems from the viewpoint of a marine resource manager. Offered alternate years. Taught at Hatfield Marine Science Center OR online through Ecampus. PREREQS: BI 370 or BI 371 or equivalent course work.
FW 434. ESTUARINE ECOLOGY (4). Integrated and synthetic training in the ecological processes of estuarine environments, with emphases on ecological interactions among organisms and the biogeochemical cycling of carbon and nitrogen. Topics include geomorphology, estuarine physics and chemistry, primary and secondary producers, ecosystem metabolism, element cycling, food webs, fisheries, restoration, management, and impacts of climate. Field trip required, transportation fee charged. CROSSLISTED as OC 434/OC 534.
FW 435. ^ WILDLIFE IN AGRICULTURAL ECOSYSTEMS (3). Examines the relationships between agricultural production and fish and wildlife populations and communities. Explores the impacts of agricultural practices on fish and wildlife. Field trips required; transportation fee charged. OSU Ecampus students are not required to attend field trips. (Writing Intensive Course) PREREQS: BI 370 and FW 251 or equivalent course work.

FW 439. ^HUMAN DIMENSIONS OF FISHERIES AND WILDLIFE MANAGEMENT (3). Students build an understanding and appreciation for the role of human dimensions (HD) in fisheries and wildlife management. Students work both independently and in groups on assignments with an HD focus. CROSSLISTED as FES 439 (Writing Intensive Course) PREREQS: Principles of fish and wildlife conservation or natural resources and introductory statistics.

## FW 445. ECOLOGICAL RESTORATION (4).

Fundamentals of restoring and reclaiming disturbed landscapes and ecosystems. Topics to be covered include types and assessment of site conditions; determining restoration goals and feasibility; hydrologic, biotic, and soil functions and their importance in restoration; and measures of successful restoration. Lec/lab/rec. CROSSLISTED as FES 445. PREREQS: BI 370 or BI 370 H or instructor approval required.

## FW 451. AVIAN CONSERVATION AND

MANAGEMENT (3). Identification, classification, life history strategies, ecology and management of upland and migratory birds. PREREQS: FW 311 or equivalent course work.

## FW 452. BIODIVERSITY CONSERVATION IN

 MANAGED FORESTS (3). Designed for students in forestry, wildlife, fisheries and related fields. Introduces the concepts of, and approaches to, managing forest stands, landscapes and regions to achieve desired habitat conditions for indicator species and conservation of biological diversity. CROSSLISTED as FES 452. PREREQS: FES 240 or FES 341 or BI 370FW 454. ^${ }^{\wedge}$ FISHERY BIOLOGY (4). Principles and methods used in studying the biology of fishes; ecological requirements of freshwater and anadromous fishes; principles and practices in sport fishery management. (Writing Intensive Course) PREREQS: FW 315 [D-] and FW 320 [D-]
FW 456. LIMNOLOGY (5). Physical, chemical, and biological concepts in limnology and techniques related to aquatic resources and their management. Lec/lab. PREREQS: Senior standing.

FW 458. MAMMAL CONSERVATION AND MANAGEMENT (4). A thorough understanding of the management, conservation, and ecology of mammals in North America; includes population dynamics, harvest management, techniques to determine abundance, diets, reproduction, and the cultural and political variables that contribute to
formulation of management programs. PREREQS: 9 credits of upper-division biological sciences.

FW 462. ECOSYSTEM SERVICES (3). Introduces students to the ecological, economic, and social/ ethical issues involved in the study of ecosystem services, with a major focus on biological components involved in ecosystem services. Topics covered include: 1) an introduction to the roles that living organisms play in the provision of ecosystem services, 2) the relationship of ecosystem functions and services, 3) the societal factors that influence this relationship, 4) general categories of ecosystem services, 5) identification of potential ecosystem services in terrestrial and aquatic systems, 6) an overview of the methods of valuation, and 7) translating ecosystems functions to services. Case studies will be used to illustrate key concepts and relationships within different ecological and social contexts. PREREQS: BI 370 or equivalent course work.

FW 464. MARINE CONSERVATION BIOLOGY
(3). Lectures, group library research, and class debates on current issues regarding the conservation of biodiversity in the sea. Topics include overfishing, invasive species, eutrophication, marine pollution, and global warming, as well as means of addressing these threats. PREREQS: (BI 370 [D-] or BI 370 H [D-] ) and /or equivalent. Seniors, postbacs, and graduate students only.

FW 465. MARINE FISHERIES (4). A global perspective on commercial fish and shellfish harvesting with emphasis on fishing technology and policy issues. Offered fall term in odd years. PREREQS: FW 315 or equivalent.

## FW 467. ANTARCTIC SCIENCE AND

CONSERVATION (4). Explores the history, geology, climate, and ecosystems of Antarctica, with special emphasis on current conservation issues. PREREQS: Upper-division standing; BI 370 or equivalent recommended.

## FW 469. METHODS IN PHYSIOLOGY AND

 BEHAVIOR OF MARINE MEGAFAUNA (3). Explanation of basic behavior and physiology of marine megafauna (mammals, birds, turtles) including mating systems, life history, migration, dive physiology, energetics and foraging ecology, and instruction in field and analytical methods for foraging behavior and physiology. PREREQS: Students should have one year of introductory biology and 9 credits of upper-division courses in Fisheries and Wildlife or biological sciences.
## FW 470. *ECOLOGY AND HISTORY:

LANDSCAPES OF THE COLUMBIA BASIN (3). Integrates environmental history and landscape ecology of the Columbia River Basin from geologic origins to the present, to create an understanding of change caused by natural processes and human activities. CROSSLISTED as HSTS 470/ HSTS 570. (Bacc Core Course) PREREQS: (HST 201 and HST 202 and HST 203) or BI 370 or equivalent course work.

FW 471. ENVIRONMENTAL PHYSIOLOGY
OF FISHES (4). Principles of the functional biology of fishes with emphasis on environmental interactions and management implications. PREREQS: FW 315 and (BI 370 or BI 371 ) or equivalent course work.
FW 472. ADVANCED ICHTHYOLOGY (3).
Evolution of fishes with emphasis on the role of ontogeny; cladistic methodology and classification contrasted with traditional taxonomic approaches. PREREQS: Two years upper-division fisheries or zoology.
FW 473. FISH ECOLOGY (4). Behavior of fishes as a mode of accommodation to various ecological and evolutionary constraints. Importance of heritable and learned patterns to population and community dynamics. Application of behavioral studies to the solution of management problems. Lec/lab/rec. PREREQS: ((BI 370 [D-] or BI 370H [D-] ) and FW 315 [D-] )

FW 474. EARLY LIFE HISTORY OF FISHES (4).
Overview of diversity of development patterns in fishes; emphasis on morphology, life history, and evolution. Offered alternate years. PREREQS: FW 315 or equivalent.
FW 475. WILDLIFE BEHAVIOR (4). Adaptive significance of egocentric and social behavior of wildlife species. Implications of behavior in sound management practice. PREREQS: 9 credits of upper-division biology.
FW 476. FISH PHYSIOLOGY (4). Physiological specializations and adaptations of major groups of fishes. PREREQS: FW 315 [D-]
FW 477. AGE AND GROWTH OF FISH (3). An overview of the terminology, theory, assumptions, limitations, error, and processing and ageing techniques for different types of calcified structures used to age fishes. PREREQS: FW 454 [D-] and introductory statistics is highly recommended.
FW 479. WETLANDS AND RIPARIAN ECOLOGY
(3). Ecology of riparian freshwater and estuarine wetlands of the Pacific Northwest. Effects of land use on ecosystem structure, function, biodiversity, and restoration will be explored. PREREQS: BI 370 or BI 371
FW 481. WILDLIFE ECOLOGY (3).
Interrelationships of wildlife, environmental change. Predicting and measuring responses of wildlife to altered habitat conditions PREREQS: (BI 370 [D-] or BI 370H [D-] or BI 371 [D-] ) and / or equivalent
FW 485. *CONSENSUS AND NATURAL
RESOURCES (3). Students will use a working
group approach. They will select a natural resource topic, study the team process and interaction as a method of learning, explore the issue using systems practice, and strive for consensus on solutions to their issue. CROSSLISTED as ANS 485, FES 485/FES 585, SOC 485/SOC 585. (Bacc Core Course)
FW 488. PROBLEM SOLVING IN FISHERIES
AND WILDLIFE SCIENCE (3). The first of a twocourse capstone sequence designed to introduce students to the synthesis of scientific information on species, habitats and ecosystems and the use of such data in shaping fisheries and wildlife conservation, management and policy. Includes a group problem solving project and case studies. For FW majors in their senior year. Lec/lab. PREREQS: (FW 320 [D-] and FW 321* [D-] ) and 400 -level FW course work (e.g., FW 454 or FW 481 or FW 426)
FW 489. EFFECTIVE COMMUNICATIONS IN FISHERIES AND WILDLIFE SCIENCE (3). Second of a two-course capstone sequence centered on analysis, synthesis, and interpretation of data and written and oral communication of management, education or policy statements. PREREQS: FW 488 [D-]
FW 491. FISH DISEASES IN CONSERVATION BIOLOGY AND AQUACULTURE (3). Introduction to diseases of fish including pathogens important to aquaculture and ornamental industries as well as to wild fish populations and conservation programs. CROSSLISTED as MB 491/MB 591. PREREQS: 9 credits of upper-division fisheries biology.

FW 493. FIELD METHODS FOR MARINE
RESEARCH (3). The primary focus is providing hands-on experience in a small class exploring various field sampling methodologies, research planning logistics, and field operations in estuary and nearshore environments. Topics covered include measurement and collection methods, animal handling techniques, equipment care and handling, sampling strategy, experimental design, data management planning and, if possible, small boat work. PREREQS: One year of biology
FW 496. FISH DISEASES IN CONSERVATION BIOLOGY AND AQUACULTURE LAB (2). This laboratory complements lectures in FW/MB

491/591, with students learning basic necropsy techniques; identification of bacterial, viral and metazoan pathogens; and molecular identification methods. CROSSLISTED as MB 496/MB 596. PREREQS: MB 303 or other upper-division laboratory course.

FW 497. ^AQUACULTURE (3). Principles and practices for the aquaculture of fish, shellfish, and algae. (Writing Intensive Course.) PREREQS: 9 credits of upper-division biology.
FW 498. AQUACULTURE LABORATORY (3). Biology and culture requirements of fish, shellfish, and algae. Emphasis on laboratory culture techniques and practical experience in handling organisms. Taught at Hatfield Marine Science Center. PREREQS: 9 credits of upper-division biology.
FW 499. SPECIAL TOPICS IN FISHERIES AND WILDLIFE (0-16). Various topics in fisheries science and wildlife science. Taught at Hatfield Marine Science Center and Corvallis campus. This course is repeatable for a maximum of 16 credits.

FW 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

FW 502. TEACHING METHODS IN FISHERIES AND WILDLIFE (1). This is a discussion course designed to help new GTAs and instructors who are learning the trials and tribulations of universitylevel teaching in our department. This is a great course for students who are interested in hearing more about teaching approaches, grading and assessment, student communication, problem students, and development of teaching Graded P/N.
FW 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
FW 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

FW 506. PROJECTS (1-6). Projects are synthesis papers or outreach products that are developed with a mentor from campus, a natural resource agency, or the students place of employment. The purpose of your project is to contribute to the field of study with a product that reflects the principles and applications learned in your classes. This course is repeatable for a maximum of 12 credits.

FW 507. SEMINAR (1-16). Selected Topics. Taught at Hatfield Marine Science Center and Corvallis campus. This course is repeatable for a maximum of 16 credits.
FW 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
FW 510. PROFESSIONAL INTERNSHIP (1-16).
This course is repeatable for a maximum of 10 credits.

## FW 514. PROFESSIONAL DEVELOPMENT:

 MEETING COMMUNICATIONS (1). Fisheries and wildlife professionals use meetings of scientists, managers and stakeholders to communicate key findings and develop consensus recommendations for policy. This 1-credit experiential learning course will expose students to a scientific or management meeting in their chosen field (fisheries, wildlife, ecology, or conservation biology) and get them to think about how meetings function as well as their content. This course is repeatable for a maximum of 3 credits.
## FW 515. FISHERIES AND WILDLIFE LAW

AND POLICY (3). Provides students with an understanding of the key legal frameworks within which they will work to conserve fish and wildlife resources. Examines federal law and policy relating to allocation and conservation of fish and wildlife resources. PREREQS: PS 201 or other introductory political science course.
FW 519. THE NATURAL HISTORY OF WHALES AND WHALING (3). Addresses the natural history of whales as a unique example of adaptation in an evolutionary lineage, and the history of whaling as
a general example of the failings of international resource management. PREREQS: Some background in vertebrate ecology and evolution or genetics is recommended.
FW 520. ECOLOGY AND MANAGEMENT
OF MARINE FISHES (3). A lecture and lab course that covers the ecology of marine fishes and important ecological principles that guide conservation and management. Life history, behavior, habitat, community dynamics and ecosystem processes are emphasized, along with alternative management strategies. PREREQS: FW 320 or equivalent population dynamics class and ichthyology.

FW 521. AQUATIC BIOLOGICAL INVASIONS (4). An overview of the background, theory, evolution, ecology, politics and conservation of invasions by introduced species in aquatic environments. Taught at Hatfield Marine Science Center OR online through Ecampus. PREREQS: One year of university-level biology.
FW 522. INTRODUCTION TO OCEAN LAW (3).
Examination of US law and primary international law focused on fisheries management with coverage of regulation of other ocean resources including energy, marine mammals, endangered species, pollution, and protected areas. Final project is intended to provide students with handson exposure to real-world fisheries and ocean management issues.
FW 524. INTRODUCTION TO FISHERIES
ASSESSMENT (3). Fisheries management strategies rely on models that predict a populationss responses to exploitation. This course introduces approaches commonly used to assess and evaluate the dynamics and status of a population. Provides an overview of the terminology, data requirements, underlying rationale, assumptions, limitations and uncertainty associated with stock assessments. PREREQS: College algebra and introductory statistics are recommended. For those unfamiliar with data collection and analysis methods in fisheries, FW $454 / 554$, Fishery Biology, is a good precursor to this course.
FW 526. COASTAL ECOLOGY AND RESOURCE
MANAGEMENT (5). Study of the ecology and management of coastal marine and freshwater ecosystems as well as natural resources, emphasizing experimental (participatory) learning in a field station setting. Lec/lab.

FW 527. PRINCIPLES OF WILDLIFE DISEASES
(4). Ecological aspects of important diseases affecting North American wildlife will be discussed Demonstrations will mainly cover migratory birds, carnivores and ruminants. Lec/lab. Ecampus sections do not use lab demonstrations.
PREREQS: Junior standing or instructor approval required.
FW 531. DYNAMICS OF MARINE BIOLOGICAL
RESOURCES (4). Strategies of marine fishery management. A synthesis of the principles of population dynamics for single- and multi-species systems from the viewpoint of a marine resource manager. Offered alternate years. Taught at Hatfield Marine Science Center OR online through Ecampus. PREREQS: BI 370 or BI 371 or equivalent course work.
FW 534. ESTUARINE ECOLOGY (4). Integrated and synthetic training in the ecological processes of estuarine environments, with emphases on ecological interactions among organisms and the biogeochemical cycling of carbon and nitrogen. Topics include geomorphology, estuarine physics and chemistry, primary and secondary producers, ecosystem metabolism, element cycling, food webs, fisheries, restoration, management, and impacts of climate. Field trip required, transportation fee charged. CROSSLISTED as OC 434/OC 534.
FW 535. WILDLIFE IN AGRICULTURAL ECOSYSTEMS (3). Examines the relationships between agricultural production and fish and
wildlife populations and communities. Explores the impacts of agricultural practices on fish and wildlife. Field trips required; transportation fee charged. OSU Ecampus students are not required to attend field trips. PREREQS: BI 370 and FW 251 or equivalent course work.
FW 537. STRUCTURED DECISION MAKING IN NATURAL RESOURCE MANAGEMENT (2). Structured decision making (SDM) is used for making natural resource management and policy decisions. It is an ideal framework for interdisciplinary teams to cooperate and identify the most effective management strategies. Graduate students from diverse backgrounds (natural resources, political science, others) are provided with an understanding of the SDM process. PREREQS: One year of college-level mathematics, one quarter of fish and wildlife management or similar course is recommended.

## FW 538. STRUCTURED DECISION MAKING IN

 NATURAL RESOURCE MANAGEMENT LAB (2). Students who are taking or have taken FW 537 are provided with the understanding of and ability to employ the techniques needed to build models that are used during the structured decisionmaking process. The laboratory emphasizes the use of graphical models and basic statistical techniques for building decision-making models.Lec/lab. PREREQS: FW 537* [D-]

## FW 540. VERTEBRATE POPULATION

DYNAMICS (4). Concepts in population ecology and quantitative approaches to managing wildlife populations; methods of parameter estimation, model structure, assumptions, and analysis, applications to common management issues. PREREQS: Upper-division population ecology and basic statistics courses expected.

FW 544. QUANTITATIVE DECISION ANALYSIS FOR FISH AND WILDLIFE MANAGEMENT (4). Decision analysis allows decision makers o examine the expected effects of different strategies before implementation; incorporate multiple objectives and values of stakeholders; determine the relative influence of various sources of uncertainty; and estimate the value of collecting additional data. Quantitatively oriented graduate students in natural resources are provided with an in-depth overview of decision analysis and adaptive management, emphasizing animal population management. Lec/lab. PREREQS: ST 511 and ST 512 or equivalent, basic background in animal population dynamics and management.
FW 545. ECOLOGICAL RESTORATION (4).
Fundamentals of restoring and reclaiming disturbed landscapes and ecosystems. Topics to be covered include types and assessment of site conditions; determining restoration goals and feasibility; hydrologic, biotic, and soil functions and their importance in restoration; and measures of successful restoration. CROSSLISTED as FES 545. PREREQS: BI 370 or BI 370 H or instructor approval required
FW 549. HISTORY OF FISHERIES SCIENCE (3). Surveys the development of fisheries science, professionalization of the discipline, patronage, and the political, economic, and social context in which fisheries science operates. PREREQS: Graduate standing.
FW 550. TROPHIC CASCADES (2-3). Theory and empirical analysis of terrestrial carnivore effects on plants and ecosystems as mediated through herbivores. Emphasis on large carnivores, frequency/strength of trophic cascades, implications for ecosystem function, management, and restoration. Lectures, current literature, discussions, field exercise, term paper, and student presentations. CROSSLISTED as FES 550. This course is repeatable for a maximum of 3 credits.

FW 551. AVIAN CONSERVATION AND
MANAGEMENT (3). Identification, classification, life history strategies, ecology and management of upland and migratory birds. PREREQS: FW 311 or equivalent course work.

## FW 552. FOREST WILDLIFE HABITAT

MANAGEMENT (4). Management of terrestrial vertebrates in forest ecosystems. Effects on silvicultural practices and landscape pattern on habitats and populations. CROSSLISTED as FES 552. PREREQS: FOR 341 or equivalent course in ecology.

FW 554. FISHERY BIOLOGY (4). Principles and methods used in studying the biology of fishes; ecological requirements of freshwater and anadromous fishes; principles and practices in sport fishery management. PREREQS: FW 315 and FW 320

FW 556. LIMNOLOGY (5). Physical, chemical, and biological concepts in limnology and techniques related to aquatic resources and their management. Lec/lab. PREREQS: Senior standing.
FW 558. MAMMAL CONSERVATION AND
MANAGEMENT (4). A thorough understanding of the management, conservation, and ecology of mammals in North America; includes population dynamics, harvest management, techniques to determine abundance, diets, reproduction, and the cultural and political variables that contribute to formulation of management programs. PREREQS: 9 credits of upper-division biological sciences.

FW 560. PSYCHOLOGY OF ENVIRONMENTAL DECISIONS (3). Natural resource management and conservation programs have one thing in common: to be effective, they must consider how and why humans make decisions. This course approaches this topic from a psychological lens and will cover the psychological processes associated with making individual and group decisions, common biases and heuristics in our decision-making, and how these apply to diverse natural resource management and conservation issues. Students will learn how to take these aspects of human decision making into consideration when participating in or facilitating collaborative environmental programs.
FW 562. ECOSYSTEM SERVICES (3). Introduces students to the ecological, economic, and social/ ethical issues involved in the study of ecosystem services, with a major focus on biological components involved in ecosystem services. Topics covered include: 1) an introduction to the roles that living organisms play in the provision of ecosystem services, 2) the relationship of ecosystem functions and services, 3) the societal factors that influence this relationship, 4) general categories of ecosystem services, 5) identification of potential ecosystem services in terrestrial and aquatic systems, 6) an overview of the methods of valuation, and 7) translating ecosystems functions to services. Case studies will be used to illustrate key concepts and relationships within different ecological and social contexts. PREREQS: BI 370 or equivalent course work.

FW 563. CONSERVATION BIOLOGY OF
WILDLIFE (3). Overview of the field of conservation biology with emphasis on the relationship to conservation and management of wildlife.
FW 564. MARINE CONSERVATION BIOLOGY
(3). Lectures, group library research, and class debates on current issues regarding the conservation of biodiversity in the sea. Topics include overfishing, invasive species, eutrophication, marine pollution, and global warming, as well as means of addressing these threats. PREREQS: BI 370 or BI 370 H or equivalent. Seniors, postbacs, and graduate students only.
FW 565. MARINE FISHERIES (4). A global perspective on commercial fish and shellfish harvesting with emphasis on fishing technology and policy issues. Offered fall term in odd years. PREREQS: FW 315 or equivalent course work.

FW 569. BEHAVIOR AND PHYSIOLOGY OF MARINE MEGAFAUNA (3). An in-depth study of marine megafauna (mammals, birds, turtles)
with an emphasis on methods and analyses of behavior and physiology for conservation. Lab and field exercises include investigations into the behavior-physiology nexus of diving, migration, thermoregulation, energy expenditure, and mating systems. Research techniques to be explored will include, for example, tracking and remote biotelemetry monitoring technologies, respirometry, genetics, and direct field study observation. Theoretical approaches, field techniques and statistical analyses will help prepare students for a career in fisheries or wildlife science. Lec/lab. Taught at HMSC. PREREQS: One year of introductory biology and nine credits of upper-division courses in Fisheries and Wildlife or biological sciences in their undergraduate program.

## FW 570. ECOLOGY AND HISTORY:

 LANDSCAPES OF THE COLUMBIA BASIN (3). Integrates environmental history and landscape ecology of the Columbia River Basin from geologic origins to the present, to create an understanding of change caused by natural processes and human activities. CROSSLISTED as HSTS 470/ HSTS 570. PREREQS: (HST 201 and HST 202 and HST 203) or BI 370 or equivalent course work.FW 571. ENVIRONMENTAL PHYSIOLOGY
OF FISHES (4). Principles of the functional biology of fishes with emphasis on environmental interactions and management implications. PREREQS: FW 315 and (BI 370 or BI 371 ) or equivalent course work.
FW 572. ADVANCED ICHTHYOLOGY (3).
Evolution of fishes with emphasis on the role of ontogeny; cladistic methodology and classification contrasted with traditional taxonomic approaches. PREREQS: Two years upper-division fisheries or zoology.
FW 573. FISH ECOLOGY AND CONSERVATION (4). Behavior of fishes as a mode of accommodation to various ecological and evolutionary constraints. Importance of heritable and learned patterns to population and community dynamics. Application of behavioral studies to the solution of management problems. PREREQS: BI 370 and FW 315 or equivalent course work.
FW 574. EARLY LIFE HISTORY OF FISHES (4). Overview of diversity of development patterns in fishes; emphasis on morphology, life history, and evolution. Offered alternate years. CROSSLISTED as OC 574. PREREQS: FW 315 or equivalent.

FW 575. WILDLIFE BEHAVIOR (4). Adaptive significance of egocentric and social behavior of wildlife species. Implications of behavior in sound management practice. PREREQS: 9 credits of upper-division biology.

FW 576. FISH PHYSIOLOGY (4). Physiological specializations and adaptations of major groups o fishes. PREREQS: FW 315 or equivalent course work.
FW 579. WETLANDS AND RIPARIAN ECOLOGY
(3). Ecology of riparian freshwater and estuarine wetlands of the Pacific Northwest. Effects of land use on ecosystem structure, function, biodiversity, and restoration will be explored. PREREQS: BI 370 or BI 371 or equivalent course work.
FW 580. STREAM ECOLOGY (3). Structure and function of stream ecosystems, with emphasis on biological processes; physical and chemical relations; riparian influences and landscape perspectives. PREREQS: 9 credits of upperdivision science.

FW 581. WILDLIFE ECOLOGY (3).
Interrelationships of wildlife, environment and humans. Evaluation of properties and habitats of wildlife populations. PREREQS: (BI 370 or BI 371) and FW 311 and FW 320 and ST 351 or equivalent course work.

FW 583. SPECIES RECOVERY PLANNING AND RESTORATION (3). The importance of communication in science is stressed and a
broad knowledge of endangered species-related information is provided. Students develop the ability to critically evaluate published information in scientific literature and to present and summarize it as part of the collaborative species recovery planning process with a varied audience of stakeholders. PREREQS: FW 563 and FW 573 or equivalent course work recommended.

## FW 585. CONSENSUS AND NATURAL

RESOURCES (3). Students will use a working group approach. They will select a natural resource topic, study the team process and interaction as a method of learning, explore the issue using systems practice, and strive for consensus on solutions to their issue. CROSSLISTED as ANS 485, FES 485/FES 585, SOC 485/SOC 585.
FW 590. COASTAL POPULATION GENETICS
AND CONSERVATION (6). Hands-on application of molecular population genetics in coastal fishery management and conservation, study design, DNA extraction, PCR, analysis techniques, paper review and write-up. Taught at Hatfield Marine Science Center. PREREQS: BI 311 or equivalent introductory genetics course.
FW 591. FISH DISEASES IN CONSERVATION BIOLOGY AND AQUACULTURE (3). Introduction to diseases of fish including pathogens important to aquaculture and ornamental industries as well as to wild fish populations and conservation programs. CROSSLISTED as MB 491/MB 591. PREREQS: 9 credits of upper-division fisheries biology.
FW 596. FISH DISEASES IN CONSERVATION BIOLOGY AND AQUACULTURE LAB (2). This laboratory complements lectures in FW/MB 491/591, with students learning basic necropsy techniques; identification of bacterial, viral and metazoan pathogens; and molecular identification methods. CROSSLISTED as MB 496/MB 596. PREREQS: MB 303 or other upper-division laboratory course.
FW 597. AQUACULTURE (3). Principles and practices for the aquaculture of fish, shellfish, and algae. PREREQS: 9 credits of upper-division biology.

FW 598. AQUACULTURE LABORATORY (3). Biology and culture requirements of fish, shellfish, and algae. Emphasis on laboratory culture techniques and practical experience in handling organisms. Taught at Hatfield Marine Science Center. PREREQS: 9 credits of upper-division biology.

FW 599. SPECIAL TOPICS IN FISHERIES AND
WILDLIFE (0-16). Various topics in fisheries science and wildlife science. Taught at Hatfield Marine Science Center and Corvallis campus. This course is repeatable for a maximum of 99 credits.

FW 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

FW 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

FW 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

FW 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
FW 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
FW 620. ECOLOGICAL POLICY (3). Policy issues associated with ecosystem management, risk assessment, biological diversity, ecosystem health, sustainability, invasive species, bioregionalism, globalization and transnational factors, and rights, ethics, and morals. PREREQS: Background in natural resources, environmental sciences, ecological sciences, ecological economics, political science, or similar discipline.
FW 661. ANALYSIS OF ANIMAL POPULATIONS
(5). Quantitative methods for estimating
parameters (abundance, survival, population stability) of animal populations. Emphasis is on vertebrate animals and statistical methods of hypothesis testing, parameter estimation, and inference testing. Offered odd-numbered years. PREREQS: ST 511 and ST 512 or equivalent
FW 667. RESEARCH PERSPECTIVES (4).
Critical evaluation of philosophical perspectives in resource science and management. The aim of the course is to help students develop their own philosophical views through discussion of dominant perspectives and their problems and suggestion of potentially more adequate views PREREQS: 9 credits of upper-division science, philosophy or natural resources.
FW 699. SPECIAL TOPICS IN FISHERIES
AND WILDLIFE (1-4). Various topics in fisheries science and wildlife science. Taught at Hatfield
Marine Science Center and Corvallis campus. This course is repeatable for a maximum of 8 credits.

FW 808. WORKSHOP (1-16).

## FOOD SCIENCE AND <br> TECHNOLOCY

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## FACULTY

Professors Daeschel, Goddik, McGorrin, Morrissey, Park, Qian, Shay, Ross, Shellhammer, Su, Zhao
Associate Professors Bakalinsky,
DeWitt, Lim, Osborne, Penner, Torres
Assistant Professors Hughes,
Tomasino, Waite-Cusic
Senior Instructor 1 Smith
Instructor Just

## Undergraduate Major

Food Science and Technology (BS, CRED, HBS)
Options
Enology and Viticulture
Fermentation Science
Food Science

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Minors
Fermentation Science
Food Science
Food Technology
Graduate Major
Food Science and Technology (MS, PhD)
    Graduate Areas of Concentration
    Brewing
    Enology
    Flavor Chemistry
    Food Chemistry/Biochemistry
    Food Engineering
    Food Microbiology/Biotechnology
    Food and Seafood Processing
    Sensory Evaluation
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## Graduate Minor <br> Food Science and Technology

Food science and technology concerns the chemistry and engineering necessary to deliver safe, convenient food products from the farm gate to the food marketer. The academic program integrates principles and concepts in the physical, biological, and engineering sciences, and applies them to the scientific and technological aspects of food and beverage processing. The role of the food scientist is to successfully integrate these disciplines to assure an abundant, high quality, and nutritious food supply.
Graduate programs leading to the MS or PhD degree in food science permit intensified study in subject areas of special interest. Research areas in the department include both basic and applied aspects of chemistry/biochemistry, microbiology/biotechnology, sensory analysis, and food engineering. Research in food processing operations covers a number of food commodities such as cereal products, dairy products, fruits, vegetables, meats, seafood, wines and beers.
Departmental facilities include wellequipped laboratories, a pilot plant, a winery, a pilot research brewery, and an artisan cheese-making plant for instruction and research. Research facilities also are available at the Coastal Oregon Marine Experiment Station Seafood Laboratory at Astoria and the Food Innovation Center in Portland, Oregon.

## WORK EXPERIENCE AND INTERNSHIPS

Because of the educational value of professional work experience, the department strongly encourages students to gain practical work experience during summer and other terms. Students typically work in brewing, wineries, dairy processing, and seasonal fruit and vegetable processing. Students may earn internship credit with prior approval of the department and of the employer. OSU students may also participate in international internship programs.

## SCHOLARSHIPS

The College of Agricultural Sciences, the department, the food industry, and the Institute of Food Technologists offer over 25 merit and financial need scholarships to encourage students preparing for careers in the food industry. For more information, contact the department, 541-737-3131, and the Office of Financial Aid and Scholarships, 541-737-2241.

## CAREER OPPORTUNITIES

Food science graduates have had excellent success in finding positions (median nationwide entry level salary for bachelor of science degree holders is $\$ 50,000$ ) in
an industry that possesses tremendous variety, mobility and opportunity for advancement. Career opportunities in the food, brewing, distilling, and enology industries include management, research and development, process and production supervision, quality assurance, distribution, sales, marketing, consulting, and trade associations. Governmental agencies employ food scientists for work in regulatory control, research, and the development of food standards.

Graduates of a master's or doctoral program hold positions in teaching, colleges and university research and extension, and in industry.

## FOOD SCIENCE AND

TECHNOLOGY (BS, CRED, HBS)
A bachelor's degree in Food Science and Technology provides the necessary foundation to pursue any of the many possible food and beverage related career paths. The program integrates principles and concepts in the physical, biological and engineering sciences (including courses in general chemistry, organic chemistry, biology, physics, math and statistics, biochemistry, microbiology, and food engineering) and applies them to the scientific and technical aspects of food and beverage processing. Students who achieve at least a 2.00 GPA in the required foundation courses in chemistry additionally earn a Chemistry minor.

In addition to completing the Food Science and Technology Core, students must select from among three options (areas of concentration):

1. Enology and Viticulture
2. Fermentation Science
3. Food Science

All curricula are approved by the Higher Education Committee of the Institute of Food Technologists, making students eligible for national and Oregon IFT scholarships, as well as providing universal degree recognition within the food industry. Beyond choosing an option, students are able to further customize their studies through a menu of elective credits, facilitating the development of additional expertise in food related areas such as microbiology, toxicology, nutrition, horticulture, and animal sciences, and crediting formalized career and professional development experiences. Among minors that complement the Food Science and Technology major are Business and Entrepreneurship, Microbiology, and Nutrition.

## Grade Requirements

All courses required for completion of the Food Science and Technology major must be passed, graded on the A-F scale. Included are both "core" and "option" courses in FST, as well as supporting courses in math, sciences, and written and oral communication.

1. A C- grade, or better, must be earned in the specified prerequisites for the following courses. (These courses have additional prerequisites, but the C- minimum applies to the prerequisites listed below).

- BEE 472: MTH 112 and (MTH 241 or MTH 251) and PH 201
- FST 420: ST 351
- FST 422: CH 331 and CH 332
- FST 460: BI 212 and CH 331 and CH 332
- FST 466: BI 212 and CH 331 and CH 332
- FST 479: BI 212 and CH 331 and CH 332

2. Students must earn at least a 2.00 "major" GPA. The major GPA is a cumulative GPA calculated on a list of courses particular to each option. Selected core and option courses are included, as specified in the list accompanying requirements of each option.
Food Science and Technology Core
(100-104 credits)
Chemistry/Biochemistry

## Foundation Courses

BB 350. Elementary Biochemistry (4)
CH 231, CH 232, CH 233. *General
Chemistry (4,4,4)
CH 261, CH 262, CH 263. *Laboratory for Chemistry 231-233 (1,1,1)
CH 324. Quantitative Analysis (4)
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
Physics, Statistics and Mathematics Foundation Courses
PH 201. *General Physics (5)
ST 351. Introduction to Statistical Methods (4)

Select either MTH 241 or (MTH 251 and MTH 252):
MTH 241. *Calculus for Management and Social Science (4)
or MTH 251. *Differential Calculus (4)
and MTH 252. Integral Calculus (4)

## Biological Science Foundation

## Courses

BI 211. *Principles of Biology (4)
BI 212. *Principles of Biology (4)
BI 213. *Principles of Biology (4)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

## Communication Foundation

Courses
COMM 111. *Public Speaking (3)
Select one of WR 222, WR 327 or WR 362:
WR 222. *English Composition (3)
WR 327. *Technical Writing (3)
WR 362. *Science Writing (3)

## Food Science and Technology Core

## Courses (29)

BEE 472. Introduction to Food Engineering Principles (5)
BEE 473. Introduction to Food Engineering Process Design (3)
FST 360. Food Safety and Sanitation (3)

FST 370. Industry Preparation/HACCP (3)
FST 385. ^Communicating Food and
Fermentation Science (3)
FST 407. Senior Seminar (1)
FST 421. *Food Law (3)
FST 422. Food Chemistry Fundamentals (4)
FST 425. Food Systems Chemistry (4)

## Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course
A C- or better grade is required in the following
courses: BI 212, CH 331-CH 332, MTH 112,
MTH 241 or MTH 251, PH 201 and ST 351.


## Postbaccalaureate Study in FST

## Admission

Students holding a bachelor's degree from an accredited institution who are otherwise admissible to Oregon State University (see: http://oregonstate.edu/ admissions/main/post-baccalaureate) will be accepted into the Food Science and Technology major upon meeting the following additional criteria:

All of the following courses (or equivalents) must be completed with a cumulative GPA of 2.25 ( 4.00 maximum scale). In the case of repeated courses, the second grade earned in the course will be used in the GPA calculation.

- BI 211-BI 213 Principles of Biology
- CH 231-CH 233 General Chemistry and CH 261-CH 263 General Chemistry Laboratory
- MTH 111 College Algebra; MTH 112 Elementary Functions and MTH 241 Calculus for Management and Social Science or MTH 251 Differential Calculus
- PH 201 General Physics


## Earning the Degree

To earn a Bachelor of Science (BS) degree in Food Science and Technology, postbaccalaureate students must fulfill all of the FST major core requirements, and those of any one of three options: Enology and Viticulture, Fermentation Science, or Food Science (see: http://oregonstate.edu/foodsci/ prospective-undergraduate-students).
The Baccalaureate Core (general studies) component of an OSU bachelor's degree is considered fulfilled by the student's first degree. Additionally, the university requires that a minimum of 45 credits applied to this degree ( 32 if the first degree is from OSU) must be completed with Oregon State University course work completed while enrolled in this degree program.
Additional information for prospective postbaccalaureate students is available at the FST undergraduate department website: http://oregonstate.edu/foodsci/ home.
Major Code: 135

## OPTIONS

## ENOLOGY AND VITICULTURE OPTION

The wine industry in the United States is centered on the West Coast, which produces about 95 percent of our nation's wines. Oregon is third in the nation in terms of the number of wineries and fourth in the nation in total volume of wine produced. The Oregon wine industry is a rapidly growing industry and is becoming increasingly important to the larger Oregon economy.
The Enology and Viticulture option within the Department of Food Science and Technology prepares students to become successful winemakers. Courses in enology, taught by food science faculty, provide a scientifically-based understanding of wine production. Supporting course work in horticulture, botany and crop and soil science, helps students develop an understanding of the interaction between grape production and winemaking. Graduates in this option will possess the necessary breadth and depth of knowledge and associated practical skills to become independently thinking and successful winemakers.
Fermentation and Enology Courses
FST 466. Wine Production Principles (3)
FST 467. Wine Production, Analysis, and
Sensory Evaluation (5)
FST/MB 479. Fermentation Microbiology (3)
Plant and Soil Science Courses
BOT 331. Plant Physiology (4)
HORT 301. The Biology of Horticulture (3)
HORT 453. Grapevine Growth and
Physiology (3)
HORT 454. Principles and Practices of
Vineyard Production (3)
SOIL 205. *Soil Science (3)
SOIL 206. *Soil Science Laboratory for SOIL 205 (1)

## Enology and Viticulture Option Electives <br> Complete 9 credits from the list below:

AG 407. Seminar: "Leadership Academy" (3) ${ }^{1}$
BOT 350. Introductory Plant Pathology (4)
ENT 311. Introduction to Insect Pest Management (4)
FST 101. Food Science Orientation (1)
FST 251. Introduction to Wines, Beers, and Spirits (3)
FST 260. *Food Science and Technology in
Western Culture (3)
FST 273. *Wine in the Western World (3)
FST 401. Research (3)1
FST 410. Internship (3)1,2
FST 420. Sensory Evaluation of Food (4)
FST 430. Innovation and Food Product
Development (4)
FST 480. Topics in Fermentation (1) (up to 2
credits of FST 480 may be applied)
HORT 251. Temperate Tree Fruit, Berries,
Grapes and Nuts (2)
HORT 316. Plant Nutrition (4)
HORT 452. Berry and Grape Physiology and
Culture (4)

MB 440. Food Microbiology (3)
MB 441. Food Microbiology Laboratory (2)
NUTR 216. *Food in Non-Western Culture (3) TOX 429. Toxic Substances in Food (3)
Total=37
Students may complete more than one option. Courses must be selected so that at least 12 credits in each option are counted uniquely toward requirements of that option.
FST Major Requirement of 2.00 GPA
(Enology and Viticulture Option)
The following courses are included in calculation of the FST major GPA for students in the Enology and Viticulture option:
BB 350. Elementary Biochemistry (4)
BEE 472. Introduction to Food Engineering Principles (5)
BEE 473. Introduction to Food Engineering Process Design (3)
BOT 331. Plant Physiology (4)
CH 324. Quantitative Analysis (4)
FST 360. Food Safety and Sanitation (3)
FST 370. Industry Preparation/HACCP (3)
FST 385. ^Communicating Food and
Fermentation Science (3)
FST 407. Senior Seminar (1)
FST 421. *Food Law (3)
FST 422. Food Chemistry Fundamentals (4)
FST 425. Food Systems Chemistry (4)
FST 466. Wine Production Principles (3)
FST 467. Wine Production, Analysis and
Sensory Evaluation (5)
FST/MB 479. Fermentation Microbiology (3)
HORT 453. Grapevine Growth and
Physiology (3)
HORT 454. Principles and Practices of Vineyard Production (3)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

Plus any of the following utilized in fulfillment of option requirements:
AG 407. Seminar: Leadership Academy (up to 3 credits)
BOT 350. Introductory Plant Pathology (4)
ENT 311. Introduction to Insect Pest Management (4)
FST 101. Food Science Orientation (1)
FST 251. Introduction to Wines, Beers and Spirits (3)
FST 260. *Food Science and Technology in Western Culture (3)
FST 273. *Wine in the Western World (3)
FST 401. Research (up to 3 credits)
FST 410. Internship (up to 3 credits)
FST 420. Sensory Evaluation of Food (4)
FST 430. Innovation and Food Product Development (4)
FST 480. Topics in Fermentation (up to 2 credits)
HORT 251. Temperate Tree Fruit, Berries, Grapes and Nuts (2)
HORT 316. Plant Nutrition (4)
HORT 452. Berry and Grape Physiology and Culture (4)
MB 440. Food Microbiology (3)
MB 441. Food Microbiology Laboratory (2)
NUTR 216. *Food in Non-Western Culture (3)

TOX 429. Toxic Substances in Food (3)

Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
${ }^{\mathbf{1}}$ Competitive selection and/or departmental approval required.
${ }^{2}$ Students may not earn internship credit in all states. Consult with internship coordinator for list of eligible states.
Option Code: 635


## FERMENTATION SCIENCE

 OPTIONThe Fermentation Science option, one of just a handful of such programs in the nation, is a hands-on applied science addressing the biological, chemical and physical processes of fermented foods, including those used in the production of wine, beer, and spirits, as well as a variety of other fermented foods such as cheese, yogurt, soy sauce, pickles, breads, and fermented vegetables. Graduates enjoy a wide variety of employment opportuni-ties-including some of the nation's largest wineries and breweries, artisan cheese plants, coffee, soy, and pickle companies, among others. Graduates of the Fermentation Science option can readily cross over from the beverage industry to the food industry with good preparedness.

## Foundation Science Courses

PH 202. *General Physics (5)
Choose one of NUTR 225 or NUTR 240:
NUTR 225. General Human Nutrition (3)
NUTR 240. Human Nutrition (3)

## Food Science and Technology

## Courses

FST 460. Brewing Science (3)
FST 466. Wine Production Principles (3)
FST/MB 479. Fermentation Microbiology (3)
FST 490. Food Processing Calculations (2)
FST 491. Food Processing Calculations
Laboratory (1)
FST 495. Food Packaging (2)
Complete two courses from among
FST 423, FST 461 and FST 467.
If all three are selected, credits
from one course are applied to
the Option Electives requirements below:
FST 423. Food Analysis (4)
FST 461. Brewing Analysis (3)
FST 467. Wine Production, Analysis, and Sensory Evaluation (5)

## Fermentation Science Option

 ElectivesComplete 6-8 credits from the list below, to bring the total in the Fermentation Science option to 37:
AG 407. Seminar: Leadership Academy (3) ${ }^{1}$
FST 101. Food Science Orientation (1)
FST 212. Dairy Processing (2)
FST 213. Dairy Processing Laboratory (1)
FST 251. Introduction to Wines, Beers, and Spirits (3)
FST 260. *Food Science and Technology in
Western Culture (3)
FST 273. *Wine in the Western World (3)
FST 401. Research (3) ${ }^{1}$
FST 410. Internship (3) ${ }^{1,2}$
FST 420. Sensory Evaluation of Food (4)

FST 430. Innovation and Food Product Development (4)
FST 480. Topics in Fermentation (1) (up to 2 credits of FST 480 may be applied)
MB 440. Food Microbiology (3)
MB 441. Food Microbiology Laboratory (2)
NUTR 216. *Food in Non-Western Culture (3)

TOX 429. Toxic Substances in Food (3)
Total=37
Footnotes:
${ }^{1}$ Competitive selection and/or departmental approval required.
${ }^{2}$ Students may not earn internship credit in all states. Consult with the internship coordinator for a list of eligible states.
Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Students may complete more than one
option. Courses must be selected so that at least 12 credits in each option are counted uniquely toward requirements of that option.
FST Major $\mathbf{2 . 0 0}$ GPA Requirement (Fermentation Science Option)
The following courses are included in calculation of the FST Major GPA for students in the Fermentation Science option:
BB 350. Elementary Biochemistry (4)
BEE 472. Introduction to Food Engineering Principles (5)
BEE 473. Introduction to Food Engineering Process Design (3)
CH 324. Quantitative Analysis (4)
FST 360. Food Safety and Sanitation (3)
FST 370. Industry Preparation/HACCP (3)
FST 385. ^Communicating Food and
Fermentation Science (3)
FST 407. Senior Seminar (1)
FST 421. *Food Law (3)
FST 422. Food Chemistry Fundamentals (4)
FST 425. Food Systems Chemistry (4)
FST 460. Brewing Science (3)
FST 466. Wine Production Principles (3)
FST/MB 479. Fermentation Microbiology (3)
FST 490. Food Processing Calculations (2)
FST 491. Food Processing Calculations Laboratory (1)
FST 495. Food Packaging (2)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

Plus any of the following utilized in fulfillment of option requirements:
AG 407. Seminar: Leadership Academy (up to 3 credits)
FST 101. Food Science Orientation (1)
FST 212. Dairy Processing (2)
FST 213. Dairy Processing Laboratory (1)
FST 251. Introduction to Wines, Beers, and Spirits (3)
FST 260. *Food Science and Technology in Western Culture (3)
FST 273. *Wine in the Western World (3)
FST 401. Research (up to 3 credits)
FST 410. Internship (up to 3 credits)
FST 420. Sensory Evaluation of Food (4)
FST 423. Food Analysis (4)
FST 430. Innovation and Food Product Development (4)

FST 461. Brewing Analysis (3)
FST 467. Wine Production Analysis, and Sensory Evaluation (5)
FST 480. Topics in Fermentation (up to 2 credits)
MB 440. Food Microbiology (3)
MB 441. Food Microbiology Laboratory (2)
NUTR 216. *Food in Non-Western Culture (3)

TOX 429. Toxic Substances in Food (3)

## Option Code: 141

## FOOD SCIENCE OPTION

Food scientists belong to one of the world's largest industries-the food industry. From the farm gate to the market, food scientists develop foods and beverages in response to society's needs and demands, working to make foods safe, nutritious, convenient, economical, and tasty. Food scientists look for better ways to select, preserve, process, and package food products, including the ingredients that go into them. Society's focus on food has increased as a heightened awareness of diet, health, and biosecurity (or food safety) has increased worldwide.

Graduates of the Food Science option are typically interested in research and development of new products, food safety, sensory and flavor qualities, quality control or quality assurance. Some even work as freelance food technologists.

## Physics/Statistics Courses

PH 202. *General Physics (5)
ST 352. Introduction to Statistical Methods (4)

## Nutrition Courses

Choose one of the following:
NUTR 225. General Human Nutrition (3)
NUTR 240. Human Nutrition (3)
Food Science and Technology
Courses
FST 420. Sensory Evaluation of Food (4)
FST 423. Food Analysis (4)
FST 490. Food Processing Calculations (2)
FST 491. Food Processing Calculations Laboratory (1)
FST 495. Food Packaging (2)
MB 440. Food Microbiology (3)
Complete 3 credits from the 200-level processing courses below (an additional 3 credits from this group may be applied to the option electives):
ANS 251. Principles of Animal Foods Technology (3)
FST 210. Fruit and Vegetable Processing (3)

FST 212. Dairy Processing (2)
FST 213. Dairy Processing Laboratory (1)

## Food Science Option Electives <br> Complete 7 credits from the list below:

AG 407. Seminar: Leadership Academy (3) ${ }^{\mathbf{1}}$
FST 101. Food Science Orientation (1)
FST 260. *Food Science and Technology in
Western Culture (3)
FST 273. *Wine in the Western World (3)
FST 401. Research (3) ${ }^{\mathbf{1}}$

FST 410. Internship (3) ${ }^{\mathbf{1 , 2}}$
FST 430. Innovation and Food Product Development (4)
FST 460. Brewing Science (3)
FST 466. Wine Production Principles (3)
FST/MB 479. Fermentation Microbiology (3)
FST 480. Topics in Fermentation (1)
MB 441. Food Microbiology Laboratory (2)
NUTR 216. *Food in Non-Western Culture (3)

TOX 429. Toxic Substances in Food (3)

## Total=38

Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
${ }^{1}$ Competitive selection and/or departmental approval required.
${ }^{2}$ Students may not earn internship credit in all states. Consult with internship coordinator for list of eligible states.

Students may complete more than one option. Courses must be selected so that at least 12 credits in each option are counted uniquely toward requirements of that option.

## FST Major 2.00 GPA Requirement

 (Food Science Option)The following courses are included in calculation of the FST Major GPA for students in the Food Science option:
BB 350. Elementary Biochemistry (4)
BEE 472. Introduction to Food Engineering Principles (5)
BEE 473. Introduction to Food Engineering Process Design (3)
CH 324. Quantitative Analysis (4)
FST 360. Food Safety and Sanitation (3)
FST 370. Industry Preparation/HACCP (3)
FST 385. ${ }^{\wedge}$ Communicating Food and
Fermentation Science (3)
FST 407. Senior Seminar (1)
FST 420. Sensory Evaluation of Food (4)
FST 421. *Food Law (3)
FST 422. Food Chemistry Fundamentals (4)
FST 423. Food Analysis (4)
FST 425. Food Systems Chemistry (4)
FST 490. Food Processing Calculations (2)
FST 491. Food Processing Calculations Laboratory (1)
FST 495. Food Packaging (2)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

MB 440. Food Microbiology (3)
Plus any of the following utilized in
fulfillment of option requirements:
AG 407. Seminar: Leadership Academy (up
to 3 credits)
ANS 251. Principles of Animal Foods
Technology (3)
FST 101. Food Science Orientation (1)
FST 210. Fruit and Vegetable Processing (3)
FST 212. Dairy Processing (2)
FST 213. Dairy Processing Laboratory (1)
FST 251. Introduction to Wines, Beers, and Spirits (3)
FST 260. *Food Science and Technology in Western Culture (3)
FST 273. *Wine in the Western World (3)
FST 401. Research (up to 3 credits)
FST 410. Internship (up to 3 credits)

FST 430. Innovation and Food Product Development (4)
FST 460. Brewing Science (3)
FST 466. Wine Production Principles (3)
FST/MB 479. Fermentation Microbiology (3)
FST 480. Topics in Fermentation (1)
MB 441. Food Microbiology Laboratory (2)
NUTR 216. *Food in Non-Western Culture (3)

TOX 429. Toxic Substances in Food (3)
Option Code: 136

## UNDERGRADUATE MINORS

## FERMENTATION SCIENCE MINOR

Required Courses (12)
FST 251. Introduction to Wines, Beers and Spirits (3)
MB 302. General Microbiology (3)
MB 303. General Microbiology Lab (2)
Select one of the following two:
BB 314. Cell and Molecular Biology (4
BB 350. Elementary Biochemistry (4)

## Elective Courses (15)

Select 15 credits from the following:
BIOE 457. Bioreactors (3)
FST 360. Food Safety and Sanitation (3)
FST 460. Brewing Science (3)
FST 466. Wine Production Principles (3)
FST 467. Wine Production, Analysis, and Sensory Evaluation (5)
FST 479. Fermentation Microbiology (3)
FST 480. Topics in Fermentation (1-2 credits per class)**
MB 440. Food Microbiology (3)
MB 441. Food Microbiology Lab (2)
**May take up to 4 credits.
Total=27
Minor Code: 141

## FOOD MANUFACTURING MINOR

The Food Manufacturing minor introduces students to several engineering and operations concepts. A key component of the minor is a three-month manufacturing internship at a food processing facility. Prior to the internship, students will work within the department's pilot plants, producing at least one of cheese, beer, wine, liquors, or fruit and vegetable products.

## Required Courses (13 credits)

BA 357. Operations Management (4)
FST 315. Pilot Plant Experiences(2)
FST 410. Internship (3)
ST 351. Introduction to Statistical Methods (4)

Select 1 of the 3 following courses (4 credits)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 268. Mathematical Ideas in Biology (4)

## Select 3 of the 5 following courses

(10-12 credits)
BA 351. Managing Organizations (4)
ENGR 390. Engineering Economy (3)
IE 355. Statistical Quality Control (4)
IE 471. Project Management in Engineering
(3)

MFGE 436. Lean Manufacturing Systems Engineering (4)

## Total=27-29 credits

## Minor Code: 797

## FOOD SCIENCE MINOR

Required Courses (7 credits)
FST 360. Food Safety and Sanitation (3) FST 422. Food Chemistry Fundamentals (4)

## Elective Courses

Select 20 credits from the following (at least 5 credits must be upper division):
ANS 251. Principles of Animal Foods Technology (3)
BEE 472. Introduction to Food Engineering Principles (5)
BEE 473. Introduction to Food Engineering Process Design (3)
FST 210. Fruit and Vegetable Processing (3)
FST 212. Dairy Processing (2)
FST 213. Dairy Processing Laboratory (1)
FST 251. Introduction to Wines, Beers, and Spirits (3)
FST 260. *Food Science and Technology in
Western Culture (3)
FST 273. *Wine in the Western World (3)
FST 420. Sensory Evaluation of Food (4)
FST 421. *Food Law (3)
FST 423. Food Analysis (4)
FST 425. Food Systems Chemistry (4)
FST 460. Brewing Science (3)
FST 466. Wine Production Principles (3)
FST 479. Fermentation Microbiology (3)
FST 480. Topics in Fermentation (1-2)
FST 490. Food Processing Calculations (2)
FST 491. Food Processing Calculations
Laboratory (1)
FST 495. Food Packaging (2)
MB 440. Food Microbiology (3)
MB 441. Food Microbiology Laboratory (2)
TOX 429. Toxic Substances in Food (3)

## Total=27

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 136

FOOD TECHNOLOGY MINOR

## Required Courses (16)

FST 210. Fruit and Vegetable Processing (3)
FST 212. Dairy Processing (2)
FST 213. Dairy Processing Lab (1)
FST 360. Food Safety and Sanitation (3)
FST 421. *Food Law (3)
MB 230. *Introductory Microbiology (4)

## Elective Courses

Select 11 credits from the following,

## 6 must be upper division:

ANS 251. Principles of Animal Foods Technology (3)
FST 251. Introduction to Wines, Beers, and Spirits (3)
FST 260. Food Science and Technology in
Western Culture (3)
FST 420. Sensory Evaluation of Food (4)
FST 480. Topics in Fermentation (1-2 credits
per class, can take up to 2 credits)
FST 495. Food Packaging (2)
NUTR 225. Human Nutrition (3)

NUTR 235. Science of Foods (5)
Total=27
Footnote:

* Baccalaureate Core Course

Minor Code: 137

## FOOD SCIENCE AND

 TECHNOLOGY (MS, PhD)
## Graduate Areas of Concentration

Brewing, enology, flavor chemistry, food chemistry/biochemistry, food engineering, food microbiology/ biotechnology, food and seafood processing, sensory evaluation
The Department of Food Science and Technology offers graduate programs leading toward the Master of Science and Doctor of Philosophy degrees. A variety of research specializations is available covering the chemical, physical, microbiological, and sensory properties of foods.

Food processing and engineering research deals with basic and applied aspects of contemporary food technologies. Areas of emphasis include the measurement and modeling of thermo-physical properties of foods and the modeling of heat and mass transfer phenomena. Other studies deal with the use of high pressure as a means of food preservation and the use of edible food coatings to enhance the nutritional quality of fresh fruits and vegetables.
Wine-related studies include relationships between sensory and chemical data and the effects of processing, wine microorganisms, and vineyard practices on quality.

Dairy processing research concerns milk quality, cheese technology, and cheese economics.

With over 75 years of history breeding and studying hops at OSU, the brewing research within FST connects to this long history by examining the flavor and stability of hops and hoppy aroma in beer as well as improved economics.

Studies in food microbiology focus on food safety and the application of beneficial microorganisms in food production. Included in this topic area are studies dealing with the effect of processing conditions on microbial viability and the characterization of yeast strains involved in fermented products.

Sensory science projects focus on an understanding of the fundamental nature of sensory phenomena and characterization of the sensory attributes of selected products.
Food chemistry research concerns the occurrence, role, formation, stability and analysis of various food constituents. Studies involving flavor chemistry and sensory evaluation aim to identify the flavor-active compounds of a wide variety of foods and beverages. Other studies focus on understanding the functional properties of cereal grains and develop-
ment of environmentally sustainable chemical and biological processes for converting food wastes and related renewable waste streams into useful byproducts.

Investigations on seafood processing and by-product utilization are being conducted on the campus, and at the Coastal Oregon Marine Experiment Station Seafood Laboratory in Astoria, Oregon.

The Food Innovation Center in Portland, Oregon-OSU's most unusual agricultural experiment station-provides entrepreneurs advice, testing and feedback on product development, packaging and shelf-life evaluation, sensory and consumer testing, marketing planning and access and business development.
Students desiring to pursue graduate study must have a BS degree or equivalent. Students from related fields of study (chemistry, microbiology, biology, etc.) should have a strong background in the basic sciences and must have earned at least a B (GPA 3.0) average during their last two years of undergraduate study.

## Major Code: 1350

## FOOD SCIENCE AND

TECHNOLOGY GRADUATE MINOR For more details, see the departmental advisor.

## Minor Code: 1350

■ FOOD SCIENCE AND TECHNOLOGY COURSES

## FST 101. FOOD SCIENCE ORIENTATION (1).

For food science majors. Orientation and academic guidance toward career planning in food science and technology.
FST 199. SPECIAL STUDIES (1-16). Graded
$\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits.

## FST 210. FRUIT AND VEGETABLE

PROCESSING (3). Lectures, lab activities
and plant tours to help majors and non-majors understand traditional and modern fruit and vegetable processing technologies. PREREQS:
CH 123 or CH 223 or ((CH 233 or CH 233 H ) and (CH 263 or CH 263 H ))
FST 212. DAIRY PROCESSING (2). Methods of processing and preserving milk and milk products and related unit operations. PREREQS: CH 123 or CH 223 or CH 233 or CH 233 H

FST 213. DAIRY PROCESSING LABORATORY (1). Laboratory and field work to accompany FST 212. Field trip required. PREREQS: Concurrent enrollment in FST 212
FST 251. INTRODUCTION TO WINES, BEERS,
AND SPIRITS (3). A descriptive introduction to the history, science, sensory, economics, and societal aspects of alcoholic beverages. PREREQS: High school biology and chemistry. Open to any major.
FST 260. *FOOD SCIENCE AND TECHNOLOGY IN WESTERN CULTURE (3). Exploring the sciences and technologies of food processing and preservation within the context of their historical, current, and possible future influences on what we eat, the structure of our society, and our day-today lives. (Bacc Core Course)
FST 273. *WINE IN THE WESTERN WORLD (3). A study of wine throughout history, from its accidental discovery and refinement through today, with a focus on the profound role wine
plays in agriculture, social rituals, human health, economics, and the ambivalent pursuit of pleasure. (Baccalaureate Core Course)
FST 315. PILOT PLANT EXPERIENCES (2). Students will be working in one of the FST pilot plants (dairy, vegetables/fruit, brewing, wine making, distilling) and will be assisting with the manufacturing of foods or beverages. Students must have available blocks of time in their schedules to contribute significantly to a production run. Production schedules for each pilot plant will be determined in advance of registration for each term. Not all pilot plants will be available each term. Lab.

FST 360. FOOD SAFETY AND SANITATION (3). Principles, practices, and regulations governing and ensuring the microbiological safety of our food supply through risk assessment, surveillance, and intervention. PREREQS: ((BI 211 [D-] or BI 211H [D-] or BI 212 [D-] or BI 212H [D-] or BI 213 [D-] or BI 213H [D-] ) and (CH 121 [D-] or CH 221 [D-] or CH 221H [D-] or CH 231 [D-] or CH 231H [D-] ))
FST 370. INDUSTRY PREPARATION/HACCP (3). Assists students in preparation for internships and employment in the food industry by introducing compliance with food safety regulations, HACCP, and audits. PREREQS: One year of chemistry and one year of biology.

## FST 385. ^COMMUNICATING FOOD AND

FERMENTATION SCIENCE (3). This writing intensive course (WIC) will guide students in the investigation and critical evaluation of literature on a topic of current interest in food or fermentation science, and the development of their ability to write concisely and with precision about technical subject matter in this discipline. Lec/rec. (Writing Intensive Course) PREREQS: WR 121 [C-] and FST 360 [D-] and MB 302* [D-] and fulfillment of Baccalaureate Core Writing II requirement. Concurrent enrollment in MB 302 permitted.

FST 399. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.
FST 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PREREQS: Honors College approval required.
FST 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FST 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required

FST 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FST 407. SENIOR SEMINAR (1).
FST 410. INTERNSHIP (1-16). A work internship to give students practical on-the-job training in the food processing or related industries. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing. Departmental approval, submission of employer and employee evaluation forms, and written reports.
FST 420. SENSORY EVALUATION OF FOOD
(4). Sensory test methods used in the evaluation of the taste, smell, texture, and color of foods as well as the evaluation of consumer acceptance of foods. This includes methods for measuring sensory qualities, underlying psychological principles, statistical methods for analyzing data, and proper interpretation of these results. Lec/lab. PREREQS: (ST 351 [C-] or ST 411 [C-] ) and (ST 352* [D-] or ST 412* [D-] )
FST 421. *FOOD LAW (3). Concepts, statutes, regulations, and agencies controlling the production, processing, and distribution and promotion of food. (Bacc Core Course)
FST 422. FOOD CHEMISTRY FUNDAMENTALS
(4). An integrated lecture/lab/recitation course applying theories of molecular reactivity to model
food systems. Lectures focus on the molecular bases of chemical phenomena that dictate the behavior of foods. Laboratories and recitations provide opportunities for students to observe, manipulate, and explore model food systems. Emphasis on major food components (water, lipids, proteins, and carbohydrates) and their behavior under conditions of particular relevance to food processing. Lec/lab/rec. PREREQS: ((CH 331 [C-] and CH 332 [C-] ) or (CH 334 [C-] and CH 335 [C-] and CH 336 [C-]) and BB 350 [D-] and (MTH 241 [D-] or MTH 252 [D-] or MTH 252 H [D-] ))
FST 423. FOOD ANALYSIS (4). An integrated laboratory/lecture course covering methods used for the quantitative analysis of the chemical composition of foods and agricultural products. PREREQS: CH 324 and CH 337 and BB 350

FST 425. FOOD SYSTEMS CHEMISTRY (4).
The chemistry of food components in real-world food systems. Focused on water, proteins, carbohydrates, lipids, and food polymers, their interactions, and the effects of food processing and storage. Integrates writing as a learning tool and means of professional communication. Lec/lab/rec. PREREQS: FST 422 [D-] and /or equivalent or instructor's discretion.
FST 430. INNOVATION AND FOOD PRODUCT
DEVELOPMENT (4). Provides technical background and hand-on laboratory experience in food product development and food innovation. Lec/lab. PREREQS: CH 331 [D-] and CH 332 [D-] and FST 360 [D-] and FST 421 [D-] and FST 422 [D-]
FST 460. BREWING SCIENCE (3). Chemistry, microbiology and engineering of malting and brewing operations for the production of beer, including the compositional analysis of barley, malt, hops, water, and beer and their effects on beer quality. PREREQS: (BI 212 [C-] or BI 212H [C-]) and CH 331 [C-] and CH 332 [C-] and BEE $472^{*}$ and MB 302*
FST 461. BREWING ANALYSIS (3).
Compositional analysis, laboratory techniques and sensory evaluation of barley, malt, hops, water, yeast and beer. Lec/lab. PREREQS: (FST 460 [D-] and (MB 303 [D-] or MB 303H [D-] ))
FST 466. WINE PRODUCTION PRINCIPLES (3). Principles of wine production technology from grape berry development through bottling, covering the microbiology and chemistry of fermentation, aging and production practices of red and white table wines, as well as sparkling and dessert wines. PREREQS: (BI 212 [C-] or BI 212 H [C-]) and CH 331 [C-] and CH 332 [C-] and BB 350 and MB 302
FST 467. WINE PRODUCTION, ANALYSIS, AND SENSORY EVALUATION (5). An integrated lecture/lab course that focuses on the practical fundamentals of red and white wine production. Students will make wine and monitor its progression from the grape to the bottle using standard chemical, microbial, and sensorial techniques. PREREQS: (FST 466 [D-] and FST 479* [D-] )
FST 479. FERMENTATION MICROBIOLOGY
(3). An introduction to industrial microbiology with a focus on the physiology of fermentation and use of microorganisms for the production of food ingredients, fermented foods, and beverages. FST students need to take BB 350 and MB students need to take BB 450 for their respective majors. CROSSLISTED as MB 479/MB 579. PREREQS: (BI 212 [C-] or BI 212H [C-]) and CH 331 [C-] and CH 332 [C-] and (BB 350 [D-] or BB 450 [D-]) and MB 302 [D-]
FST 480. TOPICS IN FERMENTATION (0-2). Selected topics in fermentation science will be presented by department faculty and invited outside experts. Topics and format will change each quarter. Students may take the course for 1 or 2 credits as the topics change. Lec/lab. This course is repeatable for a maximum of 8 credits.

FST 490. FOOD PROCESSING CALCULATIONS
(2). Application of engineering principles to produce safe processed foods meeting consumer expectations for safety and quality. Validate process engineering models by comparing predicted values with new experimental data. PREREQS: (BEE 472 [D-] and FST 360 [D-] ) COREQS: FST 491

FST 491. FOOD PROCESSING CALCULATIONS LABORATORY (1). Experiments in a pilot plant supported by a computer laboratory. Prepare samples of novel process technology products. PREREQS: Microsoft Excel skills. COREQS: FST 490

FST 495. FOOD PACKAGING (2). Fundamentals of food packaging covering the major packaging solutions with a focus on plastic, paper, and paperboard. PREREQS: Junior standing in a physical or biological science-based major.
FST 499. SPECIAL STUDIES (0-16). This course is repeatable for a maximum of 16 credits.
FST 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FST 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
FST 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FST 507. SEMINAR (1). This course is repeatable for a maximum of 4 credits.
FST 509. PRACTICUM IN TEACHING (1-16). This course is repeatable for a maximum of 16 credits.
FST 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.
FST 514. HEALTH BENEFITS OF FUNCTIONAL FOODS, NUTRACEUTICALS AND DIETARY SUPPLEMENTS (3). Functional foods, nutraceuticals and dietary supplements represent a rapidly expanding segment of domestic and international markets. This course will overview the principles and procedures necessary to evaluate and market these products. The chemistry and mechanisms of major nutraceutical ingredient categories and current scientific information supporting their biochemical and physiological efficacy will be addressed. Special dietary products, such as medical, weight control, sport, and herbal supplements, will be addressed. Regulatory aspects of labeling and structurefunction claims will be covered. CROSSLISTED as NUTR 514. PREREQS: BB 350 and CH 332
FST 520. SENSORY EVALUATION OF FOOD (4). Sensory test methods used in the evaluation of the taste, smell, texture, and color of foods as well as the evaluation of consumer acceptance of foods. This includes methods for measuring sensory qualities, underlying psychological principles, statistical methods for analyzing data, and proper interpretation of these results. Lec/lab. PREREQS: (ST 351 or ST 411) and (ST 352* or ST 412*)
FST 521. FOOD LAW (3). Concepts, statutes, regulations, and agencies controlling the production, processing, and distribution and promotion of food.
FST 522. FOOD CHEMISTRY FUNDAMENTALS
(4). An integrated lecture/lab/recitation course applying theories of molecular reactivity to model food systems. Lectures focus on the molecular bases of chemical phenomena that dictate the behavior of foods. Laboratories and recitations provide opportunities for students to observe, manipulate, and explore model food systems. Emphasis on major food components (water, lipids, proteins, and carbohydrates) and their behavior under conditions of particular relevance to food processing. Lec/lab/rec. PREREQS: ((CH 331 and CH 332 ) or (CH 334 and CH 335 and CH 336 ) and BB 350 and (MTH 241 or MTH 252 or MTH 252H))

FST 523. FOOD ANALYSIS (4). An integrated laboratory/lecture course covering methods used for the quantitative analysis of the chemical composition of foods and agricultural products. PREREQS: CH 324 and CH 337 and BB 350
FST 525. FOOD SYSTEMS CHEMISTRY (4).
The chemistry of food components in real-world food systems. Focused on water, proteins, carbohydrates, lipids, and food polymers, their interactions, and the effects of food processing and storage. Integrates writing as a learning tool and means of professional communication. Lec/lab/rec. PREREQS: FST 522 [C] and /or equivalent or instructor's discretion.

FST 560. BREWING SCIENCE (3). Chemistry, microbiology and engineering of malting and brewing operations for the production of beer, including the compositional analysis of barley, malt, hops, water, and beer and their effects on beer quality. PREREQS: (BI 212 or BI 212 H ) and CH 331 and CH 332 and BEE 472* and MB 302*

## FST 561. BREWING ANALYSIS (3).

Compositional analysis, laboratory techniques and sensory evaluation of barley, malt, hops, water, yeast and beer. Lec/lab. PREREQS: FST 460 and (MB 303 or MB 303H)
FST 566. WINE PRODUCTION PRINCIPLES
(3). Principles of wine production technology from grape berry development through bottling, covering the microbiology and chemistry of fermentation, aging and production practices of red and white table wines, as well as sparkling and dessert wines. PREREQS: (BI 212 or BI 212 H ) and CH 331 and CH 332 and BB 350 and MB 302

FST 567. WINE PRODUCTION, ANALYSIS, AND SENSORY EVALUATION (5). An integrated lecture/lab course that focuses on the practical fundamentals of red and white wine production. Students will make wine and monitor its progression from the grape to the bottle using standard chemical, microbial, and sensorial techniques. PREREQS: FST 566 [C] COREQS: FST 579
FST 579. FERMENTATION MICROBIOLOGY
(3). An introduction to industrial microbiology with a focus on the physiology of fermentation and use of microorganisms for the production of food ingredients, fermented foods, and beverages. FST students need to take BB 350 and MB students need to take BB 450 for their respective majors. CROSSLISTED as MB 479/MB 579. PREREQS: ( BI 212 or BI 212 H ) and CH 331 and CH 332 and (BB 350 or BB 450) and MB 302
FST 590. FOOD PROCESSING CALCULATIONS (2). Application of engineering principles to produce safe processed foods meeting consumer expectations for safety and quality. Validate process engineering models by comparing predicted values with new experimental data PREREQS: (BEE 572 [C] and MB 540 [C] ) and Microsoft Excel skills. COREQS: FST 591
FST 591. FOOD PROCESSING CALCULATIONS LABORATORY (1). Experiments in a pilot plant supported by a computer laboratory. Prepare samples of novel process technology products. PREREQS: Microsoft Excel skills. COREQS: FST 590

FST 595. FOOD PACKAGING (2). Fundamentals of food packaging covering the major packaging solutions with a focus on plastic, paper, and paperboard. PREREQS: Junior standing in a physical or biological science-based major.
FST 599. SPECIAL STUDIES (0-16). This course is repeatable for a maximum of 16 credits.
FST 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

FST 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

FST 605. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FST 607. SEMINAR (1). This course is repeatable for a maximum of 4 credits.
FST 620. ADVANCED TOPICS IN SENSORY SCIENCE (2). Current and/or advanced subjects in human sensory science. Includes 1) topics in human flavor perception that covers human psychophysics, neuroscience, and related fields, and 2) sensory evaluation techniques and data handling methods that are advanced in nature. Different points of view regarding above topics will be discussed. This course is repeatable for a maximum of 4 credits. PREREQS: FST 520 [C]

FST 628. FLAVOR CHEMISTRY (3). The definition of flavor, analytical methods in flavor chemistry, and mechanisms of odor interaction in food system will be discussed. In addition, an integrated approach will be used to study the flavor chemistry of economically-important agricultural products in the Pacific Northwest such as dairy products, fruits, and alcoholic beverages. PREREQS: FST 522 and FST 523
FST 639. FOOD POLYMER SCIENCE
(3). Investigates the theoretical principles and structure-function relationships of food macromolecules. The theoretical principles are related, where possible, to observable phenomena during thermal processing and storage of foods. PREREQS: (FST 422 or FST 522) and (FST 425 or FST 525) or equivalent
FST 641. PROCESSING WHEAT AND OTHER SMALL GRAINS: A MOLECULAR VIEW (3). Provides a fundamental overview of wheat and other cereals from the perspective of the molecular level events that are important in milling, baking, and other processes. Uses cereal processing (focused primarily on breadmaking) as the vehicle for placing elements of food chemistry, food polymer science, physical chemistry, and rheology into the cohesive framework of a single food category. Students will experience how the sciences of chemistry, physics, engineering, microbiology, biochemistry, nutrition, etc. amalgamate in the production of the selected cereal products. Lec/lab.
FST 666. ADVANCED TOPICS IN ENOLOGY (3). An in-depth investigation of advanced wine processing techniques and wine research, focusing on their impact on production and wine quality. PREREQS: FST 566 [B] and FST 567* [B] and it is recommended that the student have taken a viticulture course (HORT 454) and have a good understanding of how vineyard practices influence grape quality.

## HORTICULTURE

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## FACULTY

Professors Bell, Long, Mehlenbacher, Myers, Strik
Associate Professors Andrews, Braunworth, Bubl, Castagnoli, Contreras, Deluc, Detweiler, Kaiser, Lambrinos, Langellotto, W. Miller, Nonogaki, Peachey, Renquist, Rosetta, Skinkis, Stone, Walton, Yang
Assistant Professors Albert, Bouska, Choate, Coop, Edmunds, Formiga, Garrett, Hooven, Kowalewski, Levin, Lukas, Melathopoulos, Moretti, Nackley, Powell, Sagili, Sanchez, Stoven, Vining, Wang, Wiman
Instructors Bonady, Danler, Dixon, Donegan, Lemein, B. Miller, Millison, Shay, Stephan

## COURTESY FACULTY

Bassil, Bryla, Chernoh, Choi, Einhorn, Finn, Golembiewski, Griesbach, Hedstrom, Hummer, Jeknic, Jana Lee, Jung-Min Lee, Martin, Owen Jr., Peters, Reed, Scagel, Schreiner, Seiter, Tarara

## ADJUNCT FACULTY

Bondi, Kennedy, Landgren, Stephenson

## Undergraduate Major

Horticulture (BS, CRED, HBS)

## Options

Ecological and Sustainable Horticultural Production
Ecological Landscape and Urban Forestry
General Horticulture (Online)
Horticultural Research
Plant Breeding and Genetics
Therapeutic Horticulture
Turf Management
Viticulture and Enology

## Minors

Entomology (Administered by the Department of Horticulture in the College of Agricultural Sciences.) Horticulture
Turf and Landscape Management

## Graduate Major

Horticulture (MS, PhD, MAIS)

## Graduate Options

Entomology
Plant Breeding and Genetics
Graduate Minor
Horticulture

Horticulture involves the production, genetic improvement, storage, and marketing of fruits, nuts, vegetables, flowers, and vegetable crops; and the design, construction, and management of landscape plantings such as parks, gardens, golf courses, restoration projects, and sports fields. It is a science, an art, an avocation, and a business.

Horticultural and other high-value specialty crops are the largest components of Oregon's agricultural industry. Landscape horticulture is a rapidly expanding service industry in the urban areas of the Pacific Northwest and throughout the nation. Excellent and varied career opportunities exist for college graduates in both crop and landscape horticulture.

The undergraduate program provides students with a solid background in the fundamental life and physical sciences, as well as an understanding of the technologies and management systems used in the horticultural industry. Problemsolving and decision-making skills are stressed, as is student involvement. Field trips are an important component of many of the courses.

The program has eight options:

1. Ecological and Sustainable Horticultural Production
2. Ecological Landscape and Urban Forestry
3. General Horticulture (Online)
4. Horticultural Research
5. Plant Breeding and Genetics
6. Therapeutic Horticulture
7. Turf Management
8. Viticulture and Enology

The Ecological and Sustainable Horticultural Production option prepares students for careers dealing directly or indirectly with the production, breeding, post-harvest handling, marketing, and scientific study of horticultural crops.

The Ecological Landscape and
Urban Forestry option prepares students to be practitioners and leaders in the design, construction, and installation of our green spaces.

The General Horticulture is an online option and is especially recommended for students already working in the horticultural industry, whose careers will benefit from post-secondary education in the horticultural sciences.

The Horticultural Research option prepares students to assist in research or to pursue graduate studies.

The Plant Breeding and Genetics option provides an interdisciplinary approach to applied plant breeding and practical experience in breeding and genetic analysis working in the greenhouse, field, and laboratory.

The Therapeutic Horticulture option prepares students to design healing and adapted gardens and to provide
therapy programs used to improve the quality of people's lives.

The Turf Management option prepares students for careers in golf course maintenance and park and athletic field maintenance.

The Viticulture and Enology option prepares students for careers in Oregon's growing vineyard and winery industry.

All options allow the student considerable flexibility to pursue a minor or to tailor course work to meet individual goals. Qualified students interested in the business aspects of horticulture are encouraged to pursue a minor in business. All undergraduates are required to complete either an approved internship or an undergraduate research project.

A high school student preparing for the program should follow a wellbalanced college preparatory curriculum. Course work in biology, chemistry, and mathematics is strongly recommended. Course work in the social sciences, humanities, arts, and foreign languages is also encouraged, and the student should develop public speaking and writing abilities.

The program was designed to facilitate timely completion of degree requirements by transfer and postbaccalaureate students. Students intending to transfer into the program from a two- or fouryear institution should complete as many of the lower-division requirements as possible. Some professional-technical courses from community colleges may be equivalent to lower-division horticulture courses. Equivalent credit can be given for such courses. Contact a departmental advisor for further information.

For additional information about the program, contact one of the undergraduate advisors: Kelly Donegan (head advisor, all options) and Sarah McDonald (advisor for the General Horticulture option).

## HORTICULTURE (BS, CRED, HBS)

Also available via Ecampus.

## BS Degree Baccalaureate Core

 Requirements (48)All students must complete an option and its corresponding core to complete the major, which requires a minimum of 180 credits.

## Major Core

## General Science

BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
OR the alternative BI 204-BI 206 series:
BI 204, BI 205, BI 206. *Introductory Biology I,II,III $(4,4,4)$
(Horticultural Research option requires the BI 211, BI 212, BI 213 biology series.)
CH 121. General Chemistry (5)
or CH 231. *General Chemistry (4) and

CH 261. *Laboratory for Chemistry 231 (1)

CH 122. *General Chemistry (5)
or CH 232. *General Chemistry (4) and
CH 262. *Laboratory for Chemistry 232 (1)
CH 123. *General Chemistry (5)
or CH 233. *General Chemistry (4) and
CH 263. *Laboratory for Chemistry 233 (1)
(Horticultural Research option requires the
CH 231/261, CH 232/262, CH 233/263
chemistry series.)
MTH 112. *Elementary Functions (4)
or MTH 241. *Calculus for Management and Social Science (4)
or MTH 245. *Mathematics for
Management, Life, and Social Sciences (4)
or MTH 251. *Differential Calculus (4)
(Horticultural Research option requires
MTH 251.)

## Agricultural Science

BOT 331. Plant Physiology (4)
BOT 350. Introductory Plant Pathology (4)
CROP 440. Weed Management (4)
ENT 311. Introduction to Insect Pest
Management (4)
SOIL 205. *Soil Science (3) and SOIL 206.
*Soil Science Laboratory for SOIL 205 (1) or CSS 205. *Soil Science (4)

## Orientation

HORT 112. Introduction to Horticultural Systems, Practices and Careers (2) or CROP/ENT/HORT/SOIL 101. Introduction to Horticulture, Crop, Soil, and Insect Science (1)
(For Plant Breeding \& Genetics option only.)

## Horticultural Science

HORT 301. The Biology of Horticulture (3)
HORT 311. Plant Propagation (4)
HORT 316. Plant Nutrition (4)

## Experiential Learning

HORT 403. Thesis (6-12) (Horticultural Research option requires HORT 403. Thesis.)
or HORT 410. Internship (6-12) (Plant Breeding and Genetics option requires PBG 403. Thesis or PBG 410. Internship (6-12) and CSS majors only need to complete 3 credits minimum.)
HORT 412. Career Exploration: Internships and Research Projects (1)

## Grade Requirements for <br> Horticulture Major

Students pursuing a major in horticulture are required to receive a grade of C- or better in all HORT (horticulture) and PBG (plant breeding and genetics) courses that are required for completion of their major and option. If a grade below C- is received in a HORT or PBG course required for their major and option a student will need to re-take the course and receive a grade of C - or better. If the grade below a C- was received for a course that is part of a group of courses where the student can select which courses to take (i.e., they do not need to take all of the courses, just a specified number of courses or credits) then it would be acceptable for the student to substitute a course for the one that they
had received a grade below a C-. For example, in most of our options, a student needs to complete three of four plant identification courses. If a student received a grade lower than a C-in one of the classes, they could either re-take the same course or complete the other three courses with a grade of C - or better.

## Grade Requirements for

Horticulture Major - Plant Breeding and Genetics Option
Students pursuing an option in Plant Breeding and Genetics, under the Horticulture Major, and under the Crop and Soil Science Major, are required to receive a grade of C- or better in all BOT, CROP, CSS, FOR, HORT, MB, PBG, SOIL and ST courses required within their major and option.

## Major Code: 145

## OPTIONS

## ECOLOGICAL AND SUSTAINABLE HORTICULTURAL PRODUCTION OPTION

Students in the Ecological and Sustainable Horticultural Production option gain the knowledge and skills necessary to plan and manage horticultural production systems for fruit, vegetable, nursery, and greenhouse crops using environmentally sustainable practices. They come to see horticulture as a way to create and maintain vital and productive agro-ecosystems and understand the role of horticulture within a larger societal context which includes issues of ecology, economics, and politics.

The Ecological and Sustainable Horticultural Production option stresses active learning, case studies about real-world situations, and integrating ideas and facts from many different subjects. Ecological and Sustainable Horticultural Production graduates will be active learners, and possess skills prized by employers and useful for establishing their own enterprises. They will have a broad and thorough knowledge of horticulture and the skills and knowledge needed to identify, develop, and practice ecological and sustainable methods. They will be able to think critically. They will be skilled in finding and using information, as well as synthesizing information from many sources to analyze novel situations and solve problems in the field.

The Ecological and Sustainable Horticultural Production option uses the new horticulture major core.

## Option Requirements

## Plant Materials

## Select 3 of the following courses:

BOT 313. Plant Structure (4)
BOT 321. Plant Systematics (4)
BOT 323. ^Flowering Plants of the World (3) BOT 425. Flora of the Pacific Northwest (3) CROP 200. Crop Ecology and Morphology
(3)

FES 241. Dendrology (3)
HORT 226. Landscape Plant Materials I:
Deciduous Hardwoods and Conifers (4)
HORT 228. Landscape Plant Materials II:
Spring Flowering Trees and Shrubs (4)
HORT 251. Temperate Tree Fruit, Berries,
Grapes, and Nuts (2)
HORT 255. Herbaceous Ornamental Plant
Materials (3)
HORT/CROP 433. Systematics and
Adaptation of Vegetable Crops (4)

## Ecology

HORT 318. ^Applied Ecology of Managed Ecosystems (3)

## Technology

HORT/CROP 414. Precision Agriculture (4)

## Horticultural Communication

HORT 318. ^Applied Ecology of Managed Ecosystems (3)
HORT 407. Seminar (1)
HORT 411. Horticulture Book Club (1)

## Capstone

HORT/CROP 480. Case Studies in Cropping Systems Management (4)

## Advanced Horticultural Science

HORT/CROP 300. Crop Production in Pacific Northwest Agroecosystems (4)
HORT 495. Horticultural Management Plans (3)
PBG 430. Plant Genetics (3)
Horticultural Production Electives
HORT 360. Irrigation and Drainage (4)
Select 1 of the following courses:
HORT 260. Organic Farming and Gardening (3)

HORT 351. Floriculture and Greenhouse Systems (4)
HORT 361. Plant Nursery Systems (4)
HORT 451. Tree Fruit Physiology and Culture (4)
HORT 452. Berry and Grape Physiology and Culture (4)
HORT 453. Grapevine Growth and Physiology (3)
HORT 454. Principles and Practices of Vineyard Production (3)

## Horticultural Electives

Select a minimum of 9 credits from the above list or from the following list:
CROP 280. Introduction to the Complexity of Oregon Cropping Systems (4)
CROP/SOIL 325. Ag and Environmental
Predicaments: A Case Study Approach (3)
ENT 322. Honey Bee Biology and Beekeeping (3)
HORT 199. Special Topics (1-16)
HORT 199. Special Topics [Issues in
Sustainable Agriculture] (1)
HORT 285. Permaculture Design and
Theory: Certificate Course (4)
HORT 299. Special Topics (1-16)
HORT 314. Principles of Turfgrass Maintenance (4)
HORT 399. Special Topics (1-16)
HORT 405. Reading and Conference
[Pesticide Applicator Training] (4)
HORT/CROP 463. Seed Biology (3)
HORT 485. Advanced Permaculture Design (3)

HORT 499. Special Topics (1-16)
HORT 499. Special Topics [Advanced Organic Farming] (2)
or CROP 499. Special Topics [Advanced Organic Farming] (2)
HORT 499. Special Topics [Insect
Agroecology] (3)
or ENT 499. Special Topics [Insect
Agroecology] (3)
HORT 499. Special Topics [Organic and 3rd
Party Certification Practices] (2)
or CROP 499. Special Topics [Organic and
3rd Party Certification Practices] (2)
PBG 441. Plant Tissue Culture (4)
PBG 450. Plant Breeding (4)
SOIL 316. Nutrient Cycling in
Agroecoystems (4)
SOIL 455. Biology of Soil Ecosystems (4)

## Business Management

Select 1 of the following courses:
AEC 211. Management in Agriculture (4)
AEC 221. Marketing in Agriculture (3)
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 251. *Introduction to Agricultural and Food Economics (3)
BA 215. Fundamentals of Accounting (4)
BA 260. Introduction to Entrepreneurship (4)

BA 463. Family Business Management (4)

## Government and Policy

Select 1 of the following courses:
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 251. *Introduction to Agricultural and Food Economics (3)
AEC 253. Environmental Law, Policy, and Economics (4)
AGRI 411. Introduction to Food Systems: Local to Global (3)
FES 492. Ecosystem Services Ecology, Sociology, Policy (3)
NR 455. Natural Resource Decision Making (4)

PS 201. *Introduction to United States Government and Politics (4)
PS 205. *Introduction to International Relations (4)
PS 331. *State and Local Politics (4)
PS 475. Environmental Politics and Policy (4)

PS 477. International Environmental Politics and Policy (4)
SUS 350. *Sustainable Communities (4)
Ecology and Sustainability

## Ecosystems Courses

Meets Synthesis requirements. Each course must be from a different department.

## Contemporary Global Issues

Select 1 of the following courses:
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
CROP 330. *World Food Crops (3)
FES 365. *Issues in Natural Resources Conservation (3)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 300. *Sustainability for the Common Good (3)
HORT/ENT 331. *Pollinators in Peril (3)
SUS 350. *Sustainable Communities (4)
Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)
Science, Technology and Society
Select 1 of the following courses:
ANS 315. *Contentious Social Issues in Animal Agriculture (3)
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 348. *Human Ecology (3)
BOT 324. *Fungi in Society (3)
CH 374. *Technology, Energy, and Risk (3)
ENGR 350. *Sustainable Engineering (3)
ENGR 363. *Energy Matters (3)
ENSC 479. *^Environmental Case Studies (3)

FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FES/NR/RNG 477. *Agroforestry (3)
FST 421. *Food Law (3)
FW/HSTS 470. *Ecology and History: Landscapes of the Columbia Basin (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 340. *Introduction to Water Science and Policy (3)
HORT 330/ENT 300. *Plagues, Pests and Politics (3)
HST 481. *Environmental History of the United States (4)
HSTS 421. *Technology and Change (4)
NUTR 312. *Issues in Nutrition and Health (3)

PH 313. *Energy Alternatives (3)
PHL 325. *Scientific Reasoning (4)
PS 476. *Science and Politics (4)
SOIL 395. *World Soil Resources (3)
SUS 304. *Sustainability Assessment (4)

## Total credits=53-60

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Option Code: 601

## ECOLOGICAL LANDSCAPE AND URBAN FORESTRY OPTION

The landscape industry and urban forestry sector are large and diverse, offering careers in landscape design, construction, management, and restoration; conservation; park, botanical and public garden management; urban forestry policy and management; research; consulting; and interior-scaping. Landscape professionals design, build, and manage aesthetically pleasing, functional, and environmentally responsible natural spaces where we all live, work, and play. In recent years, the industry has expanded and rapidly become more sophisticated to meet the challenges of today's urban environment. Consequently, there is great demand for creative, motivated individuals who love the outdoors and enjoy working with plants, soil, water, nature, and people. In the Ecological Landscape and

Urban Forestry option, students will learn about sustainable landscape management, urban forestry, and about the ecosystem services provided by the built environment, such as carbon sequestration and climate regulation, temperature modulation, waste decomposition and detoxification, purification of water and air, storm and rainwater management, crop pollination, pest and disease control, nutrient dispersal and cycling, seed dispersal, and intellectual and spiritual inspiration, recreational experiences and scientific discovery.

The Ecological Landscape and Urban Forestry option uses the new horticulture major core.

## Option Requirements

## Plant Materials

HORT 226. Landscape Plant Materials I:
Deciduous Hardwoods and Conifers (4)
HORT 228. Landscape Plant Materials II:
Spring Flowering Trees and Shrubs (4)
Select 1 of the following courses:
BOT 313. Plant Structure (4)
BOT 321. Plant Systematics (4)
BOT 323. ^Flowering Plants of the World (3)

BOT 425. Flora of the Pacific Northwest (3)
HORT 251. Temperate Tree Fruit, Berries, Grapes, and Nuts (2)
HORT 255. Herbaceous Ornamental Plant Materials (3)
HORT/CROP 433. Systematics and
Adaptation of Vegetable Crops (4)
RNG 353. Wildland Plant Identification (4)

## Ecology

HORT 318. ^Applied Ecology of Managed Ecosystems (3)

## Technology

HORT 380. Sustainable Landscape Design (3)

## Horticultural Communication

HORT 318. ${ }^{\wedge}$ Applied Ecology of Managed
Ecosystems (3)
HORT 407. Seminar (1)
HORT 411. Horticulture Book Club (1)

## Capstone

Select 1 of the following courses:
HORT 480. Case Studies in Cropping Systems Management (4)
HORT 495. Horticultural Management Plans (3)

## Science and Technology of <br> Managed Ecosystems

HORT 314. Principles of Turfgrass Maintenance (4)
HORT 315. Sustainable Landscapes:
Maintenance, Conservation, Restore (4)
HORT/FES 350. Urban Forestry (3)
HORT/FES 447. Arboriculture (4)
HORT 358. Landscape Construction
Techniques (4)
HORT 360. Irrigation and Drainage (4)
Select 2 of the following courses, for a minimum of 6 credits:
BI 301. *Human Impacts on Ecosystems (3)
CROP/SOIL 325. ${ }^{\wedge} \mathrm{Ag}$ and Environmental
Predicaments: A Case Study Approach (3)
FES/FW 445. Ecological Restoration (4)

FW 462. Ecosystem Services (3)
GEOG 340. *Introduction to Water Science and Policy (3)
or SOIL 335. *Introduction to Water
Science and Policy (3) [Terminated
spring 2017]
GEOG 450. Land Use in the American West (3)

HORT 285. Permaculture Design and
Theory: Certificate Course (4)
HORT 319. Restoration Horticulture (3)
HORT 330/ENT 300. *Plagues, Pests, and Politics (3)
HORT 351. Floriculture and Greenhouse Systems (4)
HORT 361. Plant Nursery Systems (4)
HORT 405. Reading and Conference
[Pesticide Applicator Training] (4)
HORT/CROP 414. Precision Agriculture (4)
HORT/FES 455. Urban Forest Planning,
Policy and Management (4)
HORT 485. Advanced Permaculture Design (3)

HORT 499. Special Topics [Building Sustainable Landscapes for the 21st Century] (1)
HORT 499. Special Topics [Insect Agroecology] (3)
or ENT 499. Special Topics [Insect Agroecology] (3)
RNG 355. Desert Watershed Management (4)

SOIL 316. Nutrient Cycling in
Agroecosystems (4)
SOIL 455. Biology of Soil Ecosystems (4)
SOIL 499. Special Topics [Introduction to
Sustainable Cemetery Management] (3)
SUS 304. *Sustainability Assessment (4)

## Business Management

Select 1 of the following courses:
AEC 211. Management in Agriculture (4)
AEC 221. Marketing in Agriculture (3)
AEC 250. *Introduction to Environmental
Economics and Policy (3)
AEC 251. *Introduction to Agricultural and Food Economics (3)
BA 215. Fundamentals of Accounting (4)
BA 260. Introduction to Entrepreneurship (4)
BA 463. Family Business Management (4)

## Ecology and Sustainability

## Ecosystems Courses

Meets Synthesis Requirements. Each course must be from a different department.

## Contemporary Global Issues

Select 1 of the following courses:
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
CROP 330. *World Food Crops (3)
FES 365. *Issues in Natural Resources Conservation (3)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 300. *Sustainability for the Common Good (3)
GEOG 330. *^Geography of International
Development and Globalization (3)
HORT/ENT 331. *Pollinators in Peril (3)

SUS 350. *Sustainable Communities (4) Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)
Science, Technology and Society

## Select 1 of the following courses:

ANS 315. *Contentious Social Issues in Animal Agriculture (3)
ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 348. *Human Ecology (3)
BOT 324. *Fungi in Society (3)
CH 374. *Technology, Energy, and Risk (3)
ENGR 350. *Sustainable Engineering (3)
ENGR 363. *Energy Matters (3)
ENSC 479. *^Environmental Case Studies (3)
FES/TOX 435. *Genes and Chemicals in
Agriculture: Value and Risk (3)
FES/NR/RNG 477. *Agroforestry (3)
FST 421. *Food Law (3)
FW/HSTS 470. *Ecology and History:
Landscapes of the Columbia Basin (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 340. *Introduction to Water Science and Policy (3)
HORT 330/ENT/BI 300. *Plagues, Pests, and Politics (3)
HST 481. *Environmental History of the United States (4)
HSTS 421. *Technology and Change (4)
NUTR 312. *Issues in Nutrition and Health (3)
PH 313. *Energy Alternatives (3)
PHL 325. *Scientific Reasoning (4)
PS 476. *Science and Politics (4)
SOIL 395. *World Soil Resources (3)
SUS 304. *Sustainability Assessment (4)

## Total credits=53-59

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 789


## GENERAL HORTICULTURE <br> OPTION

## Via Ecampus only.

The online General Horticulture option curriculum is built on a strong foundation in horticultural science. This option is especially recommended for students already working in the horticultural industry, whose careers will benefit from post-secondary education in the horticultural sciences. Students learn horticultural principles and practices associated with horticultural production within the context of plant biology, pest management, soils, ecology, and economics with applications in plant nutrition, pest management, business, and marketing. In addition, students are well-informed about the latest technology and trends in the field. The option provides sufficiently broad electives for the student to build his or her curriculum to meet specific goals.

Our graduates are skilled in finding and using information, as well as synthesizing information from many sources
to solve problems. On-campus students benefit from field and lab experiences, research projects, and internships. Ecampus students will benefit from these same hands-on opportunities. With departmental support, the online student will identify opportunities for field, laboratory, internship, and research experiences, which will be vetted by the Department of Horticulture. Some lab experiences will be in the form of kits that the student will purchase and receive by mail; others will be virtual lab experiences created collaboratively between Department of Horticulture faculty and the curriculum design team in Ecampus.

The internship provides professionallevel interaction with growers, managers, field reps, and consultants, and provides hands-on experience. Similarly, the research project familiarizes students with research topics and connects them with researchers in academia, public agencies, and private industry. Mentoring and advising will assist online students in taking advantage of departmental strengths. We anticipate that many online students will already be employed in one of the horticultural industries or at research facilities.

The General Horticulture option uses the new horticulture major core.

## Option Requirements

## Plant Materials

Select 3 of the following courses:
BOT 440. Field Methods in Plant Ecology (4)
HORT 226. Landscape Plant Materials I:
Deciduous Hardwoods and Conifers (4)
HORT 228. Landscape Plant Materials II:
Spring Flowering Trees and Shrubs (4)
HORT 255. Herbaceous Ornamental Plant Materials (3)
RNG 353. Wildland Plant Identification (4)
Horticultural Production and
Management
Select 6 or more of the following courses, for a minimum of 18 credits:
CROP 310. Forage Production (4)
CROP 420. Seed Science and Technology (3)
ENT 322. Honey Bee Biology and Beekeeping (3)
ENT 440. Issues in Insect Toxicology (3)
HORT 260. Organic Farming and Gardening (3)

HORT 285. Permaculture Design and
Theory: Certificate Course (4)
HORT 314. Principles of Turfgrass
Maintenance (4)
HORT 315. Sustainable Landscapes:
Maintenance, Conservation, Restore (4)
HORT 319. Restoration Horticulture (3)
HORT 349. Diagnosing Plant Problems (3)
HORT/FES 350. Urban Forestry (3)
HORT/FES 447. Arboriculture (4)
HORT 485. Advanced Permaculture Design (3)

PBG 450. Plant Breeding (4)
Ecology
HORT 318. ^Applied Ecology of Managed Ecosystems (3)

## Technology

Select 1 of the following courses:
AG 312. Engine Theory and Operation (3)
AG 391. Farm Implements (3)
FW 303. Survey of Geographic Information
Systems in Natural Resource (3)
GEOG 201. *Foundations of Geospatial
Science and GIS (4)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)

## Horticultural Communication

HORT 318. ^Applied Ecology of Managed
Ecosystems (3)

## Capstone

HORT/CROP 300. Crop Production in Pacific Northwest Agroecosystems (4)

## Business Management

Select 1 of the following courses:
AEC 211. Management in Agriculture (4)
AEC 221. Marketing in Agriculture (3)
BA 215. Fundamentals of Accounting (4)
BA 260. Introduction to Entrepreneurship (4)

BA 365. Family Business Management (4)

## Government and Policy

Select 1 of the following courses:
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy, and Economics (4)
HORT/FES 455. Urban Forest Planning,
Policy and Management (4)
PS 201. *Introduction to United States
Government and Politics (4)
PS 205. *Introduction to International Relations (4)
PS 331. *State and Local Politics (4)
PS 475. Environmental Politics and Policy (4)
PS 476. *Science and Politics (4)
Ecology and Sustainability
Ecosystems Courses
Meets Synthesis Requirements. Each course must be from a different department.
Science, Technology and Society
Select 1 of the following courses:
AEC/ECON 352. *Environmental Economics and Policy (3)
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ANTH 481. *Natural Resources and
Community Values (3)
BI/FES/TOX 435. *Genes and Chemicals in
Agriculture: Value and Risk (3)
ENSC 479. *^Environmental Case Studies (3)

FW 350. *Endangered Species, Society and Sustainability (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 340. *Introduction to Water Science and Policy (3)
HORT 330/ENT 300. *Plagues, Pests, and Politics (3)
HST 481. *Environmental History of the
United States (4)
SOC 481. *Society and Natural Resources (4)
SOIL 395. *World Soil Resources (3)
WGSS 440. *Women and Natural Resources

## (3)

## Contemporary Global Issues

Select 1 of the following courses:
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
CROP 330. *World Food Crops (3)
FES 365. *Issues in Natural Resource Conservation (3)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 300. *Sustainability for the Common Good (3)
HORT/ENT 331. *Pollinators in Peril (3)
PHL 443. *World Views and Environmental Values (3)
SOC 480. *Environmental Sociology (4)
SUS 350. *Sustainable Communities (4)
Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)

## Total credits=46-55

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 240


## HORTICULTURAL RESEARCH OPTION

The Horticultural Research option is designed for students interested in graduate school and a career in academic or industrial research. It provides an excellent foundation in the natural sciences and horticulture and accommodates the specific interests of each student. Graduates of this program will be critical thinkers, and experienced technical communicators. They will be skilled in finding and using information, as well as synthesizing information from many sources to analyze novel situations and solve problems.

The relationship between the student and the research mentor is a key feature of this program. The mentor will assist the student in choosing upper-division classes that match the student's interests. Each student also completes a research project under the guidance of his or her mentor and writes an undergraduate thesis. Students can work with horticulture researchers on the OSU campus or at research institutions of their choosing. Our undergraduates have been welcomed at local research institutions including the United States Department of Agriculture-Agricultural Research Service laboratories, the National Clonal Germplasm Repository in Corvallis, the Corvallis Plant Materials Center of the National Resources Conservation Service, and the North Willamette Research and Extension Center.

The Horticultural Research option uses the new horticulture major core.

## Option Requirements

Plant Materials
Select 1 of the following courses:

BOT 313. Plant Structure (4)
BOT 321. Plant Systematics (4)
BOT 425. Flora of the Pacific Northwest (3)
CROP 200. Crop Ecology and Morphology (3)

FES 241. Dendrology (3)
HORT 226. Landscape Plant Materials I:
Deciduous Hardwoods and Conifers (4)
HORT 228. Landscape Plant Materials II:
Spring Flowering Trees and Shrubs (4)
HORT 251. Temperate Tree Fruit, Berries,
Grapes, and Nuts (2)
HORT 255. Herbaceous Ornamental Plant Materials (3)
HORT/CROP 433. Systematics and
Adaptation of Vegetable Crops (4)

## Ecology

Select 1 of the following courses:
BI 370. Ecology (3)
BOT 341. Plant Ecology (4)
HORT 318. ^Applied Ecology of Managed Ecosystems (3)

## Technology

Select 1 of the following courses:
HORT/CROP 414. Precision Agriculture (4)
PBG 441. Plant Tissue Culture (4)

## Horticultural Communication

HORT/BRR 406. Projects: Data Presentations (1)

HORT 407. Seminar (1)
HORT 411. Horticulture Book Club (1)
Select 1 of the following Writing

## Intensive Courses:

BOT 323. ${ }^{\wedge}$ Flowering Plants of the World (3)
CROP/SOIL 325. ^Ag and Environmental Predicaments: A Case Study Approach (3)
HORT 318. ^Applied Ecology of Managed Ecosystems (3)

## Capstone

Select 1 of the following courses:
HORT 452. Berry and Grape Physiology and Culture (4)
HORT 453. Grapevine Growth and
Physiology (3)
HORT 454. Principles and Practices of
Vineyard Production (3)
HORT/CROP 463. Seed Biology (3)
HORT/CROP 480. Case Studies in Cropping Systems Management (4)
HORT 495. Horticultural Management Plans (3)
PBG 450. Plant Breeding (4)

## Advanced Horticultural Science

PBG 430. Plant Genetics (3)

## Math and Science Foundation

## Courses

BB 350. Elementary Biochemistry (4)
CH 331. Organic Chemistry (4)
CH 332. Organic Chemistry (4)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
PH 201. *General Physics (5)
PH 202. *General Physics (5)
ST 351. Introduction to Statistical Methods (4)

Select 12 credits of upper-division
Horticulture and Life Science
courses (with approval of research mentor and advisor)

## Ecology and Sustainability

Ecosystems Courses
Meets Synthesis Requirements. Each course must be from a different department.

## Contemporary Global Issues

Select 1 of the following courses:
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
CROP 330. *World Food Crops (3)
FES 365. *Issues in Natural Resources
Conservation (3)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 300. *Sustainability for the Common Good (3)
GEOG 330. *^Geography of International
Development and Globalization (3)
HORT/ENT 331. *Pollinators in Peril (3)
SUS 350. *Sustainable Communities (4)
Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)
Science, Technology and Society
Select 1 of the following courses:
ANS 315. *Contentious Social Issues in Animal Agriculture (3)
ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 348. *Human Ecology (3)
BOT 324. *Fungi in Society (3)
CH 374. *Technology, Energy, and Risk (3)
ENGR 350. *Sustainable Engineering (3)
ENGR 363. *Energy Matters (3)
ENSC 479. *^Environmental Case Studies (3)

FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FES/NR/RNG 477. *Agroforestry (3)
FST 421. *Food Law (3)
FW/HSTS 470. *Ecology and History:
Landscapes of the Columbia Basin (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 340. *Introduction to Water Science and Policy (3)
HORT 330/ENT 300. *Plagues, Pests and Politics (3)
HST 481. *Environmental History of the United States (4)
HSTS 421. *Technology and Change (4)
NUTR 312. *Issues in Nutrition and Health (3)

PH 313. *Energy Alternatives (3)
PHL 325. *Scientific Reasoning (4)
PS 476. *Science and Politics (4)
SOIL 395. *World Soil Resources (3)
SUS 304. *Sustainability Assessment (4)

## Total credits=64-72

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 614


## PLANT BREEDING AND GENETICS OPTION

The Plant Breeding and Genetics (PBG) option at Oregon State University embodies the Land Grant mission of integrated research, teaching and extension in the context of cultivar development and fundamental genetics. Plant breeding is a collaborative discipline spanning everything from classical field approaches to gene manipulation at the molecular level. Breeders regularly cooperate with pathologists, entomologists, soil scientists, physiologists, food scientists, genomicists, molecular biologists and experts in other fields.

Students in the Plant Breeding and Genetics option will learn an interdisciplinary approach to applied plant breeding by taking courses across a broad spectrum of disciplines. The option may be tailored to meet students' career goals including graduate school, as well as directly entering public or private sector breeding programs. After completing their degree, students will have gained fundamental knowledge in plant breeding that may be applied in a range of crops including annual and perennial horticultural crops, agronomic food and feed crops, and forestry products.
This option is under both the Crop and Soil Science major and the Horticulture major. The option uses the new horticulture major core.

## Option Requirements

## Plant Materials

Select 2 of the following courses:
BOT 313. Plant Structure (4)
BOT 321. Plant Systematics (4)
BOT 425. Flora of the Pacific Northwest (3)
CROP 200. Crop Ecology and Morphology (3)

HORT 226. Landscape Plant Materials I: Deciduous Hardwoods and Conifers (4)
HORT 228. Landscape Plant Materials II:
Spring Flowering Trees and Shrubs (4)
HORT 251. Temperate Tree Fruit, Berries,
Grapes, and Nuts (2)
HORT 255. Herbaceous Ornamental Plant
Materials (3)
HORT/CROP 433. Systematics and
Adaptation of Vegetable Crops (4)

## Ecology

Select 1 of the following courses:
BI 370. Ecology (3)
BOT 341. Plant Ecology (4)
HORT 318. ^Applied Ecology of Managed
Ecosystems (3)

## Technology

PBG 441. Plant Tissue Culture (4)

## Agricultural Communication <br> CROP 407. Seminar (1)

or HORT 407. Seminar (1)
HORT 411. Horticulture Book Club (1)
Select 1 of the following Writing Intensive Courses:
BOT 323. ^Flowering Plants of the World (3)
CROP/SOIL 325. ${ }^{\wedge} \mathrm{Ag}$ and Environmental

Predicaments: A Case Study Approach (3) HORT 318. ^Applied Ecology of Managed
Ecosystems (3)

## Capstone

PBG 450. Plant Breeding (4)

## Science and Technology

CROP/HORT 463. Seed Biology (3)
PBG 430. Plant Genetics (3)
ST 351. Introduction to Statistical Methods (4)

Production and Technology
Select 4 of the following courses, for a minimum of 12 credits:
BOT 332. Laboratory Techniques in Plant Biology (3)
CROP 199. Special Studies: Issues in Sustainable Agriculture (1)
CROP 280. Introduction to the Complexity of Oregon Cropping Systems (4)
CROP 310. Forage Production (4)
CROP 330. *World Food Crops (3)
CROP 460. Seed Production (3)
CROP 499. Special Topics [Advanced Organic Farming] (2)
or HORT 499. Special Topics [Advanced Organic Farming] (2)
CROP 590. Experimental Design in Agriculture (4)
CSS 320. Principles of Oil and Fiber Crop Production (1)
CSS 321. Principles of Cereal Crop Production (1)
CSS 322. Principles of Potato Production (1)
ENT 499. Special Topics [Insect

## Agroecology] (3)

or HORT 499. Special Topics [Insect Agroecology] (3)
HORT 260. Organic Farming and Gardening (3)

HORT/CROP 300. Crop Production in
Pacific Northwest Agroecosystems (4)
HORT 351. Floriculture and Greenhouse Systems (4)
HORT 360. Irrigation and Drainage (4)
HORT 361. Plant Nursery Systems (4)
HORT 452. Berry and Grape Physiology and Culture (4)
HORT 453. Grapevine Growth and
Physiology (3)
HORT 454. Principles and Practices of
Vineyard Production (3)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

PBG 513. Plant Genetic Engineering (3)
SOIL 316. Nutrient Cycling in
Agroecosystems (4)

## Plant Synthesis

HORT/CROP 480. Case Studies in Cropping Systems Management (4)

## Ecology and Sustainability <br> \section*{Ecosystems Courses}

Meets Synthesis Requirements. Each course must be from a different department.

## Contemporary Global Issues

Select 1 of the following courses:
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
BI 301. *Human Impacts on Ecosystems (3)

BI 306. *^Environmental Ecology (3)
CROP 330. *World Food Crops (3)
FES 365. *Issues in Natural Resources Conservation (3)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 300. *Sustainability for the Common Good (3)
GEOG 330. *^Geography of International
Development and Globalization (3)
HORT/ENT 331. *Pollinators in Peril (3)
SUS 350. *Sustainable Communities (4)
Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)
Science, Technology and Society
Select 1 of the following courses:
ANS 315. *Contentious Social Issues in Animal Agriculture (3)
ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 348. *Human Ecology (3)
BOT 324. *Fungi in Society (3)
CH 374 . *Technology, Energy, and Risk (3)
ENGR 350. *Sustainable Engineering (3)
ENGR 363. *Energy Matters (3)
ENSC 479. *^Environmental Case Studies (3)

FES/TOX 435. *Genes and Chemicals in
Agriculture: Value and Risk (3)
FES/NR/RNG 477. *Agroforestry (3)
FST 421. *Food Law (3)
FW/HSTS 470. *Ecology and History:
Landscapes of the Columbia Basin (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 340. *Introduction to Water Science and Policy (3)
HORT 330/ENT 300. *Plagues, Pests, and Politics (3)
HST 481. *Environmental History of the United States (4)
HSTS 421. *Technology and Change (4)
NUTR 312. *Issues in Nutrition and Health (3)

PH 313. *Energy Alternatives (3)
PHL 325. *Scientific Reasoning (4)
PS 476. *Science and Politics (4)
SOIL 395. *World Soil Resources (3)
SUS 304. *Sustainability Assessment (4)
Total credits=44-55
Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Option Code: 785

## THERAPEUTIC HORTICULTURE <br> \section*{OPTION}

Horticultural therapy is a rapidly growing area of horticulture. The therapeutic benefits of garden environments have been understood and applied since ancient times. Horticultural therapy is recognized as a practical and effective treatment with wide-ranging benefits for people in therapeutic, vocational, and wellness programs. It is now taught and practiced throughout the world in a wide diversity of settings and cultures including mental health, physical rehabilitation, voca-
tional services, corrections, long-term care and hospice, special education, and youth and community services. Horticultural therapists design garden spaces that accommodate people with a wide range of abilities and assist people with physical, emotional or mental disabilities in gaining skills, adaptations, and coping methods that enhance their lives.

Students in the Therapeutic Horticulture option graduate with a strong foundation in horticultural science and practices. In addition, they acquire the skills and knowledge needed to design healing and adapted gardens and to provide therapy programs used to improve the quality of people's lives.

The Therapeutic Horticulture option uses the new horticulture major core.

## Option Requirements

## Plant Materials

Select 2 courses from the following:
HORT 226. Landscape Plant Materials I:
Deciduous Hardwoods and Conifers (4)
HORT 228. Landscape Plant Materials II:
Spring Flowering Trees and Shrubs (4)
HORT 251. Temperate Tree Fruit, Berries,
Grapes, and Nuts (2)
HORT 255. Herbaceous Ornamental Plant Materials (3)
HORT/CROP 433. Systematics and
Adaptation of Vegetable Crops (4)

## Ecology

HORT 318. ^Applied Ecology of Managed Ecosystems (3)

## Technology

HORT 380. Sustainable Landscape Design (3)

## Horticultural Communication

HORT 318. ^Applied Ecology of Managed Ecosystems (3)
HORT 407. Seminar (1)
HORT 411. Horticulture Book Club (1)

## Capstone

HORT 495. Horticultural Management Plans (3)

## Horticultural Science and <br> Technology

Select 2 of the following courses:
ENT 322. Honey Bee Biology and Beekeeping (3)
HORT 260. Organic Farming and Gardening (3)

HORT 285. Permaculture Design and
Theory: Certificate Course (4)
HORT 314. Principles of Turfgrass
Maintenance (4)
HORT 315. Sustainable Landscapes:
Maintenance, Conservation, Restore (4)
HORT/FES 350. Urban Forestry (3)
+HORT 351. Floriculture and Greenhouse Systems (4)
HORT 358. Landscape Construction Techniques (4)
HORT 360. Irrigation and Drainage (4)
+HORT 361. Plant Nursery Systems (4)
Horticultural and Social Sciences
HORT 270. Introduction to Therapeutic Horticulture (2)
HORT 271. Techniques \& Adaptive

Strategies in Therapeutic Horticulture (2)
HORT 272. Basic Therapeutic Skills I (2)
HORT 273. Basic Therapeutic Skills II (2)
HORT 274. Therapeutic Horticultural
Programs for Older Adults/Children (2)
HORT 275. Therapeutic Garden Design,
Maintenance, and Programming (2)
PSY 201. *General Psychology (3)
PSY 202. *General Psychology (3)
SOC 204. *Introduction to Sociology (3)
Select 3 of the following courses:
HDFS 311. Infant and Child Development (4)

HDFS 313. Adolescent Development (4)
+HDFS 314. Adult Development and Aging (4)

PSY 330. Brain and Behavior (4)
+PSY 350. Human Lifespan Development (4)
+PSY 381. Abnormal Psychology (4)
PSY 432. Physiological Psychology (4)
PSY 433. Psychopharmacology (4)
PSY 485. Behavior Modification (4)
PSY 498. Health Psychology (4)
SOC 350. Health, Illness and Society (4)
SOC 432. Sociology of Aging (3)
SOC 439. Welfare and Social Services (4)
SOC 440. Juvenile Delinquency (4)
SOC 442. Sociology of Drug Use and Abuse
(4)

-     + Courses which are requirements for Professional Registration by the American Horticultural Therapy Association (AHTA), as of October 2013, and listed only as electives in our curriculum: HDFS 314, HORT 351, HORT 361, PSY 350, PSY 381
- In addition, a 480-hour AHTA approved and supervised internship is required for Professional Registration by the AHTA.


## Ecology and Sustainability <br> Ecosystems Courses

Meets Synthesis requirements. Each course must be from a different department.

## Contemporary Global Issues

Select 1 of the following courses:
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
CROP 330. *World Food Crops (3)
FES 365. *Issues in Natural Resources Conservation (3)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 300. *Sustainability for the Common Good (3)
GEOG 330. *^Geography of International
Development and Globalization (3)
HORT/ENT 331. *Pollinators in Peril (3)
SUS 350. *Sustainable Communities (4)
Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)

## Science, Technology and Society

Select 1 of the following courses:
ANS 315. *Contentious Social Issues in
Animal Agriculture (3)
ANS/FES/FW/SOC 485. *Consensus and

Natural Resources (3)
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 348. *Human Ecology (3)
BOT 324. *Fungi in Society (3)
CH 374. *Technology, Energy, and Risk (3)
ENGR 350. *Sustainable Engineering (3)
ENGR 363. *Energy Matters (3)
ENSC 479. *^Environmental Case Studies (3)
FES/TOX 435. *Genes and Chemicals in
Agriculture: Value and Risk (3)
FES/NR/RNG 477. *Agroforestry (3)
FST 421. *Food Law (3)
FW/HSTS 470. *Ecology and History:
Landscapes of the Columbia Basin (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 340. *Introduction to Water Science and Policy (3)
HORT 330/ENT 300. *Plagues, Pests and Politics (3)
HST 481. *Environmental History of the
United States (4)
HSTS 421. *Technology and Change (4)
NUTR 312. *Issues in Nutrition and Health (3)

PH 313. *Energy Alternatives (3)
PHL 325. *Scientific Reasoning (4)
PS 476. *Science and Politics (4)
SOIL 395. *World Soil Resources (3)
SUS 304. *Sustainability Assessment (4)

## Total credits=54-60

Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 632


## TURF MANAGEMENT OPTION

Turf is the central feature of golf courses, sports fields, parks, cemeteries, and landscapes in cities and neighborhoods throughout the United States. More than 200 golf course superintendents in Oregon and 1,500 in Washington, California, and Idaho manage turf as the focal point of their facilities. Professional lawn care is a thriving industry in Oregon communities that is complemented by a vibrant sports turf and grass seed industry, all of which adds millions of dollars to local economies. This continually growing industry offers more career track jobs than any other area in horticulture.
Students in turf management become golf course superintendents, athletic field and park managers, and lawn care professionals with commensurate responsibilities and salaries. Students in this curriculum must have a passion for the outdoors, for turf maintenance, and for working with other people in a team context. Prior practical work experience and a willingness to work summers and/ or extended internships while at OSU is a characteristic shared by our students. The curriculum focuses on science, technology, 'in-field' hands-on experience, and decision making in real-world settings. Active participation in student clubs, class field labs, and out-of-class
internship work experiences is critical to success. Activities stress networking and exposure to multiple work environments to help students integrate quickly into the industry.
The Turf Management option uses the new horticulture major core.

## Option Requirements

## Plant Materials

HORT 226. Landscape Plant Materials I:
Deciduous Hardwoods and Conifers (4)
HORT 228. Landscape Plant Materials II:
Spring Flowering Trees and Shrubs (4)

## Ecology

HORT 318. ^Applied Ecology of Managed Ecosystems (3)

## Technology

AG 312. Engine Theory and Operation (3)

## Horticultural Communication

HORT 318. ^Applied Ecology of Managed Ecosystems (3)
HORT 407. Seminar (1)
HORT 411. Horticulture Book Club (1)

## Capstone

HORT 418. Golf Course Maintenance (4)

## Horticultural Science and

## Technology

GEOG 340. *Introduction to Water Science and Policy (3)
or SOIL 335. *Introduction to Water
HORT 314. Principles of Turfgrass
Maintenance (4)
HORT 315. Sustainable Landscapes:
Maintenance, Conservation, Restore (4)
HORT 358. Landscape Construction Techniques (4)
HORT 360. Irrigation and Drainage (4)
HORT 405. Reading and Conference
[Pesticide Applicator Training] (4)
Select 3 of the following courses, for
a minimum of 9 credits:
AG 221. Metals and Welding (3)
HORT/FES 350. Urban Forestry (3)
HORT 351. Floriculture and Greenhouse Systems (4)
HORT 380. Sustainable Landscape Design (3)
HORT/FES 447. Arboriculture (4)
HORT/FES 455. Urban Forest Planning,
Policy and Management. (4)
HORT 499. Special Topics [Building
Sustainable Landscapes for the 21st Century] (1)
SOIL 316. Nutrient Cycling in
Agroecosystems (4)

## Business Management

## Select 1 of the following courses:

AEC 211. Management in Agriculture (4)
AEC 250. *Introduction to Environmental Economics and Policy (3)
BA 215. Fundamentals of Accounting (4)
BA 260. Introduction to Entrepreneurship (4)
BA 463. Family Business Management (4)

## Ecology and Sustainability

Ecosystems Courses
Meets Synthesis requirements. Each course must be from a different department.
Contemporary Global Issues
Select 1 of the following courses:

AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
CROP 330. *World Food Crops (3)
FES 365. *Issues in Natural Resources Conservation (3)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 300. *Sustainability for the Common Good (3)
GEOG 330. *^Geography of International
Development and Globalization (3)
HORT/ENT 331. *Pollinators in Peril (3)
SUS 350. *Sustainable Communities (4)
Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)
Science, Technology and Society
Select 1 of the following courses:
ANS 315. *Contentious Social Issues in
Animal Agriculture (3)
ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 348. *Human Ecology (3)
BOT 324. *Fungi in Society (3)
CH 374. *Technology, Energy, and Risk (3)
ENGR 350. *Sustainable Engineering (3)
ENGR 363. *Energy Matters (3)
ENSC 479. *^Environmental Case Studies (3)
FES/TOX 435. *Genes and Chemicals in
Agriculture: Value and Risk (3)
FES/NR/RNG 477. *Agroforestry (3)
FST 421. *Food Law (3)
FW/HSTS 470. *Ecology and History:
Landscapes of the Columbia Basin (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 340. *Introduction to Water Science and Policy (3)
HORT 330/ENT 300. *Plagues, Pests and Politics (3)
HST 481. *Environmental History of the
United States (4)
HSTS 421. *Technology and Change (4)
NUTR 312. *Issues in Nutrition and Health (3)

PH 313. *Energy Alternatives (3)
PHL 325. *Scientific Reasoning (4)
PS 476. *Science and Politics (4)
SOIL 395. *World Soil Resources (3)
SUS 304. *Sustainability Assessment (4)
Total credits=55-59
Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Option Code: 656


## VITICULTURE AND ENOLOGY

## OPTION

The Oregon winegrape industry has experienced steady growth since its beginning in 1961. Oregon now ranks third nationally in the number of wineries, and fourth in wine production and vineyard acreage. Vineyards and wineries have also become an integral part of the Oregon tourism industry.

The viticulture and enology curriculum addresses the educational needs of students planning to enter the winegrape industry as viticulturists, vineyard managers, consultants and professionals.
The curriculum involves active learning, providing case studies about real-world situations, enhancing critical thinking skills through understanding the art and science of vineyard and winery production. Viticulture and enology students will be active learners in a multi-disciplinary major. Upon graduation, they will possess the skills prized by employers as managers with the ability to think critically and troubleshoot in the vineyard and winery. They will have a thorough knowledge of vine physiology, vineyard production, winery production and related topics. They will understand how their actions in the field affect the quality of the finished wine. They will be skilled in finding resources and using information to analyze novel situations and solve problems in the industry.

The Viticulture and Enology option uses the new horticulture major core.

## Option Requirements

## Plant Materials

HORT 251. Temperate Tree Fruit, Berries, Grapes, and Nuts (2)

## Ecology

Select 1 of the following courses:

## BI 370. ^Ecology (3)

BOT 341. Plant Ecology (4)
HORT 318. ^Applied Ecology of Managed
Ecosystems (3)

## Technology

PBG 430. Plant Genetics (3)

## Horticultural Communication

HORT 407. Seminar (1)
HORT 411. Horticulture Book Club (1)
Select 1 of the following Writing
Intensive Courses:
CROP/SOIL 325. ${ }^{\wedge} \mathrm{Ag}$ and Environmental
Predicaments: A Case Study Approach (3)
HORT 318. ^Applied Ecology of Managed
Ecosystems (3)

## Capstone

HORT/CROP 480. Case Studies in Cropping Systems Management (4)

## Horticultural Science and

## Technology

HORT 360. Irrigation and Drainage (4)
Select 1 of the following courses:
AG 221. Metals and Welding (3)
AG 312. Engine Theory and Operation (3)
AG 391. Farm Implements (3)
AG 425. Developments in Agricultural
Mechanics (3)
HORT 285. Permaculture Design and
Theory: Certificate Course (4)
HORT 314. Principles of Turfgrass
Maintenance (4)
HORT 405. Reading and Conference
[Pesticide Applicator Training] (4)
HORT/CROP 414. Precision Agriculture (4)
HORT 495. Horticultural Management
Plans (3)

PBG 450. Plant Breeding (4)
SOIL 316. Nutrient Cycling in Agroecosystems (4)

## Viticulture

HORT 452. Berry and Grape Physiology and Culture (4)
or HORT 451. Tree Fruit Physiology and Culture (4)
HORT 453. Grapevine Growth and Physiology (3)
HORT 454. Principles and Practices of Vineyard Production (3)

## Fermentation Foundation Sciences

CH 331. Organic Chemistry (4)
CH 332. Organic Chemistry (4)
MB 302. General Microbiology (3)
BB 350. Elementary Biochemistry (4)
or BB 314. Cell and Molecular Biology (4)

## Fermentation Science

FST 466. Wine Production Principles (3)
FST 467. Wine Production, Analysis, and Sensory Evaluation (5)

## Business Management

Select 1 of the following courses:
AEC 211. Management in Agriculture (4)
AEC 221. Marketing in Agriculture (3)
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 251. *Introduction to Agricultural and Food Economics (3)
BA 215. Fundamentals of Accounting (4) BA 260. Introduction to Entrepreneurship (4) BA 463. Family Business Management (4)

## Ecology and Sustainability

## Ecosystems Courses

Meets Synthesis requirements. Each course must be from a different department.

## Contemporary Global Issues

Select 1 of the following courses:
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3
CROP 330. *World Food Crops (3)
FES 365. *Issues in Natural Resources Conservation (3)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 300. *Sustainability for the Common Good (3)
GEOG 330. *^Geography of International Development and Globalization (3)
HORT/ENT 331. *Pollinators in Peril (3)
SUS 350. *Sustainable Communities (4)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)
Science, Technology and Society
Select 1 of the following courses:
ANS 315. *Contentious Social Issues in Animal Agriculture (3)
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 348. *Human Ecology (3)
BOT 324. *Fungi in Society (3)
CH 374. *Technology, Energy, and Risk (3)

ENGR 350. *Sustainable Engineering (3)
ENGR 363. *Energy Matters (3)
ENSC 479. *^Environmental Case Studies (3)
FES/TOX 435. *Genes and Chemicals in
Agriculture: Value and Risk (3)
FES/NR/RNG 477. *Agroforestry (3)
FST 421. *Food Law (3)
FW/HSTS 470. *Ecology and History:
Landscapes of the Columbia Basin (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 340. *Introduction to Water Science and Policy (3)
HORT 330/ENT 300. *Plagues, Pests and Politics (3)
HST 481. *Environmental History of the
United States (4)
HSTS 421. *Technology and Change (4)
NUTR 312. *Issues in Nutrition and Health (3)

PH 313. *Energy Alternatives (3)
PHL 325. *Scientific Reasoning (4)
PS 476. *Science and Politics (4)
SOIL 395. *World Soil Resources (3)
SUS 304. *Sustainability Assessment (4)
Total credits=57-63
Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 613
UNDERGRADUATE MINORS


## HORTICULTURE MINOR

Also available via Ecampus.
The Horticulture minor is an effective way for students, including majors outside the College of Agricultural Sciences, to meet their interests. The goals of students minoring in horticulture may vary widely. With just 5 credits in the minor core, students will be able to tailor their additional horticulture course work to personal goals.
HORT 112. Introduction to Horticultural Systems, Practices and Careers (2)
HORT 301. The Biology of Horticulture (3)
Additional HORT credits (22) (At least 10 must be upper division)
Course selection must be approved by the departmental academic advisor.

## Total=27 credits

Students are required to earn a grade of C- or better in all HORT and PBG courses taken to complete the minor.

## Minor Code: 145

## TURF AND LANDSCAPE

## MANAGEMENT MINOR

The Turf and Landscape Management minor is an effective way for students, including majors outside of the College of Agricultural Sciences, to meet their interests. The two areas of focus, turf or landscape, allow students to tailor their course work to personal goals.

## Requirements

HORT 112. Introduction to Horticultural Systems, Practices and Careers (2)

HORT 301. The Biology of Horticulture (3)
SOIL 205. *Soil Science (3) and SOIL 206.
*Soil Science Laboratory for Soil Science 205 (1)
or CSS 205. *Soil Science (4)
Plus courses listed under Turf Focus or Landscape Focus

## Turf Focus

HORT 314. Principles of Turfgrass
Maintenance (4)
HORT 315. Sustainable Landscapes:
Maintenance, Conservation, Restore (4)
HORT 360. Irrigation and Drainage (4)
HORT 405. Reading and Conference:
"Pesticide Applicator Training" (4)
HORT 418. Golf Course Maintenance (4)

## Total=29

Landscape Focus
Select two of the following courses:
HORT 226. Landscape Plant Materials I:
Deciduous Hardwoods and Conifers (4)
HORT 228. Landscape Plant Materials II:
Spring Flowering Trees and Shrubs (4)
HORT 255. Herbaceous Ornamental Plant Materials (3)
Select 10 to 11 credits from the following, to total a minimum of 27 credits:
HORT 285. Permaculture Design and
Theory: Certificate Course (4)
HORT 314. Principles of Turfgrass
Maintenance (4)
HORT 315. Sustainable Landscapes:
Maintenance, Conservation, Restore (4)
HORT 318. ^Applied Ecology of Managed Ecosystems (3)
HORT 358. Landscape Construction
Techniques (4)
HORT 360. Irrigation and Drainage (4)
HORT 380. Sustainable Landscape Design (3)

HORT 405. Reading and Conference:
"Pesticide Applicator Training" (4)

## Total=27

## Minimum Grade Requirement:

Students must receive a grade of C- or better in all HORT and PBG courses taken to complete the minor.

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 147

HORTICULTURE (MS, PhD, MAIS)
The Department of Horticulture offers graduate work leading to the Master of Science (MS) and Doctor of Philosophy (PhD) degrees. The MS and PhD degrees culminate in original research reported in a thesis and are often pursued by students interested in research related careers, or who wish direct training in research methods.
The Department of Horticulture has strengths and expertise in:

Breeding, Genetics, and Biotechnology. Faculty and students explore fundamental questions related to the control and regulation of plant traits using a variety of techniques and tools
including molecular biology, genomics and bioinformatics. Faculty and students also apply fundamental knowledge to make genetic improvements to crop plants and to modify plant growth and productivity. Current breeding programs exist in berry, hazelnut and vegetable systems.

Sustainable Crop Production. Faculty and students explore basic and applied questions related to the design and management of sustainable and productive horticultural cropping and farming systems. The program integrates a diverse set of disciplines and tools including basic plant sciences, applied crop management, and field experimentation and analysis. Program areas include viticulture and enology, berries and small fruit, tree fruit and nuts, vegetables, nursery and greenhouse production, and entomology.

Community and Landscape Horticultural Systems. Faculty and students explore basic and applied questions related to the design and function of urban and community landscapes including golf courses, sports fields, gardens, parks and open space. Program areas include turf and landscape management, community food systems, pollinator ecology, sustainable landscapes, and entomology

For more information, visit our website at http://horticulture.oregonstate. edu, contact a member of the graduate faculty, or contact John Lambrinos, Graduate Coordinator, Department of Horticulture, 4017 Agricultural and Life Sciences Building, OSU, Corvallis, OR 97331-7304, email: john.lambrinos@ oregonstate.edu.
Major Code: 1450

## GRADUATE OPTIONS

## ENTOMOLOGY OPTION

The Entomology (ENT) option at Oregon State University embodies the Land Grant mission of integrated research, teaching, and extension in the context of understanding the basic biology of insects and, with this knowledge, then working with insects in natural and/or managed environments. The discipline of entomology at Oregon State University covers behavior, ecology, evolution, physiology, systematics, molecular biology, chemical ecology, plant-insect interactions, pollination by honey bees and native bees, biological control, integrated pest management, and insecticide toxicology. Oregon State Entomology addresses insect-related issues in aquatic and terrestrial systems in natural, agricultural, forested, and urban environments. Entomologists collaborate with plant scientists, physiologists, pathologists, soil scientists, geneticists, molecular biolo-
gists, and experts in other fields.
Students in the Entomology option will conduct thesis research related to insects under the supervision of an entomologist associated with the graduate faculty in Crops or Horticulture, and take courses that provide knowledge and understanding about insects. After completing their degree, students will have gained fundamental knowledge in entomology that may be applied in agricultural, aquatic, forested, natural, and urban environments.

## Requirements

Thesis Credits (3)
ENT 503. Thesis (3)

## Course Credits (9)

Select 9 credits from the
following:
ENT 507. Seminar (1)
ENT 520. Insect Ecology (3)
ENT 540. Issues in Insect Toxicology (3)
ENT 599. Special Topics (3)
Z 540. Insect Physiology (3)
Z 575. Insect Biodiversity Survey (4)
Z 577. Aquatic Entomology (4)

## Total=12 Credits

Option Code: 5333
PLANT BREEDING AND GENETICS OPTION
The Plant Breeding and Genetics (PBG) graduate option at Oregon State University embodies the Land Grant mission of integrated research, teaching and extension in the context of cultivar development and fundamental genetics. Plant breeding is a collaborative discipline spanning everything from classical field approaches to gene manipulation at the molecular level. Breeders regularly cooperate with pathologists, entomologists, soil scientists, physiologists, food scientists, genomicists, molecular biologists and experts in other fields.
Students in the Plant Breeding and Genetics graduate option will learn an interdisciplinary approach to applied plant breeding by taking courses across a broad spectrum of disciplines. The option may be tailored to meet students' career goals including further graduate study, as well as direct entry into public or private sector breeding programs. After completing the degree, students will have the fundamental knowledge of plant breeding that may be applied to a range of crops including annual and perennial horticultural crops, agronomic food and feed crops, and forestry products.

## Additional Requirements

Select 12 credits from the following:
BOT/MCB 575. Comparative Genomics (4)
CROP 590. Experimental Design in
Agriculture (4)
PBG 507. Seminar (1-2)
PBG/HORT 519. Current Topics in Plant Breeding and Genetics (2)

PBG 530. Plant Genetics (3)
PBG/MCB 541. Plant Tissue Culture (4)
PBG 550. Plant Breeding (4)
PBG/MCB 620. DNA Fingerprinting (1)
PBG/MCB 621. Genetic Mapping (1)
PBG/MCB 622. Mapping Quantitative Trait Loci (1)
PBG 650. Advanced Plant Breeding and Quantitative Genetics (3)
Option Code: 1210

## HORTICULTURE GRADUATE

 MINORFor more details, see the departmental advisor.

## Minor Code: 1450

## ■ CROP SCIENCE COURSES

CROP 101. INTRODUCTION TO
HORTICULTURE, CROP, SOIL, AND INSECT
SCIENCE (1). Introduces students with interests in horticulture, crop, soil, and insect sciences to educational and professional opportunities in these disciplines. Speakers will discuss opportunities in research and academia as well as in the applied professional job market. Open to all students. CROSSLISTED as ENT 101, HORT 101, SOIL 101.
CROP 199. SPECIAL STUDIES: ISSUES IN SUSTAINABLE AGRICULTURE (1-16). Invited speakers present seminars on specific aspects of agriculture relating to sustainability. Topics vary from term to term and year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 16 credits.
CROP 200. CROP ECOLOGY AND
MORPHOLOGY (3). An introduction to the concepts and principles of crop ecology and morphology and a foundation for other crop science courses. Examines the dynamics and function of crop communities, and the biotic and environmental interactions that influence productivity. Fundamentals of the developmental morphology of crop seeds, seedlings, and plants. Morphological features of seeds and plants in relation to the identification of crop families and species of economic importance.
CROP 280. INTRODUCTION TO THE
COMPLEXITY OF OREGON CROPPING
SYSTEMS (4). An introduction to field cropping systems of western Oregon. Provides students with a broad overview of the complexity of cropping systems and the knowledge required to grow and produce a crop--plant physiology, seed biology, plant pathology, soil fertility, entomology, and weed science. Students will observe a crop under different management strategies to enhance understanding of management approaches.
CROP 300. CROP PRODUCTION IN PACIFIC NORTHWEST AGROECOSYSTEMS (4).
Relation of crop production to human culture and the natural environment. Origins of agriculture and the processes of agricultural change, and productivity and sustainability of specific crop production systems in the Pacific Northwest. History, geography, resource requirements, and key challenges faced are presented. Fundamental crop production practices in relation to productivity and sustainability. Lec/lab/rec. CROSSLISTED as HORT 300. PREREQS: One year of general biology or equivalent.
CROP 310. FORAGE PRODUCTION (4). Importance of, and current production practices for, forage crops. Lec/lab. PREREQS: (CSS 300 or CROP 300 or HORT 300) and (CSS 305 or CSS 205 or SOIL 205) or equivalent
CROP 319. PRINCIPLES OF FIELD CROP
PRODUCTION (3). Provides students with an understanding of the basic principles of field crop production--tillage, soil testing, fertilization,
variety selection, planting, and in-season crop management. Management practices for wheat, corn and soybean as PREREQS: CROP 280 or equivalent and SOIL 205

## CROP 325. ^AG AND ENVIRONMENTAL

PREDICAMENTS: A CASE STUDY APPROACH
(3). Evaluation of controversial agricultural and environmental problems. Production of clear oral and written documents describing and analyzing problems and specific courses of action utilizing team-building skills. (Writing Intensive Course) CROSSLISTED as SOIL 325. PREREQS: (CSS 305 [D-] or CSS 205 [D-] or SOIL 205 [D-] )

CROP 330. *WORLD FOOD CROPS (3). Origin, production, utilization, and improvement of the world's major food crops. The role of crop production in global economic and social development; food security and worldwide nutritional requirements. (Bacc Core Course) PREREQS: CSS 200 or CROP 200 recommended.

CROP 340. *PENS AND PLOWS: WRITINGS OF WORKING THE LAND (3). A survey of literature from ancient Greece to the twentieth century focusing on the significance of agricultural life and/ or the natural world. Students read and discuss writings considered critical in the development of Western culture and receive input on the literary significance and the accuracy of agriculture presented within the readings. (Bacc Core Course) Taught via Ecampus only.

CROP 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

CROP 403. THESIS (1-16). Independent, original study and preparation of a senior thesis. This course is repeatable for a maximum of 16 credits PREREQS: Senior standing.
CROP 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
CROP 405H. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

CROP 407. SEMINAR (1). Senior seminar intended to instruct students on proper techniques for presentation of scientific material. Each student is expected to prepare and present a scientific seminar and to submit written documentation supporting that seminar.
CROP 410. INTERNSHIP (1-6). Professional work experience previously approved and supervised by the department, written report required. This course is repeatable for a maximum of 12 credits. PREREQS: Junior standing.
CROP 414. PRECISION AGRICULTURE (4). Provides insight into the technology available to support precision agriculture and data management planning applications. Examines the concepts and applications of precision agriculture to teach practical use of hardware, equipment and software. An overview of current technology including autonomous vehicles, GPS soil and crop proximal sensors, imagery and mapping, variable rate control systems, and yield monitors. Lec/lab. CROSSLISTED as HORT 414. PREREQS: Junior standing
CROP 418. TOXIC PLANTS IN PNW PASTURES
(1). Identifying and understanding ecology and biology of harmful weeds and poisonous plants found in Pacific Northwest pastures and rangelands and determining best management and control options. Taught via Ecampus only. PREREQS: College-level plant biology and/or taxonomy courses.

## CROP 420. SEED SCIENCE AND

TECHNOLOGY (3). Seed formation and factors affecting their development and maturation. Seed structure and chemical composition. Physiological and biochemical aspects of seed germination, dormancy, deterioration and storability. The concept of seed quality, its importance in
agriculture, its attributes and impact on field performance. Methods of measuring seed quality of conventional and genetically modified seeds. Taught via Ecampus only. PREREQS: Biology, plant anatomy and/or physiology courses are recommended.
CROP 433. SYSTEMATICS AND ADAPTATION OF VEGETABLE CROPS (4). Covers the botanical and taxonomic relationships, breeding systems and adaptation of vegetable crops. Fresh material is used to illustrate varietal differences and traits of importance. Lec/lab. Offered even years. CROSSLISTED as HORT 433/HORT 533. PREREQS: (BI 102 [D-] or BI 213 [D-] or BI 311 [D-] or HORT 430 [D-] or CSS 430 [D-] or PBG 430 [D-] or HORT 450 [D-] or CSS 450 [D-] or PBG 450 [D-] )
CROP 440. WEED MANAGEMENT (4). Principles of weed control by cultural, biological, and chemical means; weed identification; introduction to herbicides and factors influencing their use. Lec/ lab/rec. PREREQS: One year biological science and one course in organic chemistry.
CROP 460. SEED PRODUCTION (3). An introduction to principles and practices of seedbased genetic delivery systems. Fundamentals of seed crop biology, cultivar maintenance and production methods are stressed. Concepts are illustrated using Pacific Northwest seed crops. PREREQS: CROP 200 or CSS 200 or equivalent.
CROP 463. SEED BIOLOGY (3). Information about reproductive development of plants such as pollination and fertilization, which is important for the initiation of seed formation, will be provided. Embryo and endosperm development as well as accumulation of seed storage materials, which are major events during seed development, will be covered, as well as the dormancy and germination mechanisms in mature seeds. Lectures and discussions (presentations required for graduate students). Offered even years. CROSSLISTED as HORT 463/HORT 563. Lec/lab.

## CROP 480. CASE STUDIES IN CROPPING

SYSTEMS MANAGEMENT (4). Decision cases involving the production of field and horticultural crops; individual and group activities; discussion of the decision-making process. Multiple field rips required. A field trip fee will be charged. CROSSLISTED as HORT 480/HORT 580. PREREQS: CROP 300 or HORT 300 and senior standing in agriculture.

## CROP 499. SPECIAL TOPICS IN CROP

SCIENCE AND SOIL SCIENCE (1-16). Technical knowledge and skills development courses offered in a wide array of course formats. Topics vary from term to term and year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 16 credits.

## CROP 499H. SPECIAL TOPICS IN CROP

SCIENCE AND SOIL SCIENCE (1-16). Technical knowledge and skills development courses offered in a wide array of course formats. Topics vary from term to term and year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
CROP 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
CROP 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Master's-level graduate students.
CROP 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

CROP 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

CROP 507. SEMINAR (1). Graded P/N. This course is repeatable for a maximum of 99 credits.

CROP 509. PRACTICUM IN TEACHING
(1-3). Developing skills and competence in teaching under staff supervision; organization
and presentation of instructional material by assisting in laboratory, recitation, and lectures CROSSLISTED as ENT 509, PBG 509, SOIL 509. This course is repeatable for a maximum of 9 credits.
CROP 520. SEED SCIENCE AND
TECHNOLOGY (3). Seed formation and factors affecting their development and maturation. Seed structure and chemical composition. Physiological and biochemical aspects of seed germination, dormancy, deterioration and storability. The concept of seed quality, its importance in agriculture, its attributes and impact on field performance. Methods of measuring seed quality of conventional and genetically modified seeds. Taught via Ecampus only. PREREQS: Biology, plant anatomy and/or physiology courses are recommended.

CROP 533. SYSTEMATICS AND ADAPTATION OF VEGETABLE CROPS (4). Covers the botanical and taxonomic relationships, breeding systems and adaptation of vegetable crops. Fresh material is used to illustrate varietal differences and traits of importance. Lec/lab. CROSSLISTED as HORT 433/HORT 533. PREREQS: BI 102 or B 213 or BI 311 or HORT 430 or CSS 430 or PBG 430 or HORT 450 or CSS 450 or PBG 450

CROP 540. WEED MANAGEMENT (4). Principles of weed control by cultural, biological, and chemical means; weed identification; introduction to herbicides and factors influencing their use. Lec/ lab/rec. PREREQS: One year biological science and one course in organic chemistry.

CROP 560. SEED PRODUCTION (3). An introduction to principles and practices of seedbased genetic delivery systems. Fundamentals of seed crop biology, cultivar maintenance and production methods are stressed. Concepts are illustrated using Pacific Northwest seed crops.
PREREQS: CROP 200 or CSS 200 or equivalent.
CROP 563. SEED BIOLOGY (3). Information about reproductive development of plants such as pollination and fertilization, which is important for the initiation of seed formation, will be provided. Embryo and endosperm development as well as accumulation of seed storage materials, which are major events during seed development, will be covered, as well as the dormancy and germination mechanisms in mature seeds. Lectures and discussions (presentations required for graduate students). Offered even years. CROSSLISTED as HORT 463/HORT 563. Lec/lab.

CROP 580. CASE STUDIES IN CROPPING
SYSTEMS MANAGEMENT (4). Decision cases involving the production of field and horticultural crops; individual and group activities; discussion of the decision-making process. Multiple field trips required. A field trip fee will be charged. CROSSLISTED as HORT 480/HORT 580. PREREQS: CROP 300 or HORT 300 and senior standing in agriculture.
CROP 590. EXPERIMENTAL DESIGN IN
AGRICULTURE (4). Field layout, analysis, and interpretation of basic experimental designs used in agronomy and plant breeding and including field plot techniques such as optimum plot size and shape, factorial arrangement, replication, subsampling, randomization, and blocking. Recitation provides practical experience with SAS. Lec/rec. PREREQS: ST 351 or equivalent.

CROP 599. SPECIAL TOPICS IN CROP SCIENCE AND SOIL SCIENCE (1-16). Technical knowledge and skills development courses offered in a wide variety of course formats. Topics vary from term to term and year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 16 credits.

CROP 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
CROP 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: PhD-level graduate students.

CROP 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

CROP 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

CROP 607. SEMINAR (1). Graded P/N. This course is repeatable for a maximum of 99 credits.
CROP 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
CROP 609. PRACTICUM IN TEACHING (1-3).
Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 9 credits.
CROP 660. HERBICIDE SCIENCE (4).
Absorption, movement, and mechanism of action in plants; behavior of herbicides in soil. Offered alternate years. PREREQS: BOT 331 and (CSS 440 or CSS 540 or CROP 440 or CROP 540)

CROP 670. PHYSIOLOGY OF CROP YIELD (3). Concepts of crop growth and production in relation to environmental and physiological factors and their interactions; current literature. PREREQS: BOT 331 or equivalent.
CROP 699. SPECIAL TOPICS IN CROP
SCIENCE AND SOIL SCIENCE (1-16). This course is repeatable for a maximum of 16 credits.

## - HORTICULTURE COURSES

HORT 101. INTRODUCTION TO
HORTICULTURE, CROP, SOIL, AND INSECT
SCIENCE (1). Introduces students with interests in horticulture, crop, soil, and insect sciences to educational and professional opportunities in these disciplines. Speakers will discuss opportunities in research and academia as well as in the applied professional job market. Open to all students. CROSSLISTED as CROP 101, ENT 101, SOIL 101.

## HORT 111. INTRODUCTION TO

HORTICULTURAL CROP PRODUCTION (2).
Characteristics of commercial horticulture; survey of commercial horticultural systems with emphasis on the Pacific Northwest; career opportunities in horticulture. Required field trips.

## HORT 112. INTRODUCTION TO

HORTICULTURAL SYSTEMS, PRACTICES AND CAREERS (2). Overview of horticultural systems and practices, with an emphasis on the Pacific Northwest. Exploration of career opportunities in horticulture. Includes viticulture, environmental landscaping, turf management, greenhouse and nursery production, farming, education, and research. Required field trips.
HORT 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
HORT 199H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

HORT 217. *SOCIAL IMPACTS OF SCIENCE (3). Contemporary societies provide funding for scientific research, at the same time they struggle with existing and emerging societal problems. This course will discuss how social problems can be addressed by science and technology, and how the impacts of research are quantified. (Bacc Core Course)

## HORT 226. LANDSCAPE PLANT MATERIALS

 : DECIDUOUS HARDWOODS AND CONIFERS(4). Identification of trees, shrubs, vines, and ground covers used in landscape horticulture. Basic plant taxonomy, nomenclature, anatomy, and use of plants in the landscape. Diverse plant material covered with an emphasis on deciduous hardwoods and conifers.
HORT 228. LANDSCAPE PLANT MATERIALS II: SPRING FLOWERING TREES AND SHRUBS (4) Identification of trees, shrubs, vines, and ground
covers used in landscape horticulture. Basic plant taxonomy, nomenclature, anatomy, and use of plants in the landscape. Diverse plant material covered with an emphasis on spring flowering trees and shrubs. Lec/rec.
HORT 251. TEMPERATE TREE FRUIT, BERRIES, GRAPES, AND NUTS (2). Covers fruit and nut crops for temperate zones. Emphasis placed on scientific and common names, plant adaptation, basic morphology, major cultivars, and markets. Offered alternate years.
HORT 255. HERBACEOUS ORNAMENTAL
PLANT MATERIALS (3). Identification and culture of herbaceous plants used in the landscape. Offered via Ecampus only.

## HORT 260. ORGANIC FARMING AND

GARDENING (3). Organic farming and gardening methods are discussed in class and practiced in the field. The philosophical background of organic farming as well as the biological, environmental and social factors involved in organic food production are covered. Emphasis is on handson application of scientific principles to create sustainable food production systems. Lec/lab.
HORT 270. INTRODUCTION TO THERAPEUTIC HORTICULTURE (2). An introduction to the history, benefits, and methods of therapeutic horticulture. Surveys program models for vocational, social/recreational, wellness and therapeutic applications of horticulture.

## HORT 271. TECHNIQUES AND ADAPTIVE

 STRATEGIES IN THERAPEUTICHORTICULTURE (2). An introduction to the characteristics of therapeutic gardens. Survey of year-round, indoor and outdoor therapeutic horticultural programming adaptations, strategies and techniques for different special populations. PREREQS: HORT 270 [D-]
HORT 272. BASIC THERAPEUTIC SKILLS I (2). The assessment and evaluation process in therapeutic horticulture. Development of communication strategies, helping skills, and horticultural skills for therapeutic situations. PREREQS: HORT 271 [D-]
HORT 273. BASIC THERAPEUTIC SKILLS II (2). Assessment and documentation tools in therapeutic horticulture. Treatment issues related to different types of physical and mental issues. Conduct and evaluate therapeutic horticultural activity sessions. PREREQS: HORT 272 [D-]
HORT 274. THERAPEUTIC HORTICULTURAL PROGRAMS FOR OLDER ADULTS/CHILDREN (2). Benefits and applications of therapeutic horticulture to older adults and special needs children. PREREQS: HORT 273 [D-]
HORT 275. THERAPEUTIC GARDEN DESIGN,
MAINTENANCE AND PROGRAMMING (2).
The history, characteristics and design of the therapeutic garden. The use of the garden in therapeutic horticultural programming. PREREQS: (HORT 274 [D-] and HORT 280 [D-] )

## HORT 285. PERMACULTURE DESIGN

AND THEORY: CERTIFICATE COURSE (4).
Permaculture design course meets internationally recognized standards for certification. Lectures, hands-on activities, experiential learning, group discussions, readings, student projects and presentations. Two mandatory weekend days. Design intensive, utilizing graphic and verbal presentation skills. Research into other functioning permaculture systems through literature, websites, and as observed on field trips. Lec/lab. This course is repeatable for a maximum of 8 credits.
HORT 286. PERMACULTURE CERTIFICATION
(1). Permaculture Designer's Certificate issued upon completion by Cascadia Permaculture Institute. Lectures, activities, experiential learning, discussions, readings, projects, presentations. Two mandatory weekend day field trips. Design intensive, utilizing graphic and verbal presentation skills. Research functioning permaculture systems as found in literature, websites, observed on field
trips. COREQS: HORT 285
HORT 299. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.
HORT 299H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

HORT 300. CROP PRODUCTION IN PACIFIC NORTHWEST AGROECOSYSTEMS (4).
Relation of crop production to human culture and the natural environment. Origins of agriculture and the processes of agricultural change, and productivity and sustainability of specific crop production systems in the Pacific Northwest. History, geography, resource requirements, and key challenges faced are presented. Fundamental crop production practices in relation to productivity and sustainability. Lec/lab/rec. CROSSLISTED as CROP 300. PREREQS: One year of general biology or equivalent.
HORT 301. THE BIOLOGY OF HORTICULTURE
(3). Gain fundamental knowledge of plant growth and development of horticultural crops and understand how manipulation of growth systems affects growth and development. The course will progress from a micro- to macro-level, the last section covering how environmental factors affect growth and development. PREREQS: General biology or botany sequence.
HORT 303. HORTICULTURAL PROJECTS
(2). Student-managed crop production projects with emphasis on container grown, greenhouse crops. Crop scheduling, propagation and planting, selecting temperature and lighting regimes, specifying growth regulator applications, nutrient management, irrigation management, pest monitoring, and problem diagnosis and correction. PREREQS: HORT 301
HORT 311. PLANT PROPAGATION (4). The regeneration of plants from vegetative and reproductive tissue and organs. Horticultural and physiological principles, methods, and techniques or laboratory, greenhouse nursery, field, and orchard. PREREQS: HORT 301

## HORT 314. PRINCIPLES OF TURFGRASS

MAINTENANCE (4). Identification and adaptation of common turfgrasses. Physiology of turfgrass growth and response to cultural and environmental stresses. Cultural practices including establishment, general maintenance, and pest control. Field trips required. PREREQS: (CSS 205 or CSS 305 or SOIL 205)

## HORT 315. SUSTAINABLE LANDSCAPES:

MAINTENANCE, CONSERVATION, RESTORE
(4). Sustainable care and maintenance practices for non-turf landscape areas. Low input pruning, planting, fertilization, and pest control with an emphasis on IPM. Plant responses to stress, particularly those encountered in the urban environment. Outdoor labs required. PREREQS: Basic knowledge of plant physiology is recommended.

HORT 316. PLANT NUTRITION (4). Basic concepts and principles of plant mineral nutrition that provide a basis for solving practical nutritional problems in horticultural crops. Areas covered include mineral nutrients, nutrient availability in the soil and plant uptake, nutrient deficiencies and toxicities and their causes and remedies, and plant and soil analysis. Lec/lab/rec. PREREQS: (CSS 205 [D-] or CSS 305 [D-] or SOIL 205 [D-] )
HORT 318. ^APPLIED ECOLOGY OF
MANAGED ECOSYSTEMS (3). Survey of
ecological processes in managed ecosystems emphasizing ecological management techniques. Ecosystem services; biodiversity management; weed dynamics; agroecology; urban ecology; restoration and mitigation; landscape management. Field trip required. (Writing Intensive Course)

HORT 319. RESTORATION HORTICULTURE (3). As world population increases to some 9 billion plus by 2044, the importance of ecologically
sound horticultural practices becomes increasingly apparent. Integration of ecological concepts and theory in management and development of created landscapes is critical for the preservation of many ecological services currently provided by undeveloped areas. Offered via Ecampus only. PREREQS: WR 121 or equivalent. Students must be reasonably proficient in writing skills and able to communicate through writing. Basic ecology course or practical experience providing understanding of ecological principals and concepts.

HORT 330. *PLAGUES, PESTS, AND POLITICS (3). Integration and interaction of agricultural and public health aspects of entomology in society and history. CROSSLISTED as ENT 300. (Bacc Core Course)
HORT 331. *POLLINATORS IN PERIL (3). Pollinators, human influences on pollination systems, and the potential consequences of pollinator decline. An introduction to the skills needed to investigate media reports and multidisciplinary scientific research. Effects of pesticides, habitat fragmentation, climate change, invasive species, pests, pathogens, and other threats to pollinators in critical natural and agricultural systems around the world. (Bacc Core Course) CROSSLISTED as ENT 331. PREREQS: Completion of a Baccalaureate Core biological science course.

HORT 349. DIAGNOSING PLANT PROBLEMS
(3). Basic principles of problem diagnosis in crop, garden, and landscape plants are covered Problems caused by cultural and environmental issues, plant diseases, insect pests, and other causes are addressed. Students will gain familiarity with resources for plant problem diagnosis. Offered via Ecampus only. PREREQS: A background in basic biology, plant pathology and/or entomology is recommended. Enrollees from outside the university setting may have gained their experience within a job or other practical setting.
HORT 350. URBAN FORESTRY (3). Introduction to principles and practices of planting and managing trees as a system of urban environment; understanding the economic, environmental, social aspects of urban forests, and an overview of contemporary land use issues and societal perspectives between people and plants. CROSSLISTED as FES 350. Offered via Ecampus only. PREREQS: Foundational forestry and horticulture courses are recommended.
HORT 351. FLORICULTURE AND
GREENHOUSE SYSTEMS (4). For students interested in growing plants in commercial or educational greenhouses. Actively explores the production and scheduling of floriculture crops for various markets. Combines the practical aspects of growing floral crops under environments created by traditional and technologically advanced greenhouses. Greenhouse structures and crop environment manipulation will be emphasized. Students actively manage a floriculture crop and are responsible for developing and implementing production schedules, and for making key decisions on the culture of diverse floral crops. PREREQS: HORT 301
HORT 358. LANDSCAPE CONSTRUCTION TECHNIQUES (4). Study of landscape construction process from initial site analysis to finished landscape. Techniques used in building hardscape and landscape areas. Field trips required. Lec/lab.
HORT 360. IRRIGATION AND DRAINAGE (4). Familiarizes students with the principles and practices of irrigation and drainage systems. Optimum use of water, irrigation and drainage system design, installation, repairs, and troubleshooting are emphasized. Lec/lab. PREREQS: CSS 305 [D-] or SOIL 205 [D-] or (SOIL 205 [D-] and SOIL 205 [D-] )
HORT 361. PLANT NURSERY SYSTEMS (4).
Covers how to grow shrubs and trees, and
herbaceous annuals and perennials in nurseries for use in urban landscapes and managed ecosystems such as forestry and restoration. Plant nursery systems are diverse and require intensive management involving a dynamic decision making process. This course actively explores field and container production systems as well as the marketing of plants, an overview of plant growth regulation and post-production handling, the influence of efficient production practices on plant quality, integrating pest management strategies, and natural resource utilization. PREREQS: HORT 301

## HORT 380. SUSTAINABLE LANDSCAPE

DESIGN (3). The assessment of design problems/ situations, the development of solutions and the communication of those solutions to the client through the design. Specific topics include designing for ecosystem maintenance/ enhancement, introduction to computer-aided design (CAD), using color in landscape designs and rendering section/elevation views.
HORT 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
HORT 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
HORT 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits.
HORT 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing. Departmental approval required.
HORT 405. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits.
HORT 405H. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HORT 406. PROJECTS: DATA PRESENTATIONS
(1). For any student doing research, to learn to develop and evaluate poster and slide presentations containing scientific data. Students are exposed to a variety of scientific disciplines as they prepare and critique their own and other students> posters and oral presentations. Students improve written and oral communication skills. Letter grade is based on participation, improvement, and the quality of a final poster project and oral presentation. Offered winter term. CROSSLISTED as BRR 406.

HORT 407. SEMINAR (1). Senior seminar intended to instruct students on proper techniques for presentation of scientific material. Each student is expected to prepare and present a scientific seminar and to attend and evaluate the seminars given by other class members.
HORT 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
HORT 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

HORT 410. INTERNSHIP (1-12). Work internship to acquaint horticulture majors with the practices of the horticulture industry. Under direction of departmental internship committee. Requires approved statement of intent, submission of employer and employee evaluation forms and written report. This course is repeatable for a maximum of 12 credits. PREREQS: Junior standing.
HORT 411. HORTICULTURE BOOK CLUB (1). Reading and discussion of noteworthy books and associated topics relating to agriculture, society and the environment. This course is repeatable for a maximum of 2 credits. PREREQS: Sophomore standing.

## HORT 412. CAREER EXPLORATION:

INTERNSHIPS AND RESEARCH PROJECTS
(1). Provides orientation to the horticulture major internship and research project requirement.

Covers procedures for selecting, performing, and reporting on an internship or research project. Includes guidance and skill development valuable in the pursuit of horticultural career goals, such as cover letter and resume preparation and interviewing experience.
HORT 414. PRECISION AGRICULTURE (4). Provides insight into the technology available to support precision agriculture and data management planning applications. Examines the concepts and applications of precision agriculture to teach practical use of hardware, equipment and software. An overview of current technology including autonomous vehicles, GPS, soil and crop proximal sensors, imagery and mapping, variable rate control systems, and yield monitors. Lec/lab. CROSSLISTED as CROP 414. PREREQS: Junior standing.
HORT 418. GOLF COURSE MAINTENANCE (4). Basic aspects of golf course maintenance under emperate zone conditions. Lec/lab. PREREQS: HORT 314
HORT 433. SYSTEMATICS AND ADAPTATION OF VEGETABLE CROPS (4). Covers the botanical and taxonomic relationships, breeding systems and adaptation of vegetable crops. Fresh material is used to illustrate varietal differences and traits of importance. Lec/lab. CROSSLISTED as CROP 433/CROP 533. PREREQS: BI 102 [D-] or BI 213 [D-] or BI 311 [D-] or HORT 430 [D-] or CSS 430 [D-] or HORT 450 [D-] or CSS 450 [D-] or PBG 450 [D-]
HORT 444. INSECT AGROECOLOGY (3).
Agroecology incorporates ecological concepts and principles to the design and management of sustainable agricultural systems. Topics include: the role of insects in sustainable agricultural systems; application of the principles of insect ecology to better manage insect pests and maximize crop yield; conserving beneficial insects and other natural resources in agroecosystems and the surrounding landscape. CROSSLISTED as ENT 444. PREREQS: General background or previous course work in entomology.
HORT 447. ARBORICULTURE (4). The principles and practices of arboriculture, the art and science of selecting, planting, establishing and maintaining trees in urban, suburban, commercial and residential landscapes. Lec/lab. CROSSLISTED as FES 447. Offered via Ecampus only. PREREQS: (FES 141 or FES 241 or HORT 226 or HORT 228) and (FOR 111 or HORT 112)
HORT 451. TREE FRUIT PHYSIOLOGY AND CULTURE (4). Plant growth and development in relation to tree fruit production; emphasis on canopy development and pruning theory, flowering and fruit set, and development, dormancy, and cold acclimation. Field trips required. PREREQS: HORT 301* and BOT 331*

## HORT 452. BERRY AND GRAPE PHYSIOLOGY

AND CULTURE (4). Production of wine grapes, caneberries, strawberries, blueberries, and other miscellaneous berry crops. Emphasis on plant growth and development; pruning and training systems; flower and fruit development and cultivars. Field trips required. Offered in alternate years. PREREQS: HORT 301
HORT 453. GRAPEVINE GROWTH AND
PHYSIOLOGY (3). The physiological aspects of grapevine growth and development including dormancy, flowering and fruit set, vegetative growth, fruit development and water relations. Additional topics include taxonomy, morphology and physiological influences of vineyard mesoclimate and vine microclimate. Lec/lab. PREREQS: HORT 301 or instructor approval.
HORT 454. PRINCIPLES AND PRACTICES OF VINEYARD PRODUCTION (3). The relationship of vineyard and canopy management to grapevine physiology and fruit quality. Nutrient/water relations within the soil/vine continuum. Vineyard microclimate, floor management, and pests will also be discussed. Lec/lab. PREREQS: HORT

301 [D-] and HORT 453 (need not be taken before HORT 454 but is highly recommended).
HORT 455. URBAN FOREST PLANNING, POLICY AND MANAGEMENT (4). Examination of planning, policy, and management strategies used in the stewardship of urban natural resources. Fundamentals for developing effective programs to maximize the economic, environmental, and social values and benefits of urban forest landscapes. CROSSLISTED as FES 455. Taught via Ecampus only. PREREQS: FES 350 or FOR 350 or HORT 350
HORT 463. SEED BIOLOGY (3). Information about reproductive development of plants such as pollination and fertilization, which is important for the initiation of seed formation, will be provided. Embryo and endosperm development as well as accumulation of seed storage materials, which are major events during seed development, will be covered, as well as the dormancy and germination mechanisms in mature seeds. Lectures and discussions (presentations required for graduate students). Offered every even year fall term. CROSSLISTED as CROP 463/CROP 563. Lec/ lab.

## HORT 480. CASE STUDIES IN CROPPING

 SYSTEMS MANAGEMENT (4). Decision cases involving the production of field and horticultural crops; individual and group activities; discussion of the decision-making process. Multiple field trips required. A field trip fee will be charged. CROSSLISTED as CROP 480/CROP 580. This course is repeatable for a maximum of 8 credits. PREREQS: CROP 300 or HORT 300 and senior standing in agriculture.
## HORT 481. CASE STUDIES IN

HORTICULTURAL SYSTEMS MANAGEMENT
(4). Field-based decision cases involving problematical situations encountered in horticultural farming systems including nursery production, orchard and vineyard systems, market gardening, Christmas tree, and row crop production. Required field trips may include weekend trips. This course is repeatable for a maximum of 8 credits. PREREQS: (HORT 300 or CSS 300) and HORT 301 and CSS 305
HORT 485. ADVANCED PERMACULTURE DESIGN (3). Course work centers on choice of advanced design project track: broad scale rural farm or ranch, urban neighborhood or community development, educational institution or organization, or commercial property business development. Students conduct in-depth site analysis and draft design document which is reviewed and revised with research-based knowledge to complete design gaps. PREREQS: (HORT 285 [D-] and HORT 286 [D-] )
HORT 495. HORTICULTURAL MANAGEMENT PLANS (3). Develop an integrated management plan for a horticultural enterprise. This course is repeatable for a maximum of 6 credits. PREREQS: Senior standing.
HORT 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

HORT 499H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Honors College approval required.
HORT 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
HORT 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
HORT 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
HORT 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
HORT 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
HORT 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

HORT 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

HORT 510. INTERNSHIP (1-12). Offered via Ecampus only. This course is repeatable for a maximum of 12 credits.

## HORT 511. RESEARCH AND EDUCATIONAL

 PERSPECTIVES IN HORTICULTURE (2). Introduces beginning graduate students to the faculty in horticulture and provides an in-depth discussion of their research and education programs.
## HORT 518. CURRENT TOPICS IN

ENTOMOLOGY (2). This is a core course of the Horticulture graduate program. Provides an advanced understanding of entomology and its relationship to other disciplines through critical analysis of the scientific literature. Students practice synthesizing information and presenting findings to peers. Instructors, topics, and specific learning objectives vary from term to term. CROSSLISTED as ENT 518. This course is repeatable for a maximum of 12 credits.

HORT 519. CURRENT TOPICS IN PLANT BREEDING AND GENETICS (2). Provides an advanced understanding of plant breeding and genetics and their relationship to other disciplines through critical analysis of the scientific literature. Students practice synthesizing information and presenting findings to peers. Instructors, topics, and specific learning objectives vary from term to term. CROSSLISTED as PBG 519. This course is repeatable for a maximum of 12 credits.
HORT 520. CURRENT TOPICS IN
HORTICULTURAL RESEARCH (2). This is a core course in the horticulture graduate program. Students gain an advanced understanding of horticulture science and its relationship to other disciplines through critical analysis of the scientific literature. Students practice synthesizing information and presenting findings to their peers. Instructors, topics and specific learning objectives vary from term to term. This course is repeatable for a maximum of 12 credits.
HORT 533. SYSTEMATICS AND ADAPTATION OF VEGETABLE CROPS (4). Covers the botanical and taxonomic relationships, breeding systems and adaptation of vegetable crops. Fresh material is used to illustrate varietal differences and traits of importance. Lec/lab. CROSSLISTED as CROP 433/CROP 533. PREREQS: BI 102 or BI 213 or BI 311 or HORT 430 or CSS 430 or HORT 450 or CSS 450

## HORT 544. INSECT AGROECOLOGY (3).

 Agroecology incorporates ecological concepts and principles to the design and management of sustainable agricultural systems. Topics include: the role of insects in sustainable agricultural systems; application of the principles of insect ecology to better manage insect pests and maximize crop yield; conserving beneficial insects and other natural resources in agroecosystems and the surrounding landscape. CROSSLISTED as ENT 544. PREREQS: General background or previous course work in entomology.HORT 547. ARBORICULTURE (4). The principles and practices of arboriculture, the art and science of selecting, planting, establishing and maintaining trees in urban, suburban, commercial and residential landscapes. Lec/lab CROSSLISTED as FES 447.

HORT 552. BERRY AND GRAPE PHYSIOLOGY AND CULTURE (4). Production of wine grapes, caneberries, strawberries, blueberries, and other miscellaneous berry crops. Emphasis on plant growth and development; pruning and training systems; flower and fruit development and cultivars. Field trips required. Offered in alternate years. PREREQS: HORT 301
HORT 555. URBAN FOREST PLANNING,
POLICY AND MANAGEMENT (4). Examination of planning, policy, and management strategies used in the stewardship of urban natural resources. Fundamentals for developing effective programs to
maximize the economic, environmental, and socia values and benefits of urban forest landscapes CROSSLISTED as FES 555. Taught via Ecampus only. PREREQS: FOR 350 or FES 350 or HORT 350 for undergraduates.
HORT 563. SEED BIOLOGY (3). Information about reproductive development of plants such as pollination and fertilization, which is important for the initiation of seed formation, will be provided. Embryo and endosperm development as well as accumulation of seed storage materials, which are major events during seed development, will be covered, as well as the dormancy and germination mechanisms in mature seeds. Lectures and discussions (presentations required for graduate students). Offered every even year fall term. CROSSLISTED as CROP 463/CROP 563. Lec/ lab.
HORT 580. CASE STUDIES IN CROPPING SYSTEMS MANAGEMENT (4). Decision cases involving the production of field and horticultural crops; individual and group activities; discussion of the decision-making process. Multiple field trips required. A field trip fee will be charged CROSSLISTED as CROP 480/CROP 580 PREREQS: CROP 300 or HORT 300 and senio standing in agriculture.
HORT 591. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
HORT 599. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.
HORT 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
HORT 603. DISSERTATION (1-16). This course is repeatable for a maximum of 999 credits.
HORT 605. READING \& CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

HORT 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
HORT 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

HORT 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

HORT 691. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits. HORT 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## PLANT BREEDING AND GENETICS COURSES

PBG 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PBG 199H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Honors College approval required.
PBG 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PBG 299H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Honors College approval required.
PBG 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

PBG 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

PBG 403. THESIS (1-16). Graded P/N. This course is repeatable for a maximum of 99 credits.

PBG 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

PBG 405H. READING AND CONFERENCE (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
PBG 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

PBG 409. TEACHING PRACTICUM (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

PBG 410. INTERNSHIP (1-12). This course is repeatable for a maximum of 12 credits.
PBG 430. PLANT GENETICS (3). Introduction to the principles of plant genetics with an emphasis on the structure and function of economically important plant genomes. PREREQS: One year of biology and chemistry.

## PBG 431. PLANT GENETICS RECITATION

 (1). Review and demonstration of plant genetics principles.PBG 441. PLANT TISSUE CULTURE (4). Principles, methods, and applications of plant tissue culture. Laboratory is important part of course. Topics include callus culture, regeneration, somaclonal variation, micropropagation, anther culture, somatic hybridization, and transformation. Lec/lab. PREREQS: (BI 311 and BOT 331) or PBG 430 or CSS 430
PBG 450. PLANT BREEDING (4). An introduction to the genetic improvement of self-pollinated, cross-pollinated, and asexually propagated species and the genetic principles on which breeding methods are based. Examples are drawn from a wide range of crops, including cereal grains, grasses, fruits, nuts, and vegetables; guest lecturers discuss their breeding programs. Additional topics include crop evaluation, germplasm preservation, disease resistance, and biotechnology. Lec/lab. PREREQS: BI 311 or PBG 430
PBG 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PBG 499H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
PBG 501. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
PBG 503. THESIS (1-16). Graded P/N. This course is repeatable for a maximum of 999 credits.

PBG 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

PBG 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

PBG 507. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

PBG 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
PBG 509. PRACTICUM IN TEACHING (1-
3). Developing skills and competence in teaching under staff supervision; organization and presentation of instructional materials by assisting in laboratory, recitation, and lectures. CROSSLISTED as ENT 509, CROP 509, SOIL 509. This course is repeatable for a maximum of 9 credits.
PBG 510. INTERNSHIP (4). This course is repeatable for a maximum of 12 credits.
PBG 513. PLANT GENETIC ENGINEERING (3). Principles, methods, and recent developments in the genetic engineering of higher plants. Offered alternate years. PREREQS: (BI 311 and BOT 331) or (CSS 430 or CSS 530) or (HORT 430 or HORT 530) or (PBG 430 or PBG 530)

PBG 519. CURRENT TOPICS IN PLANT
BREEDING AND GENETICS (2). Provides an advanced understanding of plant breeding and genetics and their relationship to other disciplines through critical analysis of the scientific literature. Students practice synthesizing information and presenting findings to peers. Instructors, topics, and specific learning objectives vary from term to term. CROSSLISTED as HORT 519. This course is repeatable for a maximum of 12 credits.

PBG 530. PLANT GENETICS (3). Introduction to the principles of plant genetics with an emphasis on the structure and function of economically important plant genomes. PREREQS: One year of biology and chemistry.
PBG 541. PLANT TISSUE CULTURE (4). Principles, methods, and applications of plant tissue culture. Laboratory is important part of course. Topics include callus culture, regeneration, somaclonal variation, micropropagation, anther culture, somatic hybridization, and transformation. Lec/lab. CROSSLISTED as MCB 541. PREREQS: (BI 311 and BOT 331) or PBG 430

PBG 550. PLANT BREEDING (4). An introduction to the genetic improvement of self-pollinated, cross-pollinated, and asexually propagated species and the genetic principles on which breeding methods are based. Example are drawn from a wide range of crops, including cereal grains, grasses, fruits, nuts, and vegetables; guest lecturers discuss their breeding programs. Additional topics include crop evaluation, germplasm preservation, disease resistance, and biotechnology. Lec/lab. PREREQS: BI 311 or PBG 430 or PBG 530

PBG 551. BREEDING CLONAL CROPS (1). The overall goal of the course is to gain fundamental knowledge of breeding methods for clonal crops; these methods are different from those used for seed-propagated crops. Specific examples from a wide array of plant species (tree fruits, berries, tree nuts, potato, sweet potato, cassava, cacao) will be provided to illustrate application of the fundamental knowledge. PREREQS: PBG 450 [C] or PBG 550 [C] and the instructor will waive the enforced prerequisite requirement for students with comparable experience and a desire to learn more about plant breeding.
PBG 591. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

PBG 598. PLANT CHROMOSOME BIOLOGY
(3). Exploration of the relationship between chromosome number, structure, and behavior to gene inheritance, organization, and expression. Discussion of chromosome manipulation strategies for genomics research, genetic analysis, and plant breeding. PREREQS: 6 credits of genetics or equivalent.
PBG 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PBG 601. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
PBG 603. DISSERTATION (1-16). Graded P/N. This course is repeatable for a maximum of 999 credits.
PBG 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

PBG 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

PBG 609. PRACTICUM IN TEACHING (1-3).
Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 9 credits.

PBG 620. DNA FINGERPRINTING (1). Principles and methods for producing and analyzing DNA fingerprints. Offered even years. CROSSLISTED as MCB 620. PREREQS: BI 311 or CSS 430 or CSS 530 or PBG 430 or PBG 530 or HORT 430 or HORT 530 or equivalent.

PBG 621. GENETIC MAPPING (1). Principles and methods for constructing genetic maps comprised of molecular and other genetic markers. Offered even years. CROSSLISTED as MCB 621.
PREREQS: BI 311 or CSS 430 or CSS 530 or PBG 430 or PBG 530 or HORT 430 or HORT 530 or equivalent.

PBG 622. MAPPING QUANTITATIVE TRAIT
LOCI (1). Principles and methods for mapping genes underlying phenotypically complex traits. Offered even years. CROSSLISTED as MCB 622. PREREQS: CROP 590 or CSS 590 or ST 513 or equivalent.
PBG 650. ADVANCED PLANT BREEDING AND QUANTITATIVE GENETICS (3). Pedigree, bulk, single-seed-descent, doubled haploid, backcross, testcross, mass, and half-sib, S~1~, and S~2~ family breeding methods; breeding hybrids and selecting sources of alleles for developing superior hybrids; the nature and consequences of genotype by environment interactions; marker assisted backcross and inbred line breeding; quantitative trait locus mapping; random linear models; designing and analyzing cultivar, line, and family selection experiments. Offered odd years. PREREQS: (CSS 430 or CSS 530 or PBG 430 or PBG 530 or HORT 430 or HORT 530) and (CSS 450 or CSS 550 or PBG 450 or PBG 550 or HORT 450 or HORT 550) and (ST 411 or ST 511) and (ST 412 or ST 512) and (ST 413 or ST 513)
PBG 691. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PBG 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## I SOIL SCIENCE COURSES

SOIL 101. INTRODUCTION TO HORTICULTURE, CROP, SOIL, AND INSECT SCIENCE (1).
Introduces students with interests in horticulture, crop, soil, and insect sciences to educational and professional opportunities in these disciplines. Speakers will discuss opportunities in research and academia as well as in the applied professional job market. Open to all students. CROSSLISTED as CROP 101, ENT 101, HORT 101.

SOIL 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 199H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
SOIL 205. SOIL SCIENCE (3). Introduction to the chemical, physical and biological nature of soils. Examines how soils function in terms of plant growth, nutrient supply, the global carbon cycle, ecological habitat, and water purification. Community-based learning projects provide hands-on experience with fundamental soil science principles and the impact of human activities on soil quality and sustainability. Lec. (Bacc Core Course if taken with SOIL 206 or FOR 206) PREREQS: SOIL 206* [D-] or FOR 206* [D-]

SOIL 206. *SOIL SCIENCE LABORATORY FOR SOIL 205 (1). Students will gain handson experience with soil science concepts and applications. Laboratory exercises and field trips will help students develop proficiency in the methods/tools for analyzing soil chemistry, biology, morphology, physical properties, and soil forming factors. Skills will be taught in the context of soils; social, economic, and environmental importance. (Bacc Core Course if taken with SOIL 205) COREQS: SOIL 205
SOIL 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 299H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

## SOIL 316. NUTRIENT CYCLING IN

AGROECOSYSTEMS (4). Nutrient forms, transformations, and cycling. Diagnosis and correction of nutrient deficiencies, pH and salinity. Impact of nutrient management practices on crop production, soil health, nutrient use efficiency, and environmental quality. Organic and inorganic fertilization. Labs include soil sampling and testing procedures, data collection on soil and plants, computer applications for soil fertility management, and field trips. Lec/lab. PREREQS:

CH 121 [D-] and (SOIL 205 [D-] or CSS 205 [D-] or CSS 305 [D-] )

## SOIL 325. ^AG AND ENVIRONMENTAL

PREDICAMENTS: A CASE STUDY APPROACH
(3). Evaluation of controversial agricultural and environmental problems. Production of clear oral and written documents describing and analyzing problems and specific courses of action utilizing team-building skills. (Writing Intensive Course) CROSSLISTED as CROP 325. PREREQS: (CSS 305 [D-] or CSS 205 [D-] or SOIL 205 [D-] )
SOIL 366. ECOSYSTEMS OF WILDLAND SOILS (3). Focuses on soils that occur in relatively undisturbed ecosystems such as forests and rangelands. Topics covered include properties and processes specific to understanding and managing the soil resource in these areas. An overview of US Soil Taxonomy will also be given. PREREQS: (SOIL 205 [D-] or CSS 205 [D-] or CSS 305 [D-] ) and an understanding and appreciation of environmental chemistry, biology, ecology, and physics is needed for this course.

## SOIL 388. SOIL SYSTEMS AND PLANT

GROWTH (4). Introduces soils as providers of critical resources for plant growth. Explains how soils supply water, air, thermal energy and nutrients to plants. Shows that sustainable management of soil resources requires substantial understanding of their role in the functioning of natural, forest, and agricultural systems. Explains controls on stocks and availabilities of individual soil resources and mechanisms making these resources plant-available. PREREQS: ((SOIL 205 [D-] and (SOIL 206 [D-] or FOR 206 [D-] )) or CSS 205 [D-] ) and (CH 121 [D-] or CH 231 [D-] ) and (BOT 220 [D-] or (BI 204 [D-] or BI 205 [D-] or BI 206 [D-] ) or (BI 211 [D-] or Bl 212 [D-] or Bl 213 [D-])
SOIL 395. *WORLD SOIL RESOURCES (3). The properties, global distribution, and agricultural productivity of major world soil groups are described. Potentials for human-accelerated soil degradation are introduced for each soil group, and reasons for conflicting assessments of degradation are discussed. (Bacc Core Course) Offered via Ecampus only. PREREQS: CH 121 [D-] and /or equivalent.
SOIL 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 403. THESIS (1-16). Independent, original study and preparation of a senior thesis. This course is repeatable for a maximum of 16 credits. PREREQS: Senior standing.
SOIL 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing.
SOIL 405H. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing and Honors College approval required.
SOIL 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing.
SOIL 408. WORKSHOP (1-16). Evaluation and judging of soils in Oregon and other states; directed studies of soil morphology, soil survey, soil fertility, soil physics, soil chemistry, soil biology, and soil information systems. This course is repeatable for a maximum of 16 credits.

SOIL 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

SOIL 410. INTERNSHIP (1-6). Professional work experience previously approved and supervised by the department, written report required. This course is repeatable for a maximum of 12 credits. PREREQS: Junior standing.
SOIL 435. ENVIRONMENTAL SOIL PHYSICS
(3). Covers principles of soil physical properties
and processes as they relate to agricultural, hydrological and environmental problems. Lec/lab. Offered odd years. PREREQS: (CSS 205 [D-] or CSS 305 [D-] or SOIL 205 [D-] ) and CH 123 and MTH 241 and PH 201 or equivalent.
SOIL 445. ENVIRONMENTAL SOIL CHEMISTRY (3). Structural chemistry of clay minerals and organic matter, cation and anion exchange, and soil solution equilibria of soils. Ion exchange, mineral-solution equilibria, and adsorption reactions of silicate clays, oxides, and organic matter are emphasized. Covers the sorption behavior of environmental contaminants and the weathering reactions that govern the transport of reactive solutes through soils. Lec/rec. Offered odd years.
SOIL 455. BIOLOGY OF SOIL ECOSYSTEMS
(4). A detailed study of the organisms that live in the soil and their activities in the soil ecosystems, soil as a habitat for organisms, taxonomy and biology of soil organisms, fundamentals of nutrient cycles, special topics in soil biology, review basis of soil microbial and ecological principles. Lec/ rec/lab. PREREQS: (CSS 305 or CSS 205 or SOIL 205). Courses in chemistry, physics, and microbiology are recommended.

## SOIL 466. SOIL MORPHOLOGY AND

CLASSIFICATION (4). Observation and description of soil properties in the field; writing soil profile descriptions; evaluating criteria that define features used to classify soils; using soil classification keys. Lec/lab. PREREQS: (SOIL 205 [D-] or CSS 205 [D-] or CSS 305 [D-] )
SOIL 468. SOIL LANDSCAPE ANALYSIS (4). Principles of soil geomorphology, soil stratigraphy, and surficial processes as applied to understanding the soil system and landscape scales. Emphasis on field observations of soils, geomorphic surfaces, and environment. Field project entails design of soil survey map units, field mapping and GIS cartographic techniques. Lec/lab. Offered even years. PREREQS: (SOIL 466* [D-] or CSS 466* [D-] )
SOIL 475. SOIL RESOURCE POTENTIALS (4).
Course builds on knowledge from introductory pedology, soil chemistry, soil physics and soil biology to practice the evaluation of nutrient availability and soil moisture storage in the rooting space. Results from the application of pedotransfer functions to observations at the pit wall are translated into quantitative, numerical expressions of soil resource potentials. Lec/lab. PREREQS: (SOIL 435 [D-] and SOIL 455 [D-] and SOIL 466 [D-] )
SOIL 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing.

SOIL 499H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing and Honors College approval required.
SOIL 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 503. THESIS/DISSERTATION (1-16). This course is repeatable for a maximum of 999 credits.
SOIL 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

SOIL 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

SOIL 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

SOIL 508. WORKSHOP (1-16). Evaluation and judging of soils in Oregon and other states; directed studies of soil morphology, soil survey, soil fertility, soil physics, soil chemistry, soil biology, and soil information systems. This course is repeatable for a maximum of 16 credits.

SOIL 509. PRACTICUM IN TEACHING
(1-3). Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. CROSSLISTED as ENT 509, CROP 509, PBG 509. This course is repeatable for a maximum of 9 credits.

SOIL 510. INTERNSHIP (1-6). Professional work experience previously approved and supervised by the department, written report required. This course is repeatable for a maximum of 6 credits.
SOIL 511. SOIL: A NATURAL AND SOCIETAL RESOURCE (3). Serves degree- and non-degree-seeking graduate learners wanting soil science knowledge but having minimal science background. Understanding soil physical, chemical, and biological properties promotes informed soil management while supporting individual to global societal values. Established curriculum facilitates graduate degrees or certificates, continuing education, professional certification, and self-improvement goals. A highly interactive social media framework supports weekly student-student and instructor-student learning interactions. PREREQS: Graduate standing: a 4-year degree from any accredited university.
SOIL 513. PROPERTIES, PROCESSES, AND FUNCTIONS OF SOILS (4). Physical, chemical, biological, and landscape properties; processes of fluid retention and movement, weathering and cation exchange, decomposition and C-N dynamics, erosion and sedimentation; functions of hydrologic regulation, nutrient cycling, environmental protection, ecological habitat. PREREQS: CH 223 or CH 233 or CH 233 H or equivalent

SOIL 515. SOIL FERTILITY MANAGEMENT
(3). Management of plant nutrients in agronomic systems; diagnosis of nutrient availability and prediction of crop response to fertilizers; interactions between nutrient response and chemical, physical and biological properties of soils. PREREQS: CSS 315 and courses in statistics, chemistry and plant physiology.
SOIL 523. PRINCIPLES OF STABLE ISOTOPES
(3). An introduction to the theory and use of stable isotopes. Applications of stable isotopes to soil science, plant physiology, hydrology, and ecosystem studies. Offered even years.

SOIL 525. MINERAL-ORGANIC MATTER
INTERACTIONS (3). Studies the fundamental properties of the mineral-organic interface and the mechanisms of interaction between mineral and organic soil properties. PREREQS: CSS 305 or CSS 205 or SOIL 205 or equivalent.

SOIL 535. SOIL PHYSICS (3). Theoretical elements of soil physical properties and processes related to agricultural, hydrological and environmental problems. Offered fall term in even years. PREREQS: Recommended are CSS 305, CSS 205, SOIL 205, MTH 241, CH 123, PH 201 or equivalent.

SOIL 536. VADOSE ZONE HYDROLOGY LABORATORY (1). Experimental elements of soil physical properties and processes allowing practical experience in the measurement and analysis of soil physical processes related to agricultural, hydrological and environmental problems. Weekly laboratory. Offered even years. PREREQS: CH 123 and PH 201 or equivalent.

SOIL 545. ENVIRONMENTAL SOIL CHEMISTRY (3). Structural chemistry of clay minerals and organic matter, cation and anion exchange, and soil solution equilibria of soils. Ion exchange, mineral-solution equilibria, and adsorption reactions of silicate clays, oxides, and organic matter are emphasized. Covers the sorption behavior of environmental contaminants and the weathering reactions that govern the transport of reactive solutes through soils. Lec/rec. Offered odd years.

SOIL 547. NUTRIENT CYCLING (3). Reviews and discusses ecosystem-level biogeochemical concepts for terrestrial and freshwater ecosystems, primarily by reading and discussing classic and current literature to determine the state-of-knowledge and uncertainties associated with it. Topics include root nutrient uptake mechanisms, soil chemical and biochemical transformations in different soil and ecosystems, measuring soil solution and watershed fluxes, soil organic matter formation and structure, the meaning of sustainability, the concept of N saturation in terrestrial ecosystems, and the use of natural abundance and tracer isotopes in ecosystem biogeochemistry. While forest biogeochemical processes will be emphasized, desert, aquatic, wetland, and prairie ecosystems will also be explored. CROSSLISTED as BOT 547 PREREQS: College-level chemistry and biology and one class in ecology (BI 370 or equivalent) and/or soils (e.g., SOIL 205).
SOIL 555. BIOLOGY OF SOIL ECOSYSTEMS (4). A detailed study of the organisms that live in the soil and their activities in the soil ecosystems, soil as a habitat for organisms, taxonomy and biology of soil organisms, fundamentals of nutrient cycles, special topics in soil biology, review basis of soil microbial and ecological principles. Lec/ rec/lab. PREREQS: CSS 305 or CSS 205 or SOIL 205. Courses in chemistry, physics, and microbiology are recommended.
SOIL 566. SOIL MORPHOLOGY AND CLASSIFICATION (4). Observation and description of soil properties in the field; writing soil profile descriptions; evaluating criteria that define features used to classify soils; using soil classification keys. Lec/lab. PREREQS: CSS 305 or CSS 205 or SOIL 205
SOIL 568. SOIL LANDSCAPE ANALYSIS
(4). Principles of soil geomorphology, soil stratigraphy, and surficial processes as applied to understanding the soil system at landscape scales. Emphasis on field observations of soils, geomorphic surfaces, and environment. Field project entails design of soil survey map units, field mapping and GIS cartographic techniques. Lec/lab. Offered odd years. PREREQS: (CSS 566* [C] or SOIL 566* [C] )
SOIL 591. SELECTED TOPICS (1-16). Course content and title will change with each offering. This course is repeatable for a maximum of 16 credits.
SOIL 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 603. THESIS/DISSERTATION (1-16). This course is repeatable for a maximum of 999 credits.
SOIL 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

SOIL 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

SOIL 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

SOIL 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

SOIL 609. PRACTICUM IN TEACHING (1-3). Developing skills and competence in teaching under staff supervision; organization and presentation of instructional material by assisting in laboratory, recitation, and lectures. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 9 credits.

SOIL 635. ADVANCED SOIL PHYSICS (3). Explores theoretical development of a key topic in soil physics. Topics may include evaporation from porous media, multiphase fluid movement, soil deformation, and soil salinization, with respect to either historical development, present day understanding or future needs of the field. Course
structure incorporates lectures and discussion requiring intensive student participation. Offered odd years. PREREQS: (CSS 535 [C] or SOIL 535 [C] ) and a working knowledge of soil physics and a passing grade in a graduate-level soil physics course.
SOIL 645. SOIL MICROBIAL ECOLOGY (3). An advanced treatment of current topics in soil microbiology, with an emphasis on the ecology of soil microorganisms. Topics include the size, composition, diversity, and activity of soil microbia communities, linkage of microbial community structure to ecosystem functions, and applications of molecular biology to soil microbiology. Offered even years. PREREQS: Recommend SOIL 455 or CSS 455 or MB 448
SOIL 684. GLOBAL BIOGEOCHEMICAL CYCLES (4). An in-depth treatment of globa biogeochemical cycles, focusing on cycles of carbon, oxygen, nitrogen, phosphorus, and sulfur in the atmosphere, hydrosphere, and lithosphere. CROSSLISTED as GEO 684. PREREQS: One year of college-level physics and chemistry, including introductory biology or equivalent. One year of graduate course work in soil, earth, ocean, atmospheric, or forest science or equivalent or consent of instructor.

SOIL 691. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
SOIL 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## OTHER DEGREES $\&$ <br> PROGPAMS WITHIN THE <br> COLLEGE OF AGRICULTUBAL SCIINCES <br> UNDERGRADUATE MAJORS WITH OPTIONS

## BIORESOURCE RESEARCH

(BS, CRED, HBS)
Completion of an option is required to earn a degree in Bioresource Research.

## Sample Curriculum

First Year (45)
BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
BRR 100. Great Experiments in Bioresource Sciences (1)
CH 231, CH 232, CH 233. *General Chemistry (4,4,4)
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
(1,1,1)
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC course (1-2)
WR 121. *English Composition (3)
Baccalaureate core (6)
Unrestricted electives (5)

## Second Year (45)

BRR 200. Developing a Research Proposal: Theory and Practice (1)
PHL 205. *Ethics (4)
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Lab (4)
PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
ST 351. Introduction to Statistical Methods (4)

Baccalaureate core selection (6)
Unrestricted electives (3)

Third Year (45)
BI 311. Genetics (4)
BRR 401. Research and Scholarship (8)
COMM 111. *Public Speaking (3)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
or MTH 268. Mathematical Ideas in Biology (4)
Baccalaureate core selection (3)
Unrestricted electives (4)
Selected courses to meet BRR option requirement (15)

## Fourth Year (45)

BB 450, BB 451. General Biochemistry $(4,3)$
BRR 401. Research and Scholarship (6)
BRR 403. ^Thesis (4)
BRR 406. Projects: Data Presentations (1)
BRR 407. Seminar (1)
BRR 409. Practicum: Teaching and Peer Mentoring (1)
WR 327. *Technical Writing (3)
Baccalaureate core selection (3)
Unrestricted electives (5)
Selected courses to meet BRR option requirement (14)

## Options Curricula

One option specialization is required (more are often possible). Course work for EACH option must total 29 credits.

## Footnotes:

* Baccalaureate Core Course
^ Writing Intensive Course (WIC)
Major Code: 113


## OPTIONS

## ANIMAL REPRODUCTION AND

## DEVELOPMENT OPTION

Animal reproduction and development entails the study of life processes in cells, organs, and whole animals to enhance efficient production of high-quality animals and animal food products. Students use antibody-based assays, molecular genetics, protein chemistry, embryo and tissue culture, electron chemistry, and other modern laboratory techniques in research in areas of animal reproduction, development and growth, preparing them for positions or graduate programs in the bioscience/biomedical/veterinary/ agricultural fields.

## Required Courses

ANS 121. *Introduction to Animal Sciences (4)

ANS 314. Animal Physiology (4)
ANS 316. Reproduction in Domestic Animals (4)
ANS 317. Reproduction in Domestic Animals Lab (1)
CROP/HORT 300. Crop Production in
Pacific Northwest Agroecosystems (4)
Select one of the following courses:
BB 314. Cell and Molecular Biology (4)
BOT 331. Plant Physiology (4)
CSS 305. Principles of Soil Science (4) EOU
campus only.
and CSS 306. Problem Solving: Soil
Science (1) EOU campus only.
or SOIL 205. *Soil Science (3)

ENT 311. Introduction to Insect Pest Management (4)
MB 302. General Microbiology (3)
RNG 341. Rangeland Ecology and Management (3)
TOX 411. Fundamentals of Toxicology (3)

## Specialization and Breadth Courses

7 to 9 credits approved by option faculty and research mentor.

## Total=29

Option Code: 127

## APPLIED GENETICS OPTION

Applied genetics is directed at changing the genomes of organisms, to increase their utility to humans. Techniques are derived from cytogenetics, molecular biology, and Mendelian and quantitative genetics. Typically, applied geneticists have expertise in one or more related fields of study such as agronomy, biochemistry, botany, entomology, food processing, forestry, microbiology, pathology, physiology, and statistics.

The goals of applied genetics include:

1. improving the quality of food and fiber products,
2. improving the cost efficiency of a given product, and
3. minimizing adverse environmental effects of food or fiber production.
Students in this option will be well prepared for positions in biosciences and agriculture, or in graduate and professional programs.

## Required Courses

PBG 430. Plant Genetics (3)
and PBG 450. Plant Breeding (4)
or ANS 378. Animal Genetics (4)
ST 411. Methods of Data Analysis (4)

## Specialization and Breadth Courses

18 to 21 credits approved by option faculty and research mentor.

## Total=29

Option Code: 114

## BIOENERGY OPTION

Bioenergy is renewable energy (e.g., fuel ethanol, hydrogen and biodiesel) derived from biomass, including byproducts, residues, woody waste products, and crops and microbes which are grown specifically for fuel. Development and production of bioenergy could contribute to long-term environmental and economic sustainability. Bioenergy research creates new uses for agricultural and other materials by developing new biochemical processes for the production of sustainable fuels. This area of research involves both science and engineering. Students completing this option will be ready for challenging careers in industry, governmental agencies, consulting companies, and novel start-up companies, or for graduate programs.

## Substituted Courses

BRR 350. Introduction to Regional

Bioenergy (2) for BRR 100 and BRR 409
BRR 450. Interdisciplinary Research:
Bioenergy Focus (2) for BRR 200

## Required Courses

1. Background Course

Choose one course from below (3 cr):
CROP 330. *World Food Crops (3)
FOR 111. Introduction to Forestry (3)
MB 302. General Microbiology (3)

## 2. Upper-Division Lab Course

Choose one course from below (2-3 cr):
BB 493. Biochemistry Laboratory Molecular
Techniques 1 (3)
BB 494. Biochemistry Laboratory Molecular Techniques 2 (3)
BOT 332. Laboratory Techniques in Plant Biology (3)
MB 303. General Microbiology Laboratory (2)

## 3. Engineering Course

Choose one course from the list, or another appropriate upperdivision course in the area of process or ecological engineering, genomics/bioinformatics, or genetic engineering, approved by research mentor (3-4):
BEE 102. Ecological Engineering II (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 453. Introduction to Process Engineering Design (4) [Terminated spring 2015]
BOT 475. Comparative Genomics (4)

## 4. Specialization and Breadth

## Courses

WSE 473. Bioenergy and Environmental Impact (3)
Choose additional courses from above and below, or other upperdivision courses approved by research mentor, to total 29 credits:
AEC 300. Applied Economic Analysis (3)
[Terminated summer 2016]
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
BB 314. Cell and Molecular Biology (4)
BEE 221. Fundamentals of Ecological Engineering (3)
Note: Students choosing BEE 221 may substitute it for BEE 102.
BEE 499. Special Topics: Biofuel Feedstocks and Production (3)
ECON 201. *Introduction to
Microeconomics (4)
ENGR 231 Understanding Energy (3)
ENGR 350. *Sustainable Engineering (3)
ENGR 363 *Energy Matters (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FOR 330. Forest Resource Economics I (4)
FOR 331. Forest Resource Economics II (4)
MB 310. Bacterial Molecular Genetics (3)
MB 312. Bacterial Physiology and Metabolism (3)
MB 456. Microbial Genetics and Biotechnology (3)
MB/FST 479. Fermentation Microbiology (3)
MTH 254. Vector Calculus I (4)

MTH 256. Applied Differential Equations (4)
PHAR 537. Bioorganic Chemistry (3)
WR 201. *Writing for Media (3)
WR 214. *Writing in Business (3)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 321. Chemistry of Renewable Materials (4)

WSE 322. Physical and Mechanical
Properties of Renewable Materials (4)
WSE 324. Renewable Materials Laboratory
(3)

WSE 453. ^Global Trade in Renewable
Materials (3)
WSE 535. Polymer Synthesis and Structure (3)

WSE 573. Bioenergy and Environmental Impact (3)

## Total=29

## Footnotes:

* Baccalaureate Core Course
^ Writing Intensive Course (WIC)
Option Code: 767


## BIOPRODUCTS OPTION

Bioproducts are biomaterials or biochemicals (e.g., biodegradable plastics and composites, antibiotics, pharmaceuticals and herbicides) produced by conversion processes from plant, animal, or microbial biomass. Development and production of bioproducts contribute to environmental and economic sustainability. Bioproducts research creates new uses for agricultural and other materials by developing new biochemical processes for the production of renewable chemicals and bioproducts. This area of research involves both science and engineering. Students completing this option will be ready for challenging careers in industry, governmental agencies, consulting companies, and novel start-up companies, or for graduate programs.
Students must choose option classes from three categories, to provide:

1. background appropriate to the systems that their research concerns (e.g., forests, agricultural crops, microbes);
2. an upper-division laboratory class;
3. appropriate "engineering" course work, broadly defined to include process engineering, ecological engineering, bioinformatics, breeding, or genetic engineering, depending on the student's choice of research.

## 1. Background Course

Choose one course from below (3 cr):
CROP 330. *World Food Crops (3)
FOR 111. Introduction to Forestry (3)
MB 302. General Microbiology (3)
2. Upper-Division Lab Course

Choose one course from below (2-3 cr):
BB 493. Biochemistry Laboratory Molecular Techniques 1 (3)
BB 494. Biochemistry Laboratory Molecular Techniques 2 (3)
BOT 332. Laboratory Techniques in Plant

Biology (3)
MB 303. General Microbiology Laboratory (2)
3. Engineering Course

Choose one from the list, or another appropriate upper-division course in the area of process or ecological engineering, genomics/ bioinformatics, or genetic engineering, approved by research mentor (3-4):
BEE 102. Ecological Engineering II (3)
BEE 320. Biosystems Analysis and Modeling (4)

BOT 475. Comparative Genomics (4)
ENGR 350. *Sustainable Engineering (3)
4. Specialization and Breadth

## Courses

Choose 19-21 credits from above and below, or other upper-division courses approved by research mentor, to total 29:
AEC 300. Applied Economic Analysis (3)
[Terminated summer 2016]
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
BB 314. Cell and Molecular Biology (4)
BEE 221. Fundamentals of Ecological Engineering (3)
Note: Students choosing BEE 221 may substitute it for BEE 102.
BEE 499. Special Topics: Biofuel Feedstocks and Production (3)
ECON 201. *Introduction to
Microeconomics (4)
ENGR 363. *Energy Matters (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FOR 330. Forest Resource Economics I (4)
FOR 331. Forest Resource Economics II (4)
MB 310. Bacterial Molecular Genetics (3)
MB 312. Bacterial Physiology and Metabolism (3)
MB 456. Microbial Genetics and Biotechnology (3)
MB/FST 479. Fermentation Microbiology (3)
MTH 254. Vector Calculus I (4)
MTH 256. Applied Differential Equations (4)
PHAR 537. Bioorganic Chemistry (3)
WR 201. *Writing for Media (3)
WR 214. *Writing in Business (3)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 321. Chemistry of Renewable Materials (3)

WSE 322. Physical and Mechanical
Properties of Renewable Materials (4)
WSE 324. Renewable Materials Laboratory (3)
WSE 453. ${ }^{\wedge}$ Global Trade in Renewable Materials (3)
WSE 535. Polymer Synthesis and Structure (3)

WSE 573. Bioenergy and Environmental Impact (3)

## Total=29

Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 768


## BIOTECHNOLOGY OPTION

Biotechnology refers to laboratory-based techniques such as genetic engineering, recombinant DNA, tissue culture, and horizontal gene transfer, to make or modify products, to improve plants or animals, or to develop useful microorganisms. Examples include gene transfer to increase plant yield or disease resistance; cell and tissue culture to clonally propagate plants or animals; manipulation of microorganisms or cultured cells for the production of fermented food and beverages or the development of vaccines; production of antibodies for detection of animal and plant diseases; drug discovery and development. Students will gain laboratory and/or field experience in modern techniques of biotechnology, preparing them for biosciences or biomedical graduate/professional schools or careers in biotechnology.

## Substituted Courses

BB 490. Biochemistry 1: Structure and
Function (3) and BB 491. Biochemistry 2: Metabolism (3)
for BB 450 and BB 451 . Biochemistry $(4,3)$

## Required Courses

BB 314. Cell and Molecular Biology (4)
BB 492. Biochemistry 3: Genetic
Biochemistry (3)
MB 302. General Microbiology (3) and MB 303. General Microbiology Lab (2)
or PBG 441. Plant Tissue Culture (4)
MB 310. Bacterial Molecular Genetics (3)
Specialization and Breadth Courses
13 to 15 credits approved by option faculty and research mentor.

## Total=29

Option Code: 116

## CLIMATE AND BIOSYSTEMS <br> MODELING OPTION

The Climate and Biosystems Modeling option applies general systems theory to the analysis of climate, environmental and agricultural systems, and their interactions. Systems theory provides a method of analyzing overall system behavior by examining the relations among-and the behavior of-individual components, and synthesizing these relationships into a mathematical framework that describes the total system. Computer simulation using this mathematical framework can predict and analyze the response to various changes in the inputs to, and/ or structure of, the system, providing a powerful tool for the development of comprehensive solutions to problems. Examples of topics for student research could include studying the effects of climate change on vectored disease transmission, marine biodiversity, distributions of crops and crop pathogens, the carbon and nitrogen cycles, and wildfire cycles. The option is flexible; students design personalized programs and may complete a double major or minor if
desired. This option will prepare students for challenging careers in governmental regulatory agencies and environmental consulting companies, or for graduate programs.

BRR students interested in climate and/or ecosystem research but not modeling should investigate the Sustainable Ecosystems option.

## Required Courses

1. Climate

Choose one course from below (4 credits):
ATS 420. Principles of Climate: Physics of Climate and Climate Change (4)
GEOG 323. ^Climatology (4)

## 2. Biosystems

Choose one from below or another appropriate course approved by research mentor (3-4 credits):
BI 370. Ecology (3)
BOT 341. Plant Ecology (4)
CE 412. Hydrology (4)
FE 430. Watershed Processes (4)
FES 341. Forest Ecology (3)
FW 320. Introductory Population Dynamics (4)

OC 440. Biological Oceanography (4)

## 3. Quantitative Modeling <br> Choose one course from below (3-4 credits):

BEE 320. Biosystems Analysis and Modeling (4)

ST 435. Quantitative Ecology (3)
ST 443. Applied Stochastic Models (3)

## 4. Computer Programming

Choose one course from below or another appropriate course approved by research mentor (4 credits):
CS 151. Introduction to C Programming (4) CS 161. Introduction to Computer Science I (4)

## 5. Statistics

Choose one sequence from below (8 credits):
ST 411, ST 412. Methods of Data Analysis $(4,4)$
ST 421, ST 422. Introduction to
Mathematical Statistics (4,4)

## Specialization and Breadth Courses

6 to 9 credits approved by research mentor.

## Total=29 credits

## Footnote:

$\wedge$ Writing Intensive Course
Option Code: 816

## ENVIRONMENTAL CHEMISTRY

## OPTION

Environmental chemistry focuses on the basic principles that control the fate of chemicals in the environment. A bewildering variety of chemicals, an inevitable result of modern industrial civilization, are released daily; some of them persist in soil, water, or air. The extent to which these chemicals are a health hazard depends in part on where, how much,
and in what form they accumulate. OSU scientists use state-of-the-art methods to detect trace amounts of chemicals in the environment, at levels as low as one part per trillion, and track their movement and transformations. Students will acquire laboratory skills that will be in high demand as the worldwide public concern with environmental quality increases.

## Substituted Courses

CH 334, CH 335, CH 336. Organic
Chemistry ( $3,3,3$ )
for CH 331, CH 332. Organic Chemistry $(4,4)$
PH 211, PH 212, PH 213. *General Physics with Calculus (4,4,4)
for PH 201, 202, 203. *General Physics $(5,5,5)$

## Required Courses

CH 390. Environmental Chemistry (3)
CH 440. Physical Chemistry (3)
CSS 305. Principles of Soil Science (4) $\boldsymbol{E O U}$ campus only.
and CSS 306. Problem Solving: Soil Science Applications (1) EOU campus only.
or SOIL 205. *Soil Science (3)
MTH 254. Vector Calculus I (4)

## Select two courses from:

CH 324. Quantitative Analysis (4)
CH 421. Analytical Chemistry (3)
CH 428. Instrumental Analysis (4)
CH 435. Structural Determination by Spectroscopic Methods (3)
CH 440. Physical Chemistry (3)
CH 461. Experimental Chemistry II (3)
SOIL 545. Geochemistry of Soil
Ecosystems (4)
TOX 430. Chemical Behavior in the Environment (3)
TOX 490. Environmental Forensic Chemistry (3)
Specialization and Breadth Courses
5 to 8 credits approved by option faculty and research mentor.
Total=29 (not including substitute courses)
Option Code: 117

## FOOD QUALITY OPTION

Food quality research includes a broad range of studies involving sensory appeal, convenience, safety, and nutrition of food and beverages. The sensory aspects of food quality emphasize taste, texture, aroma, and appearance. The convenience aspects of food quality include shelf-life, ease of preparation, and improved functional properties. Food safety is concerned with acute and chronic responses of consumers to microorganisms and chemicals that occur naturally or are added to foods. Nutritional aspects of food quality are related to the nutrient content of foods and the role of nutrients in human health. Research in these areas is grounded in the application of basic sciences, including biology, chemistry, microbiology, molecular biology, psychology and engineering. Students will
acquire skills appropriate for laboratory, industrial, or regulatory positions.

## Required Courses <br> FST 421. Food Law (3)

FST 422. Food Chemistry Fundamentals (4)
FST 423. Food Analysis (4)
MB 302. General Microbiology (3)
Specialization and Breadth Courses
14 credits approved by option faculty and research mentor.

## Total=29

Option Code: 138

## GENOMICS/BIOINFORMATICS OPTION

Technological advances in the life sciences have led to a virtual explosion of genomics, proteomics, metabolomics and related "omics" data that give unprecedented global and molecular views of living systems. The Genomics/Bioinformatics Option focuses on computational analyses of these data, using state-of-the-art methods. Computational areas of emphasis within this option include sequence (DNA and protein) analysis and alignment, biological network analysis, and quantitative modeling. Students will be able to use these data to answer research questions and address emerging applications in life sciences, biotechnology, and medicine, and will be prepared for careers or graduate programs in this new, rapidly growing field.

## Required Courses

Biochemistry/Molecular Biology:
Choose one course from below:
BB 314. Cell and Molecular Biology (4)
BB 331. *Introduction to Molecular Biology (3)

## Computer Science:

Choose either:
BOT 476. Introduction to Computing in the Life Sciences (3)

## or

CS 161, CS 162. Introduction to Computer Science I, II (4,4)
and MTH 231. Elements of Discrete Mathematics (4)

## Genomics and Bioinformatics

BB 499. Special Topics: Nucleic Acid Bioinformatics (3)
BOT 475. Comparative Genomics (4)

## Statistics

ST 352. Introduction to Statistical Methods (4)

## Organismal Biology Elective:

Choose at least 3 credits of upper-
division course work related to the group of organisms that your research concerns. Examples could include:
BOT 321. Plant Systematics (4)
MB 302. General Microbiology (3)
PBG 430. Plant Genetics (3)
PBG 450. Plant Breeding (4)
Z 361. Invertebrate Biology (3)

## Specialization and Breadth

Courses:
Choose courses from the lists be-
low, or other upper-division cours-
es approved by research mentor,

## for a total of 29 option credits.

## General electives:

BB 481. Macromolecular Structure (3)
BB 494. Biochemistry Laboratory Molecular
Techniques 2 (3)
BB 499. Special Topics: Biocomputing:
Molecular Simulation (3)
MB 310. Bacterial Molecular Genetics (3)
MB 311. ^Molecular Microbiology
Laboratory: A Writing Intensive Course (3)
MB 668. Microbial Bioinformatics and Genome Evolution (4)
If your interest is in biological data
mining, suggested choices include:
CS 261. Data Structures (4)
CS 325. Analysis of Algorithms (4)
CS 420. Graph Theory with
Applications to Computer Science (3)
If your interest is in modeling, suggested choices include:
MTH 254. Vector Calculus I (4)
MTH 256. Applied Differential
Equations (4)
MTH 341. Linear Algebra I (3)
ST 411, ST 412. Methods of Data Analysis $(4,4)$
ST 421, ST 422. Introduction to
Mathematical Statistics $(4,4)$
ST 441. Probability, Computing, and
Simulation in Statistics (4)

## Total=29

Option Code: 627

## PEST BIOLOGY AND <br> MANAGEMENT OPTION

Pest biology and management involves the study of living organisms, such as insects, fungal and bacterial pathogens, vertebrates, and weeds, that limit agricultural productivity. Students with an interest in entomology may study identification, biology and control of insects, including integrated plant protection, biocontrol, and use of beneficial insects. Research approaches range from basic laboratory studies to field experiments. Students will develop research skills in pest biology, development of management strategies, and assessment of pest impact on plants or livestock, preparing them for a variety of regulatory and research positions and graduate programs.

## Required Courses

BOT 331. Plant Physiology (4)
BOT 350. Introductory Plant Pathology (4)
CROP 440. Weed Management (4)
ENT 311. Introduction to Insect Pest
Management (5)
Specialization and Breadth Courses
12 credits approved by option faculty and research mentor.

## Total=29

Option Code: 118

## PLANT GROWTH AND DEVELOPMENT OPTION

Plant growth and development involves the study of the control and coordination of processes in cells, organs, and/ or whole plants, including, for example, changes in gene expression in response to environmental conditions such as climate change. Students will develop research skills and knowledge about the regulation of plant growth and development, metabolism, structure and function of macromolecules (i.e., enzymes, storage proteins, and nucleic acids), and whole plant physiology, preparing them for agricultural and biosciences positions or graduate programs.

## Required Courses

BOT 313. Plant Structure (4)
BOT 331. Plant Physiology (4)

## Select two of the following:

BB 314. Cell and Molecular Biology (4)
BOT 332. Laboratory Techniques in Plant Biology (3)
BOT 421. Advanced Plant Systematics (4)
CSS 305. Principles of Soil Science (4) EOU campus only.
and CSS 306. Problem Solving: Soil
Science (1) EOU campus only.
or SOIL 205. *Soil Science (3)
HORT 316. Plant Nutrition (4)
Specialization and Breadth Courses
12 to 14 credits approved by option
faculty and research mentor.

## Total=29

Option Code: 149

## SUSTAINABLE ECOSYSTEMS OPTION

Sustainable ecosystems research addresses the sustainability of agricultural, forest, rangeland, wildlife, fishery, and native ecosystems. The program aims to define and develop natural and managed ecosystems in which environmental soundness results from the conscious interaction of humans with wildlife and other components of the systems. Innovative links among scientific and humanistic disciplines will bring about increased understanding of the present and future health of natural and managed ecosystems and associated human communities. Sustainable ecosystems research is multidisciplinary: insights from sociology, political science, anthropology, or philosophy may be combined with basic concepts from biology, chemistry, and physics to support research rooted in agricultural, forestry, rangeland management or wildlife management. Students will acquire perspective by choosing among a broad variety of courses, and will participate in field, laboratory, or systems analysis projects, preparing them for graduate/professional schools or research and regulatory positions.

## Required Courses

Ecology and Ecological Methods:
BI 370. Ecology (3)
or BOT 341. Plant Ecology (4)
or FES 341. Forest Ecology (3)
or RNG 421. Wildland Restoration and
Ecology (4)
BI 371. ^Ecological Methods (3)
or RNG 441. Rangeland Analysis (4)

## Ethics/Values:

Select one of the following:
PHL 440. *Environmental Ethics (4)
PHL 443. *World Views and Environmental Values (3)

## Social/Political:

Select one of the following:
AEC 352. *Environmental Economics and Policy (3)
ANTH 481. *Natural Resources and
Community Values (3)
ANTH 482. *Anthropology of International
Development (4)
ANS 315. *Contentious Social Issues in Animal Agriculture (3)
FOR 460. ^Forest Policy (4)
FW 325. *Global Crises in Resource Ecology (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
HST 481. *Environmental History of the U.S. (4)

PS 475. Environmental Politics and Policy (4)

SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)

## Integrative/Management/

## Conservation:

## Select one of the following:

AEC 351. *Natural Resource Economics and Policy (3)
ANS/SOC 485. *Consensus and Natural Resource Issues (3)
BA 463. Family Business Management (4)
BI 348. *Human Ecology (3)
BOT 488. Environmental Physiology of Plants (3)
CROP 480. Case Studies in Cropping Systems Management (4)
FE 430. Watershed Processes (4)
FES 365. *Issues in Natural Resources Conservation (3)
FES/NR/RNG 477. *Agroforestry (3)
FOR 457. Techniques for Forest Resource Analysis (4)
FOR 459. Forest Resource Planning and Decision Making (4)
FW 321. Fisheries and Wildlife Resource Ecology (3)
GEOG 300. *Sustainability for the Common Good (3)
RNG 468. International Rangeland Resource Management (3)
SOIL 395. *World Soil Resources (3) Ecampus only.

## Specialization Courses

Nine to 14 credits approved by option faculty and research mentor.

## Total=29

Option Code: 142

## TOXICOLOGY OPTION

Toxicology concerns potentially hazardous chemicals in food and the environment and their effects on biological life. Toxic chemicals include pesticides such as insecticides and herbicides, industrial waste products, compounds that exist naturally in plants, those that contaminate foods as a result of fungal growth, and even some that are produced in the preparation and cooking of foods. Potential health effects from toxin exposures can range from immediate impairment of breathing or nerve function to chronic diseases, cancer, birth defects, and immune disorders. Toxicology research focuses on understanding mechanisms of toxicity, human and environmental risks from exposure, and means for reducing risks. Students will acquire laboratory skills in applied biochemistry and molecular, cellular, and organismal biology, preparing them for research or regulatory positions or biosciences/biomedical graduate/professional programs.

## Substituted Courses

CH 334, CH 335, CH 336. Organic
Chemistry $(3,3,3)$ for CH 331, $332(4,4)$.

## Required Courses

TOX 411. Fundamentals of Toxicology (3)
TOX 413. Environmental Toxicology and Risk Management (3)

## Specialization and Breadth Courses

23 credits approved by option faculty and research mentor.

## Total=29

Option Code: 993

## WATER RESOURCES OPTION

Water resources research involves the use of science and policy tools to identify contaminants and make assessments of water quality. Students will acquire laboratory skills to detect water contaminants and track their movements and transformations while learning related policy and management concerns. Research areas could include microbial contaminants, the impact of urbanization on water quality, and marine and estuarine water quality and its impact on fisheries and shellfish industries. Option course work covers water sciences and hydrology, environmental policy and management. Students completing this option will be prepared for graduate school or for positions in environmental consulting, research, and natural resource management.

## Water Sciences

Choose four courses from below:
CSS 305. Principles of Soil Science (4) EOU

## campus only.

or SOIL 205. *Soil Science (3)
FW 456. Limnology (5)
GEO 487. Hydrogeology (4)
MB 302. General Microbiology (3)
OC 332. Coastal Oceanography (3)

OC 433. Coastal and Estuarine Oceanography (3)
TOX 430. Chemical Behavior in the Environment (3)

## Watersheds and Hydrology:

Choose one course from below:
CE 412. Hydrology (4)
FE 430. Watershed Processes (4)

## Water Resources Environmental Analysis

Choose one course from below:
BEE 448. Non-point Source Pollution
Assessment and Control (3)
BI 371. ${ }^{\wedge}$ Ecological Methods (3)
BOT 547. Nutrient Cycling (3)
CE 413. GIS in Water Resources (3)
ENVE 456. Sustainable Water Resources Development (3)
GEO 424/GEOG 441. International Water Resources Management (3)
TOX 455. Ecotoxicology: Aquatic Ecosystems (3)

## Water Resources Environmental

 Policy and ManagementChoose one course from below:
AEC 432. Environmental Law (4)
FOR 462. Natural Resource Policy and Law (3)

FW 326. Integrated Watershed Management (3)

GEO 425/GEOG 440. Water Resources
Management in the US (3)
PS 475. Environmental Politics and Policy (4)
RNG 455. Riparian Ecohydrology and Management (4)

## Specialization and Breadth Courses

1 to 7 additional credits of upper division courses approved by research mentor, for a total of 29 credits.
Recommended areas: Climatology geology, resource economics, watersheds, watersheds management, microbial ecology, engineering, mathematics, hydrology, hydrogeology, irrigation, toxicology, ecology, environmental analysis, environmental chemistry, geochemistry, environmental management, environmental policy, economics, marine biology, aquatic and marine botany and zoology, oceanography, statistics, geography, environmental ethics, research ethics.
Option Code: 626

## INTERNATIONAL STUDIES (BA, HBA)

See International Programs for information on the International Studies Degree.
Major Code: 910

## SUSTAINABILITY (BS, HBS)

Also available via Ecampus.
OSU Main Campus Contact: Ann
Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.

OSU-Cascades Campus Contact:

Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@ osucascades.edu.

## Sustainability Core (17-20)

All Sustainability Majors and Minors must take the five courses that make up the Sustainability Core: SUS 304, SUS 350, an ecological sustainability course (SUS 102 recommended), a social sustainability course (choose one below), and an economic sustainability course (choose one below):
SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)

## Ecological Dimensions of

Sustainability (3-4)
Select 3 to 4 credits from the following:
BI 301. *Human Impacts on Ecosystems (3)
SUS 102. *Introduction to Environmental
Science and Sustainability (4)
Social Dimensions of Sustainability
(3-4)

## Select 3 to 4 credits from the

## following:

SOC 381. Social Dimensions of
Sustainability (4) Ecampus only.
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/FES/ANS/FW 485. *Consensus and
Natural Resources (3)
SUS 420. Social Dimensions of

## Sustainability (3) Ecampus, Cascades

## Campus

## Economic Dimensions of

## Sustainability (3-4)

Select 3 to 4 credits from the following:
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 351. *Natural Resources Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)

## Practicum (3-12)

Sustainability majors are required to complete a minimum of 3 Practicum credits. Before registering for a practicum, students must get practicum approved by Sustainability Double Degree advisor. Email: Sus.advising@oregonstate.edu.
SUS 401. Research (3-12)
SUS 410. Internship (3-12)
SUS 499. Special Topics (3-12)
Note: SUS 410 credits may be achieved by participation in an $\mathrm{IE}_{3}$ Global Internship with advisor approval.

## Remaining Elective Credits (4-16)

In addition to the required credits specified above, students must work with the sustainability program advisor to select courses relevant to their discipline and career path interests.

## Credits total=36

Classes that can be used to fulfill remain-
ing requirements are listed below. Students are NOT limited to taking courses within their primary major of study. The Sustainability advisor(s) will approve courses not listed here if they have an obvious link to sustainability and fulfill the intent of the double degree. See the OSU Sustainability Office list of sustain-ability-related courses.

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 465. *Systems Thinking and Practice (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 311. Intermediate Microeconomic Theory (4)
ECON 315. Intermediate Macroeconomic
Theory (4)
MGMT 452. Leadership (4)
Engineering
BEE 221. Fundamentals of Ecological Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering
Fundamentals (4)
ENVE 322. Fundamentals of Environmental Engineering (4)
HEST 310. *Introduction to Community
Engagement and Community-Based Design (3)

## Natural Sciences

ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ATS 320. *The Changing Climate (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 348. *Human Ecology (3)
BI 370. Ecology (3)
BRR 325. *Energy Technology and Social Change (3)
BRR 350. Introduction to Regional
Bioenergy (2)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
DHE/WSE 415. *Renewable Materials in the

Modern Age (3)
FES 341. Forest Ecology (3)
FES 354. Communities, Natural Areas, and
Sustainable Tourism (3)
FES 355. Management for Multiple Resource Values (3)
FES 360. Collaboration and Conflict
Management (3)
FES 365. *Issues in Natural Resources
Conservation (3) Ecampus or
Cascades campus only.
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FES/FW 445. Ecological Restoration (4)
FES/HORT 455. Urban Forest Planning,
Policy and Management (4) Ecampus only.
FES/NR/RNG 477. *Agroforestry (3)
FES/SOC/ANS/FW 485. *Consensus and
Natural Resources (3)
FOR 462. Natural Resource Policy and Law (3)
FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information Systems in Natural Resource (3)
FW 321. Applied Community and
Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society, and Sustainability (3)
FW 435. ^${ }^{\wedge}$ Wildlife in Agricultural Ecosystems (3)
FW 489. Effective Communications in
Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 309. *Environmental Justice (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
SOIL 475. Soil Resource Potentials (4)
SOIL 499. Special Topics (1-16)
SUS 103. *Introduction to Climate Change (4)

WSE 111. Renewable Materials for a Green Planet (2)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials
(3)

WSE 392. *Bamboolooza: The Fascinating World of Bamboo (3)
WSE 453. ^Global Trade in Renewable Materials (3)
WSE 455. Marketing and Innovation in Renewable Materials (4)
WSE 473. Bioenergy and Environmental Impact (3)
WSE 475. Environmental Assessment of Building Materials (4)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy, and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ANTH 481. *Natural Resources and
Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature,
Culture and the Environment (4)
FES/SOC/ANS/FW 485. *Consensus and
Natural Resources (3)
HEST 310. *Introduction to Community Engagement and Community-Based Design (3)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL/REL 443. *World Views and Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion, and Politics (4)
PS 374. *Sustainable Living: Practices and Policies (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)

PS 477. International Environmental Politics and Policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
WGSS 440. *Women and Natural Resources (3)

WGSS 450. Ecofeminism (3)

## Footnotes:

* Bacc Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Major Code: 870

## SUSTAINABILITY MINOR

Available on the Corvallis and OSU-Cascades campuses, and via Ecampus.
The Sustainability minor includes core sustainability courses (5) and tailored elective courses to expand students'
knowledge and experience of their primary major in the context of sustainability principles and frameworks. Courses from a student's major course of study will not count towards minor requirements. Completion of the Sustainability minor requires 27 credits beyond the 180-credit minimum for graduation.

## Sustainability Core (17-20)

All Sustainability students must take (8):
SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)

## Social Dimensions of

## Sustainability:

## Select 3 to 4 credits from the

 following:SOC 381. Social Dimensions of Sustainability (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/ANS/FES/FW 485. *Consensus and
Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)

## Ecological Dimensions of

## Sustainability:

Select 3 to 4 credits from the following:
BI 306. *^Environmental Ecology (3)
SUS 102. *Introduction to Environmental Science and Sustainability (4)

## Economic Dimensions of

Sustainability:

## Select 3 to 4 credits from the

 following:AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)

## Sustainability Individualized Study/ <br> Elective Credits (7-10)

Students will work with their primary academic advisor and the Sustainability academic advisor to select electives in the theme relevant to their interests for a total of 7-10 credits. Students should discuss with Sustainability advisor to apply elective courses that may not be listed below.

## Total Credits=27

## Elective Courses:

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social

Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. Introduction to
Macroeconomics (4)
ECON 315. Intermediate Macroeconomic Theory (4)

## Engineering

BEE 221. Fundamentals of Ecological Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Electric
Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering
Fundamentals (4)
ME 312. Thermodynamics (4)

## Natural Sciences

ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 370. Ecology (3)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FOR 462. Natural Resource Policy and Law (3)

FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information Systems in Natural Resource (3)
FW 321. Applied Community and Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in
Natural Resources (3)
FW 350. *Endangered Species, Society and Sustainability (3)
FW 435. ^Wildlife in Agricultural
Ecosystems (3)
FW/ANS/FES/SOC 485. *Consensus and Natural Resources (3)
FW 488. Problem Solving in Fisheries and Wildlife Science (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water and the Environment (3)
GEO 309. *Environmental Justice (3)
GEO 453. Resource Evaluation Methods/ EIS (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 340. *Introduction to Water Science
and Policy (3)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and
Development (3)
GEOG 441. International Water Resources
Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 322. Physical and Mechanical
Properties of Renewable Materials (4)
SOIL 499. Special Topics [Organic Farming] (1-16)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ANTH 481. *Natural Resources and Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and
Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature, Culture and the Environment (4)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL 443. *World Views and Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion, and Politics (4)
PS 449. ^Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)

PS 477. International Environmental Politics and policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 381. Social Dimensions of Sustainability (4)
SOC 480. *Environment Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/ANS/FES/FW 485. *Consensus and Natural Resources (3)

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
Minor Code: 871


## BIOENERGY MINOR

Bioenergy is renewable energy derived from biomass, including by-products, residues, waste products, and crops and microbes grown specifically for fuel. Development of bioenergy could contribute to long-term environmental and economic sustainability, and help mitigate the climate impact of using fossil fuels. However, developing and establishing bioenergy will require integrating expertise from social, economic, and scientific/ technical fields.
The Bioenergy minor is research-based and interdisciplinary, and provides an introduction to bioenergy concepts and issues, along with research experience and professional development. The Bioenergy minor is open to students in majors in science, agricultural sciences, forestry, engineering, earth/ocean/atmospheric sciences, education, social sciences and business, or with permission of the bioenergy adviser. Required classes for the minor present central bioenergy concepts such as life cycle analysis, feedstocks, feedstock conversions, and sustainability; introduce interdisciplinary research and research methods; expose students to regional bioenergy industries and issues; and provide professional skills and training. Each student will do a mentored bioenergy research project with a participating faculty member, industry or extension partner; write a thesis; and present a public seminar. This transcriptvisible minor complements existing majors to help students attain their career or graduate/professional school goals in the growing field of bioenergy.

For further information, contact:

## Kate Field, Director

## Wanda Crannell, Advisor

158 Strand Agriculture Hall
Oregon State University
Corvallis, OR 97331-2911
541-737-2999
E-mail: BRR@oregonstate.edu
Website: http://agsci.oregonstate.edu/brr/
A basic knowledge of chemistry is needed to understand bioenergy core concepts, such as the carbon cycle and pathways of energy conversion. Bioenergy minor students must take CH 122 or equivalent. CH 122 fulfills Bacc Core requirements and is a prerequisite for WSE 473, which is required for the Bioenergy minor.

## Required

BRR 350. Introduction to Regional Bioenergy (2)
BRR 450. Interdisciplinary Research:
Bioenergy Focus (2)
BRR 401. Research and Scholarship (10)
BRR 403. Thesis (4)
BRR 406. Projects: Data Presentation (1)
BRR 407. Seminar (1)
WSE 473. Bioenergy and Environmental Impact (3)

## Bioenergy Electives Categories

Technical Electives:
Choose one course from this list, or another course approved by the Bioenergy advisor that fulfills the intent of the Technical category.
BB 314. Cell and Molecular Biology (4)
BB 350. Elementary Biochemistry (4)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 472. Introduction to Process
Engineering (4)
BEE 473. Introduction to Process
Engineering Design (4)
BEE 499/599. Special Topics: Biofuel
Feedstocks and Production (3)
BIOE 457. Bioreactors (3)
BIOE 490. ^Bioengineering Process Design (4)

BOT 321. Plant Systemics (4)
BOT 331. Plant Physiology (4)
BOT 414. Agrostology (4)
BOT 475. Comparative Genomics (4)
CROP 300. Crop Production in Pacific
Northwest Agroecosystems (4)
FST 479. Fermentation Microbiology (3)
HORT 301. The Biology of Horticulture (3)
MB 230. *Introductory Microbiology (4)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)
MB 312. Bacterial Physiology and
Metabolism (3)
PBG 430. Plant Genetics (3)
PH 313. *Energy Alternatives (3)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 321. Chemistry and Structure of Renewable Materials (4)
WSE 322. Physical and Mechanical
Properties of Renewable Materials (4)
WSE 324. Renewable Materials Laboratory (3)

## Environmental:

Choose one course from this list, or another course approved by the Bioenergy advisor that fulfills the intent of the Environmental category.
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BEE 499. Special Topics: Bioenergy Systems and Life-Cycle Analysis (2)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
CH 390. Environmental Chemistry (3)
ENGR 350. *Sustainable Engineering (3)
ENSC 479. *^Environmental Case Studies (3)
ENVE 321. Environmental Engineering Fundamentals (4)
ENVE 322. Fundamentals of Environmental Engineering (4)
ENVE 415. Environmental Engineering Laboratory (3)
ENVE 425. Air Pollution Control (3)
WSE 473. Bioenergy and Environmental Impact (3)

## Social/Economic/Policy:

Choose one course from this list, or another course approved by the Bioenergy advisor that fulfills the intent of the Social/Economic/Policy category.
AEC 250. *Introduction to Environmental

Economics and Policy (3)
AEC 351. *Natural Resource Economics and Policy (3)
AEC 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
AEC 454. Rural Development Economics and Policy (3)
AG 492. Technology Transfer in Agriculture (3)

ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
BA 363. Technology and Innovation Management (4)
BA 458. Innovation and New Product Development (4)
BA 464. New Venture Financing (4)
CH 374. *Technology, Energy, and Risk (3)
ED 253. Learning Across the Lifespan (3)
FES/NR/RNG 477. *Agroforestry (3)
FOR 330. Forest Resource Economics I (4)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
SED 459. Science and the Nature of Inquiry (3)

SOC 418. Qualitative Research Methods (4)
SOC 481. *Society and Natural Resources (4)
WSE 455. Marketing and Innovation in Renewable Materials (4)

## Total=28-34

Minor Code: 497

## ■ COLLEGE OF AGRICULTURAL

 SCIENCE COURSESAGRI 199. SPECIAL TOPICS (1-3). This course is repeatable for a maximum of 8 credits.
AGRI 299. SPECIAL TOPICS (1-4). Targeted courses that focus on specific topics in agriculture and natural resources. Topics may vary from term to term and from year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 8 credits.
AGRI 399. SPECIAL TOPICS (1-4). Targeted
courses that focus on specific topics in agricultural science. Topics may vary from term to term and from year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 8 credits.
AGRI 402. INDEPENDENT STUDIES (1-16).
Graded P/N. This course is repeatable for a maximum of 16 credits.
AGRI 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

## AGRI 411. *INTRODUCTION TO FOOD

SYSTEMS: LOCAL TO GLOBAL (3). What is a food system, what does it look like, and how does it work? How do our food choices shape our world? Food systems, farm to plate, operate within social, political, economic, and natural environments, at multiple scales. This multidisciplinary course will introduce students to the complex topic of food systems, at different scales and from a variety of perspectives. (Bacc Core Course)
AGRI 438. EXPLORING WORLD AGRICULTURE
(2). Global practices of food production are highly diverse. However, there are also many common global issues related to agriculture, food, and natural resources. Speakers with international backgrounds and experiences will present material, as well as student teams who will
research a topic of personal interest. In addition, opportunities for global study, internship, and research will be explored.
AGRI 499. SPECIAL TOPICS (1-4). Targeted courses that focus on specific topics in agriculture and natural resources. Topics may vary from term to term and from year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 8 credits.
AGRI 511. INTRODUCTION TO FOOD SYSTEMS: LOCAL TO GLOBAL (3). What is a food system, what does it look like, and how does it work? How do our food choices shape our world? Food systems, farm to plate, operate within social, political, economic, and natural environments, at multiple scales. This multidisciplinary course will introduce students to the complex topic of food systems, at different scales and from a variety of perspectives.
AGRI 599. SPECIAL TOPICS (1-4). Targeted courses that focus on specific topics in agricultural science. Topics may vary from term to term and from year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 8 credits.

## ■ BIORESOURCE RESEARCH COURSES

BRR 100. GREAT EXPERIMENTS IN
BIORESOURCE SCIENCES (1). For students interested in BRR and undergraduate research, to introduce the research process and help them start defining research interests and project areas. Faculty describe research projects and experimental approaches, and pose interesting political and ethical questions related to scientific research. Students work with junior and senior student mentors already involved in research projects. Offered fall term. This course is repeatable for a maximum of 2 credits.
BRR 200. DEVELOPING A RESEARCH PROPOSAL: THEORY AND PRACTICE (1). An introduction to conceptual issues for organizing, planning, designing and conducting research in biological and agricultural sciences and natural resources disciplines. Students will master methods and philosophy of research, and then apply them by working in teams to analyze a timely and relevant problem and formulate experimental approaches to address it. This course is repeatable for a maximum of 2 credits.
BRR 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
BRR 325. *ENERGY TECHNOLOGY AND SOCIAL CHANGE (3). Science and technology co-evolve with a prosperous human society. The course discusses key issues surrounding the interaction between social changes and energy technologies. (Bacc Core Course) PREREQS: One term physical science with lab.
BRR 350. INTRODUCTION TO REGIONAL BIOENERGY (2). Field trips to visit regional industry and research facilities will introduce bioenergy core concepts and technologies. Guest lecturers will provide technical background and discuss economic, environmental and sociocultural sustainability of bioenergy. Course projects will analyze and present each facility in the context of regional bioenergy issues. Lec/lab.
BRR 399. SPECIAL TOPICS (0-4). This course is repeatable for a maximum of 6 credits.
BRR 401. RESEARCH AND SCHOLARSHIP (116). Undergraduate mentored research. Students select a faculty research mentor (from 7 OSU colleges) and complete 14 credits of research. Students follow established guidelines to prepare project proposals, progress reports, and a thesis; learn research methods applicable to their chosen field; gain professional skills and contacts. Students are evaluated on their ability to develop and complete a research project proposal, learn and develop research methodologies, conduct
research and trouble-shooting procedures, and demonstrate responsible and ethical participation in the research project. Offered all terms. This course is repeatable for a maximum of 99 credits. PREREQS: Departmental approval required.
BRR 403. ^THESIS (4). BRR students independently interpret and present their research in writing. Students write the thesis in a style appropriate for submission to a peer-reviewed journal in their chosen scientific discipline.
Students receive a letter grade based on their final thesis. Timeliness of reports is factored in student assessments. The student's faculty mentor and the BRR Director provide a consensus grade when the thesis is completed. Offered all terms. (Writing Intensive Course) This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
BRR 404. WRITING AND CONFERENCE (1-3).
Thesis writing for Bioenergy minor and other students. This course is repeatable for a maximum of 3 credits.
BRR 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
BRR 406. PROJECTS-DATA PRESENTATIONS
(1). For any student doing research, to learn to develop and evaluate poster and slide presentations containing scientific data. Students are exposed to a variety of scientific disciplines as they prepare and critique their own and other students> posters and oral presentations. Students improve written and oral communication skills. Letter grade is based on participation, improvement, and the quality of a final poster project and oral presentation. Offered winter term. CROSSLISTED as HORT 406.

BRR 407. SEMINAR (1). For BRR students, to encourage excellence in public speaking. Exposes students to a variety of current seminar topics and provides them with the opportunity to evaluate components of good public seminars. Students receive a grade only after completing a public seminar on their own research (final research seminar). Offered spring term.
BRR 409. PRACTICUM: TEACHING AND PEER MENTORING (1-2). Upper-division BRR students are grouped with lower-division students in BRR 100 to facilitate discussion and encourage dialogue about current research topics. Juniors and seniors Juniors and seniors continue to learn new ways to teach and communicate science issues in written and verbal formats. Offered fall term. This course is repeatable for a maximum of 16 credits.
BRR 410. INTERNSHIP (1-12). Supervised internship allowing students to gain off-campus work experience for credit. Under direction and approval of the program director, students will submit a statement of intent, identify employer contact, and provide a written report upon completion. This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing.

## BRR 450. INTERDISCIPLINARY RESEARCH:

BIOENERGY FOCUS (2). Bioenergy research presentations and papers introduce scientific inquiry, the research process, research seminars, papers and proposals. Analysis of different disciplines; approaches to research tools and data sources (e.g., quantitative versus qualitative approaches). Student teams write research proposals. Second core class in the Bioenergy minor.

BRR 499. SPECIAL TOPICS (2). This course is repeatable for a maximum of 4 credits.

The College of Business provides nationally recognized researchbased education that prepares profession-ready graduates who can excel in an innovative knowledgebased economy. The undergraduate and graduate programs in business and the undergraduate program in accounting are all accredited by the Association to Advance Collegiate Schools of Business.
The School of Design and Human Environment (SDHE) offers nationally recognized academic programs at the undergraduate and graduate level. Students can gain practical experience in their chosen fields through exciting research, internship and/or study abroad opportunities. For specific information about the School of Design and Human Environment, please refer directly to the SDHE section of this catalog or their website: http://business. oregonstate.edu/sdhe/advising.

The information below refers only to the undergraduate/graduate business-specific majors offered by the college.

The College of Business offers seven undergraduate degree programs and three graduate degree programs. Curricula lead to bachelor of arts (BA), bachelor of science (BS), master of business administration (MBA), business administration and accountancy (MBAA), and doctor of philosophy (PhD) in business administration degrees. For advanced degrees, see the Graduate School section of this catalog.

Students wanting to earn a bachelor of arts degree in the College of Business will need to:

1. Demonstrate proficiency through the second year of a foreign language (foreign language is defined as completing the 213 level of that language with a C or better or getting a signed letter from the School of Language, Culture, and Society that states they have determined the student has that level of proficiency without needing the course work), and
2. Demonstrate cultural awareness by either:
3. Completing 6 credits of upperdivision course work focusing on the culture of regions that commonly use the foreign language in which the student is proficient, or
4. Successfully complete a study abroad, global internship, or research experience of at least 10 weeks in a non-English speaking foreign country while enrolled at OSU. This experience must be clearly documented for audit purposes.
The Bachelor of Arts and Bachelor of Science degrees in Business Administration offer options in General Business (Cascades Campus and Extended Campus only), Hospitality Management (Cascades Campus
only), International Business, and Entrepreneurship for Business Majors.

Bachelor of Arts and Bachelor of Science degrees are also available in Business Information Systems, Finance, Management, and Marketing. The Accountancy degree is only a Bachelor of Science.

College of Business undergraduate students have the opportunity to participate in student exchange programs around the world

The College of Business encourages experiential learning through its Arthur Stonehill International Exchange Program, Austin Entrepreneurship Program, Austin Family Business Program, Close to Customer (C2C) Marketing Project, student clubs, and internships.

## FACULTY

Accounting:
Professor Graham
Associate Professors Coakley,
Frischmann, Kleinsorge, Moore
Assistant Professors Akroyd,
Huang, Lin, B. Scott
Senior Instructor Bourne
Instructors Lauka, Lyons, Peacock, Perez
BIS:
Professor Reitsma
Associate Professors Coakley, Marshall, Zhu
Assistant Professor Li
Senior Instructor Raja
Instructors Arora, Micheau
Global Business Analysis:
Professors Hsieh, N. King
Associate Professor Wu
Assistant Professors Chang, Kim, I. Scott, Lu

Instructors Costa, Feeney,
Gonzalez, Hasbrook, Higgins, Lewis, Lykins, Malone, Martin, Micheau, Olstad, Rose, Smith, Young
Strategy and Entrepreneurship: Associate Professors Arthurs, D. Neubaum
Assistant Professors Barden, J. Chen, Cho, Gerasyminka, HoehnWeiss, Joshi, Murnieks, Vestal
Instructors Cassidy, Dowling,
Higgins, Mentler, Morris, S. Neubaum, Noxel, Smouse, Van Order
Finance:
Professor Brooks
Associate Professors BeckerBlease, Berger, Mathew, Yang
Assistant Professors Anthony, Chira
Instructors Burgdorfer,
Varadharajan
Management:
Associate Professors Baldridge, Hacker
Assistant Professors Cho, Hardy,
Houston, Klotz, Leavitt, Murphy,

College of
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Corvallis, Oregon
97331-2603
541-737-2551
Website: http://
business.
oregonstate.edu/
Student Services
Advising and Services, 541-737-3716, studentservices@ oregonstate.edu

Career Success Center,
541-737-8957, csc@ oregonstate.edu
Graduate Business
Programs, 541-737-
5510, osumba@
oregonstate.edu
Administration
Mitzi Montoya,
Sara Hart Kimball
Dean, 541-737-6025,
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oregonstate.edu

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Paterson, Schilpzand
Instructors Broome, Cieri, Crangle, Gonzalez, LeRoux, Martell, McNeely, Morris, Swift
Marketing:
Professor McAlexander
Associate Professor Koenig
Assistant Professors Barnhart, Bee, Huff, J. King, Puzakova
Instructors Broome, Podrabsky, Toombs, Van Order

Undergraduate Majors
Accountancy (BS, CRED, HBS)
Options
Accounting Information Systems
International Business
Apparel Design (BS, CRED, HBS)
Business Administration (BA, BS, CRED, HBA, HBS)

## Options

Entrepreneurship for Business Majors
General Business (Cascades Campus and Ecampus only)
Hospitality Management (Cascades Campus only)
International Business
Merchandising Management
Retail Management (Ecampus only)
Supply Chain and Logistics Management
Business Information Systems (BA, BS, CRED, HBA, HBS)

Option
International Business
Finance (BA, BS, CRED, HBA, HBS)
Option
International Business
Hospitality Management (BA, BS, CRED, HBA, HBS) Offered at OSU-Cascades only.
Innovation Management (BA, BS, HBA, HBS)
Design and Innovation Management (BS, CRED, HBS)

## Options

Apparel Design
Design Management
Interior Design
International Studies (BA, HBA)
Management (BA, BS, CRED, HBA, HBS)

## Option

International Business
Marketing (BA, BS, CRED, HBA, HBS)
Option
International Business
Merchandising Management (BS, CRED, HBS)
Sustainability (BS, HBS)

## Minors

Business and Entrepreneurship
Merchandising Management

## Certificate Program

Postbaccalaureate Certificate in Accounting

## Graduate Majors

Business Administration (MBA)
Graduate Area of Concentration
Clean Technology
Graduate Options
Business Analytics
Corporate Finance
Innovation Management
Marketing
Organizational Leadership
Research Thesis
Supply Chain and Logistics Management
Business Administration (PhD)
Graduate Options
Accounting
Innovation/Commercialization
Business Administration and
Accountancy (MBAA)
Data Analytics (MS)
Graduate Option
Health Analytics
Design and Human Environment (MA, MAIS, MS, PhD)
Graduate Areas of Concentration (MA, MS)
Cultural/Historic Aspects of the Near Environment
Design in the Near Environment
Human Behavior and the Near Environment
Merchandising Management Textiles

Graduate Areas of Concentration (PhD)
Cultural/Historic Aspects of the Near Environment
Design in the Near Environment
Human Behavior and the Near Environment

## Graduate Minors

Business Administration
Design and Human Environment

## Graduate Certificate

Business Analytics
Data Analytics
Financial Planning

## HIGH SCHOOL PREPARATION

The following high school courses are recommended for students planning to enroll in the College of Business: English, four years; mathematics, four years; history and social studies, three years; foreign language, two years; natural science, two years. In addition, competence in microcomputer word processing, spreadsheet, and database software is recommended.

## TRANSFER STUDENTS

Students planning to transfer into the College of Business should do so as early as possible. Those planning to transfer from a community college should consult with an advisor at the community college to determine the most appropriate courses to complete prior to transfer. An advisor in the College of Business should also be contacted for advice.

## ADVISING AND EXPERIENTIAL LEARNING

The College of Business has experienced advisors available to assist students in all academic matters, as well as in the areas of career choice, internships, and other experiential learning opportunities. The resources of the Career Development Center and College of Business Career Success Center (Austin Hall 102) are available to all students seeking information concerning career development and interviews with visiting firms.

## CONCURRENT DEGREES

Students who wish to earn an undergraduate degree from the College of Business combined with another OSU degree may enroll in a concurrent degree program. Some degrees must be completed in conjunction with a primary degree (see the International Studies major in International Programs, the Sustainability major in the Department of Forest Ecosystems and Society, or the Education major in the College of Education for more information.) The requirements for earning two degrees are listed under Earning a Degree at OSU. Students who intend to obtain one of their degrees from the College of Business should see an advisor in the College of Business as soon as possible.

## MINOR PROGRAMS

The College of Business offers one tran-script-visible minor for students majoring in other disciplines. The Business and Entrepreneurship minor allows students to enhance their skills in areas such as marketing, management, finance, and entrepreneurship. More information may be obtained from the College of Business Advising Office, Austin Hall 122, 541-737-3716.

## THE ARTHUR STONEHILL INTERNATIONAL BUSINESS EXCHANGE PROGRAM

The College of Business administers the largest international business exchange program in the state. This opportunity allows qualified students to study abroad in one of 12 carefully selected and approved programs. Successful completion of course work enables students to earn their option in International Business through this one term of study. Current programs are available in Austria, Austra-
ia (I.B. option not available here), Czech Republic, Denmark, Germany, Hong Kong, Netherlands, Norway, Singapore, Spain, Sweden, and Thailand. A onecredit orientation class is required the term prior to departure, and a reflection paper is due upon return. All courses are taught in English and focus on various aspects of international finance, management, and marketing.

## AUSTIN ENTREPRENEURSHIP PROGRAM

## Sandy Neubaum, Director

The Austin Entrepreneurship Program (AEP) at Weatherford Hall is dedicated to teaching entrepreneurship and developing entrepreneurial thinking. By combining a formal entrepreneurship curriculum with a broad range of informal curriculum activities in a unique residential college facility, students live, study, work and dream together...sharing ideas, thinking creatively and learning practical life skills through hands-on experience.

## AUSTIN FAMILY BUSINESS PROGRAM

## Sherri Noxel, Director

Located within the College of Business since 1985, the Austin Family Business Program fosters family businesses through workshops, checklists, videos, academic courses, and internet resources. The program helps business-owning families manage day-to-day operations and plan for future generations.

## CLOSE TO THE CUSTOMER PROJECT (C2C) <br> Linda Lovett, Director

The C2C Project delivers market research to entrepreneurship students, as well as external clients, while providing experiential learning for students.

## GRADUATE PROGRAM

Master of Business Administration
The MBA program is an accelerated management program with an experiential component and an emphasis on innovation, sustainability, technology and entrepreneurship. The program is designed to provide our graduates with the necessary skills to solve complex business problems and to successfully compete in the business marketplace. Foundation courses include such fundamentals as business law, accounting, finance, and marketing. Advanced courses explore contemporary business topics in depth, with an emphasis on sustainability, technology, entrepreneurship and innovation in the global economy. Course work is completed in tandem with the experiential component of the program, the Integrated Business Project (IBP).

With the IBP, student teams are tasked
with creating fact-based, research-driven business plans for the companies of their choice. Whether developing an entrepreneurial venture from scratch or providing an established business with a new direction and growth potential, students become active in their own education. As the cornerstone of the College of Business MBA, the IBP program has a lasting impact not only on students but on commerce and industry in Oregon.
The MBA program is an intensive, fast-paced program designed to guide students through a rigorous foundation and core curriculum while allowing them to pursue their interests and push their boundaries. Throughout, students learn to build teams, integrate disciplines, work under pressure and multitask. In short, the same skills they will rely on when they leave campus.

## COLLEGE OF BUSINESS ACADEMIC AND PROFESSIONAL STANDARDS

The standards set forth below apply to all students enrolled in the College of Business (COB) and are in addition to those standards applicable to all students in the university. Students are responsible for satisfying these requirements.

## Prerequisite Grade Requirements

A grade of C - or better is required for prerequisites for all classes offered by the College of Business. A higher grade is required in some classes as noted in the catalog.

## Academic Progression Standards

 Academic progression standards specify the requirements a student must meet in order to graduate with a degree from the College of Business. OSU has minimum GPA standards. The College of Business (COB) has additional GPA requirements and standards. Students must satisfy both OSU and COB standards to earn their business degree.The COB Progression Standards require that students:

- Achieve a minimum grade of C- or better in all classes used to complete their business degree program.
- Maintain a minimum 2.5 GPA over all course work completed within their business degree program.
- Complete over fifty percent of the business program and discipline course work at OSU.
- Resolve all incomplete (I) grades
in any classes within the business degree program within one year, or prior to graduation, whichever occurs first.
- Make satisfactory progress toward the completion of the business degree program in a timely fashion.
The business degree program includes all COB classes (BA/ACTG) taken for major and elective credit and non-BA classes that are part of the degree requirements (see table below). Any course used to satisfy business degree requirements must be taken using the A-F grade mode. The Satisfactory/Unsatisfactory (S/U) grade basis may not be used. If a course is completed with the $\mathrm{S} / \mathrm{U}$ grade basis prior to declaring the business degree program, the original earned grade (A-F) will be used to compute progression standard GPAs.

Transfer grades in business degree program classes may be used to satisfy course work requirements but are not used in the overall COB GPA calculation used to determine graduation. They are, however, used in the All Inclusive Business GPA. Thus, if a course is completed at OSU and must be repeated to earn a higher grade, then the course must be repeated at OSU for the grade to be included in the GPA calculation.

Lower-division classes (100-200 level) completed at any accredited college or university with a grade of C - or higher may be used to satisfy pre-business core requirements, but will not be included in the overall COB GPA calculation. These transfer courses will be used in the All Inclusive Business GPA.

Upper-division classes (300-level and above) completed with a grade of C - or higher at school(s) accredited by the Association to Advance Collegiate Schools of Business may be used to satisfy upperdivision business core and discipline-specific course work requirements, but will not be included in the overall COB GPA calculation. These transfer courses will be used in the All-Inclusive Business GPA.
Guiding Professional Standards for the College of Business Community
As a member of the College of Business community, you should strive to:

- treat others with honesty, respect, and courtesy;
- maintain the highest levels of academic integrity;
- act in accordance with ethical and

| Progression Group | BA Classes | Non-BA Class |
| :--- | :--- | :--- |
| Pre-Business Core | BA 101, BA 211, BA 213, BA <br> 233, BA 260, BA 276, BA 302 | WR 222/323/327, MTH 241, MTH 245, COMM 111 or <br> COMM 114, ECON 201, ECON 202 |
| Upper-Division <br> Business Core | BA 333, BA/FIN 340 or BA <br> 360, BA 347, BA 352, |  |
| BA 353, BA 357, BA 370 or <br> ACTG 378, BA 376, BA 390, <br> BA 466 |  |  |
| Discipline-Specific Course <br> Work | All BA/ACTG courses <br> completed as part of the <br> business degree | ECON 330, ECON 340 <br> (Finance Discipline) |

social responsibilities;

- foster a professional learning environment; and
- act in a professional manner. You are also expected to comply with the law as well as all university regulations and policies that apply to you. Those university policies include, but are not limited to, the University Student Conduct Regulations, the university's Discrimination and Harassment Policies and the university's Policy on Acceptable Use of Computing Resources. Failure to comply with these laws, regulations, and policies may result in the pursuit of disciplinary action by the college, as detailed further below.
General Statement on Professional


## Conduct and Academic Integrity

## The Guiding Professional Standards for

 the College of Business community, subscribed to by all members of the College of Business community, are intended to support and implement the values held by the college. Those values encompass the pursuit of excellence in teaching, learning and scholarship. All members of the College of Business community accept our responsibility to strive to meet those standards and to act in an ethically proper manner in our dealings with others. We dedicate ourselves to create and nurture a culture of innovation, cooperation, diversity and mutual respect within the College of Business while recognizing and pursuing the social responsibilities imposed by these values.A reputation for personal integrity is valuable in the business and broader world. A good reputation is created through personal behavior and performance over time that is observed by friends, colleagues, and business associates, both superiors and subordinates.

The students, faculty, administrators and staff of the College of Business are committed to fostering and creating a positive, professional learning environment. These goals will be pursued by conduct that is honest, civil, courteous and responsible.

## Academic and Disciplinary <br> Procedures

The College of Business Academic and Disciplinary Procedures govern the college's response to a student's failure to progress adequately academically in the college or a violation of the law or university regulations and policies that apply to the student, including the Guiding Professional Standards of the college, the university Student Conduct Regulations, the university's Discrimination and Harassment Policies, or the university's Policy on Acceptable Use of Computing Resources. As is the case for all students, College of Business students are also subject to the university's Student Conduct Regulations and the procedures for
enforcement of those regulations. A failure by the student to progress adequately academically or a violation by the student of the Guiding Professional Standards of the college, the university Student Conduct Regulations, the university's Policy on Discrimination and Harassment, or the university's Policy on Acceptable Use of Computing Resources may result in the pursuit of one or more of the actions detailed below, including dismissal of the student from the college. The college will notify a student against whom it pursues such action with information about the effect of the action on the student's status in the college and information regarding how the student may respond to or appeal the action.

A student against whom the college pursues such action will be issued one of the following notices, depending on the student's academic status or the severity or frequency of the behavior resulting in the action:

## Warning Notice

"Warning" status is cautionary and is issued for one or more of the following academic reasons:

- Earning a 'D' or ' $F$ ' grade in a business program class.
- A small deviation below the minimum 2.5 business GPA.
- Failure to complete business course work in a timely fashion.
A "Warning" may also be issued to identify student behavior, which may place a student's enrollment status in the college at risk. The warning status may be removed following satisfactory resolution of behavioral concerns, as determined by the college.


## Probation Notice

If a student has larger deviations from the COB progression standards than those defined for a warning, or if the student continues to be out of compliance with any of the COB academic progression standards following a Warning, the student may be placed on probation and may be required to take specific action to correct the problem(s).

Student behavior that is a significant departure from the law or university regulations and policies that apply to the student, including the Guiding Professional Standards of the college, the university Student Conduct Regulations, the university's Discrimination and Harassment Policies, or the university's Policy on Acceptable Use of Computing Resources may also result in "Probation" status. Such behavior includes, but is not limited to, academic dishonesty, criminal violations, repeated or intentional violation of university policies, or significant breaches of the Guiding Professional Standards of the college, the university Student Conduct Regulations, the university's Policy on Discrimination and

Harassment or the university's Policy on Acceptable Use of Computing Resources. Detailed information on university policies can be found at the Student Conduct website at http://studentlife.oregonstate. edu/studentconduct.

A student on probation status must follow recommendations of the college in order to avoid suspension or dismissal. Students on probation status must meet with an advisor following each term to review their progress and standing in the college until the probation status is removed. Students who successfully fulfill the recommendations will be removed from probation status. Students who fail to follow or are unsuccessful in fulfilling the recommendations will be placed on suspension and evaluated for dismissal from the college

Probation may also be continued if a student is still out of compliance with academic or behavioral requirements but is taking steps to correct the problem(s) identified.

## Suspension Notice

A student who has displayed severe or repeated departures from the law or university regulations and policies that apply to the student, including the Guiding Professional Standards of the college, the university Student Conduct Regulations, the university's Discrimination and Harassment Policies, or the university's Policy on Acceptable Use of Computing Resources may be placed on suspension status. The college will place an indefinite hold on the progression of a student placed on suspension status until the college can adequately evaluate whether the student will be allowed to continue in the college.

Students engaged in an appeal of their dismissal from the college will also be placed on suspension status.

A student may also be placed on suspension if a student does not take steps to become compliant with the college's academic progression standards (such as retaking a class the student has failed), or the student is not making adequate progress in correcting the student's academic problems.

A student placed on suspension status will not be allowed to progress in the college. The student must wait for a minimum of one term before reapplying for admission to the college and must submit applications in accordance with published guidelines and deadlines. Following reapplication, the college will review the student's record, including any interim proof of progress. After review, the college may recommend immediate dismissal from the college, recommend that the student continues on suspension status pending receipt of additional information, or prescribe a plan to address specific concerns that resulted in the
student's suspension status. If a plan for progression is developed by the college, the student will be placed on probation status pending satisfactory progress.

If the student was placed on suspension for academic reasons and qualifies for readmission, the student must start in Pre-Business and reapply to ProSchool. If, after readmission, the college's or the university's academic standards or requirements have changed since the student was last a business major, the student will be subject to the more recent standards or requirements.

## Dismissal from the College

A student will be dismissed from the college if the student's behavior is a sufficiently severe and significant departure from the law or university regulations and policies that apply to the student, including the Guiding Professional Standards of the college, the university Student Conduct Regulations, the university's Discrimination and Harassment Policies, or the university's Policy on Acceptable Use of Computing Resources or the student fails to constructively address previous behavioral concerns after college action. A student may also be dismissed if the student departs significantly from the college's academic progression standards or if the student fails to follow adequately any plan prescribed while the student is on probation status.

## Appeal of Academic or Disciplinary

## Status

1. Any student who wishes to challenge the student's academic or disciplinary status at the college must submit an appeal in writing to the dean of the college within seven (7) calendar days following the issuance of a notice from the college identifying the student's status. The dean may refer the issue back to the college's standing committee for review if warranted. Following the review, the dean will notify the affected student of his or her decision by mail or email.
2. The student may appeal the dean's decision to the Oregon State University provost in writing within seven (7) calendar days following the issuance of a decision by the dean. The provost's decision on the appeal is the university's final decision.

SCHOOL OF DESICN AND HUMAN ENVIRONMENT

Minjeong Kim, Associate Dean
228 Milam Hall
Oregon State University
Corvallis, OR 97331-5101
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Website: http://business.oregonstate.edu/ college-business-design-programs

## FACULTY

Professors Burns, Marks
Associate Professors Chen, Kim, Lee, Mullet, Pedersen, Read
Assistant Professor Tural
Senior Instructors Burnett, Egan Instructors Cluver, Gallagher, Scranton, Vong

## Undergraduate Majors

Apparel Design (BS, CRED, HBS)
Design and Innovation Management (BS, CRED, HBS)
Options
Apparel Design
Design Management
Interior Design
Merchandising Management (BS, CRED, HBS)

## Minor

Merchandising Management

## Graduate Major

Design and Human Environment (MA, MAIS, MS, PhD)
Graduate Areas of Concentration Apparel Design
Cultural and Historic Aspects of the Near Environment
Human Behavior the Near Environment Interior Design
Merchandising Management Textiles

Graduate Minor
Design and Human Environment
The School of Design and Human Environment offers undergraduate instruction in the areas of apparel design, interiors/residential design, housing studies, and merchandising management. Advanced courses prepare students for positions in retailing of apparel and textile products, design and development of sewn products for manufacturers and retailers, housing design and policy, design of commercial and residential environments, and for graduate work leading to research and college and university teaching.

## GRADUATE STUDIES

The school offers the MS, MA, MAIS, and PhD degrees. Areas of emphasis for
the MS and MA degrees include cultural/ historic aspects of the near environment, human behavior and the near environment, design in the near environment, merchandising management and textiles. Areas of emphasis for the PhD degree include cultural/historic aspects of the near environment, design in the near environment, and human behavior and the near environment.

## PRE-PROFESSIONAL STUDIES ADMISSION REQUIREMENTS

To be considered for admission to the professional majors of Apparel Design, Merchandising Management, and Interior Design (Interior Design option and Housing Studies option), a student must earn a minimum GPA and complete a list of designated courses. Application information is available in the College of Business Advising Office in Austin Hall 122, http://business.oregonstate.edu/ advising.

## UNDERGRADUATE MAJORS WITH OPTIONS

APPAREL DESIGN (BS, CRED, HBS)
We are excited to announce that the curricular redesign of our apparel design degree program is complete. With an emphasis on outdoor and performance wear, graduates are well poised to enter the apparel industry that dominates the pacific northwest. Students interested in apparel design should visit URL http:// catalog.oregonstate.edu/MajorDetail. aspx?id=214 to view the degree requirements. Please note that we have proposed to rename the "Interior Design" major as the "Design and Innovation" major (per proposal 100333). Apparel Design is an option within this major. Until the name change is complete, please select pre-interior design as your major when applying to OSU.
The Apparel Design program prepares students to work in the diverse field of design. Apparel design and product development professionals design sportswear, suits, dresses, coats, accessories, and just about everything else that people wear. Designers research color and style trends to create concepts and sketches for fashions one to two years in advance of the market. Some create new garment styles while others adapt styles from a previous season.

The Apparel Design major is a professional program (major code 400). Entering students are designated as Pre-Apparel Design majors (major code 453). After completing at least 40 credits, students apply for acceptance into the professional program. Students will not be permitted to take Apparel Design professional course work without acceptance into the professional program. To be consid-
ered for admission into the Professional Apparel Design program, all Pre-Apparel Design students must meet the following requirements:

- Declared as Pre-Apparel Design major prior to applying to the professional program.
- A 2.5 cumulative OSU GPA.
- Completed and received a C- or better in all Pre-Apparel Design Core courses.
- Completed at least 40 credits of course work before the first term of the professional program. (Transfer credits: maximum of 30 credits transferred from accredited institution.)


## Baccalaureate Core

Courses may include BCC courses in the pre-professional core, professional core, and support courses.

## Pre-Apparel Design Core

COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical
Discourse (3)
or COMM 218. *Interpersonal
Communication (3)
DHE 160. Design Perspectives (4)
DHE 161. Design Explorations (4)
DHE 170. Introduction to the Textile and
Apparel Industry (4)
MTH 111. *College Algebra (4)
WR 121. *English Composition (3)
Two terms of Baccalaureate Core Science
Apparel Design Professional Core
DHE 221. Computer Aided Apparel Design 1 (3)
DHE 227. Apparel Design and Production 1 (4)
DHE 233. History of Contemporary Fashion (4)

DHE 255. Textiles (4)
DHE 262. Human-Centered Research in Design and Merchandising (4)
DHE 263. Human-Centered Design Theories and Strategies (4)
DHE 300. Field Experience Orientation and
Development (Section 1: Apparel Design)
$(1,1)$
and DHE 310. Field Experience (Sect 3, Apparel Design) (12)
or +select 14 credits from other
300/400-level ANTH, ART, BA, COMM,
DHE, PSY, or SOC courses.
DHE 321. Illustration, Portfolio, and Design Development (3)
DHE 327. Apparel Design and Production 2 (4)
DHE 328. Computer-Aided Pattern
Development (3)
DHE 330. ^Fashion Forecasting and Market Analysis (4)
DHE 334. Fashion History and Society (4)
DHE 355. Textile Performance and
Evaluation (4)
DHE 360. Collaborative Studio (4)
DHE 427. Draping (4)
DHE 428. Apparel Production Processes (4)
DHE 429. Advanced Apparel Design (4)
DHE 437. Consumer Behavior and Culture
(4)

DHE 475. *Global Sourcing of Textiles, Apparel, and Footwear (4)

## Support Courses

AG 111. Information Technology in Agriculture (3)
or CS 101. Computers: Applications and Implications (4)
BA 215. Fundamentals of Accounting (4)
BA 260. Introduction to Entrepreneurship (4)
BA 390. Marketing (4)
ECON 201. *Introduction to
Microeconomics (4)
ENGR 350. *Sustainable Engineering (3)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)

## Footnotes:

* Course fulfills baccalaureate core requirement
+ Courses cannot be counted twice to fulfill
requirements of the major
$\wedge$ Writing Intensive Course (WIC)


## Pre-Apparel Design major code 453

## Major Code: 400

## INTERIOR DESIGN (BS, CRED,

## HBS)

The Interior Design major is a professional program. Entering students are designated as Pre-Interior Design majors (major code 454).

Design major requirements are divided into two parts. The first part (the pre-design major), usually taken in the first two years, must be completed before formal admission into the major. The second part (Professional School) is usually taken in the last two years after formal admission into the Design major.

## Summary of Requirements: <br> Pre-Design Major (57)

Pre-Design Core Classes (32)
Art, Communications, Economics, Math,
Statistics, and Writing (25)*
Professional School (64-67)
Pro-School Design Core Classes (40)** Design Option Courses (24-27)
University General Education Requirements (24)

Unrestricted Electives (32-35)
*21 credits from pre-design major satisfy University General Education Requirements.
**8 credits from design major satisfy
University General Education Requirements
Total Required for Graduation (180)

## Design Curriculum

The Design major is a professional program offered through the College of Business.

## Pre-Design Program

Newly admitted students to OSU and all current OSU students who seek to complete an undergraduate design degree program offered by the College of Business (COB) are designated as pre-design majors. The pre-design program requires completion of courses within the first and second year (see core curriculum below) that build a solid foundation for the upper-division design curricula.

These courses must be completed before the student is eligible for admission to the professional design program. The pre-design course work may be completed at OSU or any accredited college or university that offers equivalent courses transferable to OSU.

## Professional Design Program

Admission to the professional design program is restricted to those students who have demonstrated an ability to achieve the high standards required for professional studies. Enrollment within each academic option may be limited to the number of students who can be served by the faculty and facilities of that option. Therefore students should strive to meet the minimum eligibility standards of their particular option of choice as well as those of the College of Business itself. Additional information on the proschool process and current competitive GPA levels for each option can be found on the Pro-School Competitive GPA section of the College of Business Advising website.

To apply and be considered for admission, all pre-professional students must meet the following requirements:

- Be declared as a Pre-Design major.
- Have a minimum OSU cumulative GPA of 2.5 , and a minimum cumulative GPA of 2.5 in all PreDesign course work.
- Have completed and received a C- or better in ALL courses within the PreDesign major by the end of spring term before applying.
Students who have completed their pre-design courses at a college or university other than OSU must be admitted to pre-design their first term and apply for the professional program during their first term of attendance.

Admission into the Interior Design option requires completion of DSGN 287, Studio I: Design Communication (4), and submission of a portfolio. The portfolio will expect students to submit work that demonstrates competency in both two-dimensional and three-dimensional design. The following courses are recommended for students who need to further develop those skills:
ART 115. Foundations: 2-D (4)
ART 117. Foundations: 3-D (4)

## Design Program Requirements (180)

## Design Core Curriculum (72)

The design core curriculum provides students with a broad overview of design thinking and processes;

## Option (24-27)

Options are designed to allow students to extend their professional preparation beyond the introductory level in one or more areas. There are four options available to the Design major:

1. Apparel Design
2. Design Management
3. Housing Studies
4. Interior Design

All options need to be started in the third year. See an academic advisor for more information.

## Mathematics and Statistics (8)

MTH 111. *College Algebra (4)
ST 201. Principles of Statistics (4)

## Economics (4)

ECON 201. *Introduction to
Microeconomics (4)

## Art (10)

ART 101. *Introduction to the Visual Arts (4)
ART 206. * Introduction to Art History -
Western (3)
or ART 205. * Introduction to Art History - Western (3)
or ART 204. *Introduction to Art History - Western (3)

ART 367. *History of Design (3)

## Written and Oral Communication

 (6)COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal Communication (3)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## University General Requirements

 (24)The ART, COMM, ECON, MTH, and WR classes above meet the university's baccalaureate core requirements for Mathematics, Social Processes and Institutions, Writing II, Speech, Western Culture, Literature and Arts, and Science, Technology and Society. All students must meet the other baccalaureate core requirements and the other requirements for baccalaureate degrees. (See Earning a Degree at OSU.)

## Unrestricted Electives (32-35)

Students are provided elective credits to enable them to achieve a degree of specialization and depth to match their interests.

## Minor (27)

Students are encouraged to choose a non-business university-approved minor that consists of a minimum of 27 credits, with at least 12 credits at the upper-division level. Students are responsible for determining whether the minor has been approved for transcript visibility and to request the notation on their transcript. Students may also choose to complete a coherent set of non-business courses to support their career goals.

## Pre-Interior Design (Major code 454)

## First Year (45 credits)

Students entering OSU on the Corvallis campus as their first college experience are required to participate in Innovation

Nation, the College of Business LivingLearning Community (LLC). These students will complete the following threecourse sequence during their first year:
BA 160. B-Engaged (3)
BA 161. Innovation Nation-Awareness to Action (3)
BA 162. Innovation Nation-Ideas to Reality (3)
Students who transfer to OSU from another academic institution will complete the following courses:

BA 101. Business Now (6)
BA 170. Business Insights (2)
All other students, including students completing their degree via OSU Extend Campus and current OSU students who are changing their major to design, will complete the following course:

## BA 101. Business Now (6)

All students should also complete:
ART 101. *Introduction to the Visual Arts (4)
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical
Discourse (3)
or COMM 218. *Interpersonal
Communication (3)
MTH 111. *College Algebra (4)
WR 121. *English Composition (3)
General Baccalaureate Core courses (17)
Elective credits (5-8)
Note: Students entering design programs should have basic art and illustration skills. ART 115, Foundations: 2-D
(4), and ART 117, Foundations: 3-D
(4), are highly recommended elective courses.

## Second Year (45 credits)

ART 206. * Introduction to Art History Western (3)
or ART 205. * Introduction to Art History - Western (3)
or ART 204. *Introduction to Art History - Western (3)

BA 215. Fundamentals of Accounting (4)
BA 253. Professional Development (4)
DHE 221. Computer Aided Apparel Design I (3)
DHE 281. Drawing and Sketching (4)
DSGN 244. Color Innovation (4)
DSGN 255. Textiles (4)
ECON 201. *Introduction to
Microeconomics (4)
ST 201. Principles of Statistics (4)
WR 222. *English Composition (3) or WR 323. *English Composition (3) or WR 327. *Technical Writing (3)
Baccalaureate core, minor courses, or unrestricted electives (8)
Students interested in Interior Design should complete the following course during the second year:
DHE 287. Studio I: Design Communication (4)

## Professional Interior Design (Major code 458)

Third Year (45 credits)
ART 367. *History of Design (4)
or *ENGR 350. Sustainable Engineering
(3) (Required for Housing Studies option.)

BA 260. Introduction to Entrepreneurship
(4)

BA 352. Managing Individual and Team Performance (4)
BA 354. ^Managing Ethics and Corporate Social Responsibility (4)
BA 390. Marketing (4)
DSGN 341. Design Thinking and Process Innovation (4)
MGMT 364. Project Management (4)
Interior Design option-specific course work (12-15) (See option descriptions on next page.)
Baccalaureate core, minor courses, or unrestricted electives (2-5)

## Fourth Year (45 credits)

DSGN 475. *Global Sourcing of Textiles, Apparel and Footwear (4)
MRKT 492. Consumer Behavior (4)
MRKT 495. Retail Management (4)
Interior Design option-specific course work
(12) (See option descriptions on next page.)

Baccalaureate core, minor courses, or
unrestricted electives (21)

## Total=180

## SAMPLE FOUR-YEAR PLAN:

 INTERIOR DESIGN
## First Year (44)

Fall
ART 101. *Introduction to the Visual Arts (4) BA 160. B-Engaged (3)
MTH 111. *College Algebra (4)
WR 121. *English Composition (3)
Bacc Core Science (4)

## Winter

BA 161. Innovation Nation-Awareness to Action (3)
Bacc Core Fitness (2)
Bacc Core Speech (3)
Bacc Core Science (4)

## Spring

BA 162. Innovation Nation-Ideas to Reality (3)

Bacc Core Cultural Diversity (3)
Bacc Core Difference, Power, and
Discrimination (3)
Bacc Core Science (4)

## Second Year (45)

Fall
ART 206. *Introduction to Art History-
Western (3)
BA 215. Fundamentals of Accounting (4)
DSGN 255. Textiles (4)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## Winter

BA 253. Professional Development (4)
DSGN 221. Computer Aided Design I (3)
DSGN 226. Specification Buying (4)
or DSGN 287. Studio I: Design
Communication (4)
DSGN 281. Drawing and Sketching Interiors (4)

## Spring

DSGN 244. Color Innovation (4)
ECON 201. *Introduction to

Microeconomics (4)
ST 201. Principles of Statistics (4)
Bacc Core (4)
Third Year (47)
Fall
BA 260. Introduction to Entrepreneurship (4)
BA 352. Managing Individual and Team Performance (4)
DSGN 341. Design Thinking and Process Innovation (4)
DSGN 387. Studio III: Advanced Design Communication (4)

## Winter

BA 390. Marketing (4)
DSGN 388. Studio IV: Hospitality Design (4)
DSGN 475. Global Sourcing of Textiles,
Apparel, and Footwear (4)
or Bacc Core Contemporary Global Issues (3)

MGMT 364. Project Management (4)

## Spring

ART 367. History of Design (3)
BA 354. ${ }^{\wedge}$ Managing Ethics and Corporate Social Responsibility (4)
DSGN 383. Building Construction and Materials (3)
DSGN 394. Studio V: Lighting Design (4)

## Fourth Year (44)

Fall
DSGN 464. Contemporary History of Interiors and Housing (4)
DSGN 488. Studio VI: Healthcare Design (4) Electives (7)

## Winter

MRKT 492. Consumer Behavior (4)
MRKT 495. Retail Management (4)
Electives (7)

## Spring

DSGN 495. Studio VII: Senior Thesis II (4) Electives (10)

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Pre-Interior Design major code 454

## Major Code: 458

## MERCHANDISING MANAGEMENT

## (BS, CRED, HBS)

Students in the Merchandising Management program prepare for positions in management, merchandising, inventory control, sales promotion, public relations, or human resources. This field offers a wide variety of career opportunities with retailers, manufacturers, marketing research firms and product information services. In a global, diverse, and fast-paced, competitive environment, merchandisers are involved in market analysis, product planning, sourcing, procurement, pricing, distribution and visual presentation of apparel and textile products to satisfy consumer needs.

The Merchandising Management major is a professional program (major code 416). Entering students are designated as Pre-Merchandising Management majors (major code 277).

Merchandising Management major requirements are divided into two parts. The first part (the pre-Merchandising Management major), usually taken in the first two years, must be completed before formal admission into the major. The second part (Professional School) is usually taken in the last two years after formal admission into the Design major.

## Summary of Requirements:

Pre-Merchandising Management Major (57)
Pre-Merchandising Management Core
Classes (32)
Art, Communications, Economics, Math,
Statistics, and Writing (25)*
Professional School (67)
Pro-School Core Classes (40)**
Merchandising Management Courses (27)
University General Education Requirements (24)

Unrestricted Electives (32)
*21 credits from pre-merchandising management major satisfy University General Education Requirements.
**8 credits from merchandising major satisfy University General Education Requirements

## Total Required for Graduation <br> (180)

## Merchandising Management

## Curriculum

The Merchandising Management major is a professional program offered through the College of Business.

## Pre-Merchandising Management Program

Newly admitted students to OSU and all current OSU students who seek to complete an undergraduate Merchandising Management degree program offered by the College of Business (COB) are designated as pre-Merchandising Management majors. The pre-Merchandising Management program requires completion of courses within the first and second year (see core curriculum below) that build a solid foundation for the upper-division design curricula. These courses must be completed before the student is eligible for admission to the professional design program. The pre-Merchandising Management course work may be completed at OSU or any accredited college or university that offers equivalent courses transferable to OSU.

## Professional Merchandising

## Management Program

Admission to the professional merchandising management program is restricted to those students who have demonstrated an ability to achieve the high standards required for professional studies. Enrollment within each academic option may be limited to the number of students who can be served by the faculty and facilities of that option. Therefore students should strive to meet the minimum eligibility standards of their particular option of choice as well as those of the College of Business itself. Additional
information on the pro-school process and current competitive GPA levels for each option can be found on the ProSchool Competitive GPA section of the College of Business Advising website.
To apply and be considered for admission, all pre-professional students must meet the following requirements:

- Be declared as a Pre-Merchandising Management major.
- Have a minimum OSU cumulative GPA of 2.5, and a minimum cumulative GPA of 2.5 in all PreDesign course work.
- Have completed and received a C- or better in ALL courses within the PreMerchandising Management major by the end of spring term before applying.
Students who have completed their pre-Merchandising Management courses at a college or university other than OSU must be admitted to pre-Merchandising Management their first term and apply for the professional program during their first term of attendance.


## Merchandising Management

Program Requirements (180)

## Merchandising Management Core

 Curriculum (72)The Merchandising Management core curriculum provides students with a broad overview of design thinking and processes.

## Mathematics and Statistics (8)

MTH 111. *College Algebra (4)
ST 201. Principles of Statistics (4)

## Economics (4)

ECON 201. *Introduction to
Microeconomics (4)

## Art (10)

ART 101. *Introduction to the Visual Arts (4)

ART 206. * Introduction to Art History Western (3)
or ART 204. *Introduction to Art History - Western (3)
or ART 205. * Introduction to Art History - Western (3)

ART 367. *History of Design (3)

## Written and Oral Communication

(6)

COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical
Discourse (3)
or COMM 218. *Interpersonal
Communication (3)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## University General Requirements <br> \section*{(24)}

The ART, COMM, ECON, MTH, and WR classes above meet the university's baccalaureate core requirements for Mathematics, Social Processes and Institutions, Writing II, Speech, Western Culture, Literature and Arts, and Science,

Technology and Society. All students must meet the other baccalaureate core requirements and the other requirements for baccalaureate degrees. (See Earning a Degree at OSU.)

## Unrestricted Electives (32-35)

Students are provided elective credits to enable them to achieve a degree of specialization and depth to match their interests.

## Minor (27)

Students are encouraged to choose a non-business university-approved minor that consists of a minimum of 27 credits, with at least 12 credits at the upper-division level. Students are responsible for determining whether the minor has been approved for transcript visibility and to request the notation on their transcript. Students may also choose to complete a coherent set of non-business courses to support their career goals.

## Pre- Merchandising Management

 Design (Major code 277)
## First Year (45 credits)

Students entering OSU on the Corvallis campus as their first college experience are required to participate in Innovation Nation, the College of Business LivingLearning Community (LLC). These students will complete the following threecourse sequence during their first year:
BA 160. B-Engaged (3)
BA 161. Innovation Nation-Awareness to Action (3)
BA 162. Innovation Nation-Ideas to Reality (3)

Students who transfer to OSU from another academic institution will complete the following courses:
BA 101. Business Now (6)
BA 170. Business Insights (2)
All other students, including students completing their degree via OSU Extended Campus and current OSU students who are changing their major to design, will complete the following course:
BA 101. Business Now (6)
All students should also complete:
ART 101. *Introduction to the Visual Arts (4)
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal
Communication (3)
MTH 111. *College Algebra (4)
WR 121. *English Composition (3)
General Baccalaureate Core courses (17)
Elective credits (5-8).
Note: Students entering design programs should have basic art and illustration skills. ART 115, Foundations: 2-D (4), and ART 117, Foundations: 3-D (4), are highly recommended elective courses.

## Second Year ( 45 credits)

ART 206. * Introduction to Art History Western (3)
or ART 204. *Introduction to Art History - Western (3)
or ART 205. * Introduction to Art History

- Western (3)

BA 215. Fundamentals of Accounting (4)
BA 253. Professional Development (4)
DHE 221. Computer Aided Apparel Design I (3)
DHE 255. Textiles (4)
DSGN 244. Color Innovation (4)
DSGN 281. Drawing and Sketching (4)
ECON 201. *Introduction to
Microeconomics (4)
ST 201. Principles of Statistics (4)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)
Baccalaureate core, minor courses, or unrestricted electives (8)
Professional Merchandising
Management Design (Major code

## 416)

## Third Year (45 credits)

ART 367. *History of Design (4)
or *ENGR 350. Sustainable Engineering
(3) (required for Housing Studies option)

BA 260. Introduction to Entrepreneurship (4)

BA 352. Managing Individual and Team Performance (4)
BA 354. ${ }^{\wedge}$ Managing Ethics and Corporate Social Responsibility (4)
BA 390. Marketing (4)
DSGN 341. Design Thinking and Process
Innovation (4)
DHE 330. Fashion Forecasting and Market Analysis (4)
DHE 333. History of Contemporary Fashion (4)

DSGN 335. Apparel and Footwear Value Chain (3)
DSGN 377. Retailing and Merchandising (4)
MGMT 364. Project Management (4)
Baccalaureate core, minor courses, or unrestricted electives (2-3)

## Fourth Year ( 45 credits)

DHE 475. *Global Sourcing of Textiles,
Apparel and Footwear (4)
DSGN 471. Retail Presentation Strategy (4)
DHE 472. Merchandise Planning and
Control (4)
DSGN 473. Retail Strategies Practicum (4)
MRKT 492. Consumer Behavior (4)
MRKT 495. Retail Management (4)
Baccalaureate core, minor courses, or unrestricted electives (21)

## Total=180

Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
FOUR-YEAR SAMPLE PLAN: MERCHANDISING MANAGEMENT


## First Year (44)

Fall
ART 101. *Introduction to the Visual Arts (4)
BA 160. B-Engaged (3)
MTH 111. *College Algebra (4)
WR 121. *English Composition (3)
Bacc Core Science (4)

## Winter

BA 161. Innovation Nation-Awareness to Action (3)
Bacc Core Fitness (2)
Bacc Core Speech (3)
Bacc Core Science (4)

## Spring

BA 162. Innovation Nation-Ideas to Reality (3)

Bacc Core Cultural Diversity (3)
Bacc Core Difference, Power, and
Discrimination (3)
Bacc Core Science (4)

## Second Year (45)

Fall
ART 206. *Introduction to Art HistoryWestern (3)
BA 215. Fundamentals of Accounting (4)
DSGN 255. Textiles (4)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## Winter

BA 253. Professional Development (4)
DSGN 221. Computer Aided Design 1 (3)
DSGN 226. Specification Buying (4)
or DSGN 287. Studio I: Design
Communication (4)
DSGN 281. Drawing and Sketching (4)

## Spring

DSGN 244. Color Innovation (4)
ECON 201. *Introduction to
Microeconomics (4)
ST 201. Principles of Statistics (4)
Bacc Core (4)

## Third Year (48)

## Fall

BA 260. Introduction to Entrepreneurship (4)
BA 352. Managing Individual and Team Performance (4)
DSGN 330. Fashion Forecasting ad Market Analysis (4)
DSGN 341. Design Thinking and Process Innovation (4)

## Winter

BA 390. Marketing (4)
DSGN 333. (4) [Pending proposal submission and approval]
DSGN 377. Retail and Merchandising (4)
DSGN 475. Global Sourcing of Textiles,
Apparel, and Footwear (4)

## Spring

ART 367. History of Design (3)
BA 354. ^Managing Ethics and Corporate Social Responsibility (4)
DSGN 335. Apparel and Footware Value Chain (3)
MGMT 364. Project Management (4)

## Fourth Year (43)

Fall
DSGN 471. Retail Presentation Strategies (4)
DSGN 472. Merchandise Planning and
Control (4)
Electives (7)

## Winter

MRKT 492. Consumer Behavior (4)
MRKT 495. Retail Management (4)
Electives (6)

## Spring

DSGN 473. Retail Strategies Practicum (4) Electives (10)

## Pre-Merchandising Management major code 277 <br> Major Code: 416

## MERCHANDISING MANAGEMENT MINOR

## This program suspended per

proposal 94292, July 13, 2015.
The Merchandising Management minor emphasizes the merchandising of textile products such as apparel, outdoor gear, and home furnishings.

BA 215 or equivalent, BA 390, and ECON 201, ECON 202 are prerequisites for upper-division courses in the minor.

## Core courses (28)

All courses must be taken on a graded (A-F) basis.
DHE 255. Textiles (4)
DHE 270. *Appearance, Power and Society (DPD) (4)
DHE 271. Introduction to Retail Buying (3)
DHE 277. Fashion Trend Analysis (3)
DHE 326. Sewn Product Development (5)
DHE 370. ${ }^{\wedge}$ Textile and Apparel Market Analysis (4)
DHE 470. Retail Merchandising (4)
Select a minimum of 8 credits from the following:
DHE 366. Cross Cultural Aspects of the Near Environment (4)
DHE 461. History of the Near Environment (4)

DHE 462. *History of the Near Environment II (STS) (4)
DHE 463. History of Contemporary Fashion (4)

DHE 472. Merchandise Planning and Control (4)
DHE 473. Assortment Analysis and Management (4)
DHE 475. *Global Sourcing of Textiles, Apparel, and Footwear (4)

## Total=36

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Minor Code: 416

## DESIGN AND HUMAN ENVIRONMENT (MA, MS, PhD, MAIS)

## Graduate Areas of Concentration

Apparel design, cultural and historic aspects of the near environment, human behavior in the near environment, interior design, merchandising management, and textiles

Admission to the Design and Human Environment graduate major has been suspended, November 2015.
The School of Design and Human Environment offers graduate work leading toward Master of Science, Master of Arts, and Doctor of Philosophy degrees in Design and Human Environment.

Areas of concentration for MS and MA
degrees include apparel design, cultural and historic aspects of the near environment, human behavior the near environment, interior design, merchandising management, and textiles.

Areas of concentration for the PhD degree include cultural and historic aspects of the near environment, human behavior in the near environment, merchandising management, and textiles.

Graduate programs in DHE prepare students for college and university teaching, research and creative scholarship; careers in design, product development, product quality assurance or merchandising; historic/cultural research, collection management, and preservation of textile and architectural artifacts; and public policy.

Research is a central component of the DHE graduate program. Students have an opportunity to work on research and creative scholarships with internationally recognized faculty members who have published in the areas of historic costume, human behavior and the near environment, apparel design, interior design, fashion theory, consumer behavior, and housing.

For further information, visit http://gradschool.oregonstate.edu/ programs/4410/design-and-human-environment-phd-ma-ms-minor, email MBAInfo@bus.oregonstate.edu or call 541-737-5510.

## Major Code: 4410

## DESIGN AND HUMAN ENVIRONMENT GRADUATE MINOR

For more details, see the school advisor.

## Minor Code: 4410

## ■ DESIGN AND HUMAN ENVIRONMENT COURSES

DHE 121. COMPUTER DESIGN FOR APPAREL
(3). Instruction in drawing, editing, and layout techniques using Adobe Illustrator and Photoshop. Studio.

DHE 160. DESIGN PERSPECTIVES (4).
Overview of how design reflects and shapes social, cultural, and temporal values and contexts across many different areas of design specialization. Areas to be explored include design processes, principles, and problem solving.
DHE 161. DESIGN EXPLORATIONS (4). Introduction to principles and theories of design through iterative development and making of project work. Topics include basic design terminology, design principles, and materiality. Lec/studio. PREREQS: DHE 160 [C-]
DHE 170. INTRODUCTION TO THE TEXTILE AND APPAREL INDUSTRY (4). Overview of industry sectors involved in the planning, creation, production, merchandising, distribution, and consumption of textile, apparel, and related products. Overview of various career options within the industry.
DHE 180. INTRODUCTION TO SINGLE FAMILY HOUSING (3). Critical examination of single family housing. Considers space planning fundamentals. Introduces construction principles and methods. Develops a working knowledge of methods used to communicate architectural ideas.

DHE 181. INTRODUCTION TO INTERIOR
DESIGN (3). Introduction to the interior design profession including space planning fundamentals, design process, color, sustainability, and humancentered design.
DHE 182. COMPUTER ASSISTED DESIGN AND DRAFTING (3). Instruction in computer assisted design and drafting techniques. PREREQS: Enrollment restricted to pre-interiors, pre-housing, and merchandising management majors.

## DHE 187. INTRODUCTION TO DESIGN

 COMMUNICATION (0-3). Fundamentals of design communication including drafting, lettering, illustrative sketching, perspective, and orthographic projections. Lec/studio. PREREQS: DHE 180 [C-] and enrollment restricted to pre-interiors, pre-housing, and merchandising management majors.DHE 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
DHE 221. COMPUTER AIDED APPAREL
DESIGN I (3). Introduction to the Adobe Creative Suite: Illustrator, Photoshop and InDesign. Instruction in drawing, image editing and design layout. PREREQS: DHE 170 [C-] and restricted to professional school students majoring in Merchandising Management (major code 416) and Apparel Design (major code 400).
DHE 227. APPAREL DESIGN AND
PRODUCTION 1 (4). Terminology, construction techniques and processes used to produce apparel. Development of production patterns and specifications with analysis of apparel construction related to equipment, cost, quality, end use and customer needs. PREREQS: Restricted to Apparel Design (major code 400) majors.

DHE 233. HISTORY OF CONTEMPORARY FASHION (4). Examination of fashion change in apparel from 1890 to the present. Recognition of style variations. Influence of socio-cultural factors. PREREQS: DHE 170 [C-] and restricted to professional school students majoring in Merchandising Management and Apparel Design.
DHE 240. SURVEY OF DESIGN IN THE NEAR ENVIRONMENT (3). Introduction to theories of aesthetics and elements and principles of design as related to the fields of apparel, interiors, housing, and merchandising.
DHE 242. INTRODUCTION TO SOFTGOODS MERCHANDSNG (4). Overview of merchandising functions within the apparel industry, as well as how these functions interact with industry sectors involved in the planning, creation, production, distribution, and sale of apparel and related products. Wholesale and retail assortment planning. Basic merchandising mathematics. Exce skill development. PREREQS: Restricted to PreBusiness majors.
DHE 245. APPLICATIONS OF DESIGN THEORY
(5). Examines theories of design and aesthetics, application of the elements and principles of design related to apparel, housing, and interior design. Lec/studio. PREREQS: Enrollment restricted to pre-interiors, pre-housing and preapparel majors.
DHE 255. TEXTILES (4). Properties, identification, selection, use and care of textile fibers and fabrics. Analysis of fiber, yarn, and fabric constructions in textiles.

DHE 262. HUMAN-CENTERED RESEARCH IN DESIGN AND MERCHANDISING (4). Application of a qualitative, multi-method approach to gain insight into how the consumer experience can be improved within a given context. PREREQS: DHE 161 [C-] and restricted to professional school students majoring in Apparel Design, Merchandising Management, Graphic Design, and Interior Design.
DHE 263. HUMAN-CENTERED DESIGN
THEORIES AND STRATEGIES (4). Overview of
perception, semantics, and information design theories and strategies within a human-centered
context.
DHE 270. *APPEARANCE, POWER AND
SOCIETY (4). Survey of the cultural, sociological, psychological, economic, and aesthetic influences on appearance and power. (Bacc Core Course)

## DHE 271. INTRODUCTION TO RETAIL BUYING

(3). Introduction to soft goods retailing with a
focus on the role of the retail buyer. Fundamental retailing and merchandising concepts, sustainable and socially responsible decision-making related to retail buying, basic merchandising mathematics and Excel skill development. Lec/lab.

## DHE 276. INTRODUCTION TO

MERCHANDISING MANAGEMENT (4). Overview of merchandising functions within the textile and apparel industry. Fundamental merchandising concepts. Merchandising mathematics related to pricing and re-pricing, the profit and loss statement, and performance evaluation. Excel skill development. Lec/lab. PREREQS: DHE 170 [C-] and restricted to Merchandising Management majors (major code 416).

DHE 277. FASHION TREND ANALYSIS (3). The fashion trend forecasting process within the soft goods industry; use of information sources and trend analysis in developing and promoting a fashion product. PREREQS: Enrollment restricted to merchandising management, pre-apparel and apparel design majors.

## DHE 281. DRAWING AND SKETCHING

INTERIORS (4). Build technical drawing skills, observational and perspective drawing, as well as imagination and creativity. Working knowledge of visual methods for communicating design concepts and describing interior spaces. PREREQS: DHE 280 [D-] and acceptance into the Interior Design Professional Program

## DHE 283. BUILDING CONSTRUCTION AND

 MATERIALS (3). Introduction to the manufacture, characteristics and use of construction materials used in contract and residential construction, including environmentally friendly materials. PREREQS: Enrollment restricted to students who have been admitted into the DHE interior design professional program.DHE 287. STUDIO I: DESIGN COMMUNICATION (4). Design communication through electronic media: 2D and 3D visualizations and presentations of interior space. Lec/studio. PREREQS: DHE 187 [C-] and enrollment restricted to housing studies and interior design majors.

## DHE 288. ENVIRONMENTAL BUILDING

SYSTEMS (3). Lighting, heating, ventilating, air conditioning, and acoustical systems in residential and commercial buildings. Includes sustainable building principles. PREREQS: (DHE 283 [C-] and DHE 287 [C-] ) and enrollment restricted to housing studies and interior design majors.
DHE 289. STUDIO II: RESIDENTIAL SPACE PLANNING (4). Utilization of space planning principles in the design of residences. Includes rendering, perspective drawing, graphic communication techniques, and model building. PREREQS: DHE 287 [C-] and enrollment restricted to housing studies and interior design majors.
DHE 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## DHE 300. FIELD EXPERIENCE ORIENTATION

AND DEVELOPMENT (1-2). Exploration of career choices, goals, and field experience opportunities; preparation in planning, obtaining, and completing an internship. Graded P/N. Section 1: Apparel Design. Section 2: Interior Design and Housing Studies. Section 3: Merchandising Management. Section 4: Graphic Design. This course is repeatable for a maximum of 3 credits.

DHE 310. FIELD EXPERIENCE (1-12). Integration and application of academic preparation in an on-the-job work situation with supervision by personnel at the participating site and university faculty. Application must be made
prior to participation. Section 1: Merchandising Management (1-12) Section 2: Interior Design (1-12) Section 3: Apparel Design (1-12) Section 4: Graphic Design (1-12) Graded P/N. This course is repeatable for a maximum of 16 credits PREREQS: DHE 300 [D-] and acceptance into a professional program and departmental approval. All sections: DHE 300

DHE 321. ILLUSTRATION, PORTFOLIO, AND DESIGN DEVELOPMENT (3). Techniques in technical drawing, fashion illustration, and portfolio development; use of computer-aided design applications in the design of apparel. PREREQS: (DHE 245 [C-] and DHE 277 [C-] ) and enrollment restricted to Apparel Design (major code 400) majors.
DHE 326. SEWN PRODUCT DEVELOPMENT
(5). Materials, assembly process, quality factors, and costs in the development of sewn textile products; consideration of consumer produc expectations and intended end-use. Lec/lab. PREREQS: (DHE 250* [C-] or DHE 255* [C-] ) and enrollment restricted to merchandising management, pre-apparel, and apparel design majors.

DHE 327. APPAREL DESIGN AND
PRODUCTION 2 (4). Terminology, construction techniques and processes used to produce apparel. Development of production patterns and specifications. Development of original apparel designs. PREREQS: DHE 227 [C-] and enrollment restricted to Apparel Design (major code 400) majors.

## HE 328. COMPUTER-AIDED PATTERN

DEVELOPMENT (3). Computer-aided flat pattern, grading and marker techniques using pattern development software. PREREQS: DHE 327 or previous flat pattern experience.
DHE 330. ^FASHION FORECASTING AND
MARKET ANALYSIS (4). Forecasting and market analysis processes applied to fashion goods (Writing Intensive Course) PREREQS: DHE 233 [C-] and WR 121 [C-] and WR 222 [C-] and restricted to professional school students majoring in Merchandising Management (major code 416) and Apparel Design (major code 400).

DHE 331. CONTEMPORARY ISSUES IN
HOUSING (3). Introduction to housing as a product, environment, service and process. Emphasizes housing issues that have impact upon the well-being of individuals, families and communities.

DHE 334. FASHION HISTORY AND SOCIETY (4). The influence of society, culture, geography, fashion, and technology on the design and consumption of dress, Late Middle Ages to 1899. PREREQS: DHE 330 [C-] and restricted to professional school students majoring in Merchandising Management (major code 416) and Apparel Design (major code 400).
DHE 352. TEXTILES FOR INTERIORS (4). Types, qualities, and maintenance of functional and decorative fabrics for homes and public buildings. Use of specifications, standards, and legislation. PREREQS: DHE 255 [C-] and enrollment restricted to Merchandising Management and Interior Design majors.

## DHE 355. TEXTILE PERFORMANCE AND

EVALUATION (4). Analysis and evaluation of textile materials and final products in relation to end use. Performance properties and serviceability testing, product specifications and industrial standards. Lec/lab. PREREQS: DHE 255 [C-] and restricted to professional school students majoring in Merchandising Management (major code 416) and Apparel Design (major code 400).
DHE 360. COLLABORATIVE STUDIO (4).
Examines a variety of collaborative methodologies and situations. Students will work across disciplines to solve complex collaborative projects. The projects will be both client based and hypothetical. Lec/studio. PREREQS: DHE 262 [C-] and DHE 263 [C-]

DHE 366. CROSS CULTURAL ASPECTS OF THE NEAR ENVIRONMENT (4). Sociocultural study of the function and design of clothing, housing, interiors, and textiles. Cultural diversity; impact of cross-cultural contact; ethnicity.
DHE 370. ^TEXTILE AND APPAREL MARKET
ANALYSIS (4). Organization, operation, and merchandising activities of the domestic textile and apparel industries. Analysis of the marketing process and the product/service mix of textile and apparel manufacturers. (Writing Intensive Course) PREREQS: DHE 277* [C-] and BA 390 is recommended. Enrollment restricted to Merchandising Management, pre-apparel, and Apparel Design majors.

## DHE 376. RETAIL MERCHANDISE PLANNING

 AND PRESENTATION (4). Organization, operation, and competitive strategies of soft goods retailers. Planning, procurement, and promotion of merchandise assortments and inventory management. PREREQS: DHE 276 [C-] and BA 215 [C-] and restricted to professional school students majoring in Merchandising Management (major code 416).
## DHE 387. STUDIO III: ADVANCED DESIGN

COMMUNICATION (4). Development of illustrative sketching, perspective drawing, concept model construction, and presentation materials. PREREQS: DHE 289 [C-] and enrollment restricted to Housing Studies and Interior Design majors.
DHE 388. STUDIO IV: HOSPITALITY DESIGN
(4). Study and design of hospitality spaces in compliance with building codes and industry standards, with emphasis on sustainability, safety, and cultural context. PREREQS: DHE 352 [C-] and DHE 387 [C-]
DHE 389. STUDIO IV: KITCHEN AND BATH DESIGN (4). Kitchen and bath planning in compliance with building codes and industry standards, with emphasis on resource conservation, safety, and special needs. This course utilizes both CAD and hand drafting PREREQS: DHE 387 [C-] and enrollment restricted to Housing Studies and Interior Design majors.

DHE 394. STUDIO V: LIGHTING DESIGN (4). Lighting design and documentation for residential and small commercial projects. The commercial projects include space planning and lighting design for workspace and retail environments. PREREQS: DHE 388 [C-]

DHE 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## DHE 400. FIELD EXPERIENCE ORIENTATION

 AND DEVELOPMENT (1). Exploration of career choices, goals, and field experience opportunities; preparation in planning, obtaining, and completing an internship. Graded P/N. Section 1: Apparel Design. Section 2: Interior Design and Housing Studies. Section 3: Merchandising Management. This course is repeatable for a maximum of 3 credits.DHE 401. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

DHE 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Departmental approval required.

DHE 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
DHE 405. READING AND CONFERENCE (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
DHE 406. PROJECTS (1-16). This course
is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

DHE 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

DHE 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

DHE 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
DHE 410. FIELD EXPERIENCE (6-12). Integration and application of academic preparation in an on-the-job work situation with supervision by personnel at the participating site and university faculty. Application must be made prior to participation. Section 1: Merchandising Management (12). Section 2: Interior Design (12). Section 3: Apparel Design (12). This course is repeatable for a maximum of 16 credits. PREREQS: DHE 400 [C-] and junior standing and departmental approval. Sect. 1: BA 215 and DHE 370. Sect. 2: DHE 289. Sect. 3: DHE 321.

## DHE 415. *RENEWABLE MATERIALS IN

 THE MODERN AGE (3). Micro-renewable materials anatomy course taught within an interdisciplinary, hands-on format. Suitable for all majors and backgrounds. Course covers the micro- and macro-anatomy of wood and other common renewable materials like bamboo and cellulose fibers. Utilizes studio-based learning. CROSSLISTED as WSE 415. (Bacc Core Course)DHE 415H. *RENEWABLE MATERIALS IN
THE MODERN AGE (3). Micro-renewable materials anatomy course taught within an interdisciplinary, hands-on format. Suitable for all majors and backgrounds. Course covers the micro- and macro-anatomy of wood and other common renewable materials like bamboo and cellulose fibers. Utilizes studio-based learning CROSSLISTED as WSE 415H. (Bacc Core Course) PREREQS: Honors College approval required.
DHE 422. DHE FASHION SHOW AND DESIGN EXHIBITION (1-16). Special topics in design and human environment. This course is repeatable for a maximum of 16 credits.

DHE 427. DRAPING (4). Garment design based on manipulation of fabric on a body form; emphasis on the interrelationships between fabric, garment design, and the human form. PREREQS: (DHE 321 [C-] and DHE 327 [C-] ) and enrollment restricted to Apparel Design majors (major code 400).

## DHE 428. APPAREL PRODUCTION

PROCESSES (4). Production pattern-making, pattern grading, marker making, garment specifications, and cost analysis. Apparel assembly processes; analysis of equipment capabilities and production processes. PREREQS: DHE 327 [C-] and enrollment restricted to apparel design majors.
DHE 429. ADVANCED APPAREL DESIGN (4).
Design processes and research methods used to develop apparel designs. Students will identify design problems and implement appropriate methods to develop apparel products. PREREQS: (DHE $321^{*}$ [C-] and DHE $327^{*}$ [C-] and DHE $427^{*}$ [C-] and DHE 428* [C-] ) and enrollment restricted to Apparel Design majors (major code 400).
DHE 432. STUDIO V: ADVANCED HOUSING
STUDIO (4). Problem-solving and design processes to meet or satisfy actual client needs; projects may range from remodeling to new construction design. Professional portfolio preparation. PREREQS: DHE 389 [C-] and enrollment restricted to Interior Design majors (major code 458).

DHE 435. HOUSING POLICY (3). Analysis of local, state, and federal housing and community development policies and programs that address the housing issues and needs of individuals, families, and communities.
DHE 436. REAL ESTATE FINANCE AND
MANAGEMENT (5). Examines principles and practices used in the purchase, sale
and management of real estate. Considers perspectives of consumers, investors, managers, and lenders.

## DHE 437. CONSUMER BEHAVIOR AND

CULTURE (4). Global and cultural consumer behavior, globalization and cross-cultural marketing related to soft goods merchandising and retailing. PREREQS: DHE 334 [C-] and restricted to professional school students majoring in Merchandising Management (major code 416) and Apparel Design (major code 400).
DHE 443. STUDIO VI: COMMERCIAL DESIGN
(4). Commercial design, space planning and specifications for facilities such as retail, hospitality, healthcare, public institutions and offices. PREREQS: DHE 389 [C-] and enrollment restricted to interior design majors.
DHE 445. STUDIO VII: ADVANCED
COMMERCIAL DESIGN (4). Interior design project development with emphasis on design of hospitality environments. Application of knowledge of space planning, building codes, and specifications to projects. Studio work includes concept sketches, schematic drawings, contract documents, sample boards, and models PREREQS: DHE 443 [C-] and enrollment restricted to Interior Design majors (major code 458).

DHE 453. PRODUCT QUALITY ASSURANCE
(4). Analysis and evaluation of textile materials and final products in relation to end use. Performance properties and serviceability testing, product specifications and industrial standards. Lec/lab. PREREQS: DHE 255 [C-] and DHE 326
DHE 461. HISTORY OF THE NEAR
ENVIRONMENT I (4). History of clothing, furniture, interiors, textiles, and housing and building styles; primarily Euro-American, from the ancient world to the Renaissance. The influence of social and cultural factors upon design of the near environment. Need not be taken in sequence.

## DHE 462. *HISTORY OF THE NEAR

ENVIRONMENT II (4). History of clothing, furniture, interiors, textiles, and housing and building styles; primarily Euro-American, from the Renaissance to 1899. The influence of social and cultural factors upon design of the near environment. Need not be taken in sequence. (Bacc Core Course)
DHE 463. HISTORY OF CONTEMPORARY FASHION (4). Historic analysis of fashion change in men's and women's apparel from 1890 to the present. The influence of social and cultural factors upon Euro-American fashion. PREREQS: DHE 461 or DHE 462 is recommended.
DHE 464. CONTEMPORARY HISTORY OF INTERIORS AND HOUSING (3). History of housing and interior design from the mid-19th century until the present. PREREQS: (DHE 461 [C-] or DHE 462 [C-] )

## DHE 470. RETAIL MERCHANDISING (4).

Organization, operation, and competitive strategies of soft goods retailers. Planning, procurement, pricing, and promotion of merchandise assortments and inventory management. PREREQS: DHE 370 [C-]
DHE 472. MERCHANDISE PLANNING
AND CONTROL (4). Quantitative analysis of inventory planning, pricing, and control for the profitable management of soft goods; analysis of management problems using quantitative data and merchandising principles. Lec/rec. PREREQS: DHE 271 [C-] and DHE 470 [C-] and (BA 215 [C-] or BA 215H [C-] ) and enrollment restricted to Apparel Design (major code 400) and Merchandising Management (major code 416) majors.
DHE 475. *GLOBAL SOURCING OF TEXTILES, APPAREL, AND FOOTWEAR (4). Trade theory and the effects of trade policy, cultural values, and economics on the global production, distribution, and consumption of textiles, apparel, and

## footwear. (Bacc Core Course)

DHE 476. LINE PLANNING AND PRODUCT
DEVELOPMENT (4). Overview of the
merchandising function within branded apparel companies and private label retailers. PREREQS: DHE 376 [C-] and restricted to professional school students majoring in Merchandising Management (major code 416).
DHE 481. ^PROFESSIONAL PRACTICE IN HOUSING AND INTERIOR DESIGN (3). Ethical, business, and legal aspects of the design profession. Development of written documents, schedules, specifications, and other materials typical of the profession. (Writing Intensive Course) PREREQS: DHE 389 [C-] and enrollment restricted to Interior Design (major code 458) majors.
DHE 488. STUDIO VI: HEALTHCARE DESIGN
(4). Interior design project development with emphasis on healthcare design, contract documents, and building codes. PREREQS: DHE 394 [C-]

DHE 490. STUDY TOUR (1-6). Planned study tour with specific professional focus. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval and advanced registration and deposit. Course prerequisites as appropriate to topic.
DHE 495. STUDIO VII: SENIOR THESIS II
(4). Individual design project development of programming document and construction drawings. PREREQS: DHE 494* [C-]
DHE 499. SPECIAL TOPICS IN DESIGN AND HUMAN ENVIRONMENT (1-16). This course is repeatable for a maximum of 16 credits.
DHE 501. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

DHE 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
DHE 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
DHE 505. READING AND CONFERENCE (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
DHE 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
DHE 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

DHE 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

DHE 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

DHE 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
DHE 515. RENEWABLE MATERIALS IN THE MODERN AGE (3). Micro-renewable materials anatomy course taught within an interdisciplinary, hands-on format. Suitable for all majors and backgrounds. Course covers the micro- and macro-anatomy of wood and other common renewable materials like bamboo and cellulose fibers. Utilizes studio-based learning. CROSSLISTED as WSE 515.

DHE 527. DRAPING (4). Garment design based on manipulation of fabric on a body form; emphasis on the interrelationships between fabric, garment design, and the human form. PREREQS: DHE 321 and DHE 327
DHE 528. APPAREL PRODUCTION
PROCESSES (4). Production pattern-making, pattern grading, marker making, garment
specifications, and cost analysis. Apparel assembly processes; analysis of equipment capabilities and production processes. PREREQS: DHE 327
DHE 529. ADVANCED APPAREL DESIGN (4).
Design processes and research methods used to develop apparel designs. Students will identify design problems and implement appropriate methods to develop apparel products. Lec/studio. PREREQS: DHE 327 and DHE 427 and DHE 428 are recommended and may be taken concurrently.
DHE 553. PRODUCT QUALITY ASSURANCE
(4). Analysis and evaluation of textile materials and final products in relation to end use.
Performance properties and serviceability testing, product specifications and industrial standards. Lec/lab. PREREQS: DHE 255 and DHE 326

DHE 555. FUNCTIONAL TEXTILES (3).
Development of functional textiles, functional textiles principles, production, evolution, and performance. Applications of functional textiles in areas such as sports and recreation, medical, protective gear, transportation, etc.

## DHE 561. HISTORY OF THE NEAR

ENVIRONMENT I (4). History of clothing,
furniture, interiors, textiles, and housing and building styles; primarily Euro-American, from the ancient world to the Renaissance. The influence of social and cultural factors upon design of the near environment. Need not be taken in sequence.

## DHE 562. HISTORY OF THE NEAR

ENVIRONMENT II (4). History of clothing, furniture, interiors, textiles, and housing and building styles; primarily Euro-American, from the Renaissance to 1899. The influence of social and cultural factors upon design of the near environment. Need not be taken in sequence.

## DHE 563. HISTORY OF CONTEMPORARY

FASHION (4). Historic analysis of fashion change in men's and women's apparel from 1890 to the present. The influence of social and cultural factors upon Euro-American fashion.

DHE 564. CONTEMPORARY HISTORY OF INTERIORS AND HOUSING (3). History of housing and interior design from the mid-19th century until the present.

## DHE 566. RESEARCH IN THE CROSS

 CULTURAL ASPECTS OF THE NEARENVIRONMENT (3). Examines the research methods used to study the cultural aspects of the near environment. Case studies concerning cultural variation in the design and use of fabric, clothing and adornment, housing.
DHE 570. RETAIL MERCHANDISING (4).
Organization, operation, and competitive strategies of soft goods retailers. Planning procurement, pricing, and promotion of merchandise assortments and inventory management.

## DHE 572. MERCHANDISE PLANNING

AND CONTROL (4). Quantitative analysis of inventory planning, pricing, and control for the profitable management of soft goods; analysis of management problems using quantitative data and merchandising principles. PREREQS: DHE 570* [C] and BA 215
DHE 575. GLOBAL PRODUCTION AND TRADE IN TEXTILES AND APPAREL (4). Trade theory and the effects of trade policy, cultural values, and economics on the global production, distribution, and consumption of textile products.

DHE 577. FASHION THEORY (4). Examination of historical, sociological, psychological, marketing, and economic concepts, theories, and research that contribute to current understanding of the fashion process.
DHE 582. AESTHETIC AND PERCEPTUAL THEORIES OF THE NEAR ENVIRONMENT (2).
Aesthetic aspects from the philosophical and theoretical bases formulated in art, art history, and psychology as applied to the near environment.

DHE 585. HUMAN BEHAVIOR AND THE NEAR ENVIRONMENT (3). Application of concepts and theories from cultural anthropology, sociology, psychology, and social psychology to the study of clothing and interiors. The significance of the near environment in the dynamics of social interaction.

## DHE 587. TRENDS AND ISSUES IN

MERCHANDISING (3). Theoretical approach to the study of merchandising policies and practices. Management issues related to strategic planning, competitive positioning, and operational problems of textile and apparel businesses. This course is repeatable for a maximum of 6 credits.

DHE 594. RESEARCH METHODS IN DESIGN
AND HUMAN ENVIRONMENT (3). Introduction to theory and research design in Design and Human Environment. Includes sampling, measurement, data collection (both qualitative and quantitative) and data analysis.
DHE 599. SPECIAL TOPICS IN DESIGN AND HUMAN ENVIRONMENT (1-16). This course is repeatable for a maximum of 16 credits.

DHE 601. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

DHE 602. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Departmental approval required.
DHE 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits
DHE 605. READING AND CONFERENCE (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

DHE 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
DHE 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
DHE 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
DHE 609. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

DHE 610. INTERNSHIP/WORK EXPERIENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

DHE 665. HISTORIC/CULTURAL THEORIES AND METHODS OF THE NEAR ENVIRONMENT (3). Critical analysis of historical and cultural paradigms, theories, and research methods.
DHE 685. ADVANCED TOPICS IN HUMAN BEHAVIOR AND THE NEAR ENVIRONMENT
(3). Critical evaluation of the current literature on human behavior as it relates to aspects of the near environment (clothing, interiors, housing). Latest theoretical developments and research methods. Content varies with each offering. PREREQS: DHE 585 or equivalent with a minimum grade of at least C-

DHE 690. THEORY DEVELOPMENT (3). Critical analysis of scientific explanation, research, theory, and paradigms. Focus on theory development, particularly within the area of the near environment.

## I DESIGN COURSES

DSGN 221. COMPUTER AIDED DESIGN 1 (3). Introduction to the Adobe Creative Suite: Illustrator and Photoshop. Instruction in drawing, image editing, flat illustrations and textile design.

## DSGN 226. SPECIFICATION BUYING (4).

 Introduction to terminology, assembly process, quality factors, and costs in the development of sewn product specifications. Lec/labDSGN 244. COLOR INNOVATION (4). The
aesthetics, meaning, and perception of color provide the foundational knowledge in this course.

DSGN 255. TEXTILES (4). Properties,
identification, selection, use and care of textile fibers and fabrics. Analysis of fiber, yarn, and fabric constructions in textiles.

## DSGN 276. INTRODUCTION TO

MERCHANDISING MANAGEMENT (4). Provides
the introductory knowledge necessary to prepare students for working in the retail industry. Introduces students to the retail industry including basic terminology, industry history, and to merchandising management decisions. Prepares students for more advanced knowledge acquired in the Merchandising Management concentration.
DSGN 281. DRAWING AND SKETCHING (4)
Designed for both beginning drawers and those wanting to improve their skills. Focuses exclusively on hand drawing skills with an emphasis on technical drawing skills, observational and perspective drawing, as well as imagination and creativity. Students develop a working knowledge of visual methods for communicating design concepts. Class format includes a combination of quick drawing activities, demonstrations, lectures, critiques, and work time on drawing assignments. Throughout the term students are introduced to the drawings of several prominent designers and artists.

## DSGN 327. PERFORMANCE APPAREL

INNOVATION I (4). Develop innovative performance apparel from technical specifications or prototypes. Analysis of apparel construction related to equipment, cost, quality, end use and customer needs. Lec/lab. PREREQS: DSGN 226 [C-]
DSGN 328. DIGITAL DESIGN FOR APPAREL
(3). Computer-aided flat pattern, grading and marker techniques using industry relevant pattern development software. PREREQS: DSGN 327 [C-]
DSGN 329. SPORTSWEAR INDUSTRY
COLLABORATION (3). Industry lead team project. Creation of briefs, sketch, pattern, design textile prints, construct prototypes based on dentified consumer and company. PREREQS: DSGN 327 [C-]
DSGN 330. ^FASHION FORECASTING AND
MARKET ANALYSIS (4). Forecasting and market analysis processes applied to fashion goods. (Writing Intensive Course) PREREQS: DHE 233 [C-] and WR 121 [C-] and WR 222 [C-] and restricted to professional school students majoring in Merchandising Management (major code 416) and Apparel Design (major code 400).
DSGN 335. APPAREL AND FOOTWEAR VALUE CHAIN (3). Survey of the structure, functions, and current trends within the apparel and footwear value chain.
DSGN 341. DESIGN THINKING AND PROCESS
INNOVATION (4). Application of a qualitative, multi-method approach to gain insight into how the consumer experience can be improved within a given context. Application of design thinking principles to identify and develop solutions to improve consumer experience within a given context.

DSGN 342. INTRODUCTION TO DESIGN
MANAGEMENT (4). Introduces the foundations and concepts of design strategy and creative development. PREREQS: DSGN 243 [C-]
DSGN 343. IDEA VISUALIZATION (4).
Focuses on the design process through visual communication of ideation and sketching. PREREQS: DSGN 342 [C-]
DSGN 352. TEXTILES FOR INTERIORS (4).
Types, qualities, and maintenance of functional and decorative fabrics for homes and public buildings. Use of specifications, standards, and legislation. PREREQS: DSGN 255 [C-]
or DHE 255 [C-] and enrollment restricted to Merchandising Management and Interior Design majors.
DSGN 355. SPECIFICATION AND EVALUATION OF PERFORMANCE MATERIALS (4).
Specification of materials for athletic and outdoor apparel to enhance human comfort, safety, and performance. Lec/lab. PREREQS: DSGN 255 [C-] and DSGN 327 [C-]
DSGN 377. RETAIL AND MERCHANDISING (4).
Provides the introductory foundational knowledge necessary to prepare students for working in the retail industry. Introduces students to the retail industry including basic terminology, retail strategy and related decisions, and merchandising management. This data analysis-focused course prepares students for more advanced knowledge and skills related to merchandise buying, planning, and control.
DSGN 383. BUILDING CONSTRUCTION
AND MATERIALS (3). An introduction to the manufacture, characteristics, sustainability, and use of construction materials in commercial and residential construction. PREREQS: Enrollment restricted to students who have been admitted into the interior design professional program.
DSGN 387. STUDIO III: ADVANCED DESIGN COMMUNICATION (4). Development of presentation and Building Information Modeling (BIM) skills through various computer programs including Adobe Illustrator, Adobe PhotoShop, Sketchup, and Revit Architecture. In-class exercises and take-home assignments. PREREQS: DSGN 287 [C-]

DSGN 388. STUDIO IV: HOSPITALITY DESIGN
(4). Study and design of hospitality spaces in compliance with building codes and industry standards, with emphasis on sustainability, safety, and cultural context. PREREQS: DSGN 352 [C-] and DSGN 387 [C-] or (DHE 352 [C-] and DHE 387 [C-] )
DSGN 394. STUDIO V: LIGHTING DESIGN (4). Lighting design and documentation for residential and small commercial projects. The commercial projects include space planning and lighting design for workspace and retail environments. Lec/Studio. PREREQS: DSGN 388 [C-] or DHE 388 [C-]
DSGN 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
DSGN 405. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
DSGN 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

DSGN 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

DSGN 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

DSGN 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
DSGN 410. FIELD EXPERIENCE (6-12). This course is repeatable for a maximum of 16 credits. PREREQS: and junior standing and departmental approval. Sect. 1: BA 215 and DHE 370. Sect. 2: DHE 289. Sect. 3: DHE 321.

DSGN 422. DHE FASHION SHOW AND DESIGN EXHIBITION (1-16). Special topics in design and human environment. This course is repeatable for a maximum of 16 credits.

## DSGN 427. PERFORMANCE APPAREL

INNOVATION II (4). Develop innovative performance apparel from technical specifications or prototypes. Analysis of apparel construction related to equipment, cost, quality, end use and customer needs. PREREQS: DSGN 327 [C-]
DSGN 428. TECHNICAL SPORTSWEAR SIZING AND FIT (4). Development of sizing and grading systems used in sportswear and evaluation of garment fit by use of virtual and physical prototypes. PREREQS: DSGN 327 [C-]
DSGN 429. FUNCTIONAL DESIGN AND PRODUCT DEVELOPMENT (4). Design processes and research methods used to create functional designs. Students will identify design problems and develop design brief and functional product line for identified target company. Lec/lab. PREREQS: DSGN 428 [C-]

DSGN 440. DESIGN RESEARCH (4). Surveys design principles, methods and applications in business outcomes. Application of design research is investigated and analyzed in group projects. PREREQS: DSGN 343 [C-]
DSGN 441. SERVICE DESIGN INNOVATION (4).
Focuses on the impact that service design has on business enterprises. Creative ideation, critical analysis, and innovative thinking are integrated as foundations for service design outcomes. PREREQS: DSGN 440 [C-]
DSGN 442. MATERIALITY AND MAKING FIELD PROJECT (4). Focuses on material properties and specifications. Students work in the makerspace to design product outcomes. PREREQS: DHE 440 [C-]

DSGN 464. CONTEMPORARY HISTORY OF INTERIORS AND HOUSING (3). History of interior design from the mid-19th century to the present. PREREQS: ART 204 [C-] or ART 205 [C-] or ART 206 [C-]

DSGN 471. RETAIL PRESENTATION
STRATEGIES (4). Provides an overview of, and examines competitive presentation strategies within, retail environments and channels (e.g., in-store, catalog, online, mobile) by integrating the principles and elements of design with sensory marketing. PREREQS: DSGN 377 [C-] and (BA 390 [C-] or BA 390H [C-] or MRKT 390 [C-] )

## DSGN 472. MERCHANDISE PLANNING

AND CONTROL (4). Quantitative analysis of inventory planning, pricing, and control for the profitable management of soft goods; analysis of management problems using quantitative data and merchandising principles. Lec/rec. PREREQS: DHE 271 [C-] and DHE 470 [C-] and (BA 215 [C-] or BA 215H [C-] ) and enrollment restricted to Apparel Design (major code 400) and Merchandising Management (major code 416) majors.

DSGN 473. RETAIL STRATEGIES PRACTICUM
(4). Explores the role that retail strategies play within a value delivery network. Looks at how retailing helps deliver value created in manufacturing and in services. Examines how these organizations develop strategies to attract consumers and also how consumers develop strategies to acquire goods and services from retailers. Provides a foundation for students who plan to work in retailing or related disciplines. PREREQS: DSGN 377 [C-] and senior standing.
DSGN 475. *GLOBAL SOURCING OF
TEXTILES, APPAREL, AND FOOTWEAR (4).
Trade theory and the effects of trade policy, cultural values, and economics on the global production, distribution, and consumption of extiles, apparel, and footwear. (Bacc Core Course)
DSGN 488. STUDIO VI: HEALTHCARE DESIGN
(4). Interior design project development with emphasis on healthcare design, contract documents, and building codes. PREREQS: DSGN 394 [C-] or DHE 394 [C-]
DSGN 495. STUDIO VII: SENIOR THESIS
II (3). Individual design project development of programming document and construction drawings. PREREQS: DSGN 488 [C-]

## COLLECE OF BUSINESS PROCRAMS <br> UNDERGRADUATE MAJORS WITH OPTIONS

## ACCOUNTANCY (BS, CRED, HBS)

Also available at the OSU-Cascades campus.
The goal of the Accountancy program at OSU is to provide a professionally oriented program to prepare students for successful careers in the major fields of accounting including tax accounting, cost accounting, auditing, corporate accounting and not-for-profit accounting.

With a BS degree in Accountancy, you could become a corporate accountant and work in the controller's office or that of the chief financial officer. Or you could work as a cost analyst in the production department of a company. One popular option is to become an independent auditor and "test" the financial records of companies and organizations.

Accountancy is a study of the concepts and techniques used in reporting on matters related to an entity's financial status and performance. Because entities compete for economic resources, accounting information is essential to managers for planning and controlling activities. Information generated by the accounting process is relevant for business decision-making.

The OSU College of Business is one of 160 schools to have achieved accreditation for its accountancy program by the AACSB International.

The Accountancy major at Oregon State University provides a professionally oriented program to prepare students for successful careers in the major fields of accounting. Accountancy students take the nine required courses shown below (beyond the introductory accounting courses that are taken by all business students) then choose one elective course/ track from the four tracks shown below. These tracks are designed to give students specialized knowledge in the career field they hope to enter after degree completion. These fields are Audit, Tax, and Industry.

Accountancy students satisfy University Baccalaureate Core course requirements and College of Business core course requirements. In addition to the courses, accountancy program students must meet all university and college progression standards as well as a minimum of 60 credits in upper-division courses (300-400 level) and a minimum of 180 credits total to graduate. The Oregon State Board of Accountancy requires a minimum of 225 credits in order to take the Uniform Certified Public Accounting Exam. The Certified Management Accountant program only requires 180 credits.

Accountancy major requirements are divided into two parts. The first part (the pre-accountancy major) usually taken in the first two years must be completed before formal admission into the accountancy major. The second part (Professional School) is usually taken in the last two years after formal admission into the accountancy major.

## Summary of Requirements:

Pre-Accountancy Major (52-57)
Pre-Business Core Classes (34-39)
Math, Economics, Writing and
Communications (18)*
Professional School (72)
Pro-School Business Core Classes (32)
Accountancy Courses (40)
University General Education Requirements (40)

Unrestricted Electives (11-16)
*10 credits from pre-business major satisfy University General Education Requirements.

## Total Required for Graduation

 (180)
## Accountancy Courses in

 the Professional ProgramAccountancy (BS) (40 credits)Accountancy students must complete 40 credits of accounting courses- 36 credits in required courses and 4 credits in one of the four elective tracks.

Once in the Accountancy major, students must continue to earn a C or better (not C-) in their ACTG classes for graduation and prerequisite purposes. In the first instance of a student earning lower than a C in an ACTG class, he/she must repeat the class. In the second instance of a student earning lower than a C in an ACTG class, he/she is removed from the Accountancy major and thus should see an advisor to discuss options.

## Required ( $\mathbf{3 6}$ credits):

ACTG 317. External Reporting I (4)
ACTG 318. External Reporting II (4)
ACTG 319. External Reporting III (4)
ACTG 321. Cost Management I (4)
ACTG 378. Accounting Information
Management (4)
ACTG 379. Accounting Analytics (4)
ACTG 417. Advanced Accounting (4)
ACTG 424. Introduction to Taxation (4)
ACTG 427. Assurance and Attestation Services (4)

## Electives:

Select one course from the following track list (4 credits):
ACTG 420. IT Auditing (4)
ACTG 422. Strategic Cost Management (4)
ACTG 425. Advanced Taxation (4)
ACTG 428. Advanced Audit Analytics (4)
The accountancy program electives offer four diverse tracks to students. Each track give students a unique, specialized perspective on the subject matter. Students should choose their elective track based on their career objectives: IT Audit (ACTG 420), Cost (ACTG 422), Tax (ACTG 425) or Audit (ACTG 428).

The accountancy program typically begins in students' third year with a lock-step series of accounting courses designed to provide a solid knowledge base in accounting procedures and the accounting profession. During fall term students take ACTG 317, followed by ACTG 318 and either ACTG 321 or ACTG 378 during winter term and ACTG 319 and either ACTG 321 or ACTG 378 during spring term. ACTG 424 and ACTG 427 follow during students' fourth year. Also during their fourth year, students may take accounting electives that correspond to their career interests. Students are encouraged to take more than the minimum requirement for elective classes as all elective classes are relevant for future careers.

Students wishing to pursue the Accountancy major must also be accepted into the professional business program. Enrollment into all ACTG courses except ACTG 317 is limited to students accepted into the Accountancy program. A minimum All-Inclusive Business (AIB - see Professional Business Program section below) GPA of 2.75 must be earned to be eligible for admission into the Accountancy program, but a 2.75 GPA does not guarantee acceptance as admissions are competitive and subject to capacity constraints. Instructions on how to apply can be found online at the COB advising website. Students denied admission to the Accountancy major may reapply for the following fall if they meet minimum eligibility requirements.

## Business Administration/ Accountancy Curricula

The undergraduate curriculum in business administration reflects the increasingly complex economic, social, and technological aspects of modern business decision-making. Course work emphasizes the development of effective decisionmaking, an understanding of personal values and motivation, and the awareness of the interrelationships between business and society.

## Pre-Accountancy Program

Newly admitted students to OSU and all current OSU students who seek to complete an undergraduate degree program offered by the College of Business (COB) are designated as pre-business majors (including pre-Accountancy, pre-Business Information Systems, pre-Business, preFinance, pre-Management and pre-Marketing). The pre-Accountancy program requires completion of courses within the first and second year (see core curriculum below) that build a solid foundation for the upper-division business curricula. These courses must be completed before the student is eligible for admission to the professional business program. The pre-business course work may be completed at OSU or any ac-
credited college or university that offers equivalent courses transferable to OSU.

## Professional Business Program

Admission to the professional business program is restricted to those students who have demonstrated an ability to achieve the high standards required for professional studies. Enrollment within each academic discipline (major or option) is limited to the number of students who can be served by the faculty and facilities of that major/option.
Therefore, students should strive to meet the minimum eligibility standards of their particular major of choice as well as those of the College of Business itself. Minimum standards for a particular major can often be higher. More information on the pro-school process and current competitive GPA levels for each major can be found on the Pro-School Competitive GPA section of the College of Business Advising website.
Students must apply for admission to the professional business program. To be eligible to apply, students must earn COB grades of C- or better, have 90 credits by the end of the application term, have a minimum COB GPA of 2.75 , and meet the minimum standards for their particular major of choice in the All-Inclusive Business GPA. The All-Inclusive Business GPA includes all business program course work taken from OSU and transfer institution(s). Students earning an AllInclusive Business GPA of 3.0 or above will be assured admission to the professional business program, but it does not guarantee admittance into the major of their choice. Students with an AllInclusive Business GPA less than 3.0 will be admitted to an academic discipline (major or option) with available capacity using the following criteria: compliance with entrance requirements for the major/option; their rank order based on their All-Inclusive Business GPA; and the contribution of the student to the diversity of viewpoints within the college.

Students who have completed their pre-business courses at a college or university other than OSU must be admitted to pre-business their first term and apply for the professional program during their first term of attendance.
Students may apply to the Accountancy major from any of the pre-business majors, including pre-Accountancy, pre-Business Information Systems, preBusiness, pre-Finance, pre-Management and pre-Marketing.

## Business Administration/ <br> Accountancy Program <br> Requirements (180)

Business Administration Core Curriculum (66-71)
The business administration core curriculum provides students with a broad overview of business; basic skills in
accounting and quantitative methods; an understanding of the legal and social environment of business; a background in management and organizational behavior, marketing, finance, and operations management; an understanding of the entrepreneurial process; and the opportunity to integrate course work and further develop decision-making skills through the analysis of business cases.

## Accountancy (40)

Accountancy students must complete 40 credits of accounting courses in the accountancy program. See an academic advisor for more information.

## Mathematics (4)

Basic mathematics requirements:
MTH 241. *Calculus for Management and Social Science (4)

## Economics (8)

ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to Macroeconomics (4)

## Written and Oral Communication

 (6)Business students also must take:
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## University General Requirements

 (40)MTH 241; ECON 201 and ECON 202; WR 222, WR 323 or WR 327, and COMM 111 or COMM 114 meet the university's Baccalaureate Core requirements for mathematics, social processes and institutions, writing II, and speech, respectively. All students must meet the other Baccalaureate Core requirements and the other requirements for baccalaureate degrees. (See Requirements for Baccalaureate Degrees.)

## Unrestricted Electives (11-16)

Students are provided elective credits to enable them to achieve a degree of specialization and depth to match their interests. Students are encouraged to choose a non-business univer-sity-approved minor that consists of a minimum of 27 credits, with at least 12 credits at the upper-division level. Students are responsible for determining whether the minor has been approved for transcript visibility and to request the notation on their transcript. Students may also choose to complete a coherent set of non-business courses to support their career goals.

## SAMPLE SCHEDULE

Pre-Accounting (Major code 770)

## First Year (45 credits)

Students entering OSU on the Corvallis campus as their first college experience
are required to participate in Innovation Nation, the College of Business LivingLearning Community (LLC). These students will complete the following threecourse sequence during their first year:
BA 160. B-Engaged (3)
BA 161. Innovation Nation-Awareness to Action (3)
BA 162. Innovation Nation-Ideas to Reality (3)

Students who transfer to the Corvallis campus from another college or university, and current OSU Corvallis-campus students who are changing their major to pre-business or pre-accountancy, will complete the following courses:
BA 101. Business Now (6)
BA 280. Business Insights (2)
All other students, including students completing their pre-accountancy and pre-business degree requirements via OSU Ecampus or another college/university, will complete the following course: BA 101. Business Now (6)

## All students should also complete:

COMM 111. *Public Speaking (3) or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal Communications (3)
MTH 241. *Calculus for Management and Social Science (4)
Baccalaureate core, unrestricted electives (29-32)

## Second Year (45 credits)

Corvallis-campus students in the prebusiness or pre-accountancy major should complete the following courses:
BA 281. Professional Development (3)
BA 282. Personal, Professional and
Leadership Development I (1)
BA 283. Personal, Professional and
Leadership Development II (1)
BA 284. Personal, Professional and Leadership Development III (1) All Ecampus students, and all Cor-vallis-campus students transferring into the college and eligible to apply to the professional school should complete:
BA 381. Personal and Professional Development (4)
All second-year students should also complete:
BA 211. Financial Accounting (4) (C or better required)
BA 213. Managerial Accounting (4) (C or better required)
BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)

BA 275. Foundations of Statistical Inference (4)

BA 302. Business Process Management (4)
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)
Baccalaureate core, minor courses, or unrestricted electives (4-6)
Professional Accountancy (Major code 641)
Required Accountancy Courses (40 credits)
ACTG 317. External Reporting I (4)
ACTG 318. External Reporting II (4)
ACTG 319. External Reporting III (4)
ACTG 321. Cost Management I (4)
ACTG 378. Accounting Information Management (4)
ACTG 379. Accounting Analytics (4)
ACTG 417. Advanced Accounting (4)
ACTG 424. Introduction to Taxation (4)
ACTG 427. Assurance and Attestation Services (4)
One elective accountancy course
from below ( 4 credits):
ACTG 420. IT Auditing (4)
ACTG 422. Strategic Cost Management (4)

ACTG 425. Advanced Taxation (4)
ACTG 428. Advanced Audit Analytics (4)

## Business Core Courses (32)

BA 347. International Business (4)
BA 352. Managing Individual and Team Performance (4)
BA 354. ${ }^{\wedge}$ Managing Ethics and Corporate Social Responsibility (4)
BA 357. Operations Management (4)
BA 375. Applied Quantitative Methods (4)
BA 390. Marketing (4)
BA 466. Integrative Strategic Experience (4)
FIN 340. Finance (4)
or BA 360. Introduction to Financial Management (4)
Baccalaureate core, minor courses or unrestricted electives (18)

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## SAMPLE FOUR-YEAR PLAN:

ACCOUNTANCY
Year 1 (45 credits)
Fall
BA 160. B-Engaged (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for
Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Winter

BA 161. Innovation Nation-Awareness to Action (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)

## Electives (2)

## Spring

BA 162. Innovation Nation-Ideas to
Reality (3)
BC Science (4)

WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for
Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)
Year 2 (45 credits)
Fall
BA 211. Financial Accounting (4)
BA 260. Introduction to Entrepreneurship (4)

BA 275. Foundations of Statistical Inference (4)

BA 281. Professional Development (3)
BA 282. Personal, Professional and
Leadership Development I (1)

## Winter

BA 213. Managerial Accounting (4)
BA 283. Personal, Professional and
Leadership Development II (1)
BA 302. Sustainable Business Operations (4)
ECON 201. *Introduction to
Microeconomics (4)
Elective (1)

## Spring

BA 230. Business Law I (4)
BA 284. Personal, Professional and
Leadership Development III (1)
ECON 202. *Introduction to
Macroeconomics (4)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)
Bacc Core/Electives (3)

## Year 3 (45 credits)

## Fall

ACTG 317. External Reporting I (4)
BA 352. Managing Individual and Team
Performance (4)
BA 375. Applied Quantitative Methods (4)
Bacc Core-CGI (3)

## Winter

ACTG 318. External Reporting II (4)
ACTG 378. Accounting Information
Management (4)
BA 357. Operations Management (4)
Bacc Core-STS (3)

## Spring

ACTG 319. External Reporting III (4)
ACTG 321. Cost Management (4)
ACTG 379. Accounting Analytics (4)
Electives (3)

## Year 4 (45 credits)

## Fall

ACTG 417. Advanced Accounting (4)
BA 360. Introduction to Financial
Management (4)
BA 390. Marketing (4)
Electives (3)

## Winter

ACTG 424. Introduction to Taxation (4)
BA 347. International Business (4)
BA 354. Managing Ethics and Corporate
Social Responsibility (4)
Electives (3)

## Spring

ACTG 427. Assurance and Attestation Services (4)

ACTG Elective (4)
BA 466. Integrative Strategic Experience (4)
Electives (3)

## Total=180

## Pre-Professional

Accountancy Major Code: 770
Major Code: 641

## OPTIONS

## ACCOUNTING INFORMATION <br> SYSTEMS OPTION

The Accounting Information Systems (AIS) option prepares students for entrylevel positions and successful careers in the information management or information systems auditing fields. The program builds on the business, accounting, and computer skills classes required of all accounting students, and prepares students specifically to apply the information technologies to accounting, auditing, and other business tasks.

The program of study that includes the accounting major and these selected courses has been certified by the Information Systems Audit and Control Association. Graduates of this program qualify for one year of work experience toward the Certified Information Systems Auditor designation.

## Sophomore Year

BA 272. Business Application Development
(4) (or equivalent programming course)

## Junior Year

ACTG 378. Accounting Information
Management (4) ${ }^{1}$
BA 371. Business Information Systems
Analysis and Design (4)
BA 372. Business Information Systems
Design and Development (4)
MGMT 364. Project Management (4)

## Senior Year

ACTG 420. IT Auditing (4)
BA 479. Business Telecommunications and Networking (4)
BA 483. Business Analytics (4)

## Total=28

## Footnote:

${ }^{1}$ The professional business program requires completion of either BA 370 or ACTG 378.
ACTG 378 is not included in the total credits completed within the option.

## Option Code: 236

## INTERNATIONAL BUSINESS OPTION

The International Business option prepares students for positions in organizations engaged in international trade. Students study the economic, political, geographical, and socio-cultural factors that impact business across national boundaries. Areas of greatest opportunity for overseas assignments are with service organizations such as banks, consulting firms and accounting firms; with import/ export firms; with governmental organizations; and in marketing and financial
management areas of multinational firms. A career in international business can lead to exciting and rewarding opportunities abroad. Most multinational business firms, however, hire new employees first for domestic assignments in order to provide them with a thorough knowledge of the firm, its products, and its policies, or for specific assignments in one of the functional areas of the business, before providing overseas opportunities.

Because the majority of employees who eventually hold high-level positions in an international business start in entry-level positions within business areas, all international business students must also complete requirements for a primary discipline within a business. These disciplines include the majors in accountancy, business administration (Entrepreneurship, General Business, and Hospitality Management options), business information systems, finance, management and marketing.

Students earn this option with a minimum of one quarter term of study abroad through an international exchange or study abroad program approved by the College of Business. Students must complete a minimum of 18 quarter credits in business or business-related course work. The successfully completed course work must articulate back to OSU as courses that extend the knowledge and skills attained within the business core (that is, they cannot be used as a direct substitute for a business core course). Within the Arthur Stonehill International Business Exchange program offered through the College of Business, all courses offered by the partner schools are taught in English.

## Course Requirements

BA 347. International Business (4) BA 348. International Exchange Orientation (1)

BA 349. Impact of Culture on Business (1)
BA XXX. Minimum of 18 credits of business or business-related course work completed on an approved international exchange or study aboard program.

## Total=24

Students must earn this option with one term of study abroad through an approved College of Business international exchange. Courses in these programs are taught in English.

## Option Code: 190

## BUSINESS ADMINISTRATION (BA, BS, CRED, HBA, HBS)

Also available via Ecampus.
Business Administration major requirements are divided into two parts. The first part (the pre-business major), usually taken in the first two years, must be completed before formal admission into the major. The second part (Professional School) is usually taken in the last two
years after formal admission into the Business Administration major.

## Summary of Requirements:

Pre-Business Major (52-57)
Pre-Business Core Classes (34-39)
Math, Economics, Writing and
Communications (18)*
Professional School (36)
University General Education Requirements (40)

Unrestricted Electives (47-52)
Option Courses (24)**
*10 credits from pre-business major satisfy University General Education Requirements.
** Options are available to provide specializations

## Total Required for Graduation

 (180)
## Business Administration

Curriculum
The undergraduate curriculum in business administration reflects the increasingly complex economic, social, and technological aspects of modern business decision-making. Course work emphasizes the development of effective decisionmaking, an understanding of personal values and motivation, and the awareness of the interrelationships between business and society.

## Pre-Business Program

Newly admitted students to OSU and all current OSU students who seek to complete an undergraduate degree program offered by the College of Business (COB) are designated as pre-business majors. The pre-business program requires completion of courses within the first and second year (see core curriculum below) that build a solid foundation for the upper-division business curricula. These courses must be completed before the student is eligible for admission to the professional business program. The prebusiness course work may be completed at OSU or any accredited college or university that offers equivalent courses transferable to OSU.

## Professional Business Program

 Admission to the professional business program is restricted to those students who have demonstrated an ability to achieve the high standards required for professional studies. Enrollment within each academic discipline (major or option) is limited to the number of students who can be served by the faculty and facilities of that major/option.Therefore, students should strive to meet the minimum eligibility standards of their particular major of choice as well as those of the College of Business itself. Minimum standards for a particular major can often be higher. More information on the pro-school process and current competitive GPA levels for each major can be found on the Pro-School Competitive GPA section of the College
of Business Advising website.
Students must apply for admission to the professional business program. To be eligible to apply, students must earn COB grades of C- or better, have 90 credits by the end of the application term, have a minimum COB GPA of 2.5 , and meet the minimum standards for their particular major of choice in the All-Inclusive Business GPA. The All-Inclusive Business GPA includes all business program course work taken from OSU and transfer institution(s). Students earning an AllInclusive Business GPA of 3.0 or above will be assured admission to the professional business program, but it does not guarantee admittance into the major of their choice. Students with an AllInclusive Business GPA less than 3.0 will be admitted to an academic discipline (major or option) with available capacity using the following criteria: compliance with entrance requirements for the major/option; their rank order based on their All-Inclusive Business GPA; and the contribution of the student to the diversity of viewpoints within the college.

Students who have completed their pre-business courses at a college or university other than OSU must be admitted to pre-business their first term and apply for the professional program during their first term of attendance.

## Business Administration Program

 Requirements (180)
## Business Administration Core

## Curriculum (70-75)

The business administration core curriculum provides students with a broad overview of business; basic skills in accounting and quantitative methods; an understanding of the legal and social environment of business; a background in management and organizational behavior, marketing, finance, and operations management; an understanding of the entrepreneurial process; and the opportunity to integrate course work and further develop decision-making skills through the analysis of business cases.

## Mathematics (4)

Basic mathematics requirements:
MTH 241. *Calculus for Management and Social Science (4)

## Economics (8)

ECON 201. *Introduction to Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
Written and Oral Communication (6) Business students also must take:
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal
Communications (3)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## University General Requirements (40)

MTH 241; ECON 201/ECON 202; WR
222, WR 323 or WR 327; and COMM
111, COMM 114 or COMM 218 meet the University's Baccalaureate Core requirements for mathematics, social processes and institutions, writing II, and speech, respectively. All students must meet the other baccalaureate core requirements and the other requirements for baccalaureate degrees. (See Earning a Degree at OSU.)

## Unrestricted Electives (47-52)

Students are provided elective credits to enable them to achieve a degree of specialization and depth to match their interests.

## Minor (27)

Students are encouraged to choose a non-business university-approved minor that consists of a minimum of 27 credits, with at least 12 credits at the upper-division level. Students are responsible for determining whether the minor has been approved for transcript visibility and to request the notation on their transcript. Students may also choose to complete a coherent set of non-business courses to support their career goals.

## Option (24)

Options are designed to allow students to extend their professional preparation beyond the introductory level in one or more areas. There are five options available to the Business Administration major:

1. Entrepreneurship for Business Majors
2. General Business (Available at OSU Cascades campus and Ecampus)
3. Hospitality Management (OSU Cascades campus only)
4. International Business (requires participation in study abroad program)
5. Supply Chain and Logistics Management (Ecampus only)
Some options need to be started in the third year, while others can be completed all during the fourth year. See an aca-
demic advisor for more information.

## Pre-Business (Major code 180)

## First Year (45 credits)

Students entering OSU on the Corvallis campus as their first college experience are required to participate in Innovation Nation, the College of Business LivingLearning Community (LLC). These students will complete the following threecourse sequence during their first year:

## BA 160. B-Engaged (3)

BA 161. Innovation Nation-Awareness to Action (3)
BA 162. Innovation Nation-Ideas to Reality (3)

Students who transfer to the Corvallis campus from another college or univer-
sity, and current OSU Corvallis-campus students who are changing their major to pre-business, will complete the following courses:
BA 101. Business Now (6)
BA 280. Business Insights (2)
All other students, including students completing their degree at OSU-Cascades or via OSU Ecampus, will complete the following course:
BA 101. Business Now (6)
All students should also complete:
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal
Communications (3)
MTH 241. *Calculus for Management and Social Science (4)
Baccalaureate core, unrestricted electives (29-32)

## Second Year (45 credits)

Corvallis-campus students in the prebusiness major should complete the following courses:
BA 281. Professional Development (3)
BA 282. Personal, Professional and
Leadership Development I (1)
BA 283. Personal, Professional and
Leadership Development II (1)
BA 284. Personal, Professional and
Leadership Development III (1)
All Ecampus students, and all Corvalliscampus students transferring into the college and eligible to apply to the professional school should complete:
BA 381. Personal and Professional Development (4)

All other students, including students competing their degree at OSU-Cascades, will complete:
BA 253. Professional Development (4) or BA 353. Professional Development (4)

All second-year students should also complete:
BA 211. Financial Accounting (4)
BA 213. Managerial Accounting (4)
BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)
BA 275. Foundations of Statistical Inference (4)

BA 302. Business Process Management (4)
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
WR 222. *English Composition (3) or WR 323. *English Composition (3) or WR 327. *Technical Writing (3)
Baccalaureate core, minor courses, or unrestricted electives (4-6)

## Professional Business

Administration Major (Major code 181)

## Business Core Courses (36 credits)

BA 347. International Business (4)
BA 352. Managing Individual and Team Performance (4)
BA 354. ${ }^{\wedge}$ Managing Ethics and Corporate
Social Responsibility (4)
BA 357. Operations Management (4)
BA 360. Introduction to Financial
Management (4)
or FIN 340. Finance (4)
BA 370. Business Information Systems
Overview (4)
or ACTG 378. Accounting Information
Management (4)
BA 375. Applied Quantitative Methods (4)
BA 390. Marketing (4)
BA 466. Integrative Strategic Experience (4)
Baccalaureate core, minor, option or unrestricted electives (54 credits)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## SAMPLE FOUR-YEAR PLAN:

 BUSINESS ADMINISTRATION
## Year 1 (45 credits)

Fall
BA 160. B-Engaged (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for
Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Winter

BA 161. Innovation Nation-Awareness to Action (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Spring

BA 162. Innovation Nation-Ideas to Reality (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for
Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Year 2 (45 credits)

Fall
BA 275. Foundations of Statistical Inference (4)

BA 281. Professional Development (3)
BA 282. Personal, Professional and
Leadership Development I (1)
ECON 201. *Introduction to
Microeconomics (4)
Electives (3)

## Winter

BA 211. Financial Accounting (4)
BA 283. Personal, Professional and
Leadership Development II (1)
BA 302. Sustainable Business Operations (4)
ECON 202. *Introduction to

Macroeconomics (4)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## Spring

BA 213. Managerial Accounting (4)
BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)
BA 284. Personal, Professional and
Leadership Development III (1)
Elective (1)

## Year 3 (45 credits)

Fall
BA 347. International Business (4)
BA 354. Managing Ethics and Corporate
Social Responsibility (4)
Bacc Core-CGI (3)
Option/Electives (4)

## Winter

BA 352. Managing Individual and Team Performance (4)
BA 375. Applied Quantitative Methods (4)
Bacc Core-STS (3)
Option/Electives (4)

## Spring

BA 357. Operations Management (4)
BA 370. Business Information Systems
Overview (4)
BA 390. Marketing (4)
Electives (3)

## Year 4 (45 credits)

Fall
BA 360. Introduction to Financial
Management (4)
Option/Electives (11)

## Winter

Option/Electives (15)

## Spring

BA 466. Integrative Strategic Experience (4) Option/Electives (11)

Total=180
Pre-Business major code 180
Major Code: 181

## OPTIONS

## ENTREPRENEURSHIP FOR

 BUSINESS MAJORS OPTIONThe Entrepreneurship for Business Majors option prepares students to establish their own business, to operate in growing businesses, to become involved in family-owned businesses, or to work with innovative divisions within larger organizations. The program combines classroom study with case analysis to provide students with the knowledge and skills necessary for success.

## Required Courses

BA 363. Technology and Innovation Management (4)
BA 458. Innovation and New Product
Development (4)
BA 460. Venture Management (4)
BA 464. New Venture Financing (4)
BA 467. New Venture Laboratory (4)

## Select one additional course from:

BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 365. Family Business Management (4)
BA 463. Family Business Management (4)
BA 468. Technology Commercialization (4)
MRKT 488. Personal Selling (4)

## Total=24

Option Code: 624

## GENERAL BUSINESS OPTION

## Also available via Ecampus and at

 OSU-Cascades Campus.All students in the General Business option must take 24 credits of upperdivision College of Business courses in addition to the undergraduate business core curriculum. A minimum of 12 credits must be 400 level. Courses must be pre-approved by an advisor prior to beginning this option.
Option Code: 201

## HOSPITALITY MANAGEMENT OPTION

## Available only at OSU-Cascades Campus.

Course work within the Hospitality Management option is aimed at developing the students' knowledge of strategic thinking and its application to the hospitality industry. We define the hospitality industry as including all organizations that provide overnight accommodations and/or food service, to include hotels, destination resorts, hospitals, residence halls, cruise ships, etc.
Through an understanding of scanning techniques, the student will become acquainted with the major trends in the hospitality industries and will develop the analytical skills to interpret their current and future impact. From this understanding of environmental scanning and knowledge of the forces driving change in the hospitality industry, students will develop competitive methods that define the products and services in which hospitality firms need to invest to remain competitive. Students will then identify and evaluate core competencies in terms of overall value addition and competitive advantage to the firm taking into consideration both present and future effects.
Students graduating from the program are required to possess knowledge of forces in the hospitality industry's environment that drive change. Furthermore, they should be able to assess the impact of these forces on the hospitality industry, which will enable them to appreciate the cause and effect relationship between the forces that drive change and the firms within the industry. This, in essence, will provide students with the tools to be effective leaders in the hospitality industry.

## Required Courses

BA 487. Hospitality Financial Management (4)

BA 488. Advanced Hospitality Management (4)

MRKT 486. Customer Relationship
Management (CRM) (4)
Select three from the following for 12 credits:
BA 460 . Venture Management (4)
MGMT 364. Project Management (4)
MGMT 453. Human Resources Management (4)

MRKT 488. Personal Selling (4)
MRKT 498. Services Marketing (4)
Total=24
Option Code: 491

## INTERNATIONAL BUSINESS OPTION

The International Business option prepares students for positions in organizations engaged in international trade. Students study the economic, political, geographical, and socio-cultural factors that impact business across national boundaries. Areas of greatest opportunity for overseas assignments are with service organizations such as banks, consulting firms and accounting firms; with import/ export firms; with governmental organizations; and in marketing and financial management areas of multinational firms. A career in international business can lead to exciting and rewarding opportunities abroad. Most multinational business firms, however, hire new employees first for domestic assignments in order to provide them with a thorough knowledge of the firm, its products, and its policies, or for specific assignments in one of the functional areas of the business, before providing overseas opportunities.
Because the majority of employees who eventually hold high-level positions in an international business start in entry-level positions within business areas, all international business students must also complete requirements for a primary discipline within a business. These disciplines include the majors in accountancy, business administration (Entrepreneurship, General Business, and Hospitality Management options), business information systems, finance, management and marketing.
Students earn this option with a minimum of one quarter term of study abroad through an international exchange or study abroad program approved by the College of Business. Students must complete a minimum of 18 quarter credits in business or business-related course work. The successfully completed course work must articulate back to OSU as courses that extend the knowledge and skills attained within the business core (that is, they cannot be used as a direct substitute for a business core course). Within the

Arthur Stonehill International Business Exchange program offered through the College of Business, all courses offered by the partner schools are taught in English.

## Course Requirements

BA 347. International Business (4)
BA 348. International Exchange Orientation (1)

BA 349. Impact of Culture on Business (1)
BA XXX. Minimum of 18 credits of business or business-related course work completed on an approved international exchange or study aboard program.

## Total=24

Students must earn this option with one term of study abroad through an approved College of Business international exchange. Courses in these programs are taught in English.

## Option Code: 190

## MERCHANDISING MANAGEMENT OPTION

Students in the Merchandising Management option prepare for retail management positions, merchandising positions related to product development and manufacturing, and merchandising positions related to retail. In a global, diverse, and fast-paced, competitive environment, merchandisers are involved in market analysis, business planning, assortment planning, sourcing, pricing, distribution and visual presentation of apparel and textile products to satisfy the needs of the consumer.

## Required Courses

DHE 255. Textiles (4)
DHE 330. ${ }^{\wedge}$ Fashion Forecasting and Market Analysis (4)
DHE 472. Merchandize Planning and Control (4)
DSGN 377. Retail and Merchandising (4)
DSGN 471. Retail Presentation Strategies (4)
DSGN 473. Retail Strategies Practicum (4)
MRKT 492. Consumer Behavior (4)
MRKT 495. Retail Management (4)

## Total=32 credits

Footnote:
^ Writing Intensive Course (WIC)

## Option Code: 782

## RETAIL MANAGEMENT OPTION

## Offered via Ecampus only.

The Retail Management option covers management and marketing strategies for the retail industry. The program includes all the steps required to bring the customers into the store and fulfill their buying needs. A retail store manager is responsible for ensuring that a store operates efficiently and profitably and that its employees perform adequately. They are responsible for a store's sales and employee schedule, resolving problems that arise in the store and coordinating a store's activities.

All courses in the Retail Management option are offered via Ecampus.

## Required courses (16 credits)

MGMT 453. Human Resources Management (4)

MGMT 457. Supply Chain Strategy (4)
MRKT 492. Consumer Behavior (4)
MRKT 495. Retail Management (4)

## Electives

Choose two of the following courses (8 credits):
BA 451. Supply and Sourcing Management (4)

BA 481. Survey of Business Analytics (4)
[Pending approval]
MGMT 364. Project Management (4)
MGMT 455. Influence and Negotiation (4)
MRKT 396. Fundamentals of Marketing Research (4)
MRKT 488. Personal Selling (4)
MRKT 493. Integrated Marketing
Communications (4)
MRKT 497. Global Marketing (4) [Pending submission and approval of proposal]
MRKT 498. Services Marketing (4)
[Pending submission and approval

## of proposal]

## Total=24

Option Code: 744

## SUPPLY CHAIN AND LOGISTICS MANAGEMENT OPTION

## Also available via Ecampus.

The Supply Chain and Logistics Management (SCLM) option, within the Business Administration (BA) undergraduate major, offers students an alternative focus that includes acquiring a solid mastery of international operations and supply chain and logistics management concepts and methods.

This undergraduate option prepares graduates for operations, logistics, procurement and supply chain management in the service and manufacturing industries. In the past two decades, the loss of manufacturing jobs in the U.S. triggered attrition of innovation capabilities across many sectors of the economy contributing to the current anemic economic recovery. The U.S. needs a professionallytrained workforce that is able to manage internal operations and global supply chains in the manufacturing and service sectors and in government agencies. Well-trained operations and supply chain managers are also needed in global companies that operate outside the U.S., including companies that operate in the Asia-Pacific Rim.

Entry Requirements: Admission to professional-school for this option requires earning a 2.50 cumulative GPA in pre-business course work and all prebusiness course work either completed with a grade of C - or better or registered to complete.

The Supply Chain and Logistics Management option requires a total of 28 credits beyond the undergraduate business core.

BA 451. Supply and Sourcing Management (4)

BA 454. Lean Enterprise Management and Capstone (4)
BA 459. Manufacturing and Service Operations (4)
BA 478. Supply Chain Analytics (4)
MGMT 364. Project Management (4)
MGMT 455. Influence and Negotiation (4)
MGMT 457. Supply Chain Strategy (4)

## Total=28 credits

Option Code: 694

## BUSINESS INFORMATION SYSTEMS (BA, BS, CRED, HBA, HBS)

The Business Information Systems (BIS) curriculum will teach you to harness technology to help organizations achieve a competitive advantage in today's rapidly changing environment.

You will gain a firm foundation in business administration and learn to architect, manage, develop and deploy information systems. Depending on your skills and interests you might become a business process analyst, IT project manager, data modeler, systems analyst, software quality tester, developer or database administrator, or you can choose from other technology-related business careers.
You won't only learn theory. You have plenty of opportunities to build, troubleshoot, refine and manage information systems through targeted exercises in real-world projects and current projects sponsored by outside companies to help you learn to bring together people, business processes, and information technology.
Business Information Systems (BIS) major requirements are divided into two parts. The first part (the pre-BIS major), usually taken in the first two years, must be completed before formal admission into the BIS major. The second part (Professional School) is usually taken in the last two years after formal admission into the BIS major.
Summary of Requirements:
Pre-BIS Major (52-57)
Pre-Business Core Classes (34-39)
Math, Economics, Writing and
Communications (18)*
Professional School (64)
Pro-School Business Core Classes (32)
BIS Courses (32)
University General Education Requirements (40)

Unrestricted Electives (19-24)
*10 credits from pre-business major satisfy University General Education Requirements.

## Total Required for Graduation

## (180)

## Required Courses in the Business <br> Information Systems Major (32 <br> credits)

BIS students must complete 32 credits
of information systems courses in the professional program.

## Required courses include:

ACTG 378. Accounting Information Management (4)
BA 272. Business Application Development (4)

BA 371. Business Information Systems Analysis and Design (4)
BA 372. Business Information Systems Design and Development (4)
BA 479. Business Telecommunications and Networking (4)
BA 480. Information Systems Security (4)
BA 483. Business Analytics (4)
MGMT 364. Project Management (4)

## Business Administration/BIS <br> Curricula

The undergraduate curriculum in business administration reflects the increasingly complex economic, social, and technological aspects of modern business decision-making. Course work emphasizes the development of effective decisionmaking, an understanding of personal values and motivation, and the awareness of the interrelationships between business and society.

## Pre-Business Program

Newly admitted students to OSU and all current OSU students who seek to complete an undergraduate degree program offered by the College of Business (COB) are designated as pre-business majors (including pre-Accountancy, pre-BIS, preBusiness, pre-Finance, pre-Management and pre-Marketing). The pre-business programs require completion of courses within the first and second year (see core curriculum below) that build a solid foundation for the upper-division business curricula. These courses must be completed before the student is eligible for admission to the professional business program. The pre-business course work may be completed at OSU or any accredited college or university that offers equivalent courses transferable to OSU.

## Professional Business Program

Admission to the professional business program is restricted to those students who have demonstrated an ability to achieve the high standards required for professional studies. Enrollment within each academic discipline (major or option) is limited to the number of students who can be served by the faculty and facilities of that major/option.

Therefore students should strive to meet the minimum eligibility standards of their particular major of choice as well as those of the College of Business itself. Minimum standards for a particular major can often be higher. More information on the pro-school process and current competitive GPA levels for each major can be found on the Pro-School Competitive GPA section of the College
of Business Advising website.
Students must apply for admission to the professional business program. To be eligible to apply, students must earn COB grades of C- or better, have 90 credits by the end of the application term, have a minimum COB GPA of 2.5 , and meet the minimum standards for their particular major of choice in the All-Inclusive Business GPA. The All-Inclusive Business GPA includes all business program course work taken from OSU and transfer institution(s). Students earning an AllInclusive Business GPA of 3.0 or above will be assured admission to the professional business program, but it does not guarantee admittance into the major of their choice. Students with an AllInclusive Business GPA less than 3.0 will be admitted to an academic discipline (major or option) with available capacity using the following criteria: compliance with entrance requirements for the major/option; their rank order based on their All-Inclusive Business GPA; and the contribution of the student to the diversity of viewpoints within the college.

Students who have completed their pre-business courses at a college or university other than OSU must be admitted to pre-business their first term and apply for the professional program during their first term of attendance.
Students may apply to the Business Information Systems major from any of the pre-business majors, including pre-Accountancy, pre-BIS, pre-Business, pre-Finance, pre-Management and pre-Marketing.

## Business Administration/Business Information Systems Requirements (180)

## Business Administration Core

 Curriculum (66-71)The business administration core curriculum provides students with a broad overview of business; basic skills in accounting and quantitative methods; an understanding of the legal and social environment of business; a background in management and organizational behavior, marketing, finance, and operations management; an understanding of the entrepreneurial process; and the opportunity to integrate course work and further develop decision-making skills through the analysis of business cases.

## Business Information Systems (32)

BIS students must complete 32 credits of information systems courses in the professional program. See an academic advisor for more information.

## Mathematics (4)

Basic mathematics requirements:
MTH 241. *Calculus for Management and Social Science (4)

## Economics (8)

ECON 201. *Introduction to
Microeconomics (4)

ECON 202. *Introduction to Macroeconomics (4)

## Written and Oral Communication

 (6)Business students also must take:
COMM 111. *Public Speaking (3) or COMM 114. *Argument and Critical Discourse (3) or COMM 218. *Interpersonal Communication (3)
WR 222. *English Composition (3) or WR 323. *English Composition (3) or WR 327. *Technical Writing (3)

## University General Requirements (40)

MTH 241, ECON 201/ECON 202, WR 222 , WR 323 or WR 327, and COMM 111 or COMM 114 meet the university's baccalaureate core requirements for mathematics, social processes and institutions, writing II, and speech, respectively. All students must meet the other baccalaureate core requirements and the other requirements for baccalaureate degrees. (See Earning a Degree at OSU.)
Unrestricted Electives (19-24)
Students are provided elective credits to enable them to achieve a degree of specialization and depth to match their interests. Students are encouraged to choose a non-business univer-sity-approved minor that consists of a minimum of 27 credits, with at least 12 credits at the upper-division level. Students are responsible for determining whether the minor has been approved for transcript visibility and to request the notation on their transcript. Students may also choose to complete a coherent set of non-business courses to support their career goals.

## Sample Four-Year Schedule

Pre-Business Information Systems (Major code 771)

## First Year (45 credits)

Students entering OSU on the Corvallis campus as their first college experience are required to participate in Innovation Nation, the College of Business LivingLearning Community (LLC). These students will complete the following threecourse sequence during their first year:
BA 160. B-Engaged (3)
BA 161. Innovation Nation-Awareness to Action (3)
BA 162. Innovation Nation-Ideas to Reality (3)
Students who transfer to the Corvallis campus from another college or university, and current OSU Corvallis-campus students who are changing their major to business, will complete the following courses:
BA 101. Business Now (6)
BA 280. Business Insights (2)
All other students, including students completing their pre-BIS and pre-business
degree requirements via OSU Ecampus or another college/university, will complete the following course
BA 101. Business Now (6)
All students should also complete:
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal Communications (3)
MTH 241. *Calculus for Management and Social Science (4)
Baccalaureate core, unrestricted electives (29-32)

## Second Year (45 credits)

Corvallis-campus students in the prebusiness or pre-BIS major should complete the following courses:
BA 281. Professional Development (3)
BA 282. Personal, Professional and Leadership Development I (1)
BA 283. Personal, Professional and Leadership Development II (1)
BA 284. Personal, Professional and
Leadership Development III (1)
All Ecampus students, and all Corvalliscampus students transferring into the college and eligible to apply to the professional school should complete:
BA 381. Personal and Professional Development (4)

All second-year students should also complete:
BA 211. Financial Accounting (4)
BA 213. Managerial Accounting (4)
BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)
BA 275. Foundations of Statistical Inference (4)

BA 302. Business Process Management (4)
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to Macroeconomics (4)
WR 222. *English Composition (3) or WR 323. *English Composition (3) or WR 327. *Technical Writing (3)
Baccalaureate core, minor courses, or unrestricted electives (4-6)

## Professional Business Information

Systems (Major code 183)

## Required BIS Courses ( 32 credits)

ACTG 378. Accounting Information Management (4)
BA 272. Business Application Development (4)

BA 371. Business Information Systems Analysis and Design (4)
BA 372. Business Information Systems Design and Development (4)
BA 479. Business Telecommunications and Networking (4)
BA 480. Information Systems Security (4)
BA 483. Business Analytics (4)
MGMT 364. Project Management (4)

## Business Core Courses (32 credits)

BA 347. International Business (4)
BA 352. Managing Individual and Team

Performance (4)
BA 354. ^Managing Ethics and Corporate Social Responsibility (4)
BA 357. Operations Management (4)
BA 360. Introduction to Financial
Management (4)
BA 375. Applied Quantitative Methods (4)
BA 390. Marketing (4)
BA 466. Integrative Strategic Experience (4)
Baccalaureate core, minor courses or unrestricted electives (26

## credits)

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
SAMPLE FOUR-YEAR PLAN: BUSINESS INFORMATION SYSTEMS
Year 1 (45 credits)
Fall
BA 160. B-Engaged (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for
Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)


## Winter

BA 161. Innovation Nation-Awareness to Action (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for
Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Spring

BA 162. Innovation Nation-Ideas to Reality (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Year 2 (45 credits)

Fall
BA 272. Business Application Development (4)

BA 275. Foundations of Statistical Inference (4)

BA 281. Professional Development (3)
BA 282. Personal, Professional and
Leadership Development I (1)
ECON 201. *Introduction to
Microeconomics (4)

## Winter

BA 211. Financial Accounting (4)
BA 283. Personal, Professional and
Leadership Development II (1)
BA 302. Sustainable Business Operations (4)
ECON 202. *Introduction to
Macroeconomics (4)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## Spring

BA 213. Managerial Accounting (4)
BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)

BA 284. Personal, Professional and
Leadership Development III (1)

## Year 3 (45 credits)

Fall
ACTG 378. Accounting Information
Management (4)
BA 347. International Business (4)
BA 354. Managing Ethics and Corporate
Social Responsibility (4)
Bacc Core-CGI (3)

## Winter

BA 352. Managing Individual and Team
Performance (4)
BA 371. Business Information Systems
Analysis and Design (4)
BA 375. Applied Quantitative Methods (4)
Bacc Core-STS (3)

## Spring

BA 357. Operations Management (4)
BA 372. Business Information Systems
Design and Development (4)
BA 390. Marketing (4)
Electives (3)

## Year 4 (45 credits)

## Fall

BA 360. Introduction to Financial
Management (4)
MGMT 364. Project Management (4)
Electives (7)

## Winter

BA 479. Business Telecommunications and Networking (4)
BA 480. Information Systems Security (4)

## Electives (7)

## Spring

BA 466. Integrative Strategic Experience (4)
BA 483. Business Analytics (4)

## Electives (7)

## Total=180

Pre-Business Information Systems
Major Code: 771

## Major Code: 183

## OPTIONS

## INTERNATIONAL BUSINESS <br> \section*{OPTION}

The International Business option prepares students for positions in organizations engaged in international trade. Students study the economic, political, geographical, and socio-cultural factors that impact business across national boundaries. Areas of greatest opportunity for overseas assignments are with service organizations such as banks, consulting firms and accounting firms; with import/ export firms; with governmental organizations; and in marketing and financial management areas of multinational firms. A career in international business can lead to exciting and rewarding opportunities abroad. Most multinational
business firms, however, hire new employees first for domestic assignments in order to provide them with a thorough knowledge of the firm, its products, and its policies, or for specific assignments in one of the functional areas of the business, before providing overseas opportunities.

Because the majority of employees who eventually hold high-level positions in an international business start in entry-level positions within business areas, all international business students must also complete requirements for a primary discipline within a business. These disciplines include the majors in accountancy, business administration (Entrepreneurship, General Business, and Hospitality Management options), business information systems, finance, management and marketing.

Students earn this option with a minimum of one quarter term of study abroad through an international exchange or study abroad program approved by the College of Business. Students must complete a minimum of 18 quarter credits in business or business-related course work. The successfully completed course work must articulate back to OSU as courses that extend the knowledge and skills attained within the business core (that is, they cannot be used as a direct substitute for a business core course). Within the Arthur Stonehill International Business Exchange program offered through the College of Business, all courses offered by the partner schools are taught in English.

## Course Requirements

BA 347. International Business (4)
BA 348. International Exchange Orientation (1)

BA 349. Impact of Culture on Business (1)
BA XXX. Minimum of 18 credits of business or business-related course work completed on an approved international exchange or study aboard program.

## Total=24

Students must earn this option with one term of study abroad through an approved College of Business international exchange. Courses in these programs are taught in English.

## Option Code: 190

## DESIGN AND INNOVATION

MANAGEMENT (BS, CRED, HBS)
The Design and Innovation Management major is a professional program. Entering students are designated as Pre-Design and Innovation Management majors (major code 911).

The Design and Innovation Management major requirements are divided into two parts.

1. The first part (the Pre-Design and Innovation Management major), usually taken in the first two years, must be completed before formal
admission into the major.
2. The second part (Professional School) is usually taken in the last two years after formal admission into the Design and Innovation Management major.
Summary of Requirements:
Pre-Design and Innovation Management Major (57)
Pre-Design Core Classes (32)
Art, Communications, Economics, Math,
Statistics, and Writing (25)*
Professional School (64-67)
Pro-School Design Core Classes (40)**
Design Option Courses (24-27)
University General Education Requirements (24)

Unrestricted Electives (32-35)
*21 credits from pre-design major satisfy University General Education Requirements.
**8 credits from design major satisfy University General Education Requirements
Total Required for Graduation (180)

## Design Curriculum

The Design and Innovation Management major is a professional program offered through the College of Business.

## Pre-Design Program

Newly admitted students to OSU and all current OSU students who seek to complete an undergraduate design degree program offered by the College of Business (COB) are designated as pre-design majors. The pre-design program requires completion of courses within the first and second year (see core curriculum below) that build a solid foundation for the upper-division design curricula. These courses must be completed before the student is eligible for admission to the professional design program. The pre-design course work may be completed at OSU or any accredited college or university that offers equivalent courses transferable to OSU.

## Professional Design Program

Admission to the professional design program is restricted to those students who have demonstrated an ability to achieve the high standards required for professional studies. Enrollment within each academic option may be limited to the number of students who can be served by the faculty and facilities of that option. Therefore students should strive to meet the minimum eligibility standards of their particular option of choice as well as those of the College of Business itself. Additional information on the proschool process and current competitive GPA levels for each option can be found on the Pro-School Competitive GPA section of the College of Business Advising website.

To apply and be considered for admission, all pre-professional students must meet the following requirements:

- Be declared as a Pre-Design and

Innovation Management major.

- Have a minimum OSU cumulative GPA of 2.5 , and a minimum cumulative GPA of 2.5 in all PreDesign and Innovation Management course work.
- Have completed and received a C- or better in ALL courses within the PreDesign major by the end of spring term before applying.
Students who have completed their pre-design courses at a college or university other than OSU must be admitted to pre-design their first term and apply for the professional program during their first term of attendance.

Admission into the Interior Design option requires completion of DSGN 287, Studio I: Design Communication (4), and submission of a portfolio. The portfolio will expect students to submit work that demonstrates competency in both two-dimensional and three-dimensional design. The following courses are recommended for students who need to further develop those skills:
ART 115. Foundations: 2-D (4)
ART 117. Foundations: 3-D (4)
Design Program Requirements (180)
Design Core Curriculum (72)
The design core curriculum provides students with a broad overview of design thinking and processes;

## Option (24-27)

Options are designed to allow students to extend their professional preparation beyond the introductory level in one or more areas. There are three options available to the Design and Innovation Management major:

1. Apparel Design
2. Design Management
3. Interior Design

All options need to be started in the third year. See an academic advisor for more information.

## Mathematics and Statistics (8)

MTH 111. *College Algebra (4)
ST 201. Principles of Statistics (4)

## Economics (4)

ECON 201. *Introduction to Microeconomics (4)

## Art (10)

ART 101. *Introduction to the Visual Arts (4)
ART 206. * Introduction to Art History -
Western (3)
or ART 205. * Introduction to Art History - Western (3)
or ART 204. *Introduction to Art History - Western (3)

ART 367. *History of Design (3)

## Written and Oral Communication

## (6)

COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical
Discourse (3)
or COMM 218. *Interpersonal
Communication (3)

WR 222. *English Composition (3) or WR 323. *English Composition (3) or WR 327. *Technical Writing (3)

## University General Requirements

 (24)The ART, COMM, ECON, MTH, and
WR classes above meet the university's baccalaureate core requirements for Mathematics, Social Processes and Institutions, Writing II, Speech, Western Culture, Literature and Arts, and Science, Technology and Society. All students must meet the other baccalaureate core requirements and the other requirements for baccalaureate degrees. (See Earning a Degree at OSU.)

## Unrestricted Electives (32-35)

Students are provided elective credits to enable them to achieve a degree of specialization and depth to match their interests.

## Minor (27)

Students are encouraged to choose a non-business university-approved minor that consists of a minimum of 27 credits, with at least 12 credits at the upper-division level. Students are responsible for determining whether the minor has been approved for transcript visibility and to request the notation on their transcript. Students may also choose to complete a coherent set of non-business courses to support their career goals.

## Pre-Design and Innovation <br> Management (Major code 911) <br> First Year (45 credits)

Students entering OSU on the Corvallis campus as their first college experience are required to participate in Innovation Nation, the College of Business LivingLearning Community (LLC). These students will complete the following threecourse sequence during their first year:

## BA 160. B-Engaged (3)

BA 161. Innovation Nation-Awareness to Action (3)
BA 162. Innovation Nation-Ideas to Reality (3)

Students who transfer to OSU from another academic institution will complete the following courses:
BA 101. Business Now (6)
BA 170. Business Insights (2)
All other students, including students completing their degree via OSU Extend Campus and current OSU students who are changing their major to design, will complete the following course:
BA 101. Business Now (6)
All students should also complete:
ART 101. *Introduction to the Visual Arts (4)
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal
Communication (3)

MTH 111. *College Algebra (4)
WR 121. *English Composition (3)
General Baccalaureate Core courses (17) Elective credits (5-8)
Note: Students entering design programs should have basic art and illustration skills. ART 115, Foundations: 2-D (4), and ART 117, Foundations: 3-D (4), are highly recommended elective courses.

## Second Year (45 credits)

ART 206. * Introduction to Art History Western (3)
or ART 205. * Introduction to Art History

- Western (3)
or ART 204. *Introduction to Art History
- Western (3)

BA 215. Fundamentals of Accounting (4)
BA 253. Professional Development (4)
DHE 221. Computer Aided Apparel Design I (3)
DHE 281. Drawing and Sketching (4)
DSGN 244. Color Innovation (4)
DSGN 255. Textiles (4)
ECON 201. *Introduction to
Microeconomics (4)
ST 201. Principles of Statistics (4)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)
Baccalaureate core, minor courses, or unrestricted electives (8)
Students interested in Interior Design should complete the following course during the second year:
DHE 287. Studio I: Design Communication (4)

## Professional Design and Innovation

 Management (Major code 912)
## Third Year (45 credits)

ART 367. *History of Design (4) or *ENGR 350. Sustainable Engineering (3)
(Required for Housing Studies option.)
BA 260. Introduction to Entrepreneurship (4)
BA 352. Managing Individual and Team Performance (4)
BA 354. ^Managing Ethics and Corporate Social Responsibility (4)
BA 390. Marketing (4)
DSGN 341. Design Thinking and Process Innovation (4)
MGMT 364. Project Management (4)
Interior Design option-specific course work (12-15) (See option descriptions on next page.)
Baccalaureate core, minor courses, or unrestricted electives (2-5)

## Fourth Year (45 credits)

DSGN 475. *Global Sourcing of Textiles, Apparel and Footwear (4)
MRKT 492. Consumer Behavior (4)
MRKT 495. Retail Management (4)
Interior Design option-specific course work (12) (See option descriptions on next page.)

Baccalaureate core, minor courses, or unrestricted electives (21)

## Total=180

## SAMPLE FOUR-YEAR PLAN: DESIGN AND INNOVATION MANAGEMENT <br> First Year (44) <br> Fall <br> ART 101. *Introduction to the Visual Arts (4) <br> BA 160. B-Engaged (3) <br> MTH 111. *College Algebra (4) <br> WR 121. *English Composition (3) <br> Bacc Core Science (4)

## Winter

BA 161. Innovation Nation-Awareness to Action (3)
Bacc Core Fitness (2)
Bacc Core Speech (3)
Bacc Core Science (4)

## Spring

BA 162. Innovation Nation-Ideas to Reality (3)

Bacc Core Cultural Diversity (3)
Bacc Core Difference, Power, and
Discrimination (3)
Bacc Core Science (4)

## Second Year (45)

Fall
ART 206. *Introduction to Art History-
Western (3)
BA 215. Fundamentals of Accounting (4)
DSGN 255. Textiles (4)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## Winter

BA 253. Professional Development (4)
DSGN 221. Computer Aided Design I (3)
DSGN 226. Specification Buying (4)
or DSGN 287. Studio I: Design
Communication (4)
DSGN 281. Drawing and Sketching Interiors
(4)

## Spring

DSGN 244. Color Innovation (4)
ECON 201. *Introduction to
Microeconomics (4)
ST 201. Principles of Statistics (4)
Bacc Core (4)

## Third Year (47)

Fall
BA 260. Introduction to Entrepreneurship (4)

BA 352. Managing Individual and Team Performance (4)
DSGN 341. Design Thinking and Process Innovation (4)
DSGN 387. Studio III: Advanced Design
Communication (4)

## Winter

BA 390. Marketing (4)
DSGN 388. Studio IV: Hospitality Design (4)
DSGN 475. Global Sourcing of Textiles, Apparel, and Footwear (4)
or Bacc Core Contemporary Global Issues (3)

MGMT 364. Project Management (4)

## Spring

ART 367. History of Design (3)
BA 354. ${ }^{\wedge}$ Managing Ethics and Corporate
Social Responsibility (4)

DSGN 383. Building Construction and Materials (3)
DSGN 394. Studio V: Lighting Design (4)
Fourth Year (44)
Fall
DSGN 464. Contemporary History of Interiors and Housing (4)
DSGN 488. Studio VI: Healthcare Design (4) Electives (7)

## Winter

MRKT 492. Consumer Behavior (4)
MRKT 495. Retail Management (4)
Electives (7)

## Spring

DSGN 495. Studio VII: Senior Thesis II (4) Electives (10)

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Pre-Design and Innovation
Management major code 911
Major Code: 912


## OPTIONS

## APPAREL DESIGN OPTION

The apparel design program focuses on market and consumer driven design. The program is designed to prepare students to be professionally ready for jobs the athletic and outdoor industry. Graduates of the program will be literate in the business of fashion, design, production and marketing.

After completing the pre-design core, students apply for acceptance into the professional program and the Apparel Design option.

## Required (45)

DHE 233: History of Contemporary Fashion (4)

DHE 330. ${ }^{\wedge}$ Fashion Forecasting and Market Analysis (4)
DHE 475. *Global Sourcing of Textiles,
Apparel, and Footwear (4)
DSGN 226. Specification Buying (4)
DSGN 327. Performance Apparel
Innovation 1 (4)
DSGN 328. Digital Design for Apparel (3)
DSGN 329. Sportswear Industry
Collaboration (3)
DSGN 335. Apparel and Footwear Value Chain (3)
DSGN 355. Specification and Evaluation of
Performance Materials (4)
DSGN 427. Performance Apparel
Innovation II (4)
DSGN 428. Technical Sportswear Sizing and Fit (4)
DSGN 429. Functional Design and Product Development (4)

## Total=45 credits

## Footnote:

* Baccalaureate Core
$\wedge$ Writing Intensive Course
Option Code: $\mathbf{7 8 0}$


## DESIGN MANAGEMENT OPTION

The Design Management option instructs students on how to develop innovationdriven design strategies to implement into brand and service/product development strategies. This option unites the perspectives of design and integrative thinking, sustainability, entrepreneurship, and management.

## Required (24)

DSGN 342. Introduction to Design
Management (4)
DSGN 343. Idea Visualization (4)
DSGN 377. Retail and Merchandising (4)
DSGN 440. Design Research (4)
DSGN 441. Service Design Innovation (4)
DSGN 442. Materiality and Making Field
Project (4)

## Total=24

## OPTION CODE: 781

## INTERIOR DESIGN OPTION

The Interior Design option offers students the opportunity to focus on commercial design with an emphasis on space planning, heating and lighting plans, and interior construction specifications.

After completing the pre-design core, students apply for acceptance into the professional program and the Interior Design option.

## Required (31)

DHE 283. Building Construction and Materials (3)
DHE 287. Studio I: Design Communication (4)

DHE 387. Studio III: Advanced Design Communication (4)
DHE/DSGN 388. Studio IV: Hospitality Design (4)
DHE/DSGN 394. Studio V: Lighting Design (4)

DHE 464. Contemporary History of
Interiors and Housing (4)
DHE/DSGN 488. Studio VI: Healthcare Design (4)
DHE 495. Studio VII: Senior Thesis II (4)

## Total=31

Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Core (WIC)
Option Code: 224


## FINANCE (BA, BS, CRED, HBA, HBS)

The goal of the finance program at OSU is to prepare students for careers in institutional finance, which includes careers in banking, brokerage, insurance and other fields.

Individuals entering a career with a financial institution have many opportunities open to them. Many who go into banking select career paths in either operations or lending. Within the lending area, finance majors can specialize in installment credit lending to consumers of durable goods, mortgage lending to
home builders and buyers, or commercial lending to help finance the growth of businesses.

Men and women entering the securities industry find careers as stock and bond brokers, security analysts or portfolio managers. Individuals choosing the area of insurance typically enter company operations through either claims or underwriting positions. Those with sales positions can choose to work either with corporations or individuals as a client base. In addition, many decide to work for the government as finance personnel in charge of revenue and expenditure programs.

Financial managers engage in many activities designed to ensure the efficient use of an individual's or organization's capital resources. The finance field involves the management of funds in our economic system. Because financial managers deal with other people's money, finance is a career choice for individuals who enjoy working with people and who desire challenging assignments.

The BS/BA in finance has been accepted into the Chartered Financial Analyst ${ }^{\circledR}$ (CFA) Institute University Recognition Program. This status is granted to institutions whose degree program or programs incorporate at least 70 percent of the CFA Program Candidate Body of Knowledge (CBOK), which provides students with a solid grounding in the CBOK and positions them well for the CFA exams.

Finance major requirements are divided into two parts. The first part (the pre-finance major), usually taken in the first two years, must be completed before formal admission into the Finance major. The second part (Professional School) is usually taken in the last two years after formal admission into the Finance major.

## Summary of Requirements:

Pre-Finance Major (52-57)
Pre-Business Core Classes (34-39)
Math, Economics, Writing and
Communications (18)*
Professional School (64)
Pro-School Business Core Classes (28)
Finance Courses (36)
University General Education Requirements (40)

Unrestricted Electives (19-24)
*10 credits from pre-business major satisfy University General Education Requirements.

## Total Required for Graduation

 (180)
## Finance Courses in the Professional

 Program-Finance ( 36 credits)Finance students must complete 20 credits in required courses; 12 credits of elective finance courses; and 4 credits of elective finance-specific courses.

## Required courses include (20 credits):

ACTG 378. Accounting Information Management (4)

FIN 340. Finance (4)
FIN 341. Investments (4)
FIN 342. Advanced Financial Management (4)

FIN 445. International Financial
Management (4)
Finance Electives-Select three of the following courses (12 credits):
FIN 441. Financial Institutions (4)
FIN 442. Financial Statement Analysis (4)
FIN 443. Portfolio Management (4)
FIN 444. Financial Risk Management (4)
FIN 499. Selected Topics in Finance (4)
Finance-Specific Electives-Select one of the following courses (4 credits):
ACTG 317. External Reporting I (4)
ECON 330. Money and Banking (4)
ECON 340. International Economics (4)
The Finance program typically begins in students' third year with a lock-step series of finance courses designed to provide a solid knowledge base. During fall term, students take FIN 340, followed by FIN 341 and ACTG 378 during winter term and FIN 342 during spring term. FIN 445 follows during students' fourth year. Also during their fourth-year students may take electives that correspond to their career interests.

## Business Administration/Finance Curricula

The undergraduate curriculum in business administration reflects the increasingly complex economic, social, and technological aspects of modern business decision-making. Course work emphasizes the development of effective decisionmaking, an understanding of personal values and motivation, and the awareness of the interrelationships between business and society.

## Pre-Business Program

Newly admitted students to OSU and all current OSU students who seek to complete an undergraduate degree program offered by the College of Business (COB) are designated as pre-Business majors (including pre-Accountancy, pre-BIS, preBusiness, pre-Finance, pre-Management and pre-Marketing). The pre-business program requires completion of courses within the first and second year (see core curriculum below) that build a solid foundation for the upper-division business curricula. These courses must be completed before the student is eligible for admission to the professional business program. The pre-business course work may be completed at OSU or any accredited college or university that offers equivalent courses transferable to OSU.

## Professional Business Program

Admission to the professional business program is restricted to those students who have demonstrated an ability to achieve the high standards required for professional studies. Enrollment within each academic discipline (major or op-
tion) is limited to the number of students who can be served by the faculty and facilities of that major/option.

Therefore, students should strive to meet the minimum eligibility standards of their particular major of choice as well as those of the College of Business itself. Minimum standards for a particular major can often be higher. More information on the pro-school process and current competitive GPA levels for each major can be found on the Pro-School Competitive GPA section of the College of Business Advising website.
Students must apply for admission to the professional business program. To be eligible to apply, students must earn COB grades of C- or better, have 90 credits by the end of the application term, have a minimum COB GPA of 2.5 , and meet the minimum standards for their particular major of choice in the All-Inclusive Business GPA. The All-Inclusive Business GPA includes all business program course work taken from OSU and transfer institution(s). Students earning an AllInclusive Business GPA of 3.0 or above will be assured admission to the professional business program, but it does not guarantee admittance into the major of their choice. Students with an AllInclusive Business GPA less than 3.0 will be admitted to an academic discipline (major or option) with available capacity using the following criteria: compliance with entrance requirements for the major/option; their rank order based on their All-Inclusive Business GPA; and the contribution of the student to the diversity of viewpoints within the college.

Students who have completed their pre-business courses at a college or university other than OSU must be admitted to pre-business their first term and apply for the professional program during their first term of attendance.

Students may apply to the Finance major from any of the pre-business majors, including pre-Accountancy, pre-BIS, preBusiness, pre-Finance, pre-Management and pre-Marketing.

## Business Administration/Finance Program Requirements (180) Business Administration Core Curriculum (62-67)

The business administration core curriculum provides students with a broad overview of business; basic skills in accounting and quantitative methods; an understanding of the legal and social environment of business; a background in management and organizational behavior, marketing, finance, and operations management; an understanding of the entrepreneurial process; and the opportunity to integrate course work and further develop decision-making skills through the analysis of business cases.

## Finance (36)

Finance students must complete 36 credits of finance courses in the professional program. See an academic advisor for more information.

## Mathematics (4)

Basic mathematics requirements: MTH 241. *Calculus for Management and Social Science (4)

## Economics (8)

ECON 201. *Introduction to Microeconomics (4)
ECON 202. *Introduction to Macroeconomics (4)

## Written and Oral Communication

 (6)Business students also must take:
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal
Communications (3)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## University General Requirements

 (40)MTH 241, ECON 201/ECON 202, WR 222, WR 323 or WR 327, and COMM 111 or COMM 114 meet the university's baccalaureate core requirements for mathematics, social processes and institutions, writing II, and speech, respectively. All students must meet the other baccalaureate core requirements and the other requirements for baccalaureate degrees. (See Earning a Degree at OSU.)

## Unrestricted Electives (19-24)

Students are provided elective credits to enable them to achieve a degree of specialization and depth to match their interests. Students are encouraged to choose a non-business univer-sity-approved minor that consists of a minimum of 27 credits, with at least 12 credits at the upper-division level. Students are responsible for determining whether the minor has been approved for transcript visibility and to request the notation on their transcript. Students may also choose to complete a coherent set of non-business courses to support their career goals.

## SAMPLE SCHEDULE

Pre-Finance (Major code 772)

## First Year (45 credits)

Students entering OSU on the Corvallis campus as their first college experience are required to participate in Innovation Nation, the College of Business LivingLearning Community (LLC). These students will complete the following threecourse sequence during their first year:

## BA 160. B-Engaged (3)

BA 161. Innovation Nation-Awareness to Action (3)

BA 162. Innovation Nation-Ideas to Reality (3)
Students who transfer to the Corvallis campus from another college or university, and current OSU Corvallis-campus students who are changing their major to finance, will complete the following courses:

BA 101. Business Now (6)
BA 280. Business Insights (2)
All other students, including students completing their pre-finance degree requirements via OSU Ecampus or another college/university, will complete the following course:
BA 101. Business Now (6)
All students should also complete:
COMM 111. *Public Speaking (3) or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal Communications (3)
MTH 241. *Calculus for Management and Social Science (4)
Baccalaureate core, unrestricted electives (29-32)

## Second Year (45 credits)

Corvallis-campus students in the prebusiness or pre-finance major should complete the following courses:
BA 281. Professional Development (3)
BA 282. Personal, Professional and Leadership Development I (1)
BA 283. Personal, Professional and Leadership Development II (1)
BA 284. Personal, Professional and Leadership Development III (1)
All Ecampus students, and all Corvalliscampus students transferring into the college and eligible to apply to the professional school should complete:
BA 381. Personal and Professional Development (4)

All second-year students should also complete:
BA 211. Financial Accounting (4)
BA 213. Managerial Accounting (4)
BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)

BA 275. Foundations of Statistical Inference (4)

BA 302. Business Process Management (4)
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)
Baccalaureate core, minor or unrestricted electives (8)

## Professional Finance (Major code

 182)
## Required Finance Courses (36 <br> credits):

ACTG 378. Accounting Information
Management (4)
FIN 340. Finance (4)
FIN 341. Investments (4)
FIN 342. Advanced Financial Management (4)

FIN 445. International Financial
Management (4)
Finance Electives-Select three of the
following courses (12 credits):
FIN 441. Financial Institutions (4)
FIN 442. Financial Statement Analysis (4)

FIN 443. Portfolio Management (4)
FIN 444. Financial Risk Management (4)
Finance-Specific Electives-Select one
of the following courses (4 credits):
ACTG 317. External Reporting I (4)
ECON 330. Money and Banking (4)
ECON 340. International Economics (4)

## Business Core Courses (28 credits)

BA 347. International Business (4)
BA 352. Managing Individual and Team Performance (4)
BA 354. $\wedge$ Managing Ethics and Corporate Social Responsibility (4)
BA 357. Operations Management (4)
BA 375. Applied Quantitative Methods (4)
BA 390. Marketing (4)
BA 466. Integrative Strategic Experience (4)
Baccalaureate core, minor or unrestricted electives ( 26 credits)

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
SAMPLE FOUR-YEAR PLAN:
FINANCE
Year 1 (45 credits)
Fall
BA 160. B-Engaged (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for
Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)


## Winter

BA 161. Innovation Nation-Awareness to Action (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for
Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Spring

BA 162. Innovation Nation-Ideas to Reality (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Year 2 (45 credits)

Fall
BA 211. Financial Accounting (4)
BA 275. Foundations of Statistical Inference (4)

BA 281. Professional Development (3)
BA 282. Personal, Professional and Leadership Development I (1)
ECON 201. *Introduction to
Microeconomics (4)

## Winter

BA 213. Managerial Accounting (4)
BA 283. Personal, Professional and
Leadership Development II (1)
BA 302. Sustainable Business Operations (4)
ECON 202. *Introduction to
Macroeconomics (4)
Elective (1)

## Spring

BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship
(4)

BA 284. Personal, Professional and
Leadership Development III (1)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)
Electives (3)
Year 3 ( 45 credits)
Fall
ACTG 317. External Reporting I (4)
BA 354. Managing Ethics and Corporate
Social Responsibility (4)
FIN 340. Finance (4)
Bacc Core-CGI (3)

## Winter

BA 352. Managing Individual and Team Performance (4)
BA 375. Applied Quantitative Methods (4)
FIN 341. Investments (4)
Bacc Core-STS (3)

## Spring

ACTG 378. Accounting Information
Management (4)
BA 357. Operations Management (4)
BA 370. Business Information Systems Overview (4)
BA 390. Marketing (4)
FIN 342. Advanced Financial Management (4)

## Year 4 (45 credits)

## Fall

BA 347. International Business (4)
FIN 441. Financial Institutions (4)
FIN 444. Financial Risk Management (4) Electives (3)

## Winter

FIN 442. Financial Statement Analysis (4) Electives (11)

## Spring

BA 466. Integrative Strategic Experience (4)
FIN 445. International Financial
Management (4)
Electives (7)
Total=180
Pre-Professional Finance Major Code: 772

## Major Code: 182

## INTERNATIONAL BUSINESS

 OPTIONThe International Business option prepares students for positions in organizations engaged in international trade. Students study the economic, political, geographical, and socio-cultural factors that impact business across national boundaries. Areas of greatest opportunity for overseas assignments are with service organizations such as banks, consulting firms and accounting firms; with import/ export firms; with governmental organizations; and in marketing and financial management areas of multinational firms. A career in international business can lead to exciting and rewarding opportunities abroad. Most multinational business firms, however, hire new employees first for domestic assignments in order to provide them with a thorough knowledge of the firm, its products, and its policies, or for specific assignments in one of the functional areas of the business, before providing overseas opportunities.
Because the majority of employees who eventually hold high-level positions in an international business start in entry-level positions within business areas, all international business students must also complete requirements for a primary discipline within a business. These disciplines include the majors in accountancy, business administration (Entrepreneurship, General Business, and Hospitality Management options), business information systems, finance, management and marketing.

Students earn this option with a minimum of one quarter term of study abroad through an international exchange or study abroad program approved by the College of Business. Students must complete a minimum of 18 quarter credits in business or business-related course work. The successfully completed course work must articulate back to OSU as courses that extend the knowledge and skills attained within the business core (that is, they cannot be used as a direct substitute for a business core course). Within the Arthur Stonehill International Business Exchange program offered through the College of Business, all courses offered by the partner schools are taught in English.

## Course Requirements

BA 347. International Business (4)
BA 348. International Exchange Orientation (1)

BA 349. Impact of Culture on Business (1)
BA XXX. Minimum of 18 credits of business or business-related course work completed on an approved international exchange or study aboard program.

## Total=24

Students must earn this option with one term of study abroad through an ap-
proved College of Business international exchange. Courses in these programs are taught in English.

## Option Code: 190

## HOSPITALITY MANAGEMENT

 (BA, BS, CRED)Offered only at OSU-Cascades campus.
The undergraduate curriculum in hospitality management provides students with the knowledge necessary to become leaders, executives and owners in the hospitality industry. The course work provides students with skills in service, operations management, hospitality technology, food and beverage operations as well as basic business fundamentals in marketing and accounting.

## Baccalaureate Core Classes (51-59)

Fitness (2 courses) (2,1)
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC course (1-2)
Mathematics (1 course)
MTH 111. *College Algebra (4)
Speech (1 course)
COMM 111. *Public Speaking (3)
Writing I (1 course)
WR 121. *English Composition (3)
Writing II (1 course) (3-4)
Biological Science (1 course) (4)
Biological Science or Physical Science (1-2 courses) (4-5)
Cultural Diversity (1 course) (3-4)
Literature and the Arts (1 course) (3-4)
Physical Science (1 course) (4-5)
Social Processes and Institutions (1 course)
ECON 201. *Introduction to
Microeconomics (4)
Western Culture ( 1 course) (3-4)
Difference, Power and Discrimination (1 course) (3-4)
Contemporary Global Issues (1 course)
NR 350. *Sustainable Communities (4)
Science, Technology and Society ( 1 course) (3-4)

## General Electives (13)

MTH 245. *Mathematics for Management, Life and Social Sciences (4)
Plus 3 Additional Courses (9)

## Hospitality Core Classes (66)

Food and Beverage (21)
Offered at COCC's Cascade Culinary
Institute (http://www.cocc.edu/ uploadedfiles/departments_/admissions/ catalog/cocc_14-15_catalog-coursedescripts.pdf)
CUL 110. *Culinary Foundations I** (4)
CUL 150. *Hospitality Cost Control** (4)
[Can't find in COCC catalog]
CUL 190. *Introduction to Food Service Operations - Elevation Lunch** (5) [Can't find in COCC catalog]
CUL 200. *Comprehensive Kitchen Operations** (4) [Can't find in COCC catalog]
Advanced Restaurant Management and Ownership (4) [Approval pending submission and approval of proposal.]
**Cascade Culinary Institute

## General (45)

BA 487. *Hospitality Financial Management (4)

HM 101. Introduction to Hospitality (4)
HM 230. Lodging Management (4)
HM 235. Hospitality Law and Labor Relations (4)
HM xxx. Hospitality Technology (4) [Approval pending submission and approval of proposal.]
HM xxx. Core Competencies in the Hospitality Industry (4) [Approval pending submission and approval of proposal.]
HM xxx. Hospitality Revenue Management
(4) [Pending submission and approval of proposal.]
HM 210. Hospitality Internship 1 (300 hours) (3)
HM 210. Hospitality Internship 2 (300 hours) (3)
HM 210. Hospitality Internship 3 (300 hours) (3)
HM 420. Revenue Management and Pricing (4)

HM xxx. Hospitality Technology Lab
(4) [Approval pending submission and approval of proposal.]
HM xxx. ^Advanced Hospitality (Capstone) (4) [Approval pending submission and approval of proposal.]

## Business Core (Business and

## Entrepreneurship Minor) (28)

BA 215. *Fundamentals of Accounting (4)
BA 260. *Introduction to Entrepreneurship (4)

BA 352. *Managing Individual and Team Performance (4)
or BA 351. Managing Organizations (4)
BA 360. *Introduction to Financial
Management (4)
BA 390. *Marketing (4)
ECON 201. *Introduction to
Microeconomics (4) (Credits applied in
Bacc Core section above)
Required Business Minor Elective (4)
Ecotourism and Sustainability
Specialization (12)
Sustainable Product and Service Delivery
(3) [Approval pending submission and approval of proposal.]
Sustainable Food Production Systems
Overview (3) [Approval pending submission and approval of proposal.]
SUS 420. *Social Dimensions of Sustainability (3

## Hospitality Electives (12)

Choose 12 credits from below:
HM xxx. Vacation Property Management (4) [Approval pending submission and approval of proposal.]
HM xxx. Principles of Hospitality Real Estate - Asset Management (4) [Approval pending submission and approval of proposal.]
HM xxx. Online Marketing and Reputation Management (4) [Approval pending submission and approval of proposal.]
HM xxx. Hospitality Facilities Design (4) [Approval pending submission and approval of proposal.]
HM xxx. Hospitality Franchising (4) [Approval pending submission and approval of proposal.]

## Language Option for Students

 Seeking a Bachelor of Arts Only (18)Foreign Language Series: 111, 112, 113, 211, 212, 213

## Total=181-190

Footnotes:

* Baccalaureate Core Course
^ Writing Intensive Course (WIC)


## Major Code: 291

## INNOVATION MANAGEMENT

(BA, BS, HBA, HBS)
The Innovation Management major is a double-degree program. It can only be added to a primary OSU non-business major.

Graduates of the IMDD program will gain expertise in developing new ideas and inventions and learn how to take these ideas through the innovation and commercialization process. The intent is to build upon the "technical" skills developed by students in their primary major while giving them the tools to become more productive and innovative members of the organizations where they will work. It will provide students with a foundation in business basics, such as marketing and accounting, while also building students' expertise in the innovation and commercialization process.

This major is limited to 45 qualified students per year. Interested students should consult with the College of Business Advising Office, Austin Hall 122, 541-737-3716, for more detail about the declaration requirements and process.

A College of Business GPA of 2.50 (OSU grades only) and a minimum grade of C - or above is required in all completed BA course work that is relevant to the degree program. Students may not S/U courses in this major.

## Requirements

BA 215. Fundamentals of Accounting (4)
BA 260. Introduction to Entrepreneurship (4)

BA 351. Managing Organizations (4)
or BA 352. Managing Individual and Team Performance (4)
BA 353. ${ }^{\wedge}$ Professional Development (4)
BA 363. Technology and Innovation
Management (4)
BA 390. Marketing (4)
BA 458. Innovation and New Product
Development (4)
BA 468. Technology Commercialization (4)
MGMT 452. Leadership (4)

## Total=36

Additional course work that may be completed to achieve 24 credits unique to the Innovation Management degree program: BA 460. Venture Management (4) BA 464. New Venture Financing (4)
MRKT 488. Personal Selling (4)

## Total=12

Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC
Major Code: $\mathbf{8 5 1}$


## INTERNATIONAL STUDIES (BA, HBA)

See International Programs for information on the International Studies Degree.
Major Code: 910

## MANAGEMENT (BA, BS, CRED,

 HBA, HBS)The management curriculum helps prepare students for careers as managers and supervisors in goods-producing and service enterprises. Students obtain a solid grounding in the management of systems, personnel, and quality. The integrative focus of the program also provides excellent preparation for graduatelevel studies in law, urban and regional planning, public services administration, and health care administration.

Management is the process of planning, organizing, leading and controlling all that encompasses human, material and financial resources in an organizational environment. A management degree means that you have learned the concepts of getting things done through others within organizations.

Management major requirements are divided into two parts. The first part (the pre-management major), usually taken in the first two years, must be completed before formal admission into the management major. The second part (Professional School) is usually taken in the last two years after formal admission into the management major.
Summary of Requirements:
Pre-Management Major (53)
Pre-Business Core Classes (35)
Math, Economics, Writing and
Communications (18) ${ }^{1}$
Professional School (70)
Pro-School Business Core Classes (38)
Management Courses (32)
University General Education Requirements (40)

Unrestricted Electives (17)
${ }^{1}=10$ credits from Pre-business major satisfy University General Education Requirements.
Total Required for Graduation (180)

## Management Courses in the Professional ProgramManagement (32 credits)

Management students must complete 32 credits in the professional program: 24 credits in required courses, 4 credits in 1 of the 6 elective courses, and 4 credits of experiential learning.

## Required Courses Include:

MGMT 364. Project Management (4)
MGMT 446. Cross-Cultural Management (4) or MGMT 448. Employee Recruitment and Selection (4)

MGMT 452. Leadership (4)
MGMT 453. Human Resources Management (4)

MGMT 455. Influence and Negotiation (4)
MGMT 457. Supply Chain Strategy (4)

## Electives:

Select one of the following courses:
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 363. Technology and Innovation
Management (4)
BA 432. Environmental Law, Sustainability, and Business (4)
BA 447. Topics in International Business (4)
BA 460. Venture Management (4)
BA 463. Family Business Management (4)

## Experiential Learning:

Select one of the following experiential activities:

Professional internship: Complete BA 410, Internship, with minimum of 4 credits

Research project: Complete BA 403, Thesis; or BA 405, Reading and Conference; or BA 407, Seminar, with minimum of 4 credits

International experience: Complete an international study abroad or exchange that transfers a minimum of 4 academic credits to OSU.

Mentoring: Complete the Introduction to Mentoring and Coaching Seminar series (minimum of 4 credits). This series requires participation in mentor activities.

Experiential learning/entrepreneurship (solving specific problems of local businesses or non-profit organizations): Complete BA 406, Projects, with a minimum of 4 credits.

## Business Administration/ Management Curricula

The undergraduate curriculum in business administration reflects the increasingly complex economic, social, and technological aspects of modern business decision-making. Course work emphasizes the development of effective decisionmaking, an understanding of personal values and motivation, and the awareness of the interrelationships between business and society.

## Pre-Business Program

Newly admitted students to OSU and all current OSU students who seek to complete an undergraduate degree program offered by the College of Business (COB) are designated as pre-business majors (including pre-Accountancy, pre-BIS, preBusiness, pre-Finance, pre-Management and pre-Marketing). The pre-business program requires completion of courses within the first and second year (see core curriculum below) that build a solid foundation for the upper-division business curricula. These courses must be completed before the student is eligible for admission to the professional business program. The pre-business course
work may be completed at OSU or any accredited college or university that offers equivalent courses transferable to OSU.

## Professional Business Program

Admission to the professional business program is restricted to those students who have demonstrated an ability to achieve the high standards required for professional studies. Enrollment within each academic discipline (major or option) is limited to the number of students who can be served by the faculty and facilities of that major/option.

Therefore students should strive to meet the minimum eligibility standards of their particular major of choice as well as those of the College of Business itself. Minimum standards for a particular major can often be higher. More information on the pro-school process and current competitive GPA levels for each major can be found on the Pro-School Competitive GPA section of the College of Business Advising website.

Students must apply for admission to the professional business program. To be eligible to apply, students must earn COB grades of C- or better, have 90 credits by the end of the application term, have a minimum COB GPA of 2.5 , and meet the minimum standards for their particular major of choice in the All-Inclusive Business GPA. The All-Inclusive Business GPA includes all business program course work taken from OSU and transfer institution(s). Students earning an AllInclusive Business GPA of 3.0 or above will be assured admission to the professional business program, but it does not guarantee admittance into the major of their choice. Students with an AllInclusive Business GPA less than 3.0 will be admitted to an academic discipline (major or option) with available capacity using the following criteria: compliance with entrance requirements for the major/option; their rank order based on their All-Inclusive Business GPA; and the contribution of the student to the diversity of viewpoints within the college.
Students who have completed their pre-business courses at a college or university other than OSU must be admitted to pre-business their first term and apply for the professional program during their first term of attendance.

Students may apply to the Management major from any of the pre-business majors, including pre-Accountancy, pre-BIS, pre-Business, pre-Finance, preManagement and pre-Marketing.

## Business Administration/ <br> Management Program <br> Requirements (180)

## Business Administration Core Curriculum (73)

The business administration core curriculum provides students with a broad overview of business; basic skills in accounting and quantitative methods; an understanding of the legal and social environment of business; a background in management and organizational behavior, marketing, finance, and operations management; an understanding of the entrepreneurial process; and the opportunity to integrate course work and further develop decision-making skills through the analysis of business cases.

## Management (32)

Management students must complete 32 credits of management courses in the professional program. See an academic advisor for more information.

## Mathematics (4)

Basic mathematics requirements:
MTH 241. *Calculus for Management and Social Science (4)

## Economics (8)

ECON 201. *Introduction to Microeconomics (4)

## ECON 202. *Introduction to

 Macroeconomics (4)
## Written and Oral Communication

 (6)Business students also must take:
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal Communication (3)
WR 222. *English Composition (3) or WR 323. *English Composition (3) or WR 327. *Technical Writing (3)

## University General Requirements (40)

MTH 241, ECON 201/ECON 202, WR 222, WR 323 or WR 327, and COMM 111 or COMM 114 meet the university's baccalaureate core requirements for mathematics, social processes and institutions, writing II, and speech, respectively. All students must meet the other baccalaureate core requirements and the other requirements for baccalaureate degrees. (See Earning a Degree at OSU.)

## Unrestricted Electives (17)

Students are provided elective credits to enable them to achieve a degree of specialization and depth to match their interests. Students are encouraged to choose a non-business univer-sity-approved minor that consists of a minimum of 27 credits, with at least 12 credits at the upper-division level. Students are responsible for determining whether the minor has been approved for transcript visibility and to request the notation on their transcript. Students may also choose to complete a coherent set of non-business courses to support their career goals.

## SAMPLE SCHEDULE <br> Pre-Management (Major code 773)

First Year (45 credits)
Students entering OSU on the Corvallis campus as their first college experience are required to participate in Innovation Nation, the College of Business LivingLearning Community (LLC). These students will complete the following threecourse sequence during their first year:
BA 160. B-Engaged (3)
BA 161. Innovation Nation-Awareness to Action (3)
BA 162. Innovation Nation-Ideas to Reality (3)
Students who transfer to OSU from another college or university will complete the following courses:
BA 101. Business Now (6)
BA 170. Business Insights (2)
All other students, including students completing their pre-business or premanagement degree requirements via OSU Extend Campus or at another college/university, will complete the following course:
BA 101. Business Now (6)
All students should also complete:
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal
Communication (3)
MTH 241. *Calculus for Management and Social Science (4)
Baccalaureate core, unrestricted electives (29-32)

## Second Year (45 credits)

Corvallis-campus students in the pre-
business or pre-management major should complete the following courses:
BA 281. Professional Development (3)
BA 282. Personal, Professional and Leadership Development I (1)
BA 283. Personal, Professional and
Leadership Development II (1)
BA 284. Personal, Professional and
Leadership Development III (1)
All Ecampus students and all Corvalliscampus students transferring into the college and eligible to apply to the professional school should complete:
BA 381. Personal and Professional Development (4)
All second-year students should also complete:
BA 211. Financial Accounting (4)
BA 213. Managerial Accounting (4)
BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)
BA 275. Foundations of Statistical Inference (4)

BA 302. Business Process Management (4)
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)

WR 222. *English Composition (3)
or WR 323. *English Composition (3) or WR 327. *Technical Writing (3)
Baccalaureate core, minor or unrestricted electives (8)

## Professional Management (Major

 code 196)
## Required Management Courses

(32 credits)
MGMT 364. Project Management (4)
MGMT 446. Cross-Cultural Management (4) or MGMT 448. Employee Recruitment and Selection (4)
MGMT 452. Leadership (4)
MGMT 453. Human Resources Management (4)

MGMT 455. Influence and Negotiation (4)
MGMT 457. Supply Chain Strategy (4)

## Management Electives

Select one of the following courses (4 credits):
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 363. Technology and Innovation Management (4)
BA 447. Topics in International Business (4)
BA 460. Venture Management (4)
BA 463. Family Business Management (4)

## Experiential Learning:

Select one of the following
experiential activities ( 4 credits):
Professional internship: Complete BA 410, Internship with minimum of 4 credits

Research project: Complete BA 403,
Thesis; or BA 405, Reading and Confer-
ence; or BA 407, Seminar, with minimum of 4 credits

International experience: Complete an international study abroad or exchange that transfers a minimum of 4 academic credits to OSU.

Mentoring: Complete the Introduction to Mentoring and Coaching Seminar series (minimum of 4 credits). This series requires participation in mentor activities.

Experiential learning/entrepreneurship (solving specific problems of local businesses or non-profit organizations): Complete BA 406, Projects, with a minimum of 4 credits.

## Business Core Courses (36 credits)

BA 347. International Business (4)
BA 352. Managing Individual and Team Performance (4)
BA 354. ^Managing Ethics and Corporate Social Responsibility (4)
BA 357. Operations Management (4)
BA 360. Introduction to Financial
Management (4)
BA 370. Business Information Systems Overview (4)
BA 375. Applied Quantitative Methods (4)
BA 390. Marketing (4)
BA 466. Integrative Strategic Experience (4)

## Baccalaureate core, minor or unrestricted electives (22 credits)

Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)


## SAMPLE FOUR-YEAR PLAN: MANAGEMENT

Year 1 (45 credits)
Fall
BA 160. B-Engaged (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Winter

BA 161. Innovation Nation-Awareness to Action (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Spring

BA 162. Innovation Nation-Ideas to Reality (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Year 2 (45 credits)

## Fall

BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)
BA 281. Professional Development (3)
BA 282. Personal, Professional and
Leadership Development I (1)
Electives (3)

## Winter

BA 211. Financial Accounting (4)
BA 275. Foundations of Statistical Inference (4)

BA 283. Personal, Professional and
Leadership Development II (1)
ECON 201. *Introduction to
Microeconomics (4)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## Spring

BA 213. Managerial Accounting (4)
BA 284. Personal, Professional and
Leadership Development III (1)
BA 302. Sustainable Business Operations (4)
ECON 202. *Introduction to
Macroeconomics (4)
Elective (1)
Year 3 (45 credits)
Fall
BA 347. International Business (4)
BA 352. Managing Individual and Team Performance (4)
BA 354. Managing Ethics and Corporate Social Responsibility (4)

## Bacc Core-CGI (3)

## Winter

BA 360. Introduction to Financial

## Management (4)

BA 375. Applied Quantitative Methods (4)
MGMT 364. Project Management (4)
Bacc Core-STS (3)

## Spring

BA 357. Operations Management (4)
BA 370. Business Information Systems Overview (4)
BA 390. Marketing (4)
Electives (3)

## Year 4 (45 credits)

## Fall

MGMT 453. Human Resources Management (4)

MGMT/Electives (11)

## Winter

MGMT 455. Influence and Negotiation (4)
MGMT 457. Supply Chain Strategy (4)
MGMT/Electives (7)

## Spring

BA 466. Integrative Strategic Experience (4)
MGMT 446. Cross-Cultural Management (4)
MGMT 448. Employee Recruitment and
Selection (4)
MGMT 452. Leadership (4)
Electives (3)

## Total=180

Pre-Professional Management
Major Code: 773
Major Code: 196

## INTERNATIONAL BUSINESS

## OPTION

The International Business option prepares students for positions in organizations engaged in international trade. Students study the economic, political, geographical, and socio-cultural factors that impact business across national boundaries. Areas of greatest opportunity for overseas assignments are with service organizations such as banks, consulting firms and accounting firms; with import/ export firms; with governmental organizations; and in marketing and financial management areas of multinational firms. A career in international business can lead to exciting and rewarding opportunities abroad. Most multinational business firms, however, hire new employees first for domestic assignments in order to provide them with a thorough knowledge of the firm, its products, and its policies, or for specific assignments in one of the functional areas of the business, before providing overseas opportunities.
Because the majority of employees who eventually hold high-level positions in an international business start in entry-level positions within business areas, all international business students must also complete requirements for a primary discipline within a business. These disciplines include the majors in
accountancy, business administration (Entrepreneurship, General Business, and Hospitality Management options), business information systems, finance, management and marketing.

Students earn this option with a minimum of one quarter term of study abroad through an international exchange or study abroad program approved by the College of Business. Students must complete a minimum of 18 quarter credits in business or business-related course work. The successfully completed course work must articulate back to OSU as courses that extend the knowledge and skills attained within the business core (that is, they cannot be used as a direct substitute for a business core course). Within the Arthur Stonehill International Business Exchange program offered through the College of Business, all courses offered by the partner schools are taught in English.

## Course Requirements

BA 347. International Business (4)
BA 348. International Exchange Orientation (1)

BA 349. Impact of Culture on Business (1)
BA XXX. Minimum of 18 credits of business or business-related course work completed on an approved international exchange or study aboard program.

## Total $=24$

Students must earn this option with one term of study abroad through an approved College of Business international exchange. Courses in these programs are taught in English.

## Option Code: 190

## MARKETING (BA, BS, CRED,

## HBA, HBS)

The marketing curriculum provides students with technical marketing skills and leadership training. Opportunities exist for marketing graduates in a wide variety of organizations, including manufacturing firms, service firms, retailers, wholesalers, advertising agencies, the communications media and government agencies. Career options include sales, advertising, retailing, brand management, logistics management, market research, purchasing management and more.
The heart of marketing is matching supply and demand in a complex, advanced economy. Marketing consists of a sequence of activities: identifying customer needs, developing goods and services to satisfy those needs, communicating information about products to potential customers, and distributing the products to customers. In small firms, a few people must carry out all the marketing functions or activities. Large corporations, on the other hand, tend to hire people with specific potential or skills to fill more specialized job requirements.

Marketing major requirements are
divided into two parts. The first part (the pre-Marketing major), usually taken in the first two years, must be completed before formal admission into the Marketing major. The second part (Professional School) is usually taken in the last two years after formal admission into the Marketing major.

## Summary of Requirements:

Pre-Marketing Major (52-57)
Pre-Business Core Classes (34-39)
Math, Economics, Writing and
Communications (18)*
Professional School (68-70)
Pro-School Business Core Classes (32)
Marketing Courses (36-38)
University General Education Requirements (40)

Unrestricted Electives (13-20)
*10 credits from pre-business major satisfy University General Education Requirements.
Total Required for Graduation

## (180)

## Required Courses in the

 Professional Program-Marketing (36-38 credits)Marketing major courses provide students with expertise in marketing, promotion, product management and planning and branding gained through learning marketing theory then applying that theory to experiential learning opportunities that involve applying theory to practice.

## Required Courses Include (24 credits):

MRKT 390. Principles of Marketing (4)
MRKT 396. Fundamentals of Marketing
Research (4) C or better required.
MRKT 489. Personal Selling Skills and Techniques (4)
MRKT 492. Consumer Behavior (4)
MRKT 496. Marketing Research Practicum (4)
MRKT 499. Marketing Strategy (4)
Marketing Specializations (12-14 credits)
Choose one of the following specializations:

1) Consumer Insights and Analytics Specialization:
Required (14 credits):
BA 405. Reading and Conference (2)
or BA 406. Projects (2) or BA 410. Business Internship (2) (e.g., C2C Participation or Related Internship)
BA 481. Survey of Business Analytics (4) (Pending approval CPS \# 100669)
MRKT 486. Customer Relationship Management (CRM) (4)
MRKT 491. Qualitative Research Methods (4)

Additional courses for supplementing the Consumer Insights and Analytics
Specialization:
PSY 301. Research Methods in Psychology (4)

ST 351. Introduction to Statistical Methods (4)
ST 352. Introduction to Statistical Methods (4)
2) Retail Specialization ( 14 credits):

Required ( 10 credits):
BA 405. Reading and Conference (2) or BA 406. Projects (2) or BA 410. Business Internship (2) (e.g., Participate in DAM Chic or OSU Fashion Organization or Related Internship)
DSGN 377. Retailing and Merchandising (4)

MRKT 495. Retail Management (4)
Complete at least one of the
following courses (4 credits):
DSGN 471. Retail Presentation Strategy (4)

DSGN 472. Merchandising Planning and Control (4)
3) Innovation and Communication

## Specialization (14 credits):

Required (14 credits):
BA 405. Reading and Conference (2) or BA 406. Projects (2)
or BA 410. Business Internship (2) (e.g.,
AIGA Participation or Related Internship)
BA 458. Innovation and New Product Development (4)
DSGN 341. Design Thinking and Process Innovation (4)
MRKT 493. Integrated Marketing Communications (4)
Additional courses for supplementing
the Innovation and Communication
Specialization:
DSGN 342. Introduction to Design
Management (4)
DSGN 343. Idea Visualization (4)
NMC 240. Survey of Social Media (3)
NMC 351. New Media Visualization (3)

## 4) Professional Sales and Personal

Selling Specialization (13 credits):
Required (10 credits):
BA 405. Reading and Conference (2) or BA 406. Projects (2) or BA 410. Business Internship (2) (e.g., Sales Club/Sales Academy Participation or Related Internship)
MGMT 455. Influence and Negotiation (4)

MRKT 488. Personal Selling (4)
And at least one of the
following courses ( 3 credits):
COMM 312. Advanced Public Speaking (3)

COMM 316. Advanced Persuasion (3)
COMM 318. Advanced Interpersonal Communication (3)
5) General Marketing (minimum 12 credits):

Select three of the following courses:
MRKT 488. Personal Selling (4)
MRKT 486. Customer Relationship
Management (CRM) (4)
MRKT 491. Qualitative Research Methods (4)

MRKT 493. Integrated Marketing Communications (4)
MRKT 495. Retail Management (4)
MRKT 497. Global Marketing (4)

## Marketing Curriculum

The undergraduate curriculum in marketing reflects the increasingly complex eco-
nomic, social, and technological aspects of modern business decision-making. Course work emphasizes the development of effective decision-making, an understanding of personal values and motivation, and the awareness of the interrelationships between business and society.

## Pre-Business Program

Newly admitted students to OSU and all current OSU students who seek to complete an undergraduate degree program offered by the College of Business (COB) are designated as pre-business majors (including pre-Accounting, pre-BIS, preBusiness, pre-Finance, pre-Management and pre-Marketing). The pre-business program requires completion of courses within the first and second year (see core curriculum below) that build a solid foundation for the upper-division business curricula. These courses must be completed before the student is eligible for admission to the professional business program. The pre-business course work may be completed at OSU or any accredited college or university that offers equivalent courses transferable to OSU.

## Professional Business Program

Admission to the professional business program is restricted to those students who have demonstrated an ability to achieve the high standards required for professional studies. Enrollment within each academic discipline (major or option) is limited to the number of students who can be served by the faculty and facilities of that major/option.

Therefore, students should strive to meet the minimum eligibility standards of their particular major of choice as well as those of the College of Business itself. Minimum standards for a particular major can often be higher. More information on the pro-school process and current competitive GPA levels for each major can be found on the Pro-School Competitive GPA section of the College of Business Advising website.

Students must apply for admission to the professional business program. To be eligible to apply, students must earn COB grades of C- or better, have 90 credits by the end of the application term, have a minimum COB GPA of 2.5 , and meet the minimum standards for their particular major of choice in the All-Inclusive Business GPA. The All-Inclusive Business GPA includes all business program course work taken from OSU and transfer institution(s). Students earning an AllInclusive Business GPA of 3.0 or above will be assured admission to the professional business program, but it does not guarantee admittance into the major of their choice. Students with an AllInclusive Business GPA less than 3.0 will be admitted to an academic discipline
(major or option) with available capacity using the following criteria: compliance with entrance requirements for the major/option; their rank order based on their All-Inclusive Business GPA; and the contribution of the student to the diversity of viewpoints within the college.

Students who have completed their pre-business courses at a college or university other than OSU must be admitted to pre-business their first term and apply for the professional program during their first term of attendance.

Students may apply to the Marketing major from any of the pre-business majors, including pre-Accounting, pre-BIS, pre-Business, pre-Finance, pre-Management and pre-Marketing.

## Business Administration/Marketing Program Requirements (180) <br> Business Administration Core Curriculum (70-75)

The business administration core curriculum provides students with a broad overview of business; basic skills in accounting and quantitative methods; an understanding of the legal and social environment of business; a background in management and organizational behavior, marketing, finance, and operations management; an understanding of the entrepreneurial process; and the opportunity to integrate course work and further develop decision-making skills through the analysis of business cases.

## Marketing (36-38)

Marketing students must complete 36-38 credits of marketing courses in the professional program. See an academic advisor for more information.

## Mathematics (4)

Basic mathematics requirements:
MTH 241. *Calculus for Management and Social Science (4)

## Economics (8)

ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)

## Written and Oral Communication

 (6)Business students also must take:
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal
Communication (3)
WR 222. *English Composition (3)
or WR 323. *English Composition (3) or WR 327. *Technical Writing (3)

## University General Requirements

 (40)MTH 241, ECON 201/ECON 202, WR 222, WR 323 or WR 327, and COMM 111 or COMM 114 meet the university's baccalaureate core requirements for mathematics, social processes and institutions, writing II, and speech, respectively. All
students must meet the other baccalaureate core requirements and the other requirements for baccalaureate degrees. (See Earning a Degree at OSU.)

## Unrestricted Electives (9-16)

Students are provided elective credits to enable them to achieve a degree of specialization and depth to match their interests. Students are encouraged to choose a non-business univer-sity-approved minor that consists of a minimum of 27 credits, with at least 12 credits at the upper-division level. Students are responsible for determining whether the minor has been approved for transcript visibility and to request the notation on their transcript. Students may also choose to complete a coherent set of non-business courses to support their career goals.

## SAMPLE SCHEDULE

Pre-Marketing (Major code 774)

## First Year (45 credits)

Students entering OSU on the Corvallis campus as their first college experience are required to participate in Innovation Nation, the College of Business LivingLearning Community (LLC). These students will complete the following threecourse sequence during their first year:
BA 160. B-Engaged (3)
BA 161. Innovation Nation-Awareness to Action (3)
BA 162. Innovation Nation-Ideas to Reality (3)
Students who transfer to the Corvallis campus from another college or university, and current OSU Corvallis-campus students who are changing their major to management will complete the following courses:
BA 101. Business Now (6)
BA 280. Business Insights (2)
All other students, including students completing their degree via OSU Ecampus and current OSU students who are changing their major to business, will complete the following course:
BA 101. Business Now (6)
All students should also complete:
COMM 111. *Public Speaking (3) or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal Communication (3)
MTH 241. *Calculus for Management and Social Science (4)
Baccalaureate core, unrestricted electives (29-32)

## Second Year (45 credits)

Corvallis-campus students in the prebusiness or pre-management major should complete the following courses:
BA 281. Professional Development (3)
BA 282. Personal, Professional and
Leadership Development I (1)

BA 283. Personal, Professional and Leadership Development II (1)
BA 284. Personal, Professional and Leadership Development III (1) All Ecampus students and all Corvalliscampus students transferring into the college and eligible to apply to the professional school should complete:
BA 381. Personal and Professional Development (4)
All second-year students should also
complete:
BA 211. Financial Accounting (4)
BA 213. Managerial Accounting (4)
BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)

BA 275. Foundations of Statistical Inference (4)

BA 302. Business Process Management (4)
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
WR 222. *English Composition (3) or WR 323. *English Composition (3) or WR 327. *Technical Writing (3)
Baccalaureate core, minor or unrestricted electives (8)
Professional Marketing (Major
code 799)
Required Courses Include (24
credits)
MRKT 390. Principles of Marketing (4)
MRKT 396. Fundamentals of Marketing
Research (4) C or better required.
MRKT 489. Personal Selling Skills and Techniques (4)
MRKT 492. Consumer Behavior (4)
MRKT 496. Marketing Research Practicum (4)

MRKT 499. Marketing Strategy (4)
Marketing Specializations (12-14
credits)
Choose one of the following specializations:

1) Consumer Insights and Analytics

## Specialization:

Required ( 14 credits):
BA 405. Reading and Conference (2) or BA 406. Projects (2)
or BA 410. Business Internship (2) (e.g., C2C Participation or Related Internship)
BA 481. Survey of Business Analytics (4)
(Pending approval CPS \# 100669)
MRKT 486. Customer Relationship Management (CRM) (4)
MRKT 491. Qualitative Research Methods (4)

Additional courses for supplementing the Consumer Insights and Analytics Specialization:
PSY 301. Research Methods in Psychology (4)

ST 351. Introduction to Statistical Methods (4)

ST 352. Introduction to Statistical Methods (4)
2) Retail Specialization (14 credits): Required (10 credits):

BA 405. Reading and Conference (2) or BA 406. Projects (2)
or BA 410. Business Internship (2) (e.g., Participate in DAM Chic or OSU Fashion Organization or Related Internship)
DSGN 377. Retailing and Merchandising (4)

MRKT 495. Retail Management (4)
Complete at least one of the
following courses (4 credits):
DSGN 471. Retail Presentation Strategy (4)

DSGN 472. Merchandising Planning and Control (4)
3) Innovation and Communication

Specialization ( 14 credits):
Required ( 14 credits):
BA 405. Reading and Conference (2) or BA 406. Projects (2)
or BA 410. Business Internship (2) (e.g.,
AIGA Participation or Related Internship)
BA 458. Innovation and New Product
Development (4)
DSGN 341. Design Thinking and Process Innovation (4)
MRKT 493. Integrated Marketing Communications (4)
Additional courses for supplementing
the Innovation and Communication
Specialization:
DSGN 342. Introduction to Design Management (4)
DSGN 343. Idea Visualization (4)
NMC 240. Survey of Social Media (3)
NMC 351. New Media Visualization (3)
4) Professional Sales and Personal

Selling Specialization (13 credits):
Required ( $\mathbf{1 0}$ credits):
BA 405. Reading and Conference (2) or BA 406. Projects (2)
or BA 410. Business Internship (2) (e.g., Sales Club/Sales Academy Participation or Related Internship)
MGMT 455. Influence and Negotiation (4)

MRKT 488. Personal Selling (4)
And at least one of the following courses ( 3 credits):
COMM 312. Advanced Public Speaking (3)

COMM 316. Advanced Persuasion (3)
COMM 318. Advanced Interpersonal Communication (3)
5) General Marketing (minimum 12 credits):
Select three of the following courses:
MRKT 488. Personal Selling (4)
MRKT 486. Customer Relationship
Management (CRM) (4)
MRKT 491. Qualitative Research Methods (4)

MRKT 493. Integrated Marketing
Communications (4)
MRKT 495. Retail Management (4)
MRKT 497. Global Marketing (4)
Business Core Courses ( 32 credits)
BA 347. International Business (4)
BA 352. Managing Individual and Team
Performance (4)
BA 354. ${ }^{\wedge}$ Managing Ethics and Corporate
Social Responsibility (4)
BA 357. Operations Management (4)

BA 360. Introduction to Financial Management (4)
BA 370. Business Information Systems Overview (4)
BA 375. Applied Quantitative Methods (4)
BA 466. Integrative Strategic Experience (4)
Baccalaureate core, minor or unrestricted electives (20-22 credits)

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## SAMPLE FOUR-YEAR PLAN:

## MARKETING

## Year 1 (45 credits)

Fall
BA 160. B-Engaged (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)

## Electives (2)

## Winter

BA 161. Innovation Nation-Awareness to Action (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for
Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Spring

BA 162. Innovation Nation-Ideas to Reality (3)
BC Science (4)
WR 121. *English Composition (3) (Alpha coded)
Math through MTH 241. Calculus for
Management and Social Science (4)
Bacc Core (15) (Fitness, Speech, CD, DPD)
Electives (2)

## Year 2 (45 credits)

Fall
BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)

BA 281. Professional Development (3)
BA 282. Personal, Professional and
Leadership Development I (1)
Electives (3)

## Winter

BA 211. Financial Accounting (4)
BA 275. Foundations of Statistical Inference (4)

BA 283. Personal, Professional and Leadership Development II (1)
ECON 201. *Introduction to
Microeconomics (4)
WR 222. *English Composition (3)
or WR 323. *English Composition (3)
or WR 327. *Technical Writing (3)

## Spring

BA 213. Managerial Accounting (4)
BA 284. Personal, Professional and
Leadership Development III (1)
BA 302. Sustainable Business Operations (4)
ECON 202. *Introduction to

Macroeconomics (4)
Elective (1)

## Year 3 (45 credits)

## Fall

BA 347. International Business (4)
BA 352. Managing Individual and Team Performance (4)
BA 354. Managing Ethics and Corporate
Social Responsibility (4)
Bacc Core-CGI (3)

## Winter

BA 360. Introduction to Financial
Management (4)
BA 375. Applied Quantitative Methods (4)
MRKT 390. Principles of Marketing (4)
Bacc Core-STS (3)

## Spring

BA 357. Operations Management (4)
BA 370. Business Information Systems Overview (4)
MRKT 396. Fundamentals of Marketing Research (4)
Electives (3)

## Year 4 (45 credits)

## Fall

MRKT 492. Consumer Behavior (4) MRKT/Electives (11)

## Winter

MRKT 489. Personal Selling Skills
Development (4)
MRKT 496. Marketing Research Practicum (4)

MRKT/Electives (7)

## Spring

BA 466. Integrative Strategic Experience (4)
MRKT 499. Marketing Policy (4)
MRKT/Electives (7)
Total=180

## Pre-Professional Marketing Major

## Code: 774

Major Code: 799

## INTERNATIONAL BUSINESS OPTION

The International Business option prepares students for positions in organizations engaged in international trade. Students study the economic, political, geographical, and socio-cultural factors that impact business across national boundaries. Areas of greatest opportunity for overseas assignments are with service organizations such as banks, consulting firms and accounting firms; with import/ export firms; with governmental organizations; and in marketing and financial management areas of multinational firms. A career in international business can lead to exciting and rewarding opportunities abroad. Most multinational business firms, however, hire new employees first for domestic assignments in order to provide them with a thorough knowledge of the firm, its products, and its policies, or for specific assignments in one of the functional areas of the business, before providing overseas
opportunities.
Because the majority of employees who eventually hold high-level positions in an international business start in entry-level positions within business areas, all international business students must also complete requirements for a primary discipline within a business. These disciplines include the majors in accountancy, business administration (Entrepreneurship, General Business, and Hospitality Management options), business information systems, finance, management and marketing.

Students earn this option with a minimum of one quarter term of study abroad through an international exchange or study abroad program approved by the College of Business. Students must complete a minimum of 18 quarter credits in business or business-related course work. The successfully completed course work must articulate back to OSU as courses that extend the knowledge and skills attained within the business core (that is, they cannot be used as a direct substitute for a business core course). Within the Arthur Stonehill International Business Exchange program offered through the College of Business, all courses offered by the partner schools are taught in English.

## Course Requirements

BA 347. International Business (4)
BA 348. International Exchange Orientation (1)

BA 349. Impact of Culture on Business (1)
BA XXX. Minimum of 18 credits of business or business-related course work completed on an approved international exchange or study aboard program.

## Total=24

Students must earn this option with one term of study abroad through an approved College of Business international exchange. Courses in these programs are taught in English.
Option Code: 190

## SUSTAINABILITY (BS, HBS)

## Also available via Ecampus.

OSU Main Campus Contact: Ann Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.

OSU-Cascades Campus Contact: Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@ osucascades.edu.

## Sustainability Core (17-20)

All Sustainability Majors and Minors must take the five courses that make up the Sustainability Core: SUS 304, SUS 350, an ecological sustainability course (SUS 102 recommended), a social sustainability course (choose one below), and an
economic sustainability course (choose one below):
SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)

## Ecological Dimensions of

 Sustainability (3-4)
## Select 3 to 4 credits from the

 following:BI 301. *Human Impacts on Ecosystems (3)
SUS 102. *Introduction to Environmental
Science and Sustainability (4)
Social Dimensions of Sustainability

## (3-4)

Select 3 to 4 credits from the following:
SOC 381. Social Dimensions of
Sustainability (4)(Ecampus only)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/FES/ANS/FW 485. *Consensus and
Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)(Ecampus, Cascades Campus )

## Economic Dimensions of

Sustainability (3-4)
Select 3 to 4 credits from the following:
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 351. *Natural Resources Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)

## Practicum (3-12)

Sustainability majors are required to complete a minimum of 3 Practicum credits. Before registering for a practicum, students must get practicum approved by Sustainability Double Degree advisor. Email: Sus.advising@oregonstate.edu.
SUS 401. Research (3-12)
SUS 410. Internship (3-12)
SUS 499. Special Topics (3-12)
Note: SUS 410 credits may be achieved by participation in an $\mathrm{IE}_{3}$ Global Internship with advisor approval.

## Remaining Elective Credits (4-16)

In addition to the required credits specified above, students must work with the sustainability program advisor to select courses relevant to their discipline and career path interests.

## Credits total=36

Classes that can be used to fulfill remaining requirements are listed below. Students are NOT limited to taking courses within their primary major of study. The Sustainability advisor(s) will approve courses not listed here if they have an obvious link to sustainability and fulfill the intent of the double degree. See the OSU Sustainability Office list of sustain-ability-related courses.

## Business

AEC 250. *Introduction to Environmental

Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 465. *Systems Thinking and Practice (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 311. Intermediate Microeconomic Theory (4)
ECON 315. Intermediate Macroeconomic Theory (4)
MGMT 452. Leadership (4)

## Engineering

BEE 221. Fundamentals of Ecological Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering Fundamentals (4)
ENVE 322. Fundamentals of Environmental Engineering (4)
HEST 310. *Introduction to Community Engagement and Community-Based Design (3)

## Natural Sciences

ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ATS 320. *The Changing Climate (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 348. *Human Ecology (3)
BI 370. Ecology (3)
BRR 325. *Energy Technology and Social Change (3)
BRR 350. Introduction to Regional Bioenergy (2)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
DHE/WSE 415. *Renewable Materials in the Modern Age (3)
FES 341. Forest Ecology (3)
FES 354. Communities, Natural Areas, and Sustainable Tourism (3)
FES 355. Management for Multiple Resource Values (3)
FES 360. Collaboration and Conflict Management (3)
FES 365. *Issues in Natural Resources Conservation (3) Ecampus or Cascades campus only
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)

FES/FW 445. Ecological Restoration (4)
FES/HORT 455. Urban Forest Planning,
Policy and Management (4) Ecampus only
FES/NR/RNG 477. *Agroforestry (3)
FES/SOC/ANS/FW 485. *Consensus and Natural Resources (3)
FOR 462. Natural Resource Policy and Law (3)
FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information Systems in Natural Resource (3)
FW 321. Applied Community and Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in
Natural Resources (3)
FW 350. *Endangered Species, Society, and Sustainability (3)
FW 435. ${ }^{\wedge}$ Wildlife in Agricultural
Ecosystems (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 309. *Environmental Justice (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and
Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
SOIL 475. Soil Resource Potentials (4)
SOIL 499. Special Topics (1-16)
SUS 103. *Introduction to Climate Change (4)

WSE 111. Renewable Materials for a Green Planet (2)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 392. *Bamboolooza: The Fascinating World of Bamboo (3)
WSE 453. ${ }^{\wedge}$ Global Trade in Renewable Materials (3)
WSE 455. Marketing and Innovation in Renewable Materials (4)
WSE 473. Bioenergy and Environmental Impact (3)
WSE 475. Environmental Assessment of Building Materials (4)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental

Economics and Policy (3)
AEC 253. *Environmental Law, Policy, and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ANTH 481. *Natural Resources and
Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and
Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature, Culture and the Environment (4)
FES/SOC/ANS/FW 485. *Consensus and
Natural Resources (3)
HEST 310. *Introduction to Community Engagement and Community-Based Design (3)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL/REL 443. *World Views and
Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion, and Politics (4)
PS 374. *Sustainable Living: Practices and Policies (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)

PS 477. International Environmental Politics and Policy (4)
SOC 360 . *Population Trends and Policy (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
WGSS 440. *Women and Natural Resources (3)

WGSS 450. Ecofeminism (3)

## Footnotes:

* Bacc Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Major Code: 870


## UNDERGRADUATE MINORS

## BUSINESS AND

ENTREPRENEURSHIP MINOR
Also available at OSU-Cascades and

## via Ecampus.

The Business and Entrepreneurship
minor teaches students to recognize
business opportunities, equips them with skills to secure funding, and provides insight on how to manage the commercialization of the business opportunity. Fundamental business classes are combined with those designed to specifically address the challenges of launching a new venture or an idea within an existing organization. With an innovative curriculum taught by dedicated professors, the Business and Entrepreneurship minor provides a fundamental stepping
stone on the road to identifying and commercializing business opportunities in any type of organization.

Interested students must view an online orientation, http://business.oregon-state.edu/advising/business-entrepre-neurship-minor, and meet requirements stated therein before they can declare the minor.

## Required Courses

BA 215. Fundamentals of Accounting (4)
or [BA 211. Financial Accounting (4) and
BA 213. Managerial Accounting (4)]
BA 230. Business Law I (4)
BA 260. Introduction to Entrepreneurship (4)

BA 314. Sustainable Business Operations (4)
BA 351. Managing Organizations (4)
or BA 352. Managing Individual and
Team Performance (4)
BA 360. Introduction to Financial
Management (4)
or FIN 340. Finance (4)
or ENGR 390. Engineering Economy (3)
BA 390. Marketing (4)
ECON 201. *Introduction to
Microeconomics (4)
or AEC 311. Intermediate Applied
Economics I: Producers and Consumers
(4) [AEC 250 is a prereq for AEC 311]

Note: Registration access to these substitutes is generally not allowed for minors. However, some students may have access to them via Honors College or previous status as a business major.

## Total=32

To earn the minor upon graduation, students must meet all of the following:

- Earn a minimum of C-in each of their minor courses (all courses must be taken A-F grading)
- Complete over 50 percent of their minor with OSU credits
- Have minimum 2.5 GPA (OSU grades) in all required minor course work
For further information, please contact the Office of Student Services, Austin Hall 122, 541-737-3716.


## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course
Minor Code: 574


## SUSTAINABILITY MINOR

Available on the Corvallis and OSU-Cascades campuses, and via Ecampus.
OSU Main Campus Contact: Ann Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.
OSU-Cascades Campus Contact: Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@
osucascades.edu.
The Sustainability minor includes core sustainability courses (5) and tailored elective courses to expand students' knowledge and experience of their primary major in the context of sustainability principles and frameworks. Courses from a student's major course of study will not count towards minor requirements. Completion of the Sustainability minor requires 27 credits beyond the 180 -credit minimum for graduation.

## Sustainability Core (17-20)

All Sustainability students must take (8):
SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)

## Social Dimensions of

Sustainability:
Select 3 to 4 credits from the following:
SOC 381. Social Dimensions of Sustainability (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC 485/ANS 485/FES 485/FW 485.
*Consensus and Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)

## Ecological Dimensions of

Sustainability:
Select 3 to 4 credits from the following:
BI 306. *^Environmental Ecology (3)
SUS 102. *Introduction to Environmental Science and Sustainability (4)

## Economic Dimensions of

Sustainability:

## Select 3 to 4 credits from the

## following:

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)

## Sustainability Individualized Study/

Elective Credits (7-10)
Students will work with their primary academic advisor and the Sustainability academic advisor to select electives in the theme relevant to their interests for a total of 7-10 credits. Students should discuss with Sustainability advisor to apply elective courses that may not be listed below.

## Total Credits=27

## Elective Courses:

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)

BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. Introduction to
Macroeconomics (4)
ECON 315. Intermediate Macroeconomic Theory (4)

## Engineering

BEE 221. Fundamentals of Ecological
Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Electric

## Vehicles (4)

ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering Fundamentals (4)
ME 312. Thermodynamics (4)

## Natural Sciences

ATS 320. *The Changing Climate (3) [Terminated fall 2017]
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 370. Ecology (3)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FOR 462. Natural Resource Policy and Law (3)

FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information
Systems in Natural Resource (3)
FW 321. Applied Community and Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society and Sustainability (3)
FW 435. ${ }^{\wedge}$ Wildlife in Agricultural
Ecosystems (3)
FW/ANS/FES/SOC 485. *Consensus and Natural Resources (3)
FW 488. Problem Solving in Fisheries and Wildlife Science (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water and the Environment (3)
GEO 309. *Environmental Justice (3)
GEO 453. Resource Evaluation Methods/ EIS (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species Distributions and Conservation (4)

GEOG 330. *^Geography of International Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and
Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 322. Physical and Mechanical Properties of Renewable Materials (4)
SOIL 499. Special Topics [Organic Farming] (1-16)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ANTH 481. *Natural Resources and Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature, Culture and the Environment (4)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL 443. *World Views and Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion and Politics (4)
PS 449. ^Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)
PS 477. International Environmental
Politics and policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 381. Social Dimensions of Sustainability (4)
SOC 480. *Environment Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/ANS/FES/FW 485. *Consensus and
Natural Resources (3)

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 871

GRADUATE MAJORS

## BUSINESS ADMINISTRATION

 (MBA, PhD)
## Graduate Areas of Concentration Clean technology

## Also available via Ecampus.

The Master of Business Administration program features an innovative, advanced business curriculum that ties together the functional disciplines of business. It is open to both business and non-business undergraduates. Core courses include business law, accounting, finance, operations, management and marketing.
The program provides the knowledge and skills that effective leaders needpreparing graduates to create, build and manage global enterprises that are socially responsible. Sustainable businesses operate deftly to simultaneously meet economic, social and environmental challenges. That's why applied projects are woven into our curriculum-so our graduates are ready to make smart, bold moves that solve complex problems and make a positive impact on the world.

The MBA program is a place for students to pursue their dreams and push their boundaries. Students learn to build and lead teams, integrate disciplines, work under pressure and multitask-the same skills they will rely on when they leave campus.

For more information, email MBAInfo@bus.oregonstate.edu or call 541-737-5510
The MBA requires 60 credits of course work, including 15 credits of Core-1 courses, 27 credits of Core-2 courses, and 18 credits within one of the six available graduate options:

1. Business Analytics
2. Finance
3. Innovation Management
4. Organizational Leadership
5. Marketing
6. Supply Chain and Logistics Management

## Core-1 Course Work (15 credits)

BA 513. Business Legal Environment (3)
BA 514. Operations Management (3)
BA 515. Managerial Decision Tools (3) BA 516. Creating Value in Exchange (3) BA 517. Markets and Valuation (3)
Note: Core-1 requirements may be waived if a candidate has a recent undergraduate major in business, or has completed equivalent course work within an undergraduate business minor.
Core-2 Course Work (27 credits) BA 528. Financial and Cost Analysis (3) BA 540. Corporate Finance (3)

BA 550. Organization Leadership and Management (3)
BA 555. Practical Business Analysis (3)
BA 561. Supply Chain Management (3)
BA 569. Advanced Strategic Management (3)
BA 572. Advanced Information Systems (3)
BA 590. Marketing Management (3)
MGMT 559. Managing Ethics and
Corporate Social Responsibility (3)
Option-Specific Course Work (18 credits)
Total=60 credits
Major Code: 2050

## OPTIONS

## ACCOUNTING OPTION

Graduate option for the PhD in Business Administration.

## Basic Program (26)

AEC 512. Microeconomic Theory I (4)
AEC 513. Microeconomic Theory II (4)
AEC 523. Preliminaries for Quantitative Methods (4)
AEC 625. Advanced Econometrics I (4)
AEC 627. Computational Economics (4)
BA 611. Teaching Effectiveness $(1,1)$
BA 613. Seminar in Business Research Methods (3)
DHE 607. Seminar: Foundations of Research (3)

## Advanced Program (24)

ACTG 620. Foundations of Accounting Research (3)
ACTG 621. Financial Accounting (3)
ACTG 622. Managerial Accounting (3)
ACTG 623. Taxation (3)
AEC 626. Advanced Econometrics II (4) BA 602. Independent Study (3)
FIN 640. Foundations of Financial Research (3)

FIN 641. Corporate Finance Seminar (3)

## Additional Courses to Fulfill PhD

Requirements (24)
BA 607. Seminar (8)
FIN 642. Capital Markets (3)
ST 511. Methods of Data Analysis (4)
ST 551. Statistical Methods (4)
ST 552. Statistical Methods (4)
Dissertation/Research (36)
BA 603. Thesis/Dissertation (36)

## Total=110

Option Code: 2058

## BUSINESS ANALYTICS OPTION

## Also available via Ecampus.

The Business Analytics graduate option, within the Master of Business Administration (MBA) program, supports a rapidly-growing interest from organizations that need people who can integrate data sets and tools to address opportunities and risks. The information value of both in-house and third-party data sets can now be leveraged using powerful emerging technologies. Increasingly organizations leverage advances in software interoperability, data exchange mecha-
nisms and data mining and visualization techniques to better understand their operations, customers, and markets. This trend has become known as 'data mining,' 'business analytics,' 'business intelligence' or, nowadays, 'big data'.
Candidates with an undergraduate business major or minor can complete an MBA with business analytics in nine intensive months as full-time students. Other college graduates can take Core-1 courses over the summer and join the cohort in the fall. Part-time students can complete the MBA over a longer time frame. A final capstone project and oral exam demonstrate a student's ability to apply learned concepts.

The Business Analytics graduate option requires 60 credits of course work, including 15 credits of Core- 1 courses, 27 credit hours of Core-2 courses, 15 credits within the Business Analytics graduate option, and 3 credits for an elective.

## Core-1 Course Work (15 credits)

BA 513. Business Legal Environment (3) BA 514. Operations Management (3) BA 515. Managerial Decision Tools (3) BA 516. Creating Value in Exchange (3) BA 517. Markets and Valuation (3)
Note: Core-1 requirements may be waived if a candidate has a recent undergraduate major in business, or has completed equivalent course work within an undergraduate business minor.

## Core-2 Course Work (27 credits)

BA 528. Financial and Cost Analysis (3) BA 540. Corporate Finance (3)
BA 550. Organization Leadership and Management (3)
BA 555. Practical Business Analysis (3)
BA 561. Supply Chain Management (3)
BA 569. Advanced Strategic Management (3)

BA 572. Advanced Information Systems (3)
BA 590. Marketing Management (3)
MGMT 559. Managing Ethics and
Corporate Social Responsibility (3)

## Business Analytics Graduate

Option-Specific Courses (15 credits)
BA 573. Data Analytics for Competitive Advantage (3)
BA 574. Data Management (3)
BA 575. Data Exploration and Visualization (3)

BA 576. Data and Text Mining (3)
BA 577. Integrated Business Analytics Project (3)

## Unrestricted Elective Course (3 credits) <br> Total=60 credits <br> Option Code: 2059

## CORPORATE FINANCE OPTION

The Corporate Finance graduate option, within the Master of Business Administration (MBA) program, will provide training for students in financial issues at the firm level. These issues include the process by which companies raise capital,
decide on a capital structure, implement hedging strategies, and develop governance structures. The option culminates in a capstone course in the market for corporate control where students will develop the ability to conduct analyses and valuation of transactions in this market. Graduates from this program will be well-suited for careers in traditional corporate finance settings, as well as in investment banking.

Candidates with an undergraduate business major or minor may be able to complete an MBA with a Corporate Finance graduate option in nine intensive months as full-time students. Other college graduates can take Core-1 courses over the summer and join the cohort in the fall. Part-time students can complete the MBA over a longer time frame.
The Corporate Finance graduate option requires 60 credits of course work, including 15 credits of Core- 1 courses, 27 credits of Core-2 courses, 15 credits within the Corporate Finance graduate option, and 3 credits of elective credit.

## Core-1 Course Work (15 credits)

BA 513. Business Legal Environment (3)
BA 514. Operations Management (3)
BA 515. Managerial Decision Tools (3)
BA 516. Creating Value in Exchange (3)
BA 517. Markets and Valuation (3)
Note: Core-1 requirements may be waived if a candidate has a recent undergraduate major in business, or has completed equivalent course work within an undergraduate business minor.

## Core-2 Course Work (27 credits)

BA 528. Financial and Cost Analysis (3)
BA 540. Corporate Finance (3)
BA 550. Organization Leadership and
Management (3)
BA 555. Practical Business Analysis (3)
BA 561. Supply Chain Management (3)
BA 569. Advanced Strategic Management (3)
BA 572. Advanced Information Systems (3)
BA 590. Marketing Management (3)
MGMT 559. Managing Ethics and
Corporate Social Responsibility (3)
Corporate Finance Graduate
Option Course Work (15 credits)
FIN 542. Investments (3)
FIN 544. Financial Risk Management (3)
FIN 545. International Financial
Management (3)
FIN 546. Advanced Corporate Finance (3)
FIN 549. Market for Corporate Control (3)
Unrestricted Elective Course Work (3 credits)
Total=60 credits
Option Code: 2063
INNOVATION MANAGEMENT OPTION

## Also available via Ecampus.

The Innovation Management graduate option, within the Master of Business Administration (MBA) program, emphasizes
innovation, technology commercialization, and entrepreneurship to prepare graduates to assume leadership roles in emerging businesses. This MBA graduate option provides the student background, tools and experiential learning in the management of innovative business and technical concepts. A core element of the Innovation Management graduate option is the completion of a self-paced experiential project based on development/analysis of an innovative business or technical concept.

Length: The MBA curriculum can be completed within an intensive oneyear time frame on campus. Part-time students, taking six to nine credits per quarter, can complete the program in two years on campus or in Portland.

## Learning Outcomes:

- Develop a research-driven, investorready lean canvas business model and plan to take an innovative idea to market (BA 560, BA 567, BA 570, BA 568)
- Present a compelling argument for funding (BA 567, BA 568)
The Innovation Management MBA graduate option requires 60 credits of course work, including 15 credits of Core-1 courses, 27 credits of Core-2 courses, 18 credits within the Innovation Management graduate option.


## Core-1 Course Work (15 credits)

BA 513. Business Legal Environment (3)
BA 514. Operations Management (4)
BA 515. Managerial Decision Tools (3)
BA 516. Creating Value in Exchange (4)
BA 517. Markets and Valuation (3)
Note: Core-1 requirements may be waived if a candidate has a recent undergraduate major in business, or has completed equivalent course work within an undergraduate business minor.

## Core-2 Course Work (27 credits)

BA 528. Financial and Cost Analysis (3)
BA 540. Corporate Finance (3)
BA 550. Organization Leadership and
Management (3)
BA 555. Practical Business Analysis (3)
BA 561. Supply Chain Management (3)
BA 569. Advanced Strategic Management (3)
BA 572. Advanced Information Systems (3)
BA 590. Marketing Management (3)
MGMT 559. Managing Ethics and
Corporate Social Responsibility (3)
Innovation Management Graduate
Option Course Work (18 credits)
BA 531. Business Law - Technology/New Ventures (3)
BA 560. Venture Planning (3)
BA 562. Managing Projects (3)
BA 567. Special Topics in Management (3)
BA 568. Integrated Business Project (3)
BA 570. Innovation Strategy, IP, and NPD (3)

## Total=60 credits

Option Code: 2062

## INNOVATION/

COMMERCIALIZATION OPTION
Graduate option for the PhD in Business Administration.

## Basic Program (26)

AEC 512. Microeconomic Theory I (4)
AEC 513. Microeconomic Theory II (4)
AEC 523. Preliminaries for Quantitative Methods (4)
AEC 625. Advanced Econometrics I (4)
AEC 627. Computational Economics (4)
BA 611. Teaching Effectiveness $(1,1)$
BA 613. Seminar in Business Research Methods (3)
DHE 607. Seminar: Foundations of Research (3)

## Advanced Program (24)

BA 602. Independent Study (3)
BA 660. Foundations of Entrepreneurial Research (3)
BA 661. Organizational Theory (3)
BA 662. Corporate Entrepreneurship and
New Ventures (3)
BA 663. Strategic Management (3)
BA 664. Technology Innovation and NPD (3)
MGMT 650. Organizational Behavior (3)
MGMT 690. Marketing and
Commercialization (3)

## Additional Courses to Fulfill PhD

## Requirements (24)

BA 607. Seminar (8)
BA 642. Capital Markets (3)
ST 511. Methods of Data Analysis (4)
ST 551. Statistical Methods (4)
ST 552. Statistical Methods (4)

## Dissertation/Research (36)

BA 603. Thesis/Dissertation (36)

## Total=110

Option Code: 2055

## MARKETING OPTION

The Marketing graduate option, within the Master of Business Administration (MBA) program, requires 50 credits of course work including 21 credits of general MBA course work, 16 credits of marketing management course work, and 13 credits of market research course work.

Three alternatives are available for completing the experiential course work component of this track:

1. BA 568, Integrated Business Project, through the Close to the Customer Project
2. BA 510, Business Internship, through a work experience at an approved market research firm.
3. BA 506, Projects, through a directedstudy supervised by a marketing faculty member.

## General MBA Course Work (21

## credits)

BA 528. Financial and Cost Analysis (3)
BA 540. Corporate Finance (3)
BA 550. Organization Leadership and
Management (3)
BA 562. Managing Projects (3)
BA 569. Advanced Strategic Management (3)
BA 572. Advanced Information Systems (3)

## BA 590. Marketing Management (3)

## Marketing Management Course

Work (16 credits)
MRKT 588. Personal Selling (4)
MRKT 597. Global Marketing (4)
Electives include at least two of the
following:
DHE 572. Merchandise Planning and Control (4)
DHE 575. Global Production and Trade in Textiles and Apparel (4)
DHE 587. Trends and Issues in
Merchandising (3)
MRKT 589. Personal Selling Skills
Development (4)
MRKT 592. Consumer Behavior (3)
MRKT 593. Integrated Marketing
Communications (3)
MRKT 595. Retail Management (4)
or DHE 570 Retail Merchandising (4)
and/or other courses as approved

## Market Research Course Work (13

 credits)MRKT 581. Applied Quantitative Marketing Analysis (4)
MRKT 582. Applied Qualitative Marketing Analysis (3)
MRKT 596. Marketing Research Design and Methods (3)
Complete one of the following courses:
BA 506. Projects (3)
BA 510. Business Internship (3-6)
BA 568. Integrated Business Project (3)

## Total=50 credits

Option Code: 2054

## ORGANIZATIONAL LEADERSHIP

## OPTION

## Also available via Ecampus.

The Organizational Leadership graduate option, within the Master of Business Administration (MBA) program, is designed to serve leaders and professionals from any industry. The program will be delivered on the Corvallis campus, and in Portland as an online/hybrid program in partnership with OSU Ecampus. The number of in-person sessions required for each individual online/hybrid course will depend on the courses learning objec-
tives, with in-person sessions delivered in the Collaborative Life Sciences facility in Portland.

## Key Benefits:

- Flexible and affordable program that helps prepare students for leadership roles in established and emerging business organizations.
- Online/hybrid classes blend face-toface and online sessions to maximize learning and flexibility.
- Management and leadership course content similar to educational content provided in top ranking executive MBA programs.
Length: Part-time students, taking at most two courses per academic quarter, may complete this degree in 21 months.

Additional time will be required if candidates need to complete the Core-1 courses (see below).

Learning Outcomes: Upon completion of this graduate degree option, graduates will be able to:

- Understand, analyze, and apply ethics frameworks to facilitate corporate social responsibility and ethical decision making (MGMT 559).
- Understand, analyze, and apply human resource management information to facilitate executive level strategic decision making. (MGMT 572).
- Understand, analyze, and apply classical and modern leadership theories and techniques to facilitate leadership effectiveness. (BA 550, MGMT 559).
- Understand, analyze and apply negotiation techniques toward attainment of organizational objectives. (MGMT 574).
The Organizational Leadership graduate option requires 60 credits of course work, including 15 credits of Core-1 courses, 27 credits of Core-2 courses, 12 credits within the Organizational Leadership graduate option, and 6 credits for the Integrative Capstone Experience.


## Core-1 Course Work (15 credits)

BA 513. Business Legal Environment (3)
BA 514. Operations Management (3)
BA 515. Managerial Decision Tools (3)
BA 516. Creating Value in Exchange (3)
BA 517. Markets and Valuation (3)
Note: Core-1 requirements may be waived if a candidate has a recent undergraduate major in business, or has completed equivalent course work within an undergraduate business minor.

## Core-2 Course Work ( 27 credits)

BA 528. Financial and Cost Analysis (3)
BA 540. Corporate Finance (3)
BA 550. Organization Leadership and
Management (3)
BA 555. Practical Business Analysis (3)
BA 561. Supply Chain Management (3)
BA 569. Advanced Strategic Management (3)
BA 572. Advanced Information Systems (3)
BA 590. Marketing Management (3)
MGMT 559. Managing Ethics and
Corporate Social Responsibility (3)

## Organizational Leadership

Graduate Option Courses (12 credits)
BA 533. Business Law for Managers (3)
BA 562. Managing Projects (3)
MGMT 572. Managing Human Resources (3)
MGMT 574. Negotiations (3)
Integrative Capstone Experience (6 credits)
MGMT 575. Integrative Capstone I (3)
MGMT 576. Integrative Capstone II (3)
Total=60 credits
Option Code: 2061

## RESEARCH THESIS OPTION

The Research Thesis graduate option, within the Master of Business Administration (MBA) program, is intended to offer students and College of Business faculty with joint research interests, an opportunity to engage in research as part of the student's MBA program. Students can design, execute, and report on business research problems and their solutions. These may include an analysis of existing academic literature and the formulation of research questions and research plans. Students may also collect and analyze data and report on research findings in both an oral and written format.

The Research Thesis graduate option requires a minimum of 46 credits of course work, including 33 credits of general MBA courses and a minimum of 13 credits within the Research Thesis graduate option.

## General MBA Course Work (33 credits)

BA 528. Financial and Cost Analysis (3)
BA 531. Business Law - Technology/New Ventures (3)
BA 540. Corporate Finance (3)
BA 543. Financial Markets and Institutions (3)

BA 550. Organization Leadership and Management (3)
BA 555. Practical Business Analysis (3)
BA 561. Supply Chain Management (3)
BA 562. Managing Projects (3)
BA 569. Advanced Strategic Management (3)
BA 572. Advanced Information Systems (3) BA 590. Marketing Management (3)

## Research Thesis Graduate Option (13 credits)

BA 503. Thesis (6)
BA 505. Reading and Conference (4)
MRKT 596. Marketing Research Design and Methods (3)

## Total=46 credits

Option Code: 2056

## SUPPLY CHAIN AND LOGISTICS MANAGEMENT OPTION

## Also available via Ecampus.

The Supply Chain and Logistics Management (SCLM) graduate option, within the Master of Business Administration (MBA) program, offers students an alternative focus for their MBA that includes acquiring a solid mastery of international operations and supply chain and logistics management concepts and methods.

This MBA graduate option prepares graduates for operations, logistics and supply chain management in the service and manufacturing industries. In the past two decades, the loss of manufacturing jobs in the U.S. triggered attrition of innovation capabilities across many sectors of the economy contributing to the current anemic economic recovery. The U.S. needs a professionally-trained workforce
that is able to manage internal operations and global supply chains in the manufacturing and service sectors and in government agencies. Well-trained operations and supply chain managers are also needed in global companies that operate outside the U.S., including companies that operate in the Asia-Pacific Rim.

Learning Outcomes: Graduates will acquire a solid mastery of global supply chain and international operations management concepts and methods.

- Effectively use concepts of operations and supply chain management and qualitative and quantitative methods to make appropriate decisions in international business contexts that include new and unfamiliar situations.
- Design appropriate management plans for global supply chains that are lawful, ethical and environmentally and socially responsible.
- Develop a global outlook that reflects changes experienced and anticipated by firms and industries and understand the requirements for effective change management in global operations and supply chains.
Length: The MBA curriculum can be completed within an intensive oneyear time frame on campus. Part-time students, taking six to nine credits per quarter, can complete the program in two years on campus or in Portland.

The SCLM graduate option requires 60 credits of course work, including 15 credits of Core- 1 courses, 27 credits of Core- 2 courses, 15 credits within the SCLM graduate option, and 3 credits from a list of electives.

## Core-1 Course Work (15 credits)

BA 513. Business Legal Environment (3) BA 514. Operations Management (3)
BA 515. Managerial Decision Tools (3) BA 516. Creating Value in Exchange (3) BA 517. Markets and Valuation (3)
Note: Core-1 requirements may be waived if a candidate has a recent undergraduate major in business, or has completed equivalent course work within an undergraduate business minor.

## Core-2 Course Work (27 credits)

BA 528. Financial and Cost Analysis (3)
BA 540. Corporate Finance (3)
BA 550. Organization Leadership and Management (3)
BA 555. Practical Business Analysis (3)
BA 561. Supply Chain Management (3)
BA 569. Advanced Strategic Management (3)
BA 572. Advanced Information Systems (3)
BA 590. Marketing Management (3)
MGMT 559. Managing Ethics and
Corporate Social Responsibility (3)

## SCLM Graduate Option-Specific

Courses ( 15 credits)
BA 551. Supply and Sourcing Management (3)

BA 552. Manufacturing and Service Operations (3)
BA 554. Lean Enterprise Management and Capstone (3)
BA 557. Global Logistics Management:
Fundamentals and Strategy (3)
BA 578. Supply Chain Analytics (3)

## Restricted Elective Courses (3

 credits)BA 531. Business Law - Technology/New Ventures (3)
BA 562. Managing Projects (3)
BA 573. Data Analytics for Competitive Advantage (3)

## Total=60 credits

Option Code: 2060

## BUSINESS ADMINISTRATION

 AND ACCOUNTANCY (MBAA)The Master of Business Administration and Accountancy is a one-year master's program for students with an undergraduate degree in accounting. It allows accounting students to receive an undergraduate degree and a master's degree during their five years of university study required to become a CPA. As an integrated program, the MBAA is designed to allow students the opportunity to plan early enough in their accounting education program to enable them to receive both an undergraduate degree and a graduate degree. The MBAA is also designed to accommodate postbaccalaureate students wishing to prepare for accounting careers by completing a two-year plan of study.

## Fall Term

ACTG 516. Accounting Research and Analysis (3)
ACTG 522. Strategic Cost Management (4)
BA 555. Practical Business Analysis
BA 569. Advanced Strategic Management (3)
BA 590. New Product Development (3)

## Winter Term

ACTG 517. Advanced Accounting (4)
BA 531. Business Law-Technology/New
Ventures (3)
BA 540. Corporate Finance (3)
BA 561. Supply Chain Management (3)
BA 562. Managing Projects (3)

## Spring Term

ACTG 518. Accounting Theory and Practice (6)

ACTG 520. IT Auditing (4)
ACTG 525. Advanced Taxation (4)
BA 550. Organization Leadership and
Management (3)
Elective (3-4)

## Total Credits 45

## MBAA Accounting Courses

## Required

ACTG 317. External Reporting I (4)
ACTG 318. External Reporting II (4)
ACTG 319. External Reporting III (4)
ACTG 321. Cost Management I (4)
ACTG 378. Accounting Information Management (4)

ACTG 427. Assurance and Attestation Services (4)
ACTG 516. Accounting Research and Analysis (3)
ACTG 518. Accounting Theory and Practice (6)

Any three from below:
ACTG 517. Advanced Accounting (4)
ACTG 520. IT Auditing (4)
ACTG 522. Strategic Cost Management (4)
ACTG 525. Advanced Taxation (4)
One-Year Schedule of Courses for Students with an Undergraduate Accountancy Degree
Course schedule for students with an undergraduate degree equivalent to the OSU Accountancy degree.

## Fall (12-16)

ACTG 516. Accounting Research and Analysis (3)
ACTG 522. Strategic Cost Management (4)*
BA 555. Practical Business Analysis (3)
BA 569. Advanced Strategic Management (3)

BA 590. New Product Development (3)

## Winter (12-16)

ACTG 517. Advanced Accounting (4)*
BA 531. Business Law-Technology/New Ventures (3)
BA 540. Corporate Finance (3)
BA 561. Supply Chain Management (3)
BA 562. Managing Projects (3)

## Spring (13-17)

ACTG 518. Accounting Theory and Practice (6)

ACTG 520. IT Auditing (4)*
ACTG 525. Advanced Taxation (4)* BA 550. Organization Leadership and Management (3)

## Total=45

## Footnote:

* Students take 3 of these 4 electives depending upon courses taken for undergraduate credit.


## Two-Year Schedule of Courses

## for Students without an

Undergraduate Accountancy Degree
Course schedule for students without an undergraduate accountancy degree equivalent to the OSU Accountancy degree. Students must have all MBA admission prerequisites completed before they begin classes in the fall of their first year including BA 211 and BA 213.

The course total is 81 credits over two years. Elective credits are included to ensure a minimum of 12 credits per term for financial aid or visa concerns.

## First Year

## Fall (12+)

ACTG 317. External Reporting I (4)
BA 555. Practical Business Analysis (3)
BA 590. New Product Development (3) Elective

## Winter (14)

ACTG 318. External Reporting II (4)
ACTG 378. Accounting Information Management (4)
BA 531. Business Law-Technology/New

Ventures (3)
BA 540. Corporate Finance (3)

## Spring (15)

ACTG 319. External Reporting III (4)
ACTG 321. Cost Management I (4)
ACTG 520. IT Auditing (4)
BA 550. Organization Leadership and
Management (3)

## Second Year

Fall (14)
ACTG 427. Assurance and Attestation Services (4)
ACTG 516. Accounting Research and Analysis (3)
ACTG 522. Strategic Cost Management (4)
BA 569. Advanced Strategic Management (3)

## Winter (13)

ACTG 517. Advanced Accounting (4)
BA 561. Supply Chain Management (3)
BA 562. Managing Projects (3)

## Spring (12+)

ACTG 518. Accounting Theory and Practice (6)

ACTG 525. Advanced Taxation (4)

## Total=81

## Summary of Programs in

## Accountancy

Both the one-year and two-year MBAA programs require 53 total accounting related credits ( 32 undergraduate accounting credits and 21 graduate accounting credits) and 24 business related total credits in the MBA program.

## Major Code: 6410

## BUSINESS ADMINISTRATION GRADUATE MINOR

Persons interested in the MBA program should write to: Graduate Business Programs, College of Business, Austin Hall 326, OSU, Corvallis, OR 97331-2603, or email: osumba@bus.oregonstate.edu.

## Minor Code: 2050

## ACCOUNTING CERTIFICATE

Available on Corvallis and OSU-

## Cascades Campuses.

Students holding a bachelor's degree and interested in an accounting education at OSU may look into earning a second bachelor's degree in Accountancy by contacting OSU-Cascades, 2600 NW College Way, Bend, OR 97701, 541-322-3100. Another option is to contact the College of Business Graduate Programs Office for information about how to specialize one's MBA in Accounting, Austin Hall 326 or 541-737-5510.

## Major Code: C191

## BUSINESS ANALYTICS GRADUATE CERTIFICATE

## Available on Corvallis campus and

 via Ecampus.Today's organizations-businesses, corporations, nonprofits and others-want
to better utilize available information in operational, tactical, and strategic decision making. The information value of both in-house and third party data sets can now be leveraged using powerful emerging technologies. Increasingly organizations leverage advances in software interoperability, data exchange mechanisms and data mining and visualization techniques to better understand their operations, customers, and markets. This trend has become known as 'data mining,' 'business analytics,' 'business intelligence' or, nowadays, 'big data.'

This certificate is targeted at three types of professionals:

- Managers seeking to expand the use of data analytics within their organizations.
- Information systems professionals charged with marshaling available organizational data for analytical processes.
- Business analytics professionals performing data analysis to support decision making, strategy formation, and operational improvement.


## Required Courses

BA 555. Practical Business Analysis (3)
BA 572. Advanced Information Systems (3)
BA 573. Data Analytics for Competitive Advantage (3)
BA 574. Data Management (3)
BA 575. Data Exploration \& Visualization (3)
BA 576. Data and Text Mining (3)
BA 577. Integrated Business Analytics
Project (3)

## Total=21

Major Code: CG14

## FINANCIAL PLANNING

GRADUATE CERTIFICATE
Available on the Corvallis campus and via Ecampus.

## Required

BA 540. Corporate Finance (3)
FIN 542. Investments (3
FIN 551. Financial Planning I (4)
or FIN 550. Fundamentals of Financial
Planning (4) and FIN 551. Insurance
Planning and Tax Planning (4)
FIN 552. Financial Planning II (3)
FIN 553. Financial Planning III (6)
MRKT 588. Personal Selling (4)

## Suggested Course Schedule:

## Summer

BA 540. Corporate Finance (3)
MRKT 588. Personal Selling (4)

## Fall

FIN 542. Investments (3
FIN 551. Financial Planning I (6) Continues in Winter term

## Winter

FIN 552. Financial Planning II (3)
FIN 551. Financial Planning I (6)

## Spring

FIN 553. Financial Planning III (6)

## Major Code: CG16 ■ ACCOUNTING COURSES

ACTG 317. EXTERNAL REPORTING I (4). Examines the theory and practice of financial accounting, the processing and controls phases of the accounting system, and reporting to external parties. Emphasis is placed on the accounting cycle and financial statement structure and content. The emphasis on the accounting cycle includes the processing and tracing of transaction data from source documents to financial statements. PREREQS: BA 211 [C] and BA 213 [C] and departmental approval.

## ACTG 318. EXTERNAL REPORTING II (4).

Continuation from ACTG 317 and the theory and practice of financial accounting and the reporting to external parties. Covers financial reporting objectives to provide information that is useful in investment and credit decisions, in assessing cash flow prospects, and about company resources and claims to those resources. PREREQS: ACTG 317 [C] and junior standing and departmental approval.
ACTG 319. EXTERNAL REPORTING III (4). Continuation from ACTG 318 and the theory and practice of financial accounting and the reporting to external parties. Covers financial reporting objectives to provide information that is useful in investment and credit decisions, in assessing cash flow prospects, and about company resources and claims to those resources. PREREQS: ACTG 318 [C] and departmental approval.
ACTG 321. COST MANAGEMENT I (4).
Reinforces and builds on the language and concepts of management accounting. Emphasizes different models for product costing and examines their effects on profit planning, budgeting, motivation, and control. PREREQS: ACTG 317 [C] and /or departmental approval.

## ACTG 378. ACCOUNTING INFORMATION

MANAGEMENT (4). Introduces students to the field of information management. Topics include information systems technology, the strategic role of IT, the business applications of networks, databases and Internet technologies, the system life cycle model, systems analysis and design methodologies, and the development and implementation of information systems. Lec/ rec. PREREQS: (BA 213 [C] and (BA 271 [C] or BA 302 [C] ) and (BA 275 [C] or BA 276 [C] )) and junior standing and departmental approval required.

## ACTG 378H. ACCOUNTING INFORMATION

MANAGEMENT (4). Introduces students to the field of information management. Topics include information systems technology, the strategic role of IT, the business applications of networks, databases and Internet technologies, the system life cycle model, systems analysis and design methodologies, and the development and implementation of information systems. Lec/rec. PREREQS: BA 213 [C] or BA 302 [C] and (BA 275 [C] or BA 276 [C] ) and junior standing and departmental approval required. Honors College approval required.
ACTG 379. ACCOUNTING ANALYTICS (4). Covers the analysis of data as it pertains to accounting professionals. The focuses include analytic techniques for decision making and the examination of "big data" involving accounting information. Hands-on experiences will develop skills with select software tools used in data analytics for accounting professionals. PREREQS ACTG 318 [C] and ACTG 378 [C]
ACTG 417. ADVANCED ACCOUNTING (4). An advanced course in financial accounting theory. Covers corporate combinations, consolidated financial statements, and government and not-forprofit accounting. PREREQS: ACTG 319 [C] and departmental approval required.
ACTG 420. IT AUDITING (4). Explores key information systems issues such as planning, acquisition, delivery, and monitoring from a risk
and control perspective. Students learn to use IT audit standards, guidelines, and frameworks and build data analysis tool skills. PREREQS: ((ACTG 319 [C] or BA 372 [C] ) and ACTG 378 [C] ) and departmental approval required.
ACTG 422. STRATEGIC COST MANAGEMENT
(4). Continuation of concepts and processes of management accounting. Emphasizes relevant costs, cost accumulation and allocation, segment performance measurement and control and quantitative techniques. PREREQS: ACTG 319 [C] and ACTG 321 [C] and BA 357 [C] and departmental approval.
ACTG 424. INTRODUCTION TO TAXATION (4). Meets two major objectives. First, it is a technical introduction to U.S. income tax with emphasis on general and business related topics. Second, it provides a framework for students to launch further study in the tax area. Students will be encouraged to supplement text materials with readings from the Internal Revenue Code and Regulations as well as secondary tax research services. PREREQS: ACTG 319 [C] and /or equivalent course

## ACTG 425. ADVANCED TAXATION (4).

Examination of the federal tax system as it applies to corporations, partnerships, and estates and trusts. Emphasis is placed on understanding tax planning for business owners and refining the ability to research tax issues. PREREQS: (ACTG 325 [C] or ACTG 424 [C] ) and departmental approval.

ACTG 427. ASSURANCE AND ATTESTATION SERVICES (4). Assertions of enterprises gain credibility when examined by an independent third party. Assurance and attestation provide credibility Coverage includes ethics, risk, materiality, internal control, evidence and reporting. PREREQS: ACTG 319 [C] and /or acceptance into either the Accounting Certificate Program or the MBA Program. Departmental approval required.
ACTG 428. ADVANCED AUDIT ANALYTICS
(4). An advanced four-credit course covering audit theory, current audit practice and auditor professional skills. The equivalent of three credits (30 hours) relates to in-class activities, readings, presentations, research and group discussions of relevant advanced audit topics. The equivalent of one credit (10 hours) relates to understanding the use and future of data analytics in the audit profession. Theory, current audit practice and auditor professional skills. PREREQS: ACTG 427 [C]
ACTG 429. TOPICS IN ACCOUNTING (1-4). Analysis of current topics in accounting. Topics will vary from term to term. PREREQS: Departmental approval required.

ACTG 516. ACCOUNTING RESEARCH AND
ANALYSIS (3). Emphasis on financial accounting, tax and auditing research and analysis and communication of conclusions in the context of accounting case studies. PREREQS: Acceptance into the OSU MBAA or approval of the director of the Accounting Program.

ACTG 517. ADVANCED ACCOUNTING (4). An advanced course in financial accounting theory. Corporate combinations, consolidated financial statements, foreign operations and subsidiaries, partnerships, and sole proprietorships; contemporary issues in financial accounting. PREREQS: ACTG 319 and departmental approval required.
ACTG 518. ACCOUNTING THEORY AND
PRACTICE I (3). Expands and integrates knowledge of US and international generally accepted accounting principles (GAAP) in a rigorous study of the design, selection, and consequences of various models of financial reporting. PREREQS: (ACTG 516 [C] and ACTG 517 [C] ) and acceptance into the OSU MBAA or approval by the Director of the Accounting Program.

ACTG 519. ACCOUNTING THEORY AND
PRACTICE II (3). Study of the design, selection, and consequences of various models of financial reporting. Research accounting treatments for complex facts and circumstances with ambiguous accounting guidance. Build on financial reporting models to develop in-depth understanding and application of accounting practice. PREREQS: ACTG 518 [C] and acceptance into the OSU Accountancy MBA program or approval of the director of the Accounting Program.
ACTG 520. IT AUDITING (4). Explores key information systems issues such as planning, acquisition, delivery, and monitoring from a risk and control perspective. Students learn to use IT audit standards, guidelines, and frameworks and build data analysis tool skills. PREREQS: ((ACTG 319 or BA 372) and ACTG 378) and departmental approval required.

ACTG 522. STRATEGIC COST MANAGEMENT
(4). Continuation of concepts and processes of management accounting. Emphasizes relevant costs, cost accumulation and allocation, segment performance measurement and control and quantitative techniques. PREREQS: ACTG 319 and ACTG 321 and BA 357 and departmental approval required.
ACTG 524. INTRODUCTION TO TAXATION (4). Meets two major objectives. First, it is a technical introduction to U.S. income tax with emphasis on general and business related topics. Second, it provides a framework for students to launch further study in the tax area. Students will be encouraged to supplement text materials with readings from the Internal Revenue Code and Regulations as well as secondary tax research services. PREREQS: BA 528 [C] and /or equivalent course

ACTG 525. ADVANCED TAXATION (4). Examination of the federal tax system as it applies to corporations, partnerships, and estates and trusts. Emphasis is placed on understanding tax planning for business owners and refining the ability to research tax issues. PREREQS: ACTG 424 and departmental approval required.
ACTG 527. ASSURANCE AND ATTESTATION SERVICES (4). Assertions of enterprises gain credibility when examined by an independent third party. Assurance and attestation provide credibility. Coverage includes ethics, risk, materiality, interna control, evidence and reporting. PREREQS:
ACTG 319 and departmental approval required.
ACTG 529. TOPICS IN ACCOUNTING (1-4).
Analysis of current topics in accounting. Topics will vary from term to term. PREREQS: Instructor approval required.
ACTG 620. FOUNDATIONS OF ACCOUNTING RESEARCH (3). Introduces first-year doctoral students to accounting research by discussing the development of modern accounting theory, relating it to theories in economics and finance, and exposing students to the different areas of and methodologies used in accounting research. Also begins a survey of classic and contemporary literature in the area of financial accounting research. Specific financial accounting topics may change from quarter to quarter, but sample topics include earnings management, earnings quality, and voluntary disclosure. PREREQS: Doctoral student status and departmental approval.
ACTG 621. FINANCIAL ACCOUNTING RESEARCH (3). Surveys classic and contemporary research in the area of financial accounting. Specific topics may change from quarter to quarter, but sample topics include the value relevance of accounting information, post earnings announcement drift, the residual income model, analysts, use accounting information, and market-based assessments of the usefulness and limitations of alternative accounting measurements and disclosures. PREREQS: Doctoral student status and departmental approval.

ACTG 622. ACCOUNTING, JUDGMENT AND ACCOUNTABILITY (3). Surveys classic and contemporary research in areas related to management, judgment, and accountability in accounting. Specific topics may change from quarter to quarter, but sample topics include research on management incentives and compensation, performance measurement, auditing, corporate governance, and research using behavioral methods. PREREQS: Doctoral student status and departmental approval.

ACTG 623. TAX RESEARCH (3). Surveys classic and contemporary research in the area of taxation. Specific topics may change from quarter to quarter, but sample topics include tax vs. nontax costs in business decisions, book-tax differences, taxes and financial reporting, multijurisdictional tax ssues, and tax avoidance. PREREQS: Doctoral student status and departmental approval.

## - BUSINESS ADMINISTRATION COURSES

BA 101. BUSINESS NOW (6). Presents an integrated view of both established and entrepreneurial business organizations by studying their common processes and characteristics. Introduces theory and develops basic skills in the areas of management, finance, accounting and marketing. Lec/lab/rec.
BA 140. FINANCIAL LITERACY FOR COLLEGE LIFE (2). Helps you learn the fundamentals of personal finance. It is crucial you are prepared to be prudent managers of your financial resources, enabling you to achieve long- and short-term financial goals and security. In addition, this course will examine how your background experiences, values, goals, and decisions can impact your financial future.
BA 150. EXPLORING ENTREPRENEURSHIP
(1). Participants are challenged with economic concepts and projects. Inspirational speakers address key topics concerning all aspects of business and leadership development. Students must be registered for Young Entrepreneurs Business Week Camp to receive credit for the course. Graded P/N.

BA 151. EXPLORING INVESTING (1). Students participating in Investing Week will learn about basic investment vehicles and the principles of evaluating a potential investment. Students will also learn how to understand the financial market system and how it affects their personal and business life. Students will be assigned a role as a junior analyst with Toots, Toots and Peabody, and critically assess the benefits and strengths of individual investment vehicles. Graded P/N.
BA 152. EXPLORING SOCIAL
ENTREPRENEURSHIP (1). Provides an immersive experience regarding responsible business practices. In addition, from an entrepreneurial prospective, students have the opportunity to explore ways in which real social change is being conducted worldwide. Graded P/N.
BA 160. B-ENGAGED (3). Understand and accomplish college-level academic work and explore OSU resources and options that will enhance your college experience and success. Opportunity to connect with faculty and peers with common interests in a supportive learning environment.
BA 160H. B-ENGAGED (3). Understand and accomplish college-level academic work and explore OSU resources and options that will enhance your college experience and success. Opportunity to connect with faculty and peers with common interests in a supportive learning environment. PREREQS: Honors College approval required

BA 161. INNOVATION NATION--AWARENESS
TO ACTION (3). First course in a two-course sequence. Begins a conversation on selfmanagement, offering opportunities for active reflection on critical skill sets necessary for
success in today's global market. Builds a foundation of entrepreneurial knowledge and gaining a competitive edge while becoming aware of your role in managing your own career.
BA 161H. INNOVATION NATION--AWARENESS TO ACTION (3). First course in a two-course sequence. Begins a conversation on selfmanagement, offering opportunities for active reflection on critical skill sets necessary for success in today's global market. Builds a foundation of entrepreneurial knowledge and gaining a competitive edge While becoming aware of your role in managing your own career. PREREQS: Honors College approval required.

## BA 162. INNOVATION NATION--IDEAS

TO REALITY (3). Second course in a twocourse sequence. Topics include evaluating entrepreneurial capabilities, creativity and innovation, opportunity recognition, impression management, and responsible business practices. Continues a conversation on self-management offering opportunities for active reflection on critical skill sets necessary for success in todayss global market. PREREQS: BA 161 [C-]
BA 170. BUSINESS INSIGHTS (2). The first term within a new university and/or major is a critical time for college students. Business Insights was developed to help you transition to the OSU College of Business academic community and learning expectations. Business Insights will help you understand and accomplish college-level academic work and explore OSU resources and options that will enhance your college experience and success. Additionally, Business Insights is your opportunity to connect with a faculty member and peers with common interests in a supportive learning environment.

BA 199. SPECIAL STUDIES (1-4). Graded P/N. This course is repeatable for a maximum of 4 credits.

BA 210. INTERNSHIP (1-6). Planned and supervised work experience at selected cooperating business firms. Supplementary training, conference, reports, and appraisals. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits.

BA 211. FINANCIAL ACCOUNTING (4). Accounting information from the perspective of external users, principally investors and creditors. Emphasis on the preparation and interpretation of financial statements, income recognition and determination, and asset valuation. PREREQS: (MTH 111 [C-] or MTH 241 [C-] or MTH 251 [C-] or MTH 251 H [C-] ) or Placement Test MPT(24) or Placement Test MPAL(060) and sophomore standing.
BA 211H. FINANCIAL ACCOUNTING (4).
Accounting information from the perspective of external users, principally investors and creditors. Emphasis on the preparation and interpretation of financial statements, income recognition and determination, and asset valuation. PREREQS: MTH 111 [C-] or MTH 241 [C-] or MTH 251 [C-] or MTH 251H [C-] or Placement Test MPT(24) or Placement Test MPAL(60) and sophomore standing and Honors College approval required.
BA 213. MANAGERIAL ACCOUNTING (4). Accounting information from the perspective of management users with an emphasis on data accumulation for product costing, planning, and performance evaluation and control. PREREQS: BA 211 [C-]
BA 213H. MANAGERIAL ACCOUNTING (4). Accounting information from the perspective of management users with an emphasis on data accumulation for product costing, planning, and performance evaluation and control. PREREQS: BA 211 [C-] or BA 211H [C-] and Honors College approval required.
BA 215. FUNDAMENTALS OF ACCOUNTING
(4). Looks at how the accounting model reflects business transactions and events. Students are introduced to both financial and managerial
accounting and the creation, interpretation, and analysis of financial statements. In addition, students obtain an understanding of the determination, organization, and management of costs and revenues including management decisions based upon this information.

BA 230. BUSINESS LAW I (4). Nature and function of law in our business society. Obligations arising out of agency, contract formation and breach, crimes, torts, warranty, regulation of competition, and international aspects thereof. PREREQS: Sophomore standing.
BA 230H. BUSINESS LAW I (4). Nature and function of law in our business society. Obligations arising out of agency, contract formation and breach, crimes, torts, warranty, regulation of competition, and international aspects thereof. PREREQS: Sophomore standing. Honors College approval required.
BA 233. LEGAL ENVIRONMENT OF BUSINESS
(2). Nature and function of U.S. law in our business society. Obligations arising out of agency and employment law, contract formation and breach, warranty, crimes and torts. PREREQS: Sophomore standing.
BA 233H. LEGAL ENVIRONMENT OF
BUSINESS (2). Nature and function of U.S law in our business society. Obligations arising out of agency and employment law, contract formation and breach, warranty, crimes and torts. PREREQS: Sophomore standing. Honors College approval required.
BA 253. PROFESSIONAL DEVELOPMENT
(4). Designed to improve the ability of students to describe their accomplishments and sell their ideas in situations like professional networking, company meetings, response to proposals for services, and interviews. It teaches writing skills and workplace integration for new jobs. Particular emphasis is put on verbal communication and preparation for verbal communication. Students will learn to create career plans that require them to research career options and potential employers, and prepare a developmental roadmap that will lead them to success within the chosen profession. PREREQS: (BA 101 [C-] or BA 162 [C-] or DHE 160 [C-] ) and (WR 222 [C-] or WR 323 [C-] or WR 327 [C-] )
BA 253H. PROFESSIONAL DEVELOPMENT
(4). Designed to improve the ability of students to describe their accomplishments and sell their ideas in situations like professional networking, company meetings, response to proposals for services, and interviews. It teaches writing skills and workplace integration for new jobs. Particular emphasis is put on verbal communication and preparation for verbal communication. Students will learn to create career plans that require them to research career options and potential employers, and prepare a developmental roadmap that will lead them to success within the chosen profession. PREREQS: (BA 101 [C-] or BA 162 [C-] or DHE 160 [C-] ) and (WR 222 [C-] or WR 323 [C-] or WR 327 [C-] or WR 327H [C-] ) and Honors College approval required.
BA 260. INTRODUCTION TO
ENTREPRENEURSHIP (4). Topics include evaluating entrepreneurial capabilities, creativity, business plan creation, opportunity assessment and feasibility analysis, business implementation, new product introduction, and seeking funds. PREREQS: Sophomore standing.
BA 260H. INTRODUCTION TO
ENTREPRENEURSHIP (4). Topics include evaluating entrepreneurial capabilities, creativity, business plan creation, opportunity assessment and feasibility analysis, business implementation, new product introduction, and seeking funds. PREREQS: Sophomore standing and Honors College approval required.

BA 272. BUSINESS APPLICATION
DEVELOPMENT (4). Introduction to business programming with C\#.NET. Beginning
programming skills and concepts, .NET programming environment, object-oriented and event-oriented models, and console applications.

## BA 275. FOUNDATIONS OF STATISTICAL

INFERENCE (4). An introductory course on statistical inference with an emphasis on business applications. Coverage includes descriptive statistics, random variables, probability distributions, sampling and sampling distributions, statistical inference for means and proportions using one and two samples, and linear regression analysis. PREREQS: MTH 241 [C-] or MTH 251 [C-] or MTH 251H [C-]

BA 275H. FOUNDATIONS OF STATISTICAL
INFERENCE (4). An introductory course on statistical inference with an emphasis on business applications. Coverage includes descriptive statistics, random variables, probability distributions, sampling and sampling distributions, statistical inference for means and proportions using one and two samples, and linear regression analysis. PREREQS: MTH 241 [C-] or MTH 251 [C-] or MTH 251H [C-] and Honors College approval required

## BA 276. INTRODUCTION TO STATISTICAL

INFERENCE (2). An introductory level statistics course on data analysis and statistical inference with an emphasis on business applications. Coverage includes descriptive statistics, random variables, probability distributions, sampling and sampling distributions, statistical inference for means and proportions using one and two samples. It serves as a prerequisite to BA 376. PREREQS: (MTH 245 [C-] or MTH 251 [C-] or MTH 251 H [C-] ) and sophomore standing.
BA 280. BUSINESS INSIGHTS (2). Connect with faculty and peers and explore OSU resources designed to enhance your college experience and success. Engage in professional development activities and cultivate the soft skills employers are looking for in their future employees.
BA 281. PROFESSIONAL DEVELOPMENT (3) Designed to give students an early start on the process of career planning and development.
The process involves thoughtful self-assessment, career exploration, planning and follow-through with preliminary employment strategies.
PREREQS: (BA 101 [C-] and BA 280 [C-] ) or BA 162 [C-]
BA 282. PERSONAL, PROFESSIONAL AND LEADERSHIP DEVELOPMENT I (1). BA 282, taken during fall term of the second year, helps students develop lifelong skills that are practical, meaningful, and useful. These skills and the understanding developed through this course strengthens the student's ability to adapt career goals to changing market conditions, make good decisions in difficult situations, and set financial goals. PREREQS: BA 101 [C-] or BA 162 [C-]

BA 283. PERSONAL, PROFESSIONAL AND LEADERSHIP DEVELOPMENT II (1). BA 283, taken during winter term of the second year, course helps students develop lifelong skills that are practical, meaningful, and useful. These skills and the understanding developed through this course strengthens the student's ability to adapt career goals to changing market conditions, make good decisions in difficult situations, and set financial goals. PREREQS: BA 101 [C-] or BA 162 [C-]
BA 284. PERSONAL, PROFESSIONAL AND LEADERSHIP DEVELOPMENT III (1). BA 284, taken during spring term of the second year, course helps students develop lifelong skills that are practical, meaningful, and useful. These skills and the understanding developed through this course strengthens the student's ability to adapt career goals to changing market conditions, make good decisions in difficult situations, and set financial goals. PREREQS: BA 101 [C-] or BA 162 [C-]

BA 290. INTRODUCTION TO CAREERS IN
MARKETING (3). Explores marketing through the
perspectives of current marketing professionals. introductory language and principles of marketing are introduced and examined through real world examples. Presents various careers within marketing. PREREQS: Sophomore standing
BA 302. BUSINESS PROCESS MANAGEMENT
(4). Integrates core concepts from Business Information Systems (BIS) with those of Operations Management and introduces a process-oriented view of the flows of materials information and services through and across organizations. The course helps students dentify information-bearing events, assess and improve process efficiency, learn to model and analyze business processes, and understand the interactions between human behavior and process design. Hands-on, case-based assignments and abs allow students to practice the principles addressed. PREREQS: (MTH 245 [C-] or MTH 251 [C-] or MTH 251H [C-] ) and sophomore standing
BA 314. SUSTAINABLE BUSINESS
OPERATIONS (4). Operations are the processes by which an organization transforms inputs (e.g., labor, material, and knowledge) into outputs (products and services). Operations managers are responsible for designing, running and improving the processes and systems to efficiently accomplish this for production or service businesses. This course focuses on the concepts and tools employed by operations managers to provide their organization a competitive advantage. Topics include statistical tools and quantitative methods (descriptive statistics, probabilities, sampling, interval estimation and hypothesis testing) and operations management concepts (strategies, forecasting, process design, capacity utilization, quality systems, supply chain management, inventory management, resource planning, sustainability and lean systems.)
PREREQS: MTH 111 [C-]
BA 333. LEGAL AND ETHICAL BUSINESS
SOLUTIONS (2). Legal and ethical regulations of U.S. and global business organizations including financial, human resources, operations and marketing functions. Emphasizes legal and ethical strategies for entrepreneurs including business entity selection, raising capital and managing intellectual property. PREREQS: ((BA 230 [C-] or BA 233 [C-] ) and (ECON 201 [C-] or ECON 201H [C-] )) and junior standing.
BA 333H. LEGAL AND ETHICAL BUSINESS SOLUTIONS (2). Legal and ethical regulations of U.S. and global business organizations including financial, human resources, operations and marketing functions. Emphasizes legal and ethical strategies for entrepreneurs including business entity selection, raising capital and managing intellectual property. PREREQS: (BA 230 [C-] or BA 233 [C-] ) and (ECON 201 [C-] or ECON 201H [C-] ) and junior standing and Honors College approval required.
BA 347. INTERNATIONAL BUSINESS (4). Integrated view of international business including current patterns of international business, socioeconomic and geopolitical systems within countries as they affect the conduct of business, major theories explaining international business transactions, financial forms and institutions that facilitate international transactions, and the interface between nation states and the firms conducting foreign business activities. PREREQS: (ECON 202 [C-] or ECON 202H [C-] ) and junior standing.
BA 347H. INTERNATIONAL BUSINESS (4). Integrated view of international business including current patterns of international business, socioeconomic and geopolitical systems within countries as they affect the conduct of business, major theories explaining international business transactions, financial forms and institutions that facilitate international transactions, and the interface between nation states and the firms conducting foreign business activities. PREREQS: ECON 202 [C-] or ECON 202H [C-] and junior
standing and Honors College approval required.
BA 348. INTERNATIONAL EXCHANGE
ORIENTATION (1). Consists of large-group sessions as well as small-group break-out sessions for each country individually. It is vital to attend all sessions as valuable information pertaining to your study abroad opportunity will be presented. Graded P/N.

BA 349. IMPACT OF CULTURE ON BUSINESS
(1). A requirement of all students participating in a College of Business-approved international exchange program and for completing the College of Business International Business option. The major emphasis is for students to reflect on their experience while studying, living and traveling in a foreign culture and for them to determine how the foreign culture impacts how they would conduct business in that country. Graded P/N. PREREQS: BA 348* [C-]

## BA 351. MANAGING ORGANIZATIONS (4).

A systems perspective to understanding the management functions of planning, organizing, leading and controlling. Ethical and diversity ssues are addressed as they are relevant in entrepreneurial and established ventures. PREREQS: Junior standing. No credit for business administration majors.

BA 352. MANAGING INDIVIDUAL AND TEAM PERFORMANCE (4). Diagnose individual and small-group behavior and develop skill in improving individual and small-group performance in entrepreneurial and established ventures. Emphasis on professional skill development and the practical application of theory and research. Concepts of ethics, diversity and cross-cultural relations are integrated throughout the course. PREREQS: (COMM 111 [C-] or COMM 111H [C-] or COMM 114 [C-] or COMM 114H [C-] ) and junior standing.

BA 352H. MANAGING INDIVIDUAL AND TEAM
PERFORMANCE (4). Diagnose individual
and small-group behavior and develop skill in improving individual and small-group performance in entrepreneurial and established ventures. Emphasis on professional skill development and the practical application of theory and research. Concepts of ethics, diversity and cross-cultural relations are integrated throughout the course. PREREQS: (COMM 111 [C-] or COMM 111H [C-] or COMM 114 [C-] or COMM 114H [C-] ) and junior standing. Honors College approval required
BA 353. ^PROFESSIONAL DEVELOPMENT
(4). Designed to improve the ability of students to describe their accomplishments and sell themselves in situations like professional networking, company meetings, response to proposals for services, and interviews. Emphasizes writing skills, workplace integration, verbal communication, and preparation of developmental roadmaps that will lead students to success within their chosen profession. (Writing Intensive Course) PREREQS: ((COMM 111 [C-] or COMM 111H [C-] or COMM 114 [C-] or COMM $114 \mathrm{H}[\mathrm{C}-]$ ) and (WR 222 [C-] or WR 323 [C-] or WR 327 [C-] )) and junior standing.
BA 354. ${ }^{\wedge}$ MANAGING ETHICS AND CORPORATE SOCIAL RESPONSIBILITY (4). Introduces contemporary issues that business professionals face making ethical and socially responsible decisions in an increasingly fastpaced, transparent, and global environment. (Writing Intensive Course) PREREQS: (COMM 111 [C-] or COMM 111H [C-] or COMM 114 [C-] or COMM 114H [C-] ) and (WR 222 [C-] or WR 323 [C-] or WR 327 [C-] or HC 199 [C-] ) and junior standing and admitted to professional business program.
BA 357. OPERATIONS MANAGEMENT (4). Decision making in managing the production of goods and services: product planning, process planning, facility planning, control of quantity, cost and quality. Special emphasis on exponential forecasting, inventory management, work
methods, project management, productivity improvement, and international comparisons PREREQS: (BA 275 [C-] or BA 275H [C-] or BA 276 [C-] ) and junior standing.
BA 357H. OPERATIONS MANAGEMENT (4). Decision making in managing the production of goods and services: product planning, process planning, facility planning, control of quantity, cost and quality. Special emphasis on exponential forecasting, inventory management, work methods, project management, productivity improvement, and international comparisons. PREREQS: BA 275 [C-] or BA 275H [C-] or BA 276 [C-] and junior standing and Honors College approval required.
BA 360. INTRODUCTION TO FINANCIAL
MANAGEMENT (4). Explore the issues facing a financial manager in new business ventures, small businesses, and corporations. Focus on the role of the financial manager in business settings, explores the functions of a financial manager in financial analysis, forecasting, planning, and control; asset and liability management; capital budgeting; and raising funds for new business ventures, small businesses, and corporations. PREREQS: (BA 213 [C-] or BA 213H [C-] or BA 215 [C-] or BA 215H [C-]) and (ECON 201 [C-] or ECON 201H [C-] or AREC 250 [C-] )
BA 360H. INTRODUCTION TO FINANCIAL MANAGEMENT (4). Explore the issues facing a financial manager in new business ventures, small businesses, and corporations. Focus on the role of the financial manager in business settings, explores the functions of a financial manager in financial analysis, forecasting, planning, and control; asset and liability management; capital budgeting; and raising funds for new business ventures, small businesses, and corporations. PREREQS: (BA 213 [C-] or BA 213H [C-] or BA 215 [C-] or BA 215H [C-]) and (ECON 201 [C-] or ECON 201H [C-] or AREC 250 [C-] ) and Honors College approval required.

BA 362. SOCIAL ENTREPRENEURSHIP AND SOCIAL INITIATIVES (4). The core concepts of entrepreneurship, using entrepreneurship to craft innovative responses to social problems. Entrepreneurial skills are as valuable in the social sector as they are in business. Includes both profit and non-profit firms that have programs designed to create social value. PREREQS: Junior standing

## BA 363. TECHNOLOGY AND INNOVATION

 MANAGEMENT (4). Introduces students to the fundamentals of managing innovation and technology toward the production of intellectual assets; how innovations are created, evaluated and leveraged within business strategy; and how innovation is managed within various business environments. PREREQS: (BA 260 [C-] or BA 260 H [C-] )BA 365. FAMILY BUSINESS MANAGEMENT
(4). Focuses on the opportunities and the problems characteristic of family businesses: entrepreneurship, management succession, transfer of ownership, mixing family and business roles, family conflicts, personnel issues, non-family employees, and outside advisors. Taught via Ecampus only. PREREQS: Junior standing or instructor permission.

## BA 370. BUSINESS INFORMATION SYSTEMS

OVERVIEW (4). Introduce students to the field of information management. Topics include information systems technology, the strategic role of IT, the business applications of networks, databases and Internet technologies, and the development and implementation of information systems. Use relational database models to design a real-world case study. PREREQS: BA 302 [C-] and junior standing.
BA 371. BUSINESS INFORMATION SYSTEMS ANALYSIS AND DESIGN (4). Explore systems analysis, logical design and documentation of information system (IS) applications with processoriented methodologies. Lec/rec. PREREQS: (BA 272 [C-] and ACTG 378 [C-] ) and junior standing.

BA 372. BUSINESS INFORMATION SYSTEMS DESIGN AND DEVELOPMENT (4). Logical and physical design of computer-based information systems; tools and techniques that underlie the design processes. Design of an enterprise information system with CASE tools. Alternative approaches to systems design with emphasis on object-orientation. Lec/rec. PREREQS: BA 371 [C-] and junior standing.
BA 375. APPLIED QUANTITATIVE METHODS
(4). Introduces students to the basics of data science and data analytics for handling of largescale databases. It provides an overview of the main data-analytic techniques and topics including data visualization, linear and nonlinear regression analysis, time series analysis and forecasting, classification, and clustering methods. PREREQS: BA 275 [C-] and /or equivalent. Business majors only.

BA 375H. APPLIED QUANTITATIVE METHODS
(4). Introduces students to the basics of data science and data analytics for handling of largescale databases. It provides an overview of the main data-analytic techniques and topics including data visualization, linear and nonlinear regression analysis, time series analysis and forecasting, classification, and clustering methods. PREREQS: BA 275 [C-] and /or equivalent. Business majors only. Honors College approval required.
BA 376. APPLIED QUANTITATIVE METHODS
(2). An in-depth discussion on advanced quantitative methods most relevant to business students. Topics may include regression analysis, time series and forecasting, design of experiments, simulations, decision analysis, survey data analysis, data mining and computationally intensive statistical methods. PREREQS: BA 276 [C-] and available to business majors only.
BA 381. PERSONAL AND PROFESSIONAL DEVELOPMENT (4). Designed to help students transition to the OSU and COB communities, identify and employ academic success strategies, and start the process of career planning and development. Teaches students how to set financial goals. Credit may not be received for equivalent courses BA 353 or BA 253. PREREQS: BA 101 [C-] and second-year students who transfer into the COB and those enrolled in a COB Ecampus program.
BA 390. MARKETING (4). Consumer and industrial markets, and activities and enterprises involved in distributing products to those markets. Objective is to develop an understanding of distribution processes, marketing problems, and marketing principles. PREREQS: (ECON 201 [C-] or ECON 201H [C-] or AREC 250 [C-]) and junior standing.
BA 390H. MARKETING (4). Consumer and industrial markets, and activities and enterprises involved in distributing products to those markets. Objective is to develop an understanding of distribution processes, marketing problems, and marketing principles. PREREQS: (ECON 201 [C-] or ECON 201H [C-] or AREC 250 [C-] ) and junior standing. Honors College approval required.
BA 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

BA 405. READING AND CONFERENCE (1-16).
Supervised individual work in some field of special application and interest. Subjects chosen must be approved by professor in charge. This course is repeatable for a maximum of 16 credits. PREREQS: Senior standing and departmental approval required.

BA 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

BA 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

BA 407H. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
BA 410. BUSINESS INTERNSHIP (1-12).
Planned and supervised work experience at selected cooperating business firms.
Supplementary training, conference, reports, and appraisals. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Upperdivision standing and departmental approval required.
BA 432. ENVIRONMENTAL LAW,
SUSTAINABILITY, AND BUSINESS (4). Explores
fundamental business, legal, and policy issues raised by environmental law, sustainable business practices, and clean energy policies, and their impact on business and management practices. PREREQS: Junior standing.
BA 447. TOPICS IN INTERNATIONAL
BUSINESS (1-4). Analysis of current topics in international business. Topics will vary from term to term. PREREQS: BA 347 [C-]

## BA 451. SUPPLY AND SOURCING

MANAGEMENT (4). Prepares students to effectively use operations and supply chain concepts and methods to make appropriate sourcing and supply decisions in international business contexts. Provides an overview of the global supply function and explores the steps of the supply management cycle. Topics include purchasing/procurement procedures and policy, supply organization, specifications and statement of work development, sourcing strategy, supplier evaluation, global sourcing, competitive bidding, price/cost analysis, e-procurement, and ethical, environmentally and socially responsible supply management. PREREQS: BA 357 [C-]

## BA 454. LEAN ENTERPRISE MANAGEMENT

AND CAPSTONE (4). BA 454 is the capstone
class for students in the Supply Chain and Logistics Management option. PREREQS: BA 459 [C-] and BA 478 [C-]
BA 458. INNOVATION AND NEW PRODUCT
DEVELOPMENT (4). Strategic management of an organization's system and technologies in support of innovation and new product/service development. Application experience with new product/service development process using problem solving skills, information management, and critical thinking. PREREQS: (BA 390 [C-] or BA 390H [C-] )
BA 459. MANUFACTURING AND SERVICE OPERATIONS (4). Focuses on the management of global service operations including designing and managing systems to coordinate global information and material flows within and between firms and functions in a supply chain. Covers planning operations, evaluating system alternatives, designing and researching global supply networks, examining complex adaptive systems and evaluating value stream synchronization. PREREQS: BA 451 [C-]
BA 460. VENTURE MANAGEMENT (4).
Entrepreneurial and innovation processes applied to new business start-ups, existing small businesses, and new ventures within larger organizations; new venture planning, project management, and productivity improvement. Cases and projects are used to apply concepts and to develop communication skills. PREREQS: ((BA 260 [C-] or BA 260H [C-] ) and (BA 351 [C-] or BA 352 [C-] or BA 352H [C-] ) and (BA 390 [C-] or BA 390 H [C-] )) and senior standing.
BA 463. FAMILY BUSINESS MANAGEMENT (4). Focuses on the opportunities and the problems characteristic of family businesses: entrepreneurship, management succession, transfer of ownership, mixing family and business roles, family conflicts, personnel issues, non-family employees, and outside advisors. PREREQS: Senior standing and instructor approval.
BA 464. NEW VENTURE FINANCING (4).
Explore financial issues facing entrepreneurial
business ventures: cash flow and budgets, financial analysis, financial statement forecasting, financial controls, asset management, and understanding the funding options at different points in the business life cycle including SBA loans, angel investment, venture capital, bank loans, and going public. PREREQS: ((BA 260 [C-] or BA 260 H [C-] ) and (BA 340 [C-] or FIN 340 [C-] or BA 340 H [C-] or FIN 340 H [C-] or BA 360 [C-] ))
BA 465. *SYSTEMS THINKING AND PRACTICE
(4). Hard and soft system theories examined, methods and techniques for dealing with realworld problems; skills and dialogue techniques to identify mindsets, define problems, and explore alternative pathways for solutions. (Bacc Core Course)
BA 465H. *SYSTEMS THINKING AND
PRACTICE (4). Hard and soft systems theories are examined, including methods and techniques for dealing with real-world problems; skills and dialogue techniques to identify mindsets, define problems, and explore alternative pathways for solutions. PREREQS: Honors College approval required.

## BA 466. INTEGRATIVE STRATEGIC

EXPERIENCE (4). Provides students with an overview of the basic concepts in strategic management. Students learn frameworks and models to understand and analyze a firm,s external environment and internal resources in an effort to create sustainable competitive advantages. Analysis and critique of conventional conceptions of business ethics. Evaluation of ethical issues involving businesses at firm, national, and international levels. PREREQS: ((BA 340 [C-] or BA 340 H [C-] or FIN 340 [C-] or FIN 340 H [C-] or BA 360 [C-] ) and (BA 352 [C-] or BA 352 H [C-] ) and BA 357 [C-] and (BA 390 [C-] or BA 390 H [C-] )) and senior standing.
BA 467. NEW VENTURE LABORATORY (4). Entrepreneurship capstone course. Fully develop a business plan including product specs with prototype, financial analysis, market analysis, marketing plan, management structure and proposed financing. PREREQS: (BA 357 [C-] and BA 458 [C-] )
BA 468. TECHNOLOGY COMMERCIALIZATION (4). "Hands on" class in which students will exercise commercialization concepts on recently awarded Oregon State University patents. Students will learn a process and tools to assess the business viability of a technical idea, and to develop the best business approach for commercialization. PREREQS: BA 363 [C-] and / or instructor permission.

## BA 478. SUPPLY CHAIN ANALYTICS (4).

 Explores modeling methods for design, analysis, execution and integration of supply chains. Introduces students to a variety of modeling and optimization techniques for the analysis of strategic, tactical and operational supply chain problems, including demand forecasting, risk analysis, revenue management, distribution and facility location. PREREQS: BA 357 [C-] and BA 375 [C-]BA 479. BUSINESS TELECOMMUNICATIONS
AND NETWORKING (4). Provide a fundamental understanding of the five-layer Internet model and its effects on the business environment. Planning and managing networks in support of enterprisewide computing. Assignments involve server hardware and software configurations including DNS/DHCP server configurations, addition of clients to a network, and creating/managing user accounts. PREREQS: ACTG 378 [C-] and /or instructor approval.
BA 480. INFORMATION SYSTEMS SECURITY (4). Course emphasis is on security risk mitigation methods and procedures such as access control, identity management, intrusion prevention and detection, network and physical security, etc. These and other topics will be placed in both the operational and strategic context of the business. The course also addresses several IS governance
and IS security frameworks within which the various security concepts, aspects, policies and procedures can be viewed and discussed. PREREQS: BA 272 [C-] and ACTG 378 [C-] and BA 479 [C-]
BA 482. SMALL-BUSINESS MANAGEMENT (4). Covers the management and building of smallto mid-sized businesses that are past the initial start-up phase. Topics such as promotion and marketing, human resource management, operations and quality control, budgeting, and risk management will be discussed in a small-business context. PREREQS: BA 260 (undergraduate); none for graduate course. Junior standing.

BA 483. BUSINESS ANALYTICS (4). Presents how organizations can successfully "collect, evaluate and apply information" for better decision making. Technologies such as transaction processing systems, RFID, weblogs, social networks, website usage, and online communities have the potential to reveal market trends, suppliers, preferences, and competitors, next moves. The success of an organization largely depends on its ability to take advantage of those data sets that are already available to it. PREREQS: BA 371 [C-] and BA 479 [C-] and senior standing.

## BA 486. CUSTOMER RELATIONSHIP

MANAGEMENT (CRM) (4). An integration of people, process and technology. Students will learn how individuals and companies can gain the return on investment that they expect through technology implementation, service and business process mapping, employee training, customer relationship, customer life time value, technology solutions that track customer data and employee performance. PREREQS: (BA 390 [C-] or BA 390H [C-] ) and senior standing.

## BA 487. HOSPITALITY FINANCIAL

MANAGEMENT (4). Introduces students to the evaluation of investments in competitive products and services as sustainable strategies for the hospitality industry. PREREQS: (BA 360 [C-] and BA 486 [C-] ) and senior standing.

## BA 488. ADVANCED HOSPITALITY

MANAGEMENT (4). Designed to provide students with an in-depth understanding of the importance of core competencies in the hospitality industry in terms of overall value addition, competitive methods, and competitive advantage, taking into consideration both present and future effects. PREREQS: BA 352 [C-]
BA 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
BA 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
BA 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

BA 506. PROJECTS (1-16). This course
is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

BA 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

BA 510. BUSINESS INTERNSHIP (1-6). Planned and supervised work experience at selected cooperating business firms. Supplementary training, conferences, reports, and appraisals. This course is repeatable for a maximum of 16 credits. PREREQS: Graduate standing, departmental approval required.

## BA 512. BUSINESS ANALYSIS AND

COMMUNICATION (6). Students will be guided through a process of determining business issues or challenges given specific situations, providing reasons/justifications why these are important, proposing solutions to the identified business problems, and communicating this analysis through in-class discussions and writing. PREREQS: ALS 162 [B] or instructor approval.

BA 513. BUSINESS LEGAL ENVIRONMENT (3). Provides the essential legal foundation for business managers in companies operating in the U.S. Effective strategies for managers to prevent and resolve legal disputes will be stressed. Topics include legal issues related to corporate forms, creating and enforcing contracts, reducing exposure to tort liability and the role of employees as agents of a business.
BA 514. OPERATIONS MANAGEMENT (3).
Provides a foundation for business managers in statistics and operations management. Emphasis on quantitative tools for sampling, interval estimation and hypothesis testing as well as operations management concepts for processes, quality systems, supply chain management, inventory management, resource planning, and sustainable lean systems. PREREQS: College algebra (including probabilities).

BA 515. MANAGERIAL DECISION TOOLS (3). Develop business management skills by learning the principles of managerial and financial accounting. Emphasis will be placed on understanding financial statements, cost analysis, and funding decisions. Focuses on integrating the theoretical framework of accounting and finance with the "hands on" technical skills needed to evaluate financial decisions within an organization PREREQS: College algebra.
BA 516. CREATING VALUE IN EXCHANGE (3).
A graduate-level survey course that provides a foundation for business managers in the concepts of marketing. The student will develop an understanding of marketing principles and an awareness of marketing challenges. PREREQS: Microeconomics
BA 517. MARKETS AND VALUATION (3).
Introduces students to the basic questions facing a financial manager and the tools a financial manager uses to find answers to these questions. Introduces the basic tools of finance and applications of financial theory in use today. Students will be introduced to legal, ethical, technology, and global issues facing a financial manager. The course is designed to enhance a student's approach to financial decision making and emphasizes technical analysis and quantitative approaches to decision making.

BA 528. FINANCIAL AND COST ANALYSIS (3).
Analysis of the balance sheet and income statement to determine profitability, risk, and rate of return; preparation of pro forma financial statements; cost measurement for products, projects, jobs, customers, and markets; strategic cost decision making for pricing and resource allocation. PREREQS: BA 213 with C- or higher and graduate standing.
BA 531. BUSINESS LAW - TECHNOLOGY/ NEW VENTURES (3). An integrative course on managing legal and ethical issues for new ventures. Focuses on business law for founders of start-up companies including formation of new business entities, protecting intellectual property, workforce management and global issues. Topics presented from an entrepreneurial perspective and include technology law, e-commerce law and government regulation. Students develop skills to identify and resolve legal and ethical issues, deal with administrative agencies, and proactively manage legal liability. Considerations of ethics and corporate responsibility are emphasized. PREREQS: BA 230 and BA 233 and BA 513 or equivalent with a minimum grade of C - or better, graduate standing.

## BA 532. ENVIRONMENTAL LAW,

SUSTAINABILITY, AND BUSINESS (4). Explores fundamental business, legal, and policy issues raised by environmental law, sustainable business practices, and clean energy policies, and their impact on business and management practices. PREREQS: Graduate standing.
BA 533. BUSINESS LAW FOR MANAGERS (3). Develops knowledge and skills about business law used by managers in global organizations. Topics
covered include establishing lawful and ethical business practices; preventing and responding to compliance failures, infringement and other legal threats; effective use of contracts; and resolving disputes through litigation and alternative dispute resolution. PREREQS: BA 230 and BA 233 and BA 513 and PHAR 707 and PHAR 708 or equivalent.

BA 540. CORPORATE FINANCE (3). Emphasizes analytical tools to measure and manage firm value, through corporate strategies such as mergers and acquisitions, leveraged buyouts, international expansion, and new venture development. PREREQS: (BA 340 or FIN 340 or FIN 340 H ) with a minimum grade of C - or better and graduate standing.
BA 543. FINANCIAL MARKETS AND INSTITUTIONS (3). Investigates the five major financial markets: common stock, bond, derivatives, mortgage, and currency. The course examines the agents in each of these markets, the rules of trading, and the rationale of the agents participating in the different markets. PREREQS: (BA 340 or FIN 340 or FIN 340H) with a minimum grade of C - or better and graduate standing.

## BA 550. ORGANIZATION LEADERSHIP

AND MANAGEMENT (3). Organization-wide implementation issues driven by change. Provides a balanced view of the structural and human sides of organization design. PREREQS: BA 352 a minimum grade of C - or better and graduate standing.

BA 551. SUPPLY AND SOURCING
MANAGEMENT (3). Focus on effectively using operations and supply chain management to make sourcing and supply decisions in international business contexts. Topics include purchasing/procurement procedures and policy, supply organization, specifications, sourcing strategy, supplier evaluation, competitive bidding, and e-procurement. Global contexts and environmentally and socially responsible supply management are emphasized

## BA 552. MANUFACTURING AND SERVICE

OPERATIONS (3). Focus on the management of global service operations including designing and managing systems to coordinate global information and material flows within and between firms in a supply chain. Covers planning operations, evaluating system alternatives designing and researching global supply networks, examining complex adaptive systems and evaluating value stream synchronization. PREREQS: BA 551 [B-] and BA 555 [B-]

## BA 554. LEAN ENTERPRISE MANAGEMENT

 AND CAPSTONE (3). Analyze business cases that address global value creation and production/ delivery systems. Complete integrated business projects to identify critical operations and supply chain management issues, apply multidisciplinary knowledge, analyze and evaluate alternative solutions and write and present reports recommending firm strategies. International business and cross-cultural competencies are emphasized. PREREQS: BA 552 [B-] and BA 561 [B-]BA 555. PRACTICAL BUSINESS ANALYSIS
(3). Advanced survey of quantitative business methods useful for aiding management decisions. Topics include a review of basic statistics, mathematical programming, business simulation, statistical process control, advanced regression analysis and forecasting. PREREQS: BA 275 with a minimum grade of C - or better graduate standing.

## BA 557. GLOBAL LOGISTICS MANAGEMENT

FUNDAMENTALS AND STRATEGY (3).
Students will learn key concepts, basic strategies, and decision-making tools relevant to logistics management, and apply them to real-world logistics problems faced by companies in the context of managing their global supply chains. PREREQS: BA 551 [B] and BA 552 [B] and BA 561 [B] and graduate standing

BA 560. VENTURE PLANNING (3).
Entrepreneurial and innovation processes applied to new business start-ups, existing small businesses, and new ventures within larger organizations; emphasis on venture planning with project management. Lec/rec. PREREQS: ((BA 340 or BA 340 H or FIN 340 or FIN 340 H ) and (BA 390 or BA 390 H )) with a minimum grade of $\mathrm{C}-$ or better and graduate standing. Restricted to MBA students who are completing the Integrated Business Project (IBP).
BA 561. SUPPLY CHAIN MANAGEMENT (3).
Covers tools and concepts needed to manage the entire supply chain effectively. Topics include negotiation, purchasing, logistics operations, and applying e-business tools. Emphasis on creating integrated supply chains. PREREQS: (BA 357 and BA 555) with a minimum grade of C - or better.

BA 562. MANAGING PROJECTS (3). Covers tools and concepts used by managers to plan and initiate business projects. Computer applications, cases and a project. PREREQS: (BA 352 and BA 357) with a minimum grade of C - or better and graduate standing.
BA 563. FAMILY BUSINESS MANAGEMENT
(4). Focuses on the opportunities and the problems characteristic of family businesses: entrepreneurship, management succession, transfer of ownership, mixing family and business roles, family conflicts, personnel issues, non-family employees, and outside advisors. PREREQS: Graduate standing and instructor approval.

BA 565. SYSTEMS THINKING AND PRACTICE (4). Hard and soft system theories examined, methods and techniques for dealing with realworld problems; skills and dialogue techniques to identify mindsets, define problems, and explore alternative pathways for solutions. PREREQS: Graduate standing.

BA 566. CLEAN TECHNOLOGY
COMMERCIALIZATION (3). Students will exercise commercialization concepts on recently awarded clean technology patents. Students will learn process and tools to assess the business viability of a technical idea, and to develop the best business approach for commercialization. Lec/rec. PREREQS: Graduate standing.
BA 567. SELECTED TOPICS IN MANAGEMENT
(0-4). Examination of the impact of recent advances in management on contemporary business. Topic will vary from term to term. Lec/ rec. This course is repeatable for a maximum of 16 credits. PREREQS: Graduate standing.

## BA 568. INTEGRATED BUSINESS PROJECT

(3). The project requires students to complete a business plan, as a means of directing the development of a business. A business plan can help focus a business idea, chart a course for strategic business development, and facilitate setting objectives and creating evaluative benchmarks of progress. To be taken during the last year of the MBA program.

## BA 569. ADVANCED STRATEGIC

MANAGEMENT (3). Advanced integrative casebased course on the process of systematically developing and managing firm strategies. Topics are covered from a general management perspective and include setting corporate goals and objectives, analyzing external competitive environments, understanding business models, identifying strategy options, and designing appropriate organization systems and structure for implementation of plans. International and e-business issues are integrated throughout. PREREQS: Graduate standing. All foundation courses.

BA 570. INNOVATION STRATEGY, IP, AND NPD (3). Enables students who are aspiring entrepreneurs forming new ventures or corporate managers leading existing businesses to understand the fundamental drivers of the success or failure of new products, from the perspective of the strategic management of
technological innovation. PREREQS: BA 560 [B-] and acceptance into the OSU MBA Program or approval by the Director of MBA Operations

## BA 572. ADVANCED INFORMATION SYSTEMS

(3). The development, implementation and management of information technology applications will be addressed. Topics will address the development and application of technology to support linkages within the organization and outside the organization. Projects will be assigned to illustrate the topics. PREREQS: Graduate standing.
BA 573. DATA ANALYTICS FOR COMPETITIVE
ADVANTAGE (3). Case studies, hands-on data analysis experience, and a class project will introduce basic concepts of data analytics, sketch the lifecycle of a data analytics project, and connect analytics to business consequences. Students will use representative analytic tools to support decision making.

BA 574. DATA MANAGEMENT (3). Familiarize students with the major activities involved in collecting and managing data for a data analytics project, including extracting information from relational databases, mapping organizational requirements into a data design, transforming data into information, exploring data warehouse concepts, and exploring basic concepts underlying Hadoop and other noSQL data management and analysis methods. PREREQS: BA 573 [C]

## BA 575. DATA EXPLORATION AND

VISUALIZATION (3). In this course we concentrate on the initial, exploratory phases of business analytic data analysis. We explore different types of data and the types of analysis they allow; aggregating and disaggregating data and issues of validity with both selecting and collecting data. We also start exploring one or more datasets relating to our Integrated Business Analytics Project (BA 577). PREREQS: BA 573 [C]
BA 576. DATA AND TEXT MINING (3). Examine how data/text analysis technologies can be used to improve decision making. The class covers the fundamental principles and techniques of data mining, text analysis, and uses real-world examples and cases to place data-mining techniques in context. Students will have handson experience with data/text mining software. PREREQS: BA 574 [C] and BA 575 [C]

BA 577. INTEGRATED BUSINESS ANALYTICS
PROJECT (3). Students will integrate what they have learned to solve industry-sponsored problems. The goal of the class is to provide students with opportunities to design, implement, and evaluate analytic solutions for a real-world enterprise. Student teams will examine the data requirements, technical requirements, and organizational requirements necessary for the success of analytical solutions. The project will give students the experience of leading and managing an analytical team, much as a Chief Analytics Officer (CAO) would be expected to do. PREREQS: BA 555 [C] and BA 574 [C] and BA 575 [C]
BA 578. SUPPLY CHAIN ANALYTICS (3).
Explores modeling methods for design, analysis, execution and integration of supply chains. Introduces students to a variety of modeling and optimization techniques for the analysis of strategic, tactical and operational supply chain problems including demand forecasting, risk analysis, revenue management, distribution and facility location. PREREQS: BA 555 [B-]

BA 582. SMALL-BUSINESS MANAGEMENT
(4). Covers the management and building of small- to mid-sized businesses that are past the initial start-up phase. Topics such as promotion and marketing, human resource management, operations and quality control, budgeting, and risk management will be discussed in a small-business context. PREREQS: BA 260 (undergraduate); none for graduate course. Junior standing.

BA 590. MARKETING MANAGEMENT (3). Provides students with an understanding of how a market-orientation can help firms to profitably deliver value to their targeted customers. Through a combination of lectures, in-class exercises, and case discussions, students will learn how to analyze complex marketing challenges, and make strategic decisions based on established marketing management principles. PREREQS: BA 390 with a minimum grade of C - or better and graduate standing.
BA 601. RESEARCH AND SCHOLARSHIP (1-16). Graded P/N. This course is repeatable for a maximum of 32 credits.

BA 602. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 32 credits.

BA 603. THESIS/DISSERTATION (1-16). Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 999 credits.
BA 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 32 credits.
BA 607. SEMINAR (1-16). This course is repeatable for a maximum of 32 credits.

## BA 611. TEACHING EFFECTIVENESS (1-6).

Provides an overview of a broad range of effective teaching techniques and common issues associated with teaching at the college level (e.g., defining learning outcomes, common pitfalls, assessing of student learning, etc.). This course is repeatable for a maximum of 6 credits. PREREQS: Doctoral student status.

BA 612. FOUNDATIONS OF BUSINESS
RESEARCH (3). Introduces first-year business doctoral students to concepts fundamental to conducting research in business as a social science. Specific topics may change from quarter to quarter, but sample topics include the academic environment in business, research paradigms, ethics in research, fundamentals of scientific research, constructs, validity, sampling, and analysis and interpretation. PREREQS: Doctoral student status and departmental approval.

## BA 613. SEMINAR IN BUSINESS RESEARCH

METHODS (3). Provides first-year business PhD students with an in-depth introduction to the most common research methodologies used by current business faculty across multiple functional disciplines. Specific research methods covered may change from quarter to quarter, but sample topics include use of basic econometric models for analysis of archival data, experimental methodologies, qualitative research techniques, and survey research. PREREQS: Doctoral student status and departmental approval
BA 660. FOUNDATIONS OF
ENTREPRENEURSHIP RESEARCH (3).
Provides a broad overview of the foundations of entrepreneurship research, including theoretical underpinnings of the field as well as some of the common and/or promising approaches to the study of entrepreneurial phenomena. PREREQS: Doctoral student status and departmental approval.

## BA 661. DOCTORAL SEMINAR IN

ORGANIZATIONAL THEORY (3). Surveys research on classic and contemporary developments in basic organizational theory PREREQS: Doctoral student status and departmental approval.

BA 662. CORPORATE ENTREPRENEURSHIP AND NEW VENTURES (3). Surveys research in the area of corporate entrepreneurship and venturing, focusing on relevant theoretical underpinnings and core concepts in the corporate entrepreneurship, entrepreneurship, and strategy literatures. PREREQS: Doctoral student status and departmental approval.
BA 663. STRATEGIC MANAGEMENT (3).
Surveys research exploring the central question in strategy: Why do some firms outperform others? The course considers a wide variety of
foundational and contemporary issues in the field, and while specific topics may change from quarter to quarter, sample topics include competitive and cooperative interactions, the resource-based view and firm capabilities, organizational learning and adaptation, and industry evolution. PREREQS: Doctoral student status and departmental approval.

## BA 664.TECHNOLOGY AND INNOVATION

 MANAGEMENT (3). Surveys research on the management of innovation and technology in organizations, focusing on innovation as an outcome (product, service, technology, practice) and on the process of generation, adoption, and implementation of innovation in organizations. PREREQS: Doctoral student status and departmental approval.BA 808. WORKSHOPS (0-16). Workshops aimed at practicing professionals in the discipline. Topics may vary.

## I FINANCE COURSES

FIN 340. FINANCE (4). Role and functions of a financial manager in the modern business environment in which a manager operates; formulation of financial objectives and policies; financial analysis, forecasting, planning, and control; asset management; capital budgeting; acquisition of funds through borrowing, stock issue, and by internal means; dividend policy; and international aspects of finance. PREREQS: ((BA 213 [C-] or BA 215 [C-] or BA 215H [C-] ) and (ECON 201 [C-] or ECON 201H [C-] )) and junior standing.
FIN 340H. FINANCE (4). Role and functions of a financial manager in the modern business environment in which a manager operates; formulation of financial objectives and policies; financial analysis, forecasting, planning, and control; asset management; capital budgeting; acquisition of funds through borrowing, stock issue, and by internal means; dividend policy; and international aspects of finance. PREREQS: ((BA 213 [C-] or BA 215 [C-] or BA 215H [C-] ) and (ECON 201 [C-] or ECON 201H [C-] )) and junior standing. Honors College approval required.
FIN 341. INVESTMENTS (4). Risk and reward characteristics of investments; sources of investment information; domestic and internationa security markets; investment characteristics of common stocks, debt securities, convertible securities, option contracts, and investment companies; real property investment; economic market analysis; technical market analysis; tax aspects of investments; and investment management. PREREQS: (FIN 340 [C-] or FIN 340 H [C-] or BA 340 [C-] or BA 340 H [C-] or BA 360 [C-] )
FIN 342. ADVANCED FINANCIAL
MANAGEMENT (4). Capital market theory and the valuation of risky assets, capital budgeting, valuing the firm's securities, capital structure theory, long-term financing alternatives, cost of capital, dividend policy, working capital management, financial analysis and planning, mergers, and takeovers. PREREQS: (FIN 340 [C-] or FIN 340 H [C-] or BA 340 [C-] or BA 340 H [C-] or BA 360 [C-] )
FIN 434. CFA PREPARATION (2-4). Provides students with structure and guidance in their preparation for the Chartered Financial Analyst (CFA) Level exam. Students systematically prepare for and are tested on the 18 sections of the exam. This course is repeatable for a maximum of 4 credits.
FIN 437. APPLIED PORTFOLIO MANAGEMENT (2). Hands-on experience of managing two investment portfolios. Each member in the Oregon State Investment Group (OSIG) should act as a financial analyst to analyze a chosen company by performing the Discounted Cash Flow (DCF) or Residual Income Model (RIM), the relative valuation, and the SWOT analyses. The weekly
seminar offers opportunities for students to present their analyses and offer comments and suggestions to other,s presentations. PREREQS: Junior standing, instructor approval required.
FIN 438. APPLIED PORTFOLIO MANAGEMENT II (1). Each student will act as a financial analyst to analyze a chosen company using models learned in FIN 437. Provides students with an opportunity to practice security valuation and get familiar with the tools. In addition, this course will focus on various measures of portfolio performance. PREREQS: FIN 437 [C-] or BA 437 [C-] and junior standing and instructor approval required.
FIN 439. APPLIED PORTFOLIO MANAGEMENT
III (1). Each student will act as a financial analyst to analyze a chosen company using models learned from FIN 437. Provides students additional opportunity to practice security valuation and strengthen their understanding of the tools. In addition, this course will introduce ways to develop an efficient portfolio. PREREQS: FIN 437 [C-] or BA 437 [C-] and junior standing and instructor approval required.
FIN 440. FIXED INCOME SECURITIES (4). Provides students with intermediate knowledge of fixed income assets, interest rate and interest rate theory, the tools for estimating values, and managing portfolios of fixed income assets. The course can also serve as a partial coverage of material expected of applicants planning on seeking the Certified Financial Analyst designation. PREREQS: FIN 341 [C-] and FIN 342 [C-]
FIN 441. FINANCIAL INSTITUTIONS (4).
Introduction of markets and institutions that form the economic system of trading financial and real assets both domestically and internationally. The introduction of concepts of financial theory, institutional detail, regulatory environments, and the history of financial markets. Topics include legal, ethical, technological, and global issues facing financial managers, markets, and institutions. PREREQS: (BA 341 [C-] or FIN 341 [C-] or AREC 465 [C-] or AEC 465 [C-]) and (BA 342 [C-] or FIN 342 [C-] or AREC 442 [C-] or AEC 442 [C-] ) and senior standing.
FIN 442. FINANCIAL STATEMENT ANALYSIS
(4). Student develop the understanding and skill to use financial statements for investment decisions, credit decisions, performance analysis, and forecasting. Three main topic areas: analysis overview, accounting analysis, and financial analysis. PREREQS: (BA 341 [C-] or FIN 341 [C-] ) and (BA 342 [C-] or FIN 342 [C-] ) and ACTG 317 [C-] and /or instructor approval. Senior standing.
FIN 443. PORTFOLIO MANAGEMENT (4).
An introduction to the construction, revision, and performance evaluation of financial asset portfolios. PREREQS: FIN 341 [C-] or BA 341 [C-]
FIN 444. FINANCIAL RISK MANAGEMENT (4). Investigation of financial hedging activities for corporations and financial institutions using futures, options, and other derivative securities. Identification of risk attributes, valid hedging rationales, and management of hedging programs. PREREQS: (BA 341 [C-] or FIN 341 [C-]) and (BA 342 [C-] or FIN 342 [C-] ) and senior standing.

## FIN 445. INTERNATIONAL FINANCIAL

MANAGEMENT (4). International monetary environment; foreign exchange risk management; source and availability of funds to finance trade and multinational operations; taxation planning and control; international portfolio diversification; international banking; capital budgeting; political risk evaluation of performance. PREREQS: (FIN 342 [C-] or BA 342 [C-] ) and (BA 347 [C-] or ECON 340 [C-]) and (FIN 441 [C-] or FIN 444 [C-] or BA 441 [C-] or BA 444 [C-] )
FIN 499. SELECTED TOPICS IN FINANCE (1-4).
Examination of the impact of recent advances in finance on contemporary business. Topic will vary from term to term. This course is repeatable
or a maximum of 16 credits. PREREQS: Senior standing

FIN 542. INVESTMENTS (3). Introduction to the tools and concepts of security analysis and investments; basic security types, including stocks, bonds, options and futures, respective markets and to how these securities are traded; fundamental valuation techniques and theory for stocks and bonds. PREREQS: BA 360 or equivalent.
FIN 543. PORTFOLIO MANAGEMENT (4).
An introduction to the construction, revision, and performance evaluation of financial asset portfolios. PREREQS: FIN 542 [C]
FIN 544. FINANCIAL RISK MANAGEMENT
(4). Investigation of financial hedging activities for corporations and financial institutions using futures, options, and other derivative securities. Identification of risk attributes, valid hedging rationales, and management of hedging programs. PREREQS: FIN 542
FIN 545. INTERNATIONAL FINANCIAL
MANAGEMENT (3). The goal of this course is to teach students how to become an effective global financial manager. To achieve this goal, the course focuses on important topics that include the fundamentals of the macroeconomic environment of international financial management, the financial environment in which a multinational firm and its managers must function, and the foreign exchange management and financial management in a multinational firm. Students will be exposed to business-related global issues, processes, trends, and systems inside and outside the classroom. PREREQS: BA 540 [B-]

## FIN 546. ADVANCED CORPORATE FINANCE

(3). The second course in the Corporate Finance sequence. Examines corporate payout policies and capital structure choices, choices in debt financing, financial planning and working capital management, and valuation of projects using a real-options approach. PREREQS: BA 540 [B-] and acceptance into the OSU MBA Program or approval by the Director of MBA Operations
FIN 549. MERGERS AND ACQUISITIONS (3). Provides an in-depth examination of the theory and practice of the market for corporate control, primarily focusing on mergers and acquisitions (M\&A). The objective of the course is to provide an understanding of how to structure, value, and implement an M\&A transaction. Students will be expected to apply the appropriate tools and skills to evaluate M\&A transactions. PREREQS: FIN 546 [B-]

## FIN 550. FUNDAMENTALS OF FINANCIAL

PLANNING (4). Professional conduct and regulation, general financial planning principles, and education planning. PREREQS: Graduate standing.

FIN 551. FINANCIAL PLANNING I (6).
Fundaments of financial planning; regulations in the financial services industry; income and debt management techniques; risk management process in financial planning; insurance planning; income tax fundamentals; tax management strategies. PREREQS: BA 528 [C] and FIN 542 [C] and graduate standing.
FIN 552. FINANCIAL PLANNING II (3).
Retirement planning; qualified and non-qualified retirement plans; IRAs; legal, tax, financial and non-financial aspects of estate planning; trusts; wills; wealth transfers. PREREQS: FIN 551 [C]
FIN 553. FINANCIAL PLANNING III (6).
Synthesis and integration of financial planning fundamentals to develop a comprehensive financial plan; client communication. PREREQS: FIN 552 [C]
FIN 640. FOUNDATIONS OF FINANCIAL
RESEARCH (3). Provides an in-depth introduction to the foundations of financial research with an emphasis on theoretical developments and empirical research methods. Specific topics may
change from quarter to quarter, but sample topics include theory of the firm, capital structure theory, dividend policy, and event study methodology. PREREQS: Doctoral student status and departmental approval.
FIN 641. CORPORATE FINANCE SEMINAR (3). Survey classic and contemporary research in the area of corporate finance. Specific topics may change from quarter to quarter, but sample topics include capital structure, dividend policy, agency theory, adverse selection and signaling, and non-cooperative games with and without complete information. PREREQS: Doctoral student status and departmental approval.

FIN 642. CAPITAL MARKETS (3). Surveys research on capital markets. Specific topics may change from quarter to quarter, but sample topics include asset pricing models, efficient markets vs behavioral finance, market volatility, volume, new issues market, and emerging markets. PREREQS: Doctoral student status and departmental approval.

## ■ HOSPITALITY MANAGEMENT COURSES

HM 101. INTRODUCTION TO HOSPITALITY (4). Introduction to the food-service, lodging, and tourism components of the hospitality industry, and the essential leadership and management skills necessary for success in the field. Background information, current issues, and future challenges in various segments of the industry are included.
HM 210. HOSPITALITY INTERNSHIP (3).
Students are required to complete this internship so that OSU and the sponsoring company can offer a platform from where students can apply the management concepts learned in class and acquire the necessary hands-on experience in a hotel, restaurant/food service and/or tourism industry to eventually qualify for a supervisory of managerial level role. PREREQS: HM 101 [C-]
HM 230. LODGING MANAGEMENT (4). Provides a comprehensive introduction to the management of hotels and lodging properties. Focuses on operations, service, management and financials of the lodging industry. PREREQS: HM 101 [C-]

HM 235. HOSPITALITY LAW AND LABOR RELATIONS (4). Provides insight into the laws and regulations governing the hospitality industry with an emphasis on labor relations and human resources best practices. Addresses the general concepts of tort, contracts, liability, risk management, employment practices, licensing and insurance needs. Explores the legal issues that today,s hospitality professionals face such as privacy, labor laws, the common law system for innkeepers and newer hospitality products in the shared economy such as AirBnB or VRBO.

HM 240. HOSPITALITY COST CONTROL (4). introduces the basic techniques and control procedures used in the hospitality industry to maximize profit and minimize costs. Examines and discusses methods employed to protect and uphold the investors/owners strategic financial goals. Students will focus on all aspects of hospitality control objectives; from food and beverage costs, purchasing, labor costs, menu pricing, establishing room rates, cash flow, theft and loss prevention, to computer applications. The principles of effective budgeting, important hospitality financial ratios and the factors that determine hospitality profitability will also be reviewed.
HM 310. INTERNSHIP II (3). Hospitality Internship II builds on the knowledge students have gained from their course work internship (HM 210). Students are required to complete this internship in a hotel, restaurant/food service and/or related hospitality sector. In cooperation with OSU and the sponsoring company, students will apply the HM concepts learned in class to a real-world business environment.

HM 320. SERVICE AUTOMATION AND
TECHNOLOGY (4). Students discover the basic concepts of hospitality technology and service automation. The hospitality industry continues to see significant changes in all facets of business due to changing customer expectations, new and cheaper technology, and a challenging labor market. The result of these forces has led the hospitality industry to increasingly turn to automation of basic job tasks to stay competitive. Examines new technologies shaping the hospitality industry and how industry leaders are taking advantage of these new technologies to improve efficiency and service.
HM 340. HOSPITALITY COST CONTROL (4). Introduces the basic techniques and control procedures used in the hospitality industry to maximize profit and minimize costs. Examines and discusses methods employed to protect and uphold the investors/owners strategic financial goals. Students will focus on all aspects of hospitality control objectives; from food and beverage costs, purchasing, labor costs, menu pricing, establishing room rates, cash flow, theft and loss prevention, to computer applications. The principles of effective budgeting, important hospitality financial ratios and the factors that determine hospitality profitability will also be reviewed.

HM 410. HOSPITALITY INTERNSHIP III (3). Hospitality Internship III builds on the knowledge the students have gained from their course work and their previous internships (HM 210 \& HM 310). Students are required to complete this internship in a hotel, restaurant/food service and/ or related hospitality sector. In cooperation with OSU and the sponsoring company, students apply the HM concepts learned in class to a real-world environment. PREREQS: HM 310 [C-]

## HM 420. REVENUE MANAGEMENT AND

PRICING (4). Revenue management is critical to the hospitality industry due to the perishable nature of a service-based product. The fundamental principles and concepts of revenue management covered are capacity management, duration control, demand and revenue forecasting, discounting, overbooking practices, displacement analysis, channel management, and pricing execution

## HM 425. ADVANCED RESTAURANT

MANAGEMENT AND OWNERSHIP (4). Covers
concept development, design and funding of a new restaurant, and best practices in operations and management of a full-service foodservice operation. Intended for students wishing to develop their knowledge of foodservice entrepreneurialism, creation, operations and management/ownership.
HM 460. HOSPITALITY INVESTMENT AND ASSET MANAGEMENT (4). Covers the principles of hospitality investment and asset management. Provides future hospitality owners/executives with the tools and knowledge to evaluate real estate investments in new hospitality ventures. Tools for financial analysis and assessment, debt and equity financing (public and private), and the use of industry benchmarks are discussed and practiced. Students explore the financial feasibility of a specific hospitality investment while considering financial risk, new income streams, competitor analysis and market forecasting, investment and asset management.

## MANAGEMENT COURSES

MGMT 364. PROJECT MANAGEMENT (4). Covers the tools available to project managers, the human and organizational dimensions in different project environments, some computer applications, cases, and a project. PREREQS: BA 351 [C-] or BA 352 [C-] or BA 352H [C-]
MGMT 446. CROSS-CULTURAL MANAGEMENT
(4). Provides a comprehensive understanding of cross-cultural management issues including leading culturally diverse workforces and
managing diversity in the workplace. Students will not only learn theoretical foundations and best practices to address regarding global work practices, but also learn how to transfer and apply the course materials in this course to their PREREQS: BA 352 [C-] or BA 352H [C-]
MGMT 448. EMPLOYEE RECRUITMENT AND SELECTION (4). Provides an in-depth coverage of best practices pertaining to the process of attracting, selecting, and hiring new employees in modern organizations. Topics that will be emphasized include recruitment tactics, legal issues related to staffing, the criteria organizations use to make hiring decisions, and the strengths and weaknesses of various techniques used to evaluate prospective applicants throughout the selection process. The implications of what we discuss for the organization, the hiring manager, and the job-seeker are considered. PREREQS: BA 352 [C-]
MGMT 452. LEADERSHIP (4). In-depth study of leadership research, theory and skills. Emphasis on analysis of organizational leadership situations and application of leadership skills in the workplace. PREREQS: BA 351 [C-] or BA 352 [C-] or BA 352H [C-

## MGMT 453. HUMAN RESOURCES

MANAGEMENT (4). Personnel administration for line supervisors and managers. Integrates systems approach to understanding government regulation of employment, resolution of workplace personnel problems, and performance-based personnel management. PREREQS: BA 351 [C-] or BA 352 [C-] or BA 352H [C-]
MGMT 455. INFLUENCE AND NEGOTIATION
(4). Focuses on analysis, skill development and application of management research to real-life organizational influence, persuasion, negotiation and conflict management situations. PREREQS: BA 352 [C-] or BA 352H [C-]
MGMT 456. MANAGEMENT FIELD PRACTICUM (4). An innovative application of key management principles and tools to real-life projects is provided Students will be responsible for developing, designing, executing, and evaluating projects. PREREQS: MGMT 364 [C-] or BA 364 [C-] and senior standing.
MGMT 457. SUPPLY CHAIN STRATEGY (4). Covers tools and concepts needed to manage the supply chain effectively. Topics include negotiation, purchasing, logistics operations, and applying e-business tools. Emphasis on creating integrated supply chains. PREREQS: BA 357 [C-]

## MGMT 459. MANAGING ETHICS AND

 CORPORATE SOCIAL RESPONSIBILITY (4). Introduces students to contemporary issues managers face making ethical and sociallyresponsible decisions in an increasingly competitive, transparent, and global environment. Practical examples and cases, as well as contemporary behavioral ethics research and theory are incorporated throughout the course. PREREQS: (BA 352 [C-] or BA 352H [C-] ) and senior standing and a minimum passing grade of C- or better.MGMT 499. SELECTED TOPICS IN
MANAGEMENT (1-4). Examination of the impact of recent advances in management on contemporary business. Topic will vary from term to term. This course is repeatable for a maximum of 16 credits. PREREQS: Senior standing and departmental approval.

## MGMT 553. HUMAN RESOURCES

MANAGEMENT (4). Personnel administration for line supervisors and managers. Integrates systems approach to understanding government regulation of employment, resolution of workplace personnel problems, and performance-based personnel management. PREREQS: (BA 350 or BA 352 or BA 352 H ) with a minimum grade of C or better and graduate standing.

MGMT 555. INFLUENCE AND NEGOTIATION
(4). Focuses on analysis, skill development and application of management research to real life organizational influence, persuasion, negotiation and conflict management situations. PREREQS: BA 516 [C]
MGMT 559. MANAGING ETHICS AND CORPORATE SOCIAL RESPONSIBILITY (3). Introduces students to contemporary issues managers face making ethical and sociallyresponsible decisions in an increasingly competitive, transparent, and global environment. Practical examples and cases, as well as contemporary behavioral ethics research and theory are incorporated throughout the course.
MGMT 571. ETHICAL LEADERSHIP (3).
Students will learn the theoretical paradigms of ethical conduct and decision making and consider the role of business in society. PREREQS: BA 550 [C] and graduate standing.

MGMT 572. MANAGING HUMAN RESOURCES (3). Students will learn the theories of human resource management, the legal requirements for human resource practices and the practical skills to execute human resource management activities. PREREQS: BA 516 or equivalent with a minimum grade of C - or better and graduate standing.
MGMT 574. NEGOTIATIONS (3). Students will learn the theories of negotiation and the techniques to develop an effective negotiation style. PREREQS: BA 516 with a minimum grade of C- or better and graduate standing.
MGMT 575. INTEGRATIVE CAPSTONE I (3).
First course in a two-course sequence spanning the final two quarters of the OLMBA program. Students will conduct an extensive analysis of the students organization, the industry and external environment, the organizationss competitors, internal organization, and business level strategy. PREREQS: BA 562 [B] and Graduate standing and enrolled in the Organizational Leadership MBA Program. It is expected that students will complete MGMT 575 and MGMT 576 sequentially.

## MGMT 576. INTEGRATIVE CAPSTONE II (3).

Second course in a two-course sequence spanning the final two quarters of the OLMBA program. Students start from the final proposal in MGMT 575 and formulate an integrative project plan through the application of multidisciplinary knowledge. PREREQS: MGMT 575 [B] and with a B or better. Graduate standing and enrolled in Organizational Leadership MBA Program.

MGMT 650. ORGANIZATIONAL BEHAVIOR (3). Surveys research on individual differences, psychological states, and team processes related to work motivation, decision-making and performance. PREREQS: Doctoral student status and departmental approval.

## ■ MARKETING COURSES

MRKT 390. PRINCIPLES OF MARKETING (4).
Covers concepts and principles used by marketing professionals. Designed explicitly for Marketing majors, it's an introduction to the relationships between customers, products, and companies in a competitive and dynamically evolving marketplace. PREREQS: ECON 201 [C-] or ECON 201H [C-] and admission to Pro School Marketing major.

MRKT 396. FUNDAMENTALS OF MARKETING RESEARCH (4). Introduction to the fundamentals of market research. Provides a basic understanding of marketing research and relevant decisions in the process. PREREQS: ((BA 275 [C-] or BA 276 [C-] or ST 202 [C-] ) and (BA 390 [C-] or BA 390H [C-] ))

MRKT 486. CUSTOMER RELATIONSHIP MANAGEMENT (CRM) (4). An integration of people, process and technology. Students will learn how individuals and companies can gain the return on investment that they expect through technology implementation, service and business
process mapping, employee training, customer relationship, customer life time value, technology solutions that track customer data and employee performance. PREREQS: BA 396 [C-] or MRKT 396 [C-] and Senior standing.
MRKT 488. PERSONAL SELLING (4). An introductory course that focuses on two areas: the principles and theory of personal selling, and on understanding and developing the interpersonal communication skills needed for successful personal selling. PREREQS: BA 390 [C-] or BA 390H [C-]
MRKT 489. PERSONAL SELLING SKILLS
DEVELOPMENT (4). Learn and develop the skills necessary for persuasive encounters in personal selling settings, such as making sales calls, preparing and delivering presentations, writing documents (sales proposals, cover letters, and resumes) and structuring logical, persuasive, prioritized arguments. PREREQS: MRKT 488 [C-] or BA 491 [C-] and senior standing.

## MRKT 491. QUALITATIVE RESEARCH

METHODS (4). Students will gain an overall understanding of qualitative research and methods such as focus groups, in-depth interviews, and observational research. Explores qualitative research methods through hands-on learning and experiences. PREREQS: BA 390 [Cor BA 390H [C-] or MRKT 390 [C-]
MRKT 492. CONSUMER BEHAVIOR (4). Understanding the processes that lead to purchase, so as to improve decisions on segmentation and the appropriate marketing mix for each segment. How consumers and households make decisions, and why different individuals/groups make different decisions. Application of behavioral science concepts at individual, subcultural and cultural levels. Effects of consumerism and regulation also are considered. PREREQS: BA 390 [C-] or BA 390H [C-]
MRKT 493. ADVERTISING MANAGEMENT (4) Analysis of the influence of marketing communications on the attitudes and behaviors of consumer and industrial buyers. Identification and examination of the major decisions made by marketing/advertising managers in implementing the promotional mix. PREREQS: BA 390 [C-] or BA 390H [C-]
MRKT 495. RETAIL MANAGEMENT (4).
Management of retail business with emphasis on strategic planning, analysis, and control, focused on middle- and upper-middle management decisions. PREREQS: BA 390 [C-] or BA 390H [C-]

## MRKT 496. MARKETING RESEARCH

PRACTICUM (4). Provides the student with practical experience in the collection, analysis and interpretation of primary data. PREREQS: MRKT 396 [C] or BA 396 [C] and departmental approval. Marketing majors or instructor approval required.
MRKT 497. GLOBAL MARKETING (4).
Consideration of cultural, political, regulatory, economic and trade barriers in the design of marketing plans for product development, pricing, channels of distribution; and promotion alternatives in a global market. PREREQS: (BA 347 [C-] and (BA 390 [C-] or BA 390H [C-] ))
MRKT 498. SERVICES MARKETING (4).
Formulation of strategic and tactical marketing plans for organizations (both profit and not-for-profit) in the service sector of the economy. Projects or cases are used to provide a comprehensive experience. PREREQS: BA 390 [C-] or BA 390 H [C-] or BA 590 [C-]
MRKT 499. MARKETING STRATEGY (4). Market and competitive analysis for developing overall strategies and tactics to achieve the marketing objectives of the business enterprise. Projects or cases are used to provide a comprehensive experience. PREREQS: MRKT 396 [C] or BA 396 [C]

## MRKT 581. APPLIED QUANTITATIVE

MARKETING ANALYSIS (4). Includes a comprehensive presentation of quantitative methods used in marketing management. It is designed to prepare students to use quantitative techniques in making marketing decisions. Topics include ANOVA, regression, discriminant and logit analysis, factor analysis, cluster analysis, and structural equation modeling. PREREQS: BA 596 [C] or MRKT 596 [C]

## MRKT 582. APPLIED QUALITATIVE

MARKETING ANALYSIS (3). Explores the uses and application of qualitative research methods to inform and improve marketing decision-making. Students will be introduced to such methods as focus group interviews, individual in-depth interviews, observational research methods, participant observation, and ethnographic immersion. Students will learn appropriate analytic strategies and reporting methodologies. PREREQS: BA 596 [C] or MRKT 596 [C]
MRKT 588. PERSONAL SELLING (4). An introductory course that focuses on two areas: the principles and theory of personal selling, and on understanding and developing the interpersonal communication skills needed for successful personal selling.
MRKT 589. PERSONAL SELLING SKILLS
DEVELOPMENT (4). Learn and develop the skills necessary for persuasive encounters in personal selling settings, such as making sales calls, preparing and delivering presentations, writing documents (sales proposals, cover letters, and resumes) and structuring logical, persuasive, prioritized arguments. PREREQS: BA 491 or MRKT 488 with a minimum grade of C - or better. Senior standing.
MRKT 592. CONSUMER BEHAVIOR (3).
Understanding the processes that lead to purchase, so as to improve decisions on segmentation and the appropriate marketing mix for each segment. How consumers and households make decisions, and why different individuals/groups make different decisions. Application of behavioral science concepts at individual, subcultural and cultural levels. Effects of consumerism and regulation also are considered.
PREREQS: BA 516 [B-]

MRKT 593. INTEGRATED MARKETING
COMMUNICATIONS (3). Analysis of the influence of marketing communications on the attitudes and behaviors of consumer and industrial
buyers. Identification and examination of the major decisions made by marketing/advertising managers in implementing the promotional mix. PREREQS: BA 516 [B-]
MRKT 595. RETAIL MANAGEMENT (4).
Management of retail business with emphasis on strategic planning, analysis, and control, focused on middle- and upper-management decisions.
PREREQS: (BA 390 or BA 390 H or BA 590) and a minimum grade of C - or better and graduate standing.
MRKT 596. MARKETING RESEARCH DESIGN
AND METHODS (3). Focuses on articulating
research problems, creating appropriate research design to address information needs (i.e., understanding markets, competitors, and customers), ethics (to include IRB training), and the application of diverse data collection methods, including secondary, qualitative, and quantitative methods. Measurement, sampling, and data preparation will also be addressed. PREREQS:

## BA 390 or equivalent.

MRKT 597. GLOBAL MARKETING (4).
Consideration of cultural, political, regulatory, economic and trade barriers in the design of marketing plans for product development, pricing, channels of distribution; and promotion alternatives in a global market. PREREQS: (BA 347 and (BA 390 or BA 309 H or BA 590) with a minimum grade of C - or better and graduate standing
MRKT 599. SELECTED TOPICS IN MARKETING
(1-4). Concepts and methods in advanced marketing management practice. Latest theoretical developments and quantitative methods in marketing, with particular relevance to managerial applications. Topics will vary from term to term. This course is repeatable for a maximum of 16 credits. PREREQS: Graduate standing.

## MRKT 690. MARKETING AND

COMMERCIALIZATION (3). Surveys marketing research related to innovation. Specific topics may change from quarter to quarter, but sample topics include research on marketing strategy, consumer behavior, brand equity, brand management, and product management, each from the perspective of the consumer and the firm. PREREQS: Doctoral student status and departmental approval.

## College of Business 253

The College of Earth, Ocean, and Atmospheric Sciences (CEOAS) has a three-fold mission: to pursue basic and applied research; educate and train undergraduate and graduate students; and to extend information to society about Earth, oceans and atmosphere, including their interactions and the interrelationships with humans and ecosystems.

The college prepares students for professional careers and enables faculty to seek out new ideas and innovative approaches to the complex issues of planetary-scale science. Degree offerings are: Earth Sciences (BS, CRED, HBS) with options in Climate Science, Geography, Geology, and Ocean Science; Environmental Sciences (BS, CRED, HBS); Geography and Geospatial Science (BS); Geography (MA, MS, PhD, MAIS); Geology (MA, MS, PhD, MAIS); Marine Resource Management (MA, MS); and Ocean, Earth, and Atmospheric Sciences (MA, MS, PhD, MAIS).

Please see http://ceoas.oregonstate.edu/ for more information about the college.

## HISTORY

In 2011, the College of Earth, Ocean, and Atmospheric Sciences was created by the merger of the College of Oceanic and Atmospheric Sciences (COAS), the Department of Geosciences and the Environmental Sciences Undergraduate Program in the College of Science. The college is at the heart of a new research and education enterprise organized around the interdisciplinary sciences of the Earth, ocean, and atmosphere. It spans the natural science disciplines and creates strong linkages with the social sciences both within the college as well as around the university.

The college is Oregon's principal source of expert knowledge about the Earth, ocean, and the atmosphere, especially in the Pacific Northwest region, which has long been the focus of major research efforts by OSU researchers. It conducts the only comprehensive oceanographic and atmospheric research programs in Oregon, as well as major programs in geology, geography, and geospatial studies. Today, research activities of the college extend throughout the world and to all oceans. Its graduates hold professional and leadership positions in science, resource management, education, regulatory agencies, and the private sector in the United States and internationally.

The new college has celebrated 100 years of excellence in the Geology program while establishing new degree options in ocean and climate science. The college has diversified and increased general education courses and offers certificates in geospatial studies and water conflict management and transformation. The college fosters experiential learning through labs, field, and shipboard experiences.

## FACULTY

Professors Barnes, Barth, Becker, Benoit-Bird, Bloomer, Brook, Campana, Cianelli, Clark, Colwell, Conway, Crump, Davis, de Silva, Dever, Dilles, Egbert, Goldfinger, Goñi, Graham, Haggerty, Hales, Haller, Harris, Harte, Jones, Kent, Koppers, Kosro, Letelier, Lyle, Matano, Marinelli, Meigs, Mellinger, Mix, Mote, Moum, Nabelek, Nash, Nielsen, Nolin, Noone, Özkan-Haller, Reimers, Samelson, Schultz, Skyllingstad, Smyth, Spitz, Torres, Trehu, Wheatcroft, Wolf Associate Professors Carlson, Corcoran, de Szoeke, Gosnell, Haley, Kirby, Kurapov, Lancaster, Lerczak, Matsumoto, Ruggiero, Santelmann, Schmittner, Shearman, Shell, Stoner, Tepley, Tufillaro, Waldbusser, White Assistant Professors Bernard, Buizert, Copeman, Creveling, Durland, Fehrenbacher, Fram, Haxel, Hutchings, Jarvis, Juranek, Kennedy, McKay, O'Neill, Rupp, Shiel, Shroyer, Thurber, Tilt, Van Den Hoek, Wettstein, Wilson, Wrathall, Zhao
Senior Instructors L. Becker, Cook, Hommel, K. Yalcin
Instructors Hyrapiet, Keller, Milstein, Nelson, R. Yalcin
Academic Advisors Chuinard (head advisor), Gaid, Lieuallen, Menn
Experiential Learning
Coordinator Cardinal-Lanier

## EMERITI

Allen, Bennett, Byrne, Caldwell, Carey, Chelton (Distinguished) Coakley, Collier, Couch, Cowles, Dalrymple, Deardorff, de Szoeke, Dillon, Duncan, Esbensen, Fisk, Frenkel, Gates, Gonor, Good, Gordon (Associate), Grunder, Holman, Huyer, Jackson, Keller, Kimerling, Klinkhammer, Komar, Kulm, Lawrence, Levi, Lillie, Mahrt, Maresh, Matzke, Miller, R. Miller, Morris, Muckleston, Nelson, Neshyba, Niem, Nolan, Paulson, Pearcy, Pease, Pillsbury (Associate), Pisias, Prahl, Rosenfeld, B. Sherr, E. Sherr, Simoneit, Small, Smith, Strub, Taylor, Unsworth, Vong, Wheeler (Distinguished), Yeats, Zaneveld

Please see the college website at http:// ceoas.oregonstate.edu for updated listings that include adjunct faculty, research faculty, courtesy faculty, and research associates.

## Undergraduate Majors

Earth Sciences (BS, CRED, HBS)

## Options

Climate Science
Geography
Geology
Ocean Science
Environmental Sciences (BS, CRED, HBS)
Options
Alternative Energy

CEOAS Student Services Office 104 Wilkinson Hall Oregon State University Corvallis, OR 97331-5503 541-737-1201 FAX 541-737-1200 Website: http:// ceoas.oregonstate. edu/

## Administration

Roberta
Marinelli,
Dean
Anita Grunder
Associate Dean for Academic Programs

Flaxen Convay,
Director of
Marine Resource
Management
Program

## Larry Becker,

Director of the
Environmental
Sciences
Undergraduate
Program
Edward Brook,
Director of Geology
Program
Julia Jones,
Director of Geography Program

Robert
Wheatcroft,
Director of Ocean Science Program

Karen Shell,
Director of Atmospheric Science Program

Lynette deSilva, Director, Water Conflict Management and Transformation Graduate Certificate

## Kuuipo Walsh,

 Director, Geographic information Science ProgramMary Chuinard,
Head Advisor
Robert Allan,
Director of Graduate Student Development

Jessica CardinalLanier,
Experiential Learning Coordinator

Applied Ecology
Aquatic Biology
Conservation, Resources, and
Sustainability
Earth Systems
Environmental Agriculture
Environmental Policy and Economics
Environmental Science Education
Environmental Water Resources
Geography and Geospatial Science (BS, CRED, HBS)

## Undergraduate Minors <br> Earth Sciences <br> Environmental Sciences <br> Geography <br> Geology <br> Oceanography <br> Undergraduate Certificate <br> Geographic Information Science <br> Graduate Majors <br> Geography (MA, MAIS, MS, PhD) <br> Graduate Areas of Concentration <br> Geographic Information Science <br> Physical Geography <br> Resource Geography <br> Geology (MA, MAIS, MS, PhD) <br> Graduate Areas of Concentration <br> Solid Earth Processes and History

- Volcanology, Igneous Petrology and Economic Geology
- Active Tectonics and Earthquake Geology
Surface Earth Processes and History
- Earth System History
- Hydrogeology and Hydrology
- Geomorphology and Surface Processes
- Climate and Biogeochemical Cycles
Marine Resource Management (MA, MS)
Graduate Area of Concentration
Marine Resource Management
Ocean, Earth and Atmospheric Sciences
(MA, MAIS, MS, PhD)
Graduate Areas of Concentration Atmospheric Sciences
Geological Oceanography
Geophysics
Ocean Ecology and Biogeochemistry
Physical Oceanography
Graduate Minors
Geography


## Geology

Marine Resource Management
Ocean, Earth and Atmospheric Sciences
Risk and Uncertainty Quantification in Earth Systems
Water Conflict Management and Transformation

## Graduate Certificates

Geographic Information Science
Marine Resource Management

Water Conflict Management and Transformation

## REQUIREMENTS FOR UNDERGRADUATE PROGRAMS IN THE COLLEGE:

The University Baccalaureate Core requirements are explained in a separate section, "Earning a Degree at Oregon State University". The major and option requirements are explained below. If you want to add a minor program or certificate, you will also need to complete the requirements for that minor or certificate. Specific requirements for interdisciplinary minors are listed in the Interdisciplinary Programs section of this catalog.

## Academic Advising

Undergraduates within CEOAS are assigned a professional advisor based on the student's major program of study. Advisors help to monitor academic progress through the degree programs, assist students with defining goals within the major, help in navigating university policies and regulations, and provide referrals to campus-wide resources. Faculty within CEOAS are involved as mentors for undergraduates-to guide students on professional and career-related decisions and to help connect students with research opportunities.

## Internships and Experiential

## Learning

CEOAS places a strong emphasis in gaining experience outside of the classroom and offers specialized support to all students for internships and undergraduate research through a designated experiential learning coordinator available to all undergraduates within the college.

## Teacher Education

The Earth Sciences and Environmental Sciences majors provide excellent scientific preparation for teaching middle school and high school science. All professional teacher licensure certification occurs in the College of Education.

## Double Degrees

Undergraduates with majors in CEOAS can earn a second degree in education, innovation management, international studies, or sustainability. See the College of Education, College of Business, International Programs or Department of Forest Ecosystems and Society sections of this catalog for more information.

## COLLEGE UNDERGRADUATE GRADUATION REQUIREMENTS

Along with fulfilling the university-level, baccalaureate core, and major requirements for BS degrees within CEOAS, students must meet the following college requirements:

- A grade of at least $C$ - minus is required for all upper-
division ( 300 level and above) courses taken to fulfill major requirements.
- A minimum 2.00 GPA in major requirement courses (excluding baccalaureate core and electives) is required for all CEOAS majors.
- "S/U" grading is not allowed for courses taken to fulfill major requirements.


## REQUIREMENTS FOR ADMISSION TO THE GRADUATE PROGRAMS <br> IN THE COLLEGE:

1. A bachelor's degree with a major (40 quarter credits or more) in a relevant discipline (see individual program requirements) such as physics, mathematics, chemistry, biology, geology, atmospheric science, computer science, or engineering. Geography and Marine Resource Management applicants also have a bachelor's degree in the social or political sciences, geography, economics, business administration, or fisheries.
2. A minimum cumulative grade-point average of 3.00 on a 4.00 scale for the last 90 quarter credits of undergraduate work.
3. A solid foundation in prerequisites (see individual program requirements).
4. Graduate Record Examination (GRE) scores (general).
5. Three letters of recommendation.
6. For TOEFL requirements, please see the OSU Admissions Web pages for graduate requirements and contact the CEOAS Student Services Office for specific information.
Early January is the deadline to apply for the following fall term admission. Early application is strongly recommended.

## MASTER'S PROGRAMS

All students in College of Earth, Ocean, and Atmospheric Sciences graduate majors must satisfy the minimum program requirements ( 45 credits including 6 credits of thesis) established by the Graduate School. Some graduate credits earned at other institutions may be approved for inclusion in the program. The Marine Resource Management graduate program requires additional course work credits. Please contact the Student Services for more information.

A two-hour, final oral examination is required for completion of the master's program (thesis option only).

## DOCTOR OF PHILOSOPHY

## PROGRAM

The content of PhD programs, other than core requirements, is determined by individual students and their committees. Specific university requirements
are formulated by the Graduate School. Approximately 80 credits of courses in the graduate major (including the core courses and 30 to 35 credits of thesis) are usually included in the major. The dissertation is based on an original investigation in some area of the graduate major.

One year of courses taken as a part of a master's program is normally transferable into the PhD program.

## DEGREES AND PROGRAMS WTHIN THE COLLEGE OF EARTH, OCEAN, AND ATMOSPHERICS SCIENCES <br> UNDERGRADUATE MAJORS WITH OPTIONS

EARTH SCIENCES (BS, CRED, HBS)
The Earth Sciences major program is among the nation's premier undergraduate programs, serving students with a broad range of interests and career aspirations. The program engages in science and in critical societal issues facing the region, the nation, and the international community.

The Earth Sciences major offers four options: Climate Science, Geography, Geology, and Ocean Science. The degree emphasizes hands-on learning through laboratory and field, or shipboard, experiences and undergraduate research and internships. The separate options provide preparation for careers with climate, geological or marine science emphasis and are also suited for students interested in careers in environmental science, science education, and in graduate studies.

The Geology option includes the topics covered by the test for the state Geologist Practice Examination conducted by the Board of Geologist Examiners (http://www.oregon.gov/osbge/Pages/ index.aspx).

## Required Baccalaureate Core Courses (36-38)

Earth Sciences Major Requirements (36-37)
ATS 201. *Climate Science (4)
CH 231. *General Chemistry (4) and CH
261. *Laboratory for Chemistry 231 (1) or CH 121. General Chemistry (5)
PH 211. *General Physics with Calculus (4)
or PH 201. *General Physics (5)
GEO 201. *Physical Geology (4)
GEO 202. *Earth Systems Science (4)
MTH 251. *Differential Calculus (4)
OC 201. *Oceanography (4)
ST 351. Introduction to Statistical Methods (4)

In addition, select one "skills" course from the list below:
CBEE 102. Engineering Problem Solving and Computations (3)
ENGR 112. Introduction to Engineering Computing (3)
GEOG 360. GIScience I: Geographic

Information Systems and Theory (4)
PH 265. Scientific Computing (3)
ST 352. Introduction to Statistical Methods (4)

## Earth Sciences Options

All students must complete one of three options:

- Climate Science
- Geography
- Geology
- Ocean Science

Footnote:

* Baccalaureate Core Course

Major Code: $\mathbf{8 3 4}$
OPTIONS

## CLIMATE SCIENCE OPTION

Students completing the Climate Science option will be prepared for a variety of careers in different areas related to climate, including 1) research and technical fields, 2) outreach, education, and communication, and 3) policy and economics. All students will gain skills in the areas of basic science, data collection and analysis, in addition to a rigorous curriculum in climate science. A broad set of electives will allow students to pursue additional course work to prepare them in their specific areas of interest. Some students may choose to pursue advanced degrees in related disciplines, whereas others will enter the job market directly.
Option specific Math and Science
Requirements (23-24)
Students taking PH 211 in this
option are required to take PH 221 concurrently.
PH 221. Recitation for Physics 211 (1)
An additional term of college-level chemistry:
CH 122. *General Chemistry (5)
or CH 232 . *General Chemistry (4) and
CH 262. *Laboratory for Chemistry 232 (1)
Two additional terms of college-level physics:
PH 202. *General Physics (5)
PH 203. *General Physics (5)
or
PH 212. *General Physics with Calculus (4) and PH 222. *Recitation for Physics 212. (1)

PH 213. *General Physics with Calculus (4) and PH 223. *Recitation for Physics 213. (1)

Two additional terms of calculus:
MTH 252. Integral Calculus (4)
MTH 254. Vector Calculus I (4)
Core Requirements (29)
ATS 295. Observing Climate (3)
ATS 301. ^Climate Data Analysis (4)
ATS 310. Meteorology (4)
ATS 420. Principles of Climate: Physics of
Climate and Climate Change (4)
ATS 421. Climate Modeling (4)
GEO 484. Introduction to Biogeochemistry (3)

GEO 486. Quaternary Paleoclimatology (3)
GEOG 323. ^Climatology (4)

## Experiential Learning (6)

$\mathbf{6}$ credits from the following:
ATS 401. Research (6)
ATS 403. Thesis (6)
ATS 410. Internship (6)
Electives (21-22)
At least one course in Climate
Impacts, Adaptation, or
Mitigation:
CH 374. *Technology, Energy, and Risk (3)
ENGR 363. *Energy Matters (3)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 240. *Climate Change, Water and Society (3)
GEOG 441. International Water Resources Management (3)
GEOG 440. Water Resources Management in the United States (3)
OC 333. Oceans, Coasts, and People (3)
PH 313. *Energy Alternatives (3)
WSE 473. Bioenergy and Environmental Impact (3)
At least one course in Policy or Economics:
AEC/ECON 352. *Environmental
Economics and Policy (3)
PS 455. The Politics of Climate Change (4)
PS 473. US Energy Policy (4)
PS 477. International Environmental
Politics and Policy (4)
PS 478. Renewable Energy Policy (4)
An additional 15 credits of electives

## listed above or below:

ATS 411. Thermodynamics and Cloud
Microphysics (4)
ATS 412. Atmospheric Radiation (3)
ATS 413. Atmospheric Chemistry (3)
ATS 475. Planetary Atmospheres (3)
GEO 433. Coastal Geomorphology (3)
GEO 481. Glacial Geology (4)
GEO 488. Quaternary Stratigraphy of North

## America (3)

GEOG 423. Snow Hydrology (3)
OC 334. ^Polar Oceanography (3)
OC 430. Principles of Physical
Oceanography (4)
OC 440. Biological Oceanography (4)
OC 450. Chemical Oceanography (3)
OC 460. Geological Oceanography (3)
No more than two skills courses of electives below may be used toward the 15 additional elective credits:
GEOG 480. Remote Sensing I: Principles and Applications (4)
GEOG 481. Remote Sensing I: Digital Image Processing (4)
MTH 256. Applied Differential Equations (4)
MTH 341. Linear Algebra I (3)
ST 352. Introduction to Statistical Methods (4)

WR 362. *Science Writing (3)
Total=79-81
Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: $\mathbf{8 3 6}$


## GEOGRAPHY OPTION

The Geography option under the Earth Sciences major will be terminated. It has been replaced by the Geography and

Geospatial Science major.

## Requirements (29-30)

ANTH 110. *Introduction to Cultural Anthropology (3)
or PS 204. *Introduction to Comparative Politics (3)
or SOC 204. *Introduction to Sociology (3)
BI 213. Principles of Biology (4)
CS 161. Introduction to Computer Science I (4)
GEOG 295. Introduction to Geographic Field Research (3)
GEOG 201. *Foundations of Geospatial Science and GIS (4)
GEOG 323. ^Climatology (4)
or GEOG 330. *^Geography of International Development and Globalization (3)
GEOG 370. Geovisualization: Cartography (4)
ST 202. Principles of Statistics (4)
or ST 352. Introduction to Statistical Methods (4)

## Electives (32)

Choose from the four lists below, including at least one course in Physical Geography; one course in Geography of Resources, Planning, Hazards; one course in GIScience; and one course in Regional Geography/Globalization:

## Physical Geography

GEO 322. Surface Processes (4)
GEO 484. Introduction to Biogeochemistry (3)

GEO 486. Quaternary Paleoclimatology (3)
GEO 487. Hydrogeology (4)
GEOG 323. ^Climatology (4)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 423. Snow Hydrology (3)
GEO 432. Applied Geomorphology (3)

## Geography of Resources, Planning,

## Hazards

GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 430. Resilience-Based Natural Resource Management (3)
GEOG 431. Global Resources and Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 440. Water Resources Management in the United States (3)
GEOG 450. Land Use in the American West (3)

GEOG 452. Sustainable Site Planning (3)
OC 333. Oceans, Coasts and People (3)

## GIScience

FE 208. Forest Surveying (4)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 361. GIScience II: Analysis and Applications (4)
GEOG 472. Geovisualization: Geovisual Analytics (3)
GEOG 480. Remote Sensing I: Principles and Applications (4)
GEOG 481. Remote Sensing II: Digital Image Processing (4)
Regional Geography/Globalization
GEOG 311. *Geography of Africa (3)
GEOG 313. *Geography of Asia (3)

GEOG 314. *Geography of Latin America (3)
GEOG 315. *Geography of the United States and Canada (3)
GEOG 330. *^Geography of International Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)

## Option Total=61-62

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Courses (WIC)
Option Code: 263


## GEOLOGY OPTION

The Geology option is suitable for students interested in careers in applied geology, environmental sciences, science education, and in research. The Geology option includes the topics covered by the test for the state Geologist Practice Examination conducted by the Board of Geologist Examiners (http://www.oregon. gov/osbge/Pages/index.aspx).

## Requirements

CH 232. *General Chemistry (4) and CH 262. *Laboratory for Chemistry 232 (1) or CH 122. *General Chemistry (5)
PH 212. *General Physics with Calculus (4) or PH 202. *General Physics (5)
In addition, complete a third term of either chemistry or physics:
CH 233. *General Chemistry (4) and CH
263. *Laboratory for Chemistry 233 (1)
or CH 123 . *General Chemistry (5)

## OR

PH 213. *General Physics with Calculus (4) or PH 203. *General Physics (5)
GEO 203. *Evolution of Planet Earth (4)
GEO 295. Introduction to Field Geology (3)
GEO 310. Earth Materials I: Mineralogy (4)
GEO 315. Earth Materials II: Petrology (4)
GEO 322. Surface Processes (4)
GEO 340. Structural Geology (4)
GEO 370. Stratigraphy and Sedimentology (4)
GEO 415. Earth Materials III: Igneous
Petrography (4)
GEO 430. Geochemistry (4)
GEO 463. ^Geophysics and Tectonics (4)
GEO 487. Hydrogeology (4)
GEO 495. Advanced Field Geology (6)
MTH 252. Integral Calculus (4)

## Elective Specializations

## Choose 9-12 credits from any courses

## below:

GEO 403. Thesis (3) may count toward the 9-12 credits.

## Solid Earth

GEO 412. Igneous Petrology (4)
GEO 440. Economic Geology (4)
GEO 497. Field Mapping of Ore Deposits (3)

## Earth Surface

BI 427. Paleobiology (3)
GEO 432. Applied Geomorphology (3)
GEO 481. Glacial Geology (4)
GEO 484. Introduction to Biogeochemistry (3)

GEO 486. Quaternary Paleoclimatology (3)
GEO 488. Quaternary Stratigraphy of North
America (3)
GEOG 423. Snow Hydrology (3)

SOIL 466. Soil Morphology and
Classification (4)
SOIL 468. Soil Landscape Analysis (4)

## Natural Hazards

GEO 427. ^Volcanology (4)
GEO 433. Coastal Geomorphology (3)
GEO 461. Geology of Earthquakes (3)

## GIScience

GEOG 480. Remote Sensing I: Principles and Applications (4)
GEOG 472. Geovisualization: Geovisual Analytics (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 481. Remote Sensing II: Digital
Image Processing (4)

## Option Total=76-81

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## OCEAN SCIENCE OPTION

This option is offered within the following major(s):
Earth Sciences - College of Earth, Ocean, and Atmospheric Sciences Because of its interdisciplinary scope and quantitative rigor, the Ocean Science option is suitable for students interested in careers in all aspects of marine science, environmental sciences, science education, and in advanced graduate studies in a range of subjects.

## Requirements

CH 232. *General Chemistry (4) and CH 262. *Laboratory for Chemistry 232 (1) or CH 122. *General Chemistry (5)
PH 212. *General Physics with Calculus (4) and PH 222. Recitation for Physics 212 (1) or PH 202. *General Physics (5)
In addition, complete the third term of either the chemistry or physics series:
CH 233. *General Chemistry (4) and CH 263. *Laboratory for Chemistry 233 (1) or CH 123. *General Chemistry (5)

## OR

PH 213. *General Physics with Calculus (4) and PH 223. Recitation for Physics 213 (1) or PH 203. *General Physics (5)
Plus two additional courses in biology; select two of the following:
BI 211. *Principles of Biology (4)
BI 212. *Principles of Biology (4)
BI 213. *Principles of Biology (4)
MTH 252. Integral Calculus (4)
OC 295. Introduction to Field Oceanography (3)
OC 332. Coastal Oceanography (3)
OC 333. Oceans, Coasts, and People (3)
OC 334. ^Polar Oceanography (3)
OC 430. Principles of Physical
Oceanography (4)
OC 440. Biological Oceanography (4)
OC 450. Chemical Oceanography (3)
OC 460. Geological Oceanography (3)

## Experiential Learning

The program must contain at least 6 credits of experiential learning that may include an internship, research or senior thesis. Combinations of these are allowed
(e.g., 3 credits of internship or 3 credits of research). Students are urged to work with advisors and the program head at an early stage of their study to plan their experiential learning.

## Select combinations of from the

following that total 6 credits:
OC 401. Research Projects (1-16)
OC 403. Thesis (1-16)
OC 410. Internship (1-16)
Plus two terms (2 credits total) of enrollment in a marine-oriented seminar series:
OC 407. Seminar (1)
Plus at least 18 credits from the electives below:
Students could choose to focus on a specific area or sample from a wide range. Additional MTH courses would be ap-
propriate for some students planning on graduate studies in ocean science.)

## Biological

BI 211. *Principles of Biology (4)
BI 212. *Principles of Biology (4)
BI 213. *Principles of Biology (4)
BI 351. Marine Ecology (3)
BI 370. Ecology (3)
BI/FW 464. Marine Conservation Biology (3)
GEO 484. Introduction to Biogeochemistry (3)

OC/FW 434. Estuarine Ecology (4)

## Climate

ATS 301. Climate Data Analysis (4)
ATS 310. Meteorology (4)
ATS 420. Principles of Climate: Physics of
Climate and Climate Change (4)
ATS 421. Climate Modeling (4)
GEO 481. Glacial Geology (4)
GEO 486. Quaternary Paleoclimatology (3)
GEOG 323. ^Climatology (4)

## Fluids

CE 311. Fluid Mechanics (4)
CE 412. Hydrology (4)
OC 433. Coastal and Estuarine Oceanography (3)

## Geological

GEO 370. Stratigraphy and Sedimentology (4)

GEO 433. Coastal Geomorphology (3)
GEO 463. ^Geophysics and Tectonics (4)

## Remote Sensing

GEOG 370. Geovisualization: Cartography (4)

GEOG 480. Remote Sensing I: Principles and Applications (4)

## Option Total=78-80

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 659
GEOGRAPHY AND GEOSPATIAL SCIENCE (BS, CRED, HBS)
Geography is a scientific approach to understanding people's relationship with their environment and resources. Geography is central to many important issues, including planning for land-use change, global studies, and adaptation to climate change. Geospatial science
applies techniques, including web mapping, geovisualization, remote sensing, and geographic information systems (GIS), to address these issues. Geographic thinking and geospatial technology are present in every aspect of modern life, and career opportunities abound for students trained in geography and geospatial science.

Students majoring in Geography and Geospatial Science complete work in five major areas:

1. OSU's baccalaureate core
2. Basic statistics and math
3. Geography and Geospatial Science core
4. Electives
5. Experiential learning (field courses and internship or research)
The major consists of 85 credits of
course work. In addition to baccalaureate core courses, the major consists of
6. supporting mathematics and statistics ( 12 cr );
7. foundational skills in geography and geospatial science ( 17 cr ),
8. upper-division geospatial science ( 12 cr);
9. experiential learning ( 9 cr );
10. seminar ( 1 cr );
11. upper-division electives ( 31 cr ); and
12. capstone course ( 3 cr )

## Supporting Skills (12)

MTH 112. *Elementary Functions (4)
ST 351. Introduction to Statistical Methods (4)

ST 352. Introduction to Statistical Methods (4)

## Foundational Skills (17)

GEOG 105. *Geography of the Non-Western World (3)
or GEOG 106. *Geography of the Western World (3)
GEOG 102. *Physical Geography (4)
or GEO 202. *Earth Systems Science (4)
GEOG 103. *Human Geography (3) or GEOG 203. *Human-Environment Geography (3)
GEOG 201. *Foundations of Geospatial Science and GIS (4)
GEOG 240. *Climate Change, Water, and Society (3)
or GEOG 250. *Land-Use Planning for Sustainable Communities (3) or GEOG 251. Geography of Disaster Management (3)

## Upper-Division Geospatial Science <br> Techniques and Problem-Solving (12)

GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 370. Geovisualization: Cartography (4)

GEOG 480. Remote Sensing I: Principles and Applications (4)

## Seminar (1)

GEOG 407. Seminar (1)

## Experiential Learning (9)

GEOG 295. Introduction to Geographic Field Research (3)

GEOG 410. Internship (3)
or GEOG 401. Research (3)
or GEOG 403. Thesis (3)
GEOG 495. Field Geography of Oregon I (3)
Capstone (3)
GEOG 464. Geospatial Perspectives on Intelligence, Security, and Ethics (3)
Upper-Division Geography and
Geospatial Science Electives (31)
GEOG 323. ^Climatology (4)
or GEOG 324. Geography of Life: Species Distributions and Conservation (4)

Select 27 credits from lists below, at least five courses at $\mathbf{4 0 0}$ level.
Geospatial Science
GEOG 361. GIScience II: Analysis and Applications (4)
GEOG 371. Geovisualization: Web Mapping (4)

GEOG 462. GIScience III: Programming for Geospatial Analysis (4)
GEOG 463. GIScience IV: Spatial Modeling (4)

GEOG 472. Geovisualization: Geovisual Analytics (3)
GEOG 481. Remote Sensing II: Digital Image Processing (4)

## International Studies

GEOG 311. *Geography of Africa (3)
GEOG 313. *Geography of Asia (3)
GEOG 314. *Geography of Latin America (3)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 431. Development and Global Resources (3)

## Water Resources

GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 423. Snow Hydrology (4)
GEOG 424. Hydrology for Water Resource Management (3)
GEOG 440. Water Resources Management
in the United States (3)
GEOG 441. International Water Resources Management (3)

## Resources, Hazards, and Planning

GEOG 300. *Sustainability for the Common Good (3)
GEOG 331. *Population, Consumption and Environment (3)
GEOG 350. *Geography of Natural Hazards (3)

GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 432. *Geography of Food and Agriculture (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)

## Total=85

Footnotes:
*Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
SAMPLE FOUR-YEAR PLAN: GEOGRAPHY AND GEOSPATIAL SCIENCE

GEOG 102. *Physical Geography (4)
or GEO 202. *Earth Systems Science (4)
GEOG 103. *Human Geography (3) or GEOG 203. *Human-Environment Geography (3)
GEOG 105. *Geography of the Non-Western World (3)
or GEOG 106. * Geography of the
Western World (3)
MTH 112. *Elementary Functions (4)

## Sophomore Year (18)

GEOG 201. *Foundations of Geospatial Science and GIS (4)
GEOG 240. *Climate Change, Water, and Society (3)
or GEOG 250. *Land Use Planning for Sustainable Communities (3) or GEOG 251. *Geography of Disaster Management (3)
GEOG 295. Introduction to Geographic Field Research (3)
ST 351. Introduction to Statistical Methods (4)

ST 352. Introduction to Statistical Methods (4)

## Junior Year (up to 42)

## Fall (14)

GEOG 300. *Sustainability for the Common Good (3)
or GEOG 331. *Population, Consumption, and Environment (3)
or GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4) GEOG 370. Geovisualization: Cartography (4)
GEOG 450. Land Use in the American West (3)

## Winter (14)

GEOG 300. *Sustainability for the Common Good (3)
or GEOG 330. *^Geography of
International Development and
Globalization (3)
or GEOG 350. *Geography of Natural
Hazards (3)
GEOG 361. GIScience II: Analysis and Applications (4)
GEOG 371. Geovisualization: Web Mapping (4)

GEOG 423. Snow Hydrology (3)
or GEOG 424. Hydrology for Water
Resources Management (3)
or GEOG 441. International Water
Resources Management (3)

## Spring (14)

GEOG 300. *Sustainability for the Common Good (3)
or GEOG 340. *Introduction to Water
Science and Policy (3)
or GEOG 430. Resilience-Based Natural
Resource Management (3)
or GEOG 440. Water Resources
Management in the United States (3)
GEOG 323. ^Climatology (4)
or GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 431. Global Resources and Development (3)
or GEOG 432. Geography of Food and Agriculture (3)
GEOG 462. GIScience III: Programming for

Geospatial Analysis (4)
or GEOG 472. Geovisualization: Geovisual Analytics (3)

## Senior Year (up to 27)

## Fall (8)

GEOG 407. Seminar (1)
GEOG 450. Land Use in the American West (3)
or GEOG 440. Water Resources
Management in the United States (3)
or GEOG 463. GIScience IV: Spatial
Modeling (4)
GEOG 480. Remote Sensing I: Principles and Applications (4)

## Winter (10)

GEOG 410. Internship (1-16)
or GEOG 401. Research (1-16)
or GEOG 403. Thesis (3)
GEOG 423. Snow Hydrology (3)
or GEOG 424. Hydrology for Water
Resources Management (3)
or GEOG 441. International Water
Resources Management (3)
or GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 481. Remote Sensing II: Digital
Image Processing (4)

## Spring (9)

GEOG 430. Resilience-Based Natural Resource Management (3)
or GEOG 452. Sustainable Site Planning
(3)
or GEOG 472. Geovisualization: Geovisual Analytics (3)
GEOG 464. Geospatial Perspectives on
Intelligence, Security, and Ethics (3)
GEOG 495. Field Geography of Oregon I (3)
Sample Two-Year Plan: Geography
and Geospatial Science)
Up to 29 transfer credits may be accepted representing the equivalent of:
GEOG 102. *Physical Geography (4)
or GEO 202. *Earth Systems Science (4)
GEOG 103. *Human Geography (3)
or GEOG 203. *Human-Environment Geography (3)
GEOG 105. *Geography of the Non-Western
World (3)
or GEOG 106. * Geography of the
Western World (3)
GEOG 201. *Foundations of Geospatial
Science and GIS (4)
GEOG 240. *Climate Change, Water, and Society (3)
or GEOG 250. *Land Use Planning for Sustainable Communities (3)
or GEOG 251. *Geography of Disaster Management (3)
MTH 112. *Elementary Functions (4)
ST 351. Introduction to Statistical Methods (4)
and ST 352. Introduction to Statistical Methods (4)

## Junior Year (up to 42)

## Fall (14)

GEOG 295. Introduction to Geographic
Field Research (3)
GEOG 300. *Sustainability for the Common Good (3)
or GEOG 331. *Population, Consumption,
and Environment (3)
or GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 370. Geovizualization: Cartography (4)

## Winter (14)

GEOG 300. *Sustainability for the Common Good (3)
or GEOG 330. *^Geography of
International Development and
Globalization (3)
or GEOG 350. *Geography of Natural
Hazards (3)
GEOG 361. GIScience II: Analysis and Applications (4)
GEOG 371. Geovisualization: Web Mapping (4)

GEOG 423. Snow Hydrology (3)
or GEOG 424. Hydrology for Water
Resources Management (3)
or GEOG 441. International Water
Resources Management (3)

## Spring (14)

GEOG 300. *Sustainability for the Common Good (3)
or GEOG 340. *Introduction to Water
Science and Policy (3)
or GEOG 430. Resilience-Based Natural
Resource Management (3)
or GEOG 440. Water Resources
Management in the United States (3)
GEOG 323. ${ }^{\wedge}$ Climatology
or GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 431. Global Resources and
Development (3)
or GEOG 432. Geography of Food and Agriculture (3)
GEOG 462. GIScience III: Programming for Geospatial Analysis (4)
or GEOG 472. Geovisualization: Geovisual
Analytics (3)

## Senior Year (up to 27)

Fall (8)
GEOG 450. Land Use in the American West (3)
or GEOG 440. Water Resources
Management in the United States (3)
or GEOG 463. GIScience IV: Spatial
Modeling (4)
GEOG 480. Remote Sensing I: Principles
and Applications (4)
GEOG 507. Seminar (1)

## Winter (10)

GEOG 410. Internship (3)
or GEOG 401. Research (3)
or GEOG 403. Thesis (3)
GEOG 423. Snow Hydrology (3)
or GEOG 424. Hydrology for Water
Resources Management (3)
or GEOG 441. International Water
Resources Management (3)
or GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 481. Remote Sensing II: Digital
Image Processing (4)

## Spring (9)

GEOG 430. Resilience-Based Natural
Resource Management (3)
or GEOG. 440. Water Resources

Management in the United States (3) or GEOG 452. Sustainable Site Planning (3) or GEOG 472. Geovisualization: Geovisual Analytics (3)
GEOG 464. Geospatial Perspectives on
Intelligence, Security, and Ethics (3)
GEOG 495. Field Geography of Oregon I (3)
Footnotes:

* Baccalaureate Core Course
^ Writing Intensive Course (WIC)
Option Code: 262


## OCEAN SCIENCE OPTION

Because of its interdisciplinary scope and quantitative rigor, the Ocean Science option is suitable for students interested in careers in all aspects of marine science, environmental sciences, science education, and in advanced graduate studies in a range of subjects.

## Requirements

CH 232. *General Chemistry (4) and CH 262. *Laboratory for Chemistry 232 (1) or CH 122. *General Chemistry (5)
PH 212. *General Physics with Calculus (4) and PH 222. Recitation for Physics 212 (1) or PH 202. *General Physics (5)
In addition, complete the third term
of either the chemistry or physics series:
CH 233. *General Chemistry (4) and CH
263. *Laboratory for Chemistry 233 (1)
or CH 123. *General Chemistry (5)
OR
PH 213. *General Physics with Calculus (4) and PH 223. Recitation for Physics 213 (1)
or PH 203. *General Physics (5)
Plus two additional courses in
biology; select two of the following:
BI 211. *Principles of Biology (4)
BI 212. *Principles of Biology (4)
BI 213. *Principles of Biology (4)
MTH 252. Integral Calculus (4)
OC 295. Introduction to Field
Oceanography (3)
OC 332. Coastal Oceanography (3)
OC 333. Oceans, Coasts, and People (3)
OC 334. ^Polar Oceanography (3)
OC 430. Principles of Physical
Oceanography (4)
OC 440. Biological Oceanography (4)
OC 450. Chemical Oceanography (3)
OC 460. Geological Oceanography (3)

## Experiential Learning

The program must contain at least 6 credits of experiential learning that may include an internship, research or senior thesis. Combinations of these are allowed (e.g., 3 credits of internship or 3 credits of research). Students are urged to work with advisors and the program head at an early stage of their study to plan their experiential learning.
Select combinations of from the
following that total 6 credits:
OC 401. Research Projects (1-16)
OC 403. Thesis (1-16)
OC 410. Internship (1-16)
Plus two terms ( 2 credits total) of enrollment in a marine-oriented

## seminar series:

OC 407. Seminar (1)

## Plus at least 18 credits from the

 electives below:Students could choose to focus on a specific area or sample from a wide range. Additional MTH courses would be appropriate for some students planning on graduate studies in ocean science.)

## Biological

BI 211. *Principles of Biology (4)
BI 212. *Principles of Biology (4)
BI 213. *Principles of Biology (4)
BI 351. Marine Ecology (3)
BI 370. Ecology (3)
BI/FW 464. Marine Conservation Biology (3) GEO 484. Introduction to Biogeochemistry (3)

OC/FW 434. Estuarine Ecology (4)

## Climate

ATS 301. Climate Data Analysis (4)
ATS 310. Meteorology (4)
ATS 420. Principles of Climate: Physics of
Climate and Climate Change (4)
ATS 421. Climate Modeling (4)
GEO 481. Glacial Geology (4)
GEO 486. Quaternary Paleoclimatology (3)
GEOG 323. ${ }^{\wedge}$ Climatology (4)

## Fluids

CE 311. Fluid Mechanics (4)
CE 412. Hydrology (4)
OC 433. Coastal and Estuarine Oceanography (3)

## Geological

GEO 370. Stratigraphy and Sedimentology (4)

GEO 433. Coastal Geomorphology (3)
GEO 463. ^Geophysics and Tectonics (4)

## Remote Sensing

GEOG 370. Geovisualization: Cartography (4)

GEOG 480. Remote Sensing I: Principles and Applications (4)

## Option Total=78-80

Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)


## Option Code: 659

## ENVIRONMENTAL SCIENCES (BS, CRED, HBS)

Also available via Ecampus.
See below for all approved specialization areas.
Larry C. Becker, Director
Environmental Sciences Undergraduate Program
104 CEOAS Administration Building
Oregon State University
Corvallis, OR 97331
541-737-1201
Email: ceoas.undergrad@oregonstate.edu Website: http://ceoas.oregonstate.edu/ academics/undergraduate/

## Undergraduate Major

Environmental Sciences (BS, CRED, HBS)

## Options

Alternative Energy
Applied Ecology
Aquatic Biology
Conservation, Resources, and
Sustainability
Earth Systems
Environmental Agriculture
Environmental Policy and Economics
Environmental Science Education
Environmental Water Resources

## Minor

Environmental Sciences

## Graduate Major

Environmental Sciences (MA, MS, PhD, PSM) (This interdisciplinary program is hosted by the Graduate School.)

An Environmental Sciences undergraduate degree provides a rigorous education that can lead to helping to understand and resolve some of today's most challenging scientific and policy issues-including global climate change, pollution, biodiversity conservation, sustainability, and balancing resource use and preservation. To help reach these objectives, the Bachelor of Science in Environmental Sciences offers an interdisciplinary approach to environmental problem solving. As an Environmental Sciences major, a student completes course work in four general areas:

1. OSU's general education courses (the baccalaureate core)
2. Basic science and math
3. Environmental sciences and humanities core
4. A specialization area

In addition, each student completes a minimum of 3 credits of experiential learning as an internship, research, study abroad, or field course. The BS degree in Environmental Sciences provides excellent training for a variety of careersincluding work with federal, state, and local agencies, industry, non-profits, and education-or for graduate school. Students can pursue the BS degree either at the Corvallis campus or online through OSU Ecampus.

## Major Curriculum

The Environmental Sciences major requires credits in seven categories: 48 credits of baccalaureate core; 51-53 credits of basic science and math; 27-36 credits of environmental sciences and humanities; 27-31 credits of specialization; 3 credits writing intensive course; 3 credits minimum of experiential learning; and 4-53 credits of elective courses (depends on the number of baccalaureate core electives that will also meet requirements of the major).

## Baccalaureate Core (48)

The university baccalaureate core course
(BCC) requirement is met with 48 credits and a writing intensive course (WIC). The environmental sciences student satisfies the general education requirement by selecting 27 unrestricted credits from the general list of approved courses and 21 credits from a restrictive list of BCC courses, which simultaneously satisfy requirements for the Environmental Sciences major. The WIC and Synthesis requirements are satisfied by courses taken as part of the environmental sciences core curriculum.

## Orientation

ENSC 101. Environmental Sciences Orientation (1)

## Basic Science and Math Courses

(51-53 credits)
BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
or BI 204, BI 205, BI 206. *Introductory Biology I, II, III (4,4,4)
CH 121 . General Chemistry (5) and CH 122, CH 123. *General Chemistry $(5,5)$ or CH 231, CH 232, CH 233. *General
Chemistry $(4,4,4)$ and CH 261, CH 262 ,
CH 263. *Laboratory for Chemistry 231, 232, 233 (1,1,1)
MTH 251. *Differential Calculus (4)
MTH 268. Mathematical Ideas in Biology (4) or MTH 252. Integral Calculus (4)
PH 201, PH 202. *General Physics $(5,5)$ or PH 211, PH 212. *General Physics with Calculus $(4,4)$
ST 351, ST 352. Introduction to Statistical Methods (4,4)
Environmental Sciences and Humanities Core (28-38 credits)
Natural Environmental Systems (minimum of 12 credits)
One course in atmosphere:
ATS 201. *Climate Science (4)
ATS 310. Meteorology (4)
ATS 420. Principles of Climate: Physics of
Climate and Climate Change (4)
GEOG 323. ^Climatology (4)
One course in biosphere:
BI 370. Ecology (3)
One course in geosphere:
CSS 205. *Soil Science (4)
GEO 202. *Earth Systems Science (4)
GEO 221. *Environmental Geology (4)
GEO 322. Surface Processes (4)
GEOG 102. *Physical Geography (4)
GEOG 350. *Geography of Natural Hazards (3)

SOIL 205. *Soil Science (3)
and SOIL 206. *Soil Science Laboratory for SOIL 205 (1)
SOIL 395. *World Soil Resources (3)

## One course in hydrosphere:

FW 456. Limnology (5)
GEOG 340. *Introduction to Water Science and Policy (3)
GEO 487. Hydrogeology (4)
OC 201. *Oceanography (4)

## Humans and the Environment

(15-20 credits)
One course in economics, selected from the following:

AEC 250. *Introduction to Environmental
Economics and Policy (3)
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
FW 462. Ecosystem Services (3)

## One course in ethics and

## environmental ethics, selected from

 the following:ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ANTH 481. *Natural Resources and Community Values (3)
CH 374. *Technology, Energy, and Risk (3)
ES 353. *Environmental Racism (4)
ES/PHL/REL 448. Native American Philosophies (4)
FES/TOX 435. *Genes and Chemicals in
Agriculture: Value and Risk (3)
FW 340. *Multicultural Perspectives in
Natural Resources (3)
GEO 309. *Environmental Justice (3)
PHL 325. *Scientific Reasoning (4)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL/REL 443. *World Views and
Environmental Values (3)
PS 461. Environmental Political Theory (4)
SOC 456. *Science and Technology in Social Context (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
WGSS 440. *Women and Natural Resources (3)

## One course in the human <br> environment, selected from the following:

AG 301. *Ecosystem Science of Pacific NW Indians (3)
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 301. *Human Impacts on Ecosystems (3)
BI 348. *Human Ecology (3)
ENSC 479. *^Environmental Case Studies (3)

FW 325. *Global Crises in Resource Ecology (3)

FW/HSTS 470. *Ecology and History: Landscapes of the Columbia Basin (3)
GEO 308. *Global Change and Earth Sciences (3)
GEOG 203. *Human-Environment Geography (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 431. Global Resources and Development (3)
GEOG 450. Land Use in the American West (3)

HST 481. *Environmental History of the United States (4)
SUS 102. *Introduction to Environmental
Science and Sustainability (4)
SUS 330. Ecological Dimensions of Sustainability (3)
SUS 350. *Sustainable Communities (4)
WGSS 440. *Women and Natural Resources (3)

Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)
One course in environmental law and policy, selected from the following:

AEC 253. *Environmental Law, Policy, and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 432. Environmental Law (4)
FOR 462. Natural Resource Policy and Law (3)

FW 415. Fisheries and Wildlife Law and Policy (3)
FW 422. Introduction to Ocean Law (3)
GEOG 340. *Introduction to Water Science and Policy (3)
PS 475. Environmental Politics and Policy (4)
PS 476. *Science and Politics (4)
PS 477. International Environmental
Politics and Policy (4)
SOC 360. *Population Trends and Policy (4)
WGSS 440. *Women and Natural Resources (3)

One course in environmental management, selected from the following:
BI/FW 464. Marine Conservation Biology (3)
BOT/FOR 413. Forest Pathology (3)
FES/HORT 350. Urban Forestry (3)
FES 352. Wilderness Management (3)
FES 355. Management for Multiple Resource Values (3)
FES 365. *Issues in Natural Resources Conservation (3)
FES 412. Forest Entomology (3)
FES/FW 445. Ecological Restoration (4)
FOR 346. Topics in Wildland Fire (3)
FW 251. Principles of Fish and Wildlife Conservation (3)
FW 323. Management Principles of Pacific Salmon in the Northwest (3)
FW 326. Integrated Watershed Management (3)

FW 431. Dynamics of Marine Biological Resources (4)
FW 435. ^Wildlife in Agricultural Ecosystems (3)
GEO 306. *Minerals, Energy, Water and the Environment (3)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 441. International Water Resources Management (3)
GEOG 440. Water Resources Management in the United States (3)
GEOG 452. Sustainable Site Planning (3)
NR 455. Natural Resource Decision Making (4)

RNG 341. Rangeland Ecology and Management (3)
RNG 355. Desert Watershed Management (4)

RNG 421. Wildland Restoration and Ecology (4)
RNG 455. Riparian Ecohydrology and Management (4)
RNG 490. Rangeland Management Planning (4)

## Experiential Learning (3 credits)

The program must contain at least one course, internship, or research experience that provides opportunities for hands-on experience in design and collection of observations in the physical, biological or social environment. Students are
urged to work with advisors at an early stage in their study to identify courses or experiences that are appropriate.
Specialization Area (27+ credits)
This requirement can be met by completing an approved certificate, option, or minor from a participating program in the environmental or closely related sciences, or working with advisors to develop an innovative course cluster to analyze environmental systems.

## Approved Certificates:

- Geographic Information Science


## Approved Options (All options

 under the Environmental Sciences major):- Alternative Energy
- Applied Ecology (EC)
- Aquatic Biology (EC)
- Conservation, Resources, and Sustainability (EC)
- Earth Systems (EC)
- Environmental Agriculture (EC)
- Environmental Policy and Economics (EC)
- Environmental Science Education
- Environmental Water Resources (EC)


## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
EC Available via Ecampus
Major Code: 657


## OPTIONS

## ALTERNATIVE ENERGY OPTION

The Alternative Energy option draws from a variety of disciplines that offer courses in energy-related topics, not engineering. Students in this option will be well-informed about energy alternatives for work in urban and regional planning, city government, NGOs promoting energy alternatives to fossil fuels sources, power companies working with the public, policymaking in the energy field, and law school with an aim toward environmental law.

## Alternative Energy Core

Choose 3 courses from below (10-11 credits):
CHE 450. Conventional and Alternative Energy Systems (3)
ECON 466. ${ }^{\wedge}$ Economics of Traditional and Renewable Energy (4)
PH 313. *Energy Alternatives (3)
PS 473. US Energy Policy (4)

## Electives

Choose from the list below or additional core courses to total at least 27 credits:
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 432. Environmental Law (4)
ANTH 469. Energy in Cultural Perspective (4)
BA 432. Environmental Law, Sustainability, and Business (4)
BRR 350. Introduction to Regional Bioenergy (2)

BRR 450. Interdisciplinary Research: Bioenergy Focus (2)
ENGR 350. *Sustainable Engineering (3)
ENGR 363. *Energy Matters (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEOG 300. *Sustainability for the Common Good (3)
NSE 319. *Societal Aspects of Nuclear Technology (3)
PS 455. The Politics of Climate Change (4)
PS 477. International Environmental
Politics and Policy (4)
PS 478. Renewable Energy Policy (4)
WSE 473. Bioenergy and Environmental Impact (3)

## Total=27

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 842


## APPLIED ECOLOGY OPTION

## Also available via Ecampus.

The Applied Ecology option is for Environmental Sciences students who seek to orient their studies around ecology. This is applied ecology and therefore includes geographic methods for measuring and data collection in ecological change. Students seeking a concentration in policy and management are encouraged to consider the Conservation, Resources, and Sustainability option.

Students should first complete
BI 370 Ecology (3).
Core (10-20)
Ecological Studies
Select a minimum of 1 course from below:
BOT 341. Plant Ecology (4)
FES 341. Forest Ecology (3)
FW 479. Wetlands and Riparian Ecology (3)
RNG 341. Rangeland Ecology and
Management (3)

## Field Methods

Select a minimum of 1 course from below:
BI 371. ^Ecological Methods (3)
BOT 440. Field Methods in Plant Ecology (4)
RNG 353. Wildland Plant Identification (4)

## Geographic Methods

Select 1 to 3 courses from below:
GEOG 201. *Foundations of Geospatial
Science and GIS (4)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 370. Geovisualization Cartography (4)
GEOG 480. Remote Sensing I: Principles and Applications (4)

## Electives

Select 9-17 credits from below:
BI 311. Genetics (4)
or PBG 430. Plant Genetics (3)
BI 345. *Introduction to Evolution (3)
or BI 445. Evolution (3)
BI 351. Marine Ecology (3)
BI 481. Biogeography (3)

BOT 313. Plant Structure (4)
BOT 321. Plant Systematics (4)
BOT 331. Plant Physiology (4)
BOT 415. Forest Insect and Disease
Management (5) [Terminated winter 2017]
FES 342. Forest types of the Northwest (3)
FES/HORT 350. Urban Forestry (3)
FES/FW 445. Ecological Restoration (4)
FOR 346. Topics in Wildland Fire (3)
FW 311. Ornithology (3)
FW 312. Systematics of Birds (2)
FW 315. Ichthyology (3)
FW 317. Mammalogy (3)
FW 320. Introductory Population Dynamics (4)

FW 321. Applied Community and
Ecosystem Ecology (3)
FW 427. Principles of Wildlife Diseases (4)
FW/OC 434. Estuarine Ecology (4)
FW 451. Avian Conservation and
Management (3)
FW 456. Limnology (5)
FW 462. Ecosystem Services (3)
FW/HSTS 470. *Ecology and History:
Landscapes of the Columbia Basin (3)
FW 473. Fish Ecology (4)
FW 481. Wildlife Ecology (4)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
HORT 318. ^Applied Ecology of Managed
Ecosystems (3)
RNG 351. Range Ecology I-Grassland (3)
RNG 352. Range Ecology II-Shrublands (3)
RNG 355. Desert Watershed Management (4)
RNG 421. Wildland Restoration and Ecology (4)
RNG 441. Rangeland Analysis (4)
RNG 442. Rangeland-Animal Relations (4)
RNG 455. Riparian Ecohydrology and
Management (4)
SOIL 366. Ecosystems of Wildland Soils (3)
SOIL 455. Biology of Soil Ecosystems (4)
Z 350. Animal Behavior (3)
Z 365. Biology of Insects (4)
Z 423. Environmental Physiology (4)
Z 477. Aquatic Entomology (4)

## Total Credits=27+

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 845


## AQUATIC BIOLOGY OPTION

## Also available via Ecampus.

The Aquatic Biology option under the Environmental Sciences major offers students considerable depth in aquatic biology with course work possibilities that emphasize ecology in fresh, estuarine, and marine (saltwater) environments.

## Core (11)

BI 351. Marine Ecology (3)
FW 456. Limnology (5)
FW 479. Wetlands and Riparian Ecology (3)

## Electives (16)

## Aquatic Organisms

BI/FW 302. Biology and Conservation of
Marine Mammals (4)
and FW 301. Field Techniques for Marine

Mammal Conservation (1)
BOT 416. Aquatic Botany (4)
FW 315. Ichthyology (3)
Z 361. Invertebrate Biology (3)
and $Z 362$. Invertebrate Biology
Laboratory (2)
or Z 461. Marine and Estuarine
Invertebrate Zoology (4)
Z 477. Aquatic Entomology (4)
Freshwater Environmental Biology
BI/FW 421. Aquatic Biological Invasions (4)
FW 323. Management Principles of Pacific
Salmon in the Northwest (3)
FW 473. Fish Ecology (4)
FW 497. ^Aquaculture (3)

## Marine Environmental Biology

BI 352. Marine Ecology Laboratory (2)
BI/FW 421. Aquatic Biological Invasions (4)
FW 331. Ecology of Marine and Estuarine Birds (4)
FW 426. Coastal Ecology and Resource Management (5)
FW 431. Dynamics of Marine Biological Resources (4)
FW/OC 434. Estuarine Ecology (4)
FW/BI 464. Marine Conservation Biology (3)

OC 334. ^Polar Oceanography (3)
OC 440. Biological Oceanography (4)

## Total Credits=27

## Footnote:

^ Writing Intensive Course (WIC)
Option Code: 501

## CONSERVATION, RESOURCES,

 AND SUSTAINABILITY OPTION
## Also available via Ecampus.

The Conservation, Resources, and Sustainability option helps students to think in terms of conservation approaches, resource management, and sustainability as science and policy that combine as both personal endeavor and profession.

Students should first complete

## BI 370 Ecology (3).

## Conservation

Choose at least 3 courses from below:
BI/FW 302. Biology and Conservation of Marine Mammals (4)
FES/FW 445. Ecological Restoration (4)
FES/FW 452. Biodiversity Conservation in
Managed Forests (3)
FW 320. Introductory Population Dynamics (4)

FW 326. Integrated Watershed Management (3)

FW 370. Conservation Genetics (4)
FW 435. ^Wildlife in Agricultural
Ecosystems (3)
FW 451. Avian Conservation and
Management (3)
FW 467. Antarctic Science and
Conservation (4)
Resource Management and Policy
Choose at least 3 courses from below:
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental

Economics and Policy (3)
AEC 432. Environmental Law (4)
FES/HORT 350. Urban Forestry (3)
FES 352. Wilderness Management (3)
FES 355. Management for Multiple Resource Values (3)
FES/HORT 455. Urban Forestry Planning,
Policy and Management (4)
FES 493. Environmental Interpretation (4)
FOR 330. Forest Resource Economics I (4)
FOR 331. Forest Resource Economics II (4)
FOR 346. Topics in Wildland Fire (3)
FW 321. Applied Community and
Ecosystem Ecology (3)
FW 323. Management Principles of Pacific
Salmon in the Northwest (3)
FW 415. Fisheries and Wildlife Law and Policy (3)
FW 422. Introduction to Ocean Law (3)
FW 435. ${ }^{\wedge}$ Wildlife in Agricultural
Ecosystems (3)
FW 462. Ecosystem Services (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 441. International Water Resources Management (3)
GEOG 440. Water Resources Management
in the United States (3)
GEOG 431. Global Resources and
Development (3)
GEOG 452. Sustainable Site Planning (3)
GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
PS 473. U.S. Energy Policy (4)
PS 475. Environmental Politics and Policy (4)

PS 477. International Environmental Politics and Policy (4)
RNG 341. Rangeland Ecology and Management (3)
RNG 490. Rangeland Management Planning (4)
SUS 304. *Sustainability Assessment (4)

## Society and Values

Choose at least 1 course from below:
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ANTH 481. *Natural Resources and Community Values (3)
BEE 411. Global Environmental Change:
Using Data to Inform Decisions (3)
BI 348. *Human Ecology (3)
FES 360. Collaboration and Conflict Management (3)
FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 439. ^Human Dimensions of Fisheries and Wildlife Management (3)
FW/HSTS 470. *Ecology and History:
Landscapes of the Columbia Basin (3)
GEO 309. *Environmental Justice (3)
HST 481. *Environmental History of the United States (4)
NR 455. Natural Resource Decision Making (4)

PHL 443. *World Views and Environmental Values (3)
PS 461. Environmental Political Theory (4)
SOC 480. *Environmental Sociology (4)

SOC 481. *Society and Natural Resources (4)
SUS 330. Ecological Dimensions of
Sustainability (3) [Terminated fall 2016]
SUS 350. *Sustainable Communities (4)
WGSS 440. *Women and Natural Resources (3)

WGSS 450. Ecofeminism (3)
Total Credits greater than or $=\mathbf{2 7}$
Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: $\mathbf{8 4 3}$


## EARTH SYSTEMS OPTION

## Also available via Ecampus.

With the Earth Systems option, students will obtain a solid base in the sciences and they would be able to apply that base in an integrative way in order to build a strong knowledge traditionally referred to as natural history.
Students should first complete GEO
202 *Earth Systems Science (4) or GEO
221 *Environmental Geology (4).

## Earth Systems Core

Select a minimum of 11 credits from below:
GEO 201. *Physical Geology (4)
or *SOIL 205. Soil Science (3)
GEO 203. *Evolution of Planet Earth (4)
GEOG 323. ^Climatology (4)
or ATS 210. Introduction to Atmospheric
Sciences (3)
or ATS 310. Meteorology (4)
OC 201. *Oceanography (4)
Students should select an additional course in atmosphere, hydrosphere, and geosphere from the approved list in the Environmental Sciences and Humanities core (minimum of 11 credits).

## Electives

Select from at least 2 categories
from below:

## Atmosphere:

ATS 411. Thermodynamics and Cloud
Microphysics (4)
ATS 412. Atmospheric Radiation (3)
ATS 413. Atmospheric Chemistry (3)
ATS 420. Principles of Climate: Physics of Climate and Climate Change (4)
ATS 421. Climate Modeling (4)
GEO 484. Introduction to Biogeochemistry (3)

## Earth History:

GEO 308. *Global Change and Earth
Sciences (3)
GEO 370. Stratigraphy and Sedimentology (4)

GEO 481. Glacial Geology (4)
GEO 486. Quaternary Paleoclimatology (3)
GEO 488. Quaternary Stratigraphy on North America (3)

## Earth's Surface:

FE 430. Watershed Processes (4)
GEO 322. Surface Processes (4)
GEO 340. Structural Geology (4)
GEO 432. Applied Geomorphology (3)
GEO 433. Coastal Geomorphology (3)

GEO 487. Hydrogeology (4)
GEOG 423. Snow Hydrology (3)

## Oceans:

FW/OC 434. Estuarine Ecology (4)
OC 332. Coastal Oceanography (3)
OC 333. Oceans, Coasts, and People (3)
OC 334. ^Polar Oceanography (3)
OC 430. Principles of Physical
Oceanography (4)
OC 433. Coastal and Estuarine
Oceanography (3)
OC 440. Biological Oceanography (4)
OC 450. Chemical Oceanography (3)
OC 460. Geological Oceanography (3)

## Soils:

SOIL 366. Ecosystems of Wildland Soils (3)
SOIL 435. Environmental Soil Physics (3)
SOIL 445. Environmental Soil Chemistry (3)
SOIL 455. Biology of Soil Ecosystems (4)
SOIL 466. Soil Morphology and
Classification (4)
SOIL 468. Soil Landscape Analysis (4)
Human-Environment Interaction:
GEO 304. *Geography of Natural Hazards (3)

GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 307. *National Park Geology and Preservation (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 430. Resilience-Based Natural Resource Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 441. International Water Resources Management (3)
GEOG 440. Water Resources Management in the United States (3)
GEOG 431. Global Resources and Development (3)
GEOG 439. *Geography of Food and Agriculture (3)

## Methods:

GEOG 201. *Foundations of Geospatial Science and GIS (4)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 370. Geovisualization: Cartography (4)

GEOG 480. Remote Sensing I: Principles and Applications (4)

## Total Credits greater than or $=\mathbf{2 7}$

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Option Code: 848

## ENVIRONMENTAL AGRICULTURE

 OPTION
## Also available Via Ecampus.

The Environmental Agriculture option has a core of agricultural sciences courses and includes a variety of course possibilities in the areas of agricultural ecology and production, as well as societal issues related to agriculture and environmental science.
Students should first complete:
SOIL 205. *Soil Science (3) and SOIL 206.
*Soil Science Laboratory for Soil 205 (1) or SOIL 395. *World Soil Resources (3)

## Core

Select a minimum of 6-8 credits from below:
AGRI 411. Introduction to Food Systems: Local to Global (3)
ANS 121. *Introduction to Animal Sciences (4)

CROP 280. Introduction to the Complexity of Oregon Cropping Systems (4)
CROP/HORT 300. Crop Production in Pacific Northwest Agroecosystems (4) or CROP 200. Crop Ecology and Morphology (3)
ENT 311. Introduction to Insect Pest Management (4)
HORT 260. Organic Farming and Gardening (3)

HORT 301. The Biology of Horticulture (3)
HORT 318. ^Applied Ecology of Managed Ecosystems (3)

## Ecology and Production

Select a minimum of 9 credits from below:
AGRI 438. Exploring World Agriculture (2)
ANS 215. Beef/Dairy Industries (3)
ANS 216. Sheep/Swine Industries (3)
ANS 217. Poultry Industries (3)
BEE 439. Irrigation Principles and Practices (4)

BOT 313. Plant Structure (4)
BOT 350. Introductory Plant Pathology (4)
CROP 310. Forage Production (4)
CROP 319. Principles of Field Crop
Production (3)
CRP 440. Weed Management (4)
ENT 322. Honey Bee Biology and
Beekeeping (3)
FES/HORT 350. Urban Forestry (3)

## Ecampus only

FES/NR/RNG 477. *Agroforestry (3)
HORT 226. Landscape Plant Materials I:
Deciduous Hardwoods and Conifers (4)
HORT 228. Landscape Plant Materials II:
Spring Flowering Trees and Shrubs (4)
HORT 285. Permaculture Design and
Theory: Certificate Course (4)
HORT 311. Plant Propagation (4)
HORT 314. Principles of Turfgrass
Maintenance (4)
HORT 315. Sustainable Landscapes:
Maintenance, Conservation, Restore (4)
HORT 316. Plant Nutrition (4)
HORT 351. Floriculture and Greenhouse Systems (4)
HORT 361. Plant Nursery Systems (4)
HORT 380. Sustainable Landscape Design (3)
PBG 431. Plant Genetics Recitation (1)
RNG 442. Rangeland-Animal Relations (4)

## Societal Issues

Select a minimum of 6 credits from below:
AEC 372. Agricultural Cooperatives (3)
AEC 442. Agricultural Business
Management (4)
ANS 315. *Contentious Social Issues in Animal Agriculture (3)
ANTH 361. Food Studies in a Social Justice Perspective (4)
ANTH 486. Anthropology of Food (4)
CROP 330. *World Food Crops (3)

ENT/HORT 331. *Pollinators in Peril (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
GEOG 432. *Geography of Food and Agriculture (3)
HORT 319. Restoration Horticulture (3)

## Ecampus only

HORT 330/ENT 300. *Plagues, Pests and Politics (3)
SUS 350. *Sustainable Communities (4) 400-level CROP, ENT, HORT courses may be added in consultation with an advisor.

## Total credits=27

Footnotes:
*Baccalaureate Core Course (BCC)
Option Code: $\mathbf{8 4 9}$

## ENVIRONMENTAL POLICY AND ECONOMICS OPTION

## Also available via Ecampus.

The Environmental Conservation and Sustainability option is for students interested in environmental law, policy and advocacy.
Students must first complete
ECON 201. *Introduction to Mi-
croeconomics (4)
Core Courses (11)
AEC/ECON 352. *Environmental
Economics and Policy (3)
PS 201. *Introduction to United States
Government and Politics (4)
PS 475. Environmental Politics and Policy (4)
Electives (choose a minimum of 16 credits from list below)

## Economics

AEC 311. Intermediate Applied Economics
I: Producers and Consumers (4)
AEC 313. Intermediate Applied Economics
II: Markets, Welfare \& Policy (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)
AEC 454. Rural Development Economics and Policy (3)
AEC 461. ^Agricultural and Food Policy Issues (4)
ECON 311. Intermediate Microeconomic Theory (4)
ECON 428. ^Introduction to Economic Research (4)
ECON 435. Public Economics (4)
ECON 439. ^Public Policy Analysis (4)
ECON 466. ${ }^{\wedge}$ Economics of Traditional and Renewable Energy (4)

## Policy

AEC 432. Environmental Law (4)
AEC 452. Marine Economics (3)
FOR 460. ^Forest Policy (4)
FOR 462. Natural Resource Policy and Law (3)

FW 415. Fisheries and Wildlife Law and Policy (3)
FW 422. Introduction to Ocean Law (3)
PS 311. Congressional Politics (4)
PS 314. Interest Group Politics (4)
PS 315. The Politics of Media (4)
PS 316. Public Opinion and Politics (4)
PS 331. *State and Local Politics (4)

PS 455. The Politics of Climate Change (4)
PS 461. Environmental Political Theory (4)
PS 473. US Energy Policy (4)
PS 476. *Science Politics (4)
PS 477. International environmental Politics and Policy (4)
PS 478. Renewable Energy Policy (4)

## Applications

ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
BEE 411. Global Environmental Change: Using Data to Inform Decisions (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FOR 330. Forest Resource Economics I (4)
FW 340. *Multicultural Perspectives in Natural Resources (3)
GEO 309. *Environmental Justice (3)
GEOG 330. ${ }^{\wedge *}$ Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 430. Resilience-Based Natural Resource Management (3)
GEOG 431. Global Resources and Development (3)
GEOG 440. Water Resource Management in the U.S. (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

HST 481. *Environmental History of the United States (4)
PS 455. The Politics of Climate Change (4)
SOC 360. *Population Trends and Policy (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)

## Total Credits=31

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Option Code: 844

ENVIRONMENTAL SCIENCE EDUCATION OPTION
The Environmental Science Education option in Environmental Sciences prepares students for entry into OSU's Education Double Degree Program or the MS Professional Teacher Education Program. Environmental Sciences students preparing to teach in secondary school can choose either to pursue a state endorsement in Integrated Science (to teach any middle school science class or high school environmental science, earth science, or another course that is not biology, chemistry, or physics) or Biology, for all secondary biology classes. Students should consult the Content Mastery Sheets for these subjects that are provided by the OSU College of Education. The courses required are subject to change.

## Environmental Science Education <br> Core (12-13 credits)

Practicum Experience (3 credits)
SED 406. Projects (1-16)
or ED 309. Field Practicum (3-6)
or ED 409. Practicum/Clinical Experience
(1-16)
Education Courses (6 credits)
ED 216. *Purpose, Structure, \& Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)
SED 412. Technology Foundations for Teaching Math and Science (3)
SED 413. Inquiry in Science and Science Education (3)
Human Development Course (3-4 credits)
ED 253. Learning Across the Lifespan (3)
ED 512. Psychology of the Adolescent (3)
HDFS 313. Adolescent Development (4)
Special Course Requirements by Program:

- Required for students in the Double Degree Program: ED 216, ED 219, ED 253
- Required for students in the PreMS Professional Teacher Education Program: SED 412, SED 413
- Students preparing for the MS Professional Teacher Education Program must take either HDFS 313 or ED 512.
Environmental Sciences students preparing to teach in secondary school can choose either to pursue a state endorsement in Integrated Science (to teach any middle school science class or high school environmental science, earth science, or another course at is not biology, chemistry, or physics) or Biology, for all secondary biology classes. Students should consult the Content Mastery
Sheets for these subjects that are provided by the OSU College of Education. The courses required are subject to change.


## Upper-Division Science (14-15 credits)

In consultation with your advisor, select additional upper-division science courses from Atmospheric Sciences (ATS), Biochemistry and Biophysics (BB), Botany (BOT), Geology (GEO), History of Science (HSTS), Microbiology (MB), Oceanography (OC) or Zoology (Z).

BI 311. Genetics (4) and BI 445. Evolution (3) are recommended but not required.

## Environmental Sciences students seeking an endorsement in Integrated Science, must take:

ATS 210. Introduction to the Atmospheric Sciences (3)
or GEOG 323. ${ }^{\wedge}$ Climatology (4)
GEO 202. *Earth Systems Science (4)
GEO 203. *Evolution of Planet Earth (4)
or GEO 308. *Global Change and Earth Sciences (3)
OC 201. *Oceanography (4)

## Environmental Sciences students

seeking an endorsement in Biology, must take:
CH 231. *General Chemistry (4)
CH 232. *General Chemistry (4)
CH 233. *General Chemistry (4)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing intensive Course (WIC)


## Option Code: 846

## ENVIRONMENTAL WATER

 RESOURCES OPTION
## Also available via Ecampus.

The Environmental Sciences BS with the option in Water Resources provides a solid science base for domestic and international work related to water.
Students must first complete GEOG 340. *Introduction to Water Science and Policy (3) or SOIL 335. *Introduction to Water Science and Policy (3).

The option requires a minimum of 27 credits from the three categories below.

## Core

Choose a minimum of one course, additional courses count in the Sciences category:
CE 412. Hydrology (4)
FE 430. Watershed Processes (4)
or FE 434. Forest Watershed Management (4)

GEO 487. Hydrogeology (4)

## Sciences

Choose a minimum of two courses:
BEE 458. Nonpoint Source Pollution
Assessment and Control (3)
CE 311. Fluid Mechanics (4)
CE 313. Hydraulic Engineering (4)
CE 417. Hydraulic Engineering Design (4)
FW 456. Limnology (5)
FW 479. Wetlands and Riparian Ecology (3)
GEO 322. Surfaces Processes (4)
GEO 432. Applied Geomorphology (3)
GEOG 323. ${ }^{\wedge}$ Climatology (4)
GEOG 423. Snow Hydrology (3)
Resources and Policy
Choose a minimum of two courses:
AEC 351. *Natural Resource Economics and
Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
ENVE 456. Sustainable Water Resources
Development (3)
FW 431. Dynamics of Marine Biological Resources (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 440. Water Resources Management in the United States (3)
GEOG 441. International Water Resources Management (3)
GEOG 452. Sustainable Site Planning (3)
OC 333. Oceans, Coasts, and People (3)
RNG 355. Desert Watershed Management (4)
RNG 455. Riparian Echydrology and Management (4)
Total Credits = $\mathbf{2 7}$
Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course
Option Code: 847
GEOGRAPHY AND GEOSPATIAL
SCIENCE (BS, CRED, HBS)
Geography is a scientific approach to understanding people's relationship with their environment and resources. Geography is central to many important
issues, including planning for land-use change, global studies, and adaptation to climate change. Geospatial science applies techniques, including web mapping, geovisualization, remote sensing, and geographic information systems (GIS), to address these issues. Geographic thinking and geospatial technology are present in every aspect of modern life, and career opportunities abound for students trained in geography and geospatial science.

Students majoring in Geography and Geospatial Science complete work in five major areas:

1. OSU's baccalaureate core
2. Basic statistics and math
3. Geography and Geospatial Science core
4. Electives
5. Experiential learning (field courses and internship or research)
The major consists of 85 credits of course work. In addition to baccalaureate core courses, the major consists of
6. supporting mathematics and statistics ( 12 cr );
7. foundational skills in geography and geospatial science ( 17 cr ),
8. upper-division geospatial science (12 cr);
9. experiential learning ( 9 cr );
10. seminar ( 1 cr );
11. upper-division electives ( 31 cr ); and
12. capstone course ( 3 cr )

## Supporting Skills (12)

MTH 112. *Elementary Functions (4)
ST 351. Introduction to Statistical Methods (4)

ST 352. Introduction to Statistical Methods (4)

## Foundational Skills (17)

GEOG 105. *Geography of the Non-Western World (3)
or GEOG 106. *Geography of the Western World (3)
GEOG 102. *Physical Geography (4)
or GEO 202. *Earth Systems Science (4)
GEOG 103. *Human Geography (3) or GEOG 203. *Human-Environment Geography (3)
GEOG 201. *Foundations of Geospatial Science and GIS (4)
GEOG 240. *Climate Change, Water, and Society (3)
or GEOG 250. *Land-Use Planning for Sustainable Communities (3) or GEOG 251. Geography of Disaster Management (3)

## Upper-Division Geospatial Science <br> Techniques and Problem-Solving (12) <br> GEOG 360. GIScience I: Geographic Information Systems and Theory (4) <br> GEOG 370. Geovisualization: Cartography (4) <br> GEOG 480. Remote Sensing I: Principles and Applications (4)

## Seminar (1)

GEOG 407. Seminar (1)

Experiential Learning (9)
GEOG 295. Introduction to Geographic Field Research (3)
GEOG 410. Internship (3)
or GEOG 401. Research (3)
or GEOG 403. Thesis (3)
GEOG 495. Field Geography of Oregon I (3)
Capstone (3)
GEOG 464. Geospatial Perspectives on Intelligence, Security, and Ethics (3)
Upper-Division Geography and Geospatial Science Electives (31) GEOG 323. ^Climatology (4) or GEOG 324. Geography of Life: Species Distributions and Conservation (4)

## Select 27 credits from lists below,

at least five courses at 400 level

## Geospatial Science

GEOG 361. GIScience II: Analysis and Applications (4)
GEOG 371. Geovisualization: Web Mapping (4)

GEOG 462. GIScience III: Programming for Geospatial Analysis (4)
GEOG 463. GIScience IV: Spatial Modeling (4)

GEOG 472. Geovisualization: Geovisual Analytics (3)
GEOG 481. Remote Sensing II: Digital Image Processing (4)

## International Studies

GEOG 311. *Geography of Africa (3)
GEOG 313. *Geography of Asia (3)
GEOG 314. *Geography of Latin America (3)

GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 431. Development and Global Resources (3)

## Water Resources

GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 423. Snow Hydrology (4)
GEOG 424. Hydrology for Water Resource Management (3)
GEOG 440. Water Resources Management in the United States (3)
GEOG 441. International Water Resources Management (3)

## Resources, Hazards, and Planning

GEOG 300. *Sustainability for the Common Good (3)
GEOG 331. *Population, Consumption and Environment (3)
GEOG 350. *Geography of Natural Hazards (3)

GEOG 430. Resilience-Based Natural Resource Management (3)
GEOG 432. *Geography of Food and Agriculture (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
Total=85
Footnotes:
*Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)

## SAMPLE FOUR-YEAR PLAN: GEOGRAPHY AND GEOSPATIAL SCIENCE

## Freshman Year (14)

GEOG 102. *Physical Geography (4)
or GEO 202. *Earth Systems Science (4)
GEOG 103. *Human Geography (3)
or GEOG 203. *Human-Environment
Geography (3)
GEOG 105. *Geography of the Non-Western World (3)
or GEOG 106. * Geography of the
Western World (3)
MTH 112. *Elementary Functions (4)

## Sophomore Year (18)

GEOG 201. *Foundations of Geospatial Science and GIS (4)
GEOG 240. *Climate Change, Water, and Society (3)
or GEOG 250. *Land Use Planning for Sustainable Communities (3) or GEOG 251. *Geography of Disaster Management (3)
GEOG 295. Introduction to Geographic Field Research (3)
ST 351. Introduction to Statistical Methods (4)

ST 352. Introduction to Statistical Methods (4)

## Junior Year (up to 42)

Fall (14)
GEOG 300. *Sustainability for the Common Good (3)
or GEOG 331. *Population, Consumption, and Environment (3)
or GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 370. Geovisualization: Cartography (4)

GEOG 450. Land Use in the American West (3)

## Winter (14)

GEOG 300. *Sustainability for the Common Good (3)
or GEOG 330. *^Geography of
International Development and Globalization (3)
or GEOG 350. *Geography of Natural Hazards (3)
GEOG 361. GIScience II: Analysis and Applications (4)
GEOG 371. Geovisualization: Web Mapping (4)

GEOG 423. Snow Hydrology (3)
or GEOG 424. Hydrology for Water Resources Management (3)
or GEOG 441. International Water
Resources Management (3)

## Spring (14)

GEOG 300. *Sustainability for the Common Good (3)
or GEOG 340. *Introduction to Water Science and Policy (3)
or GEOG 430. Resilience-Based Natural Resource Management (3)
or GEOG 440. Water Resources
Management in the United States (3)
GEOG 323. ^Climatology (4)
or GEOG 324. Geography of Life: Species
Distributions and Conservation (4)

GEOG 431. Global Resources and Development (3)
or GEOG 432. Geography of Food and Agriculture (3)
GEOG 462. GIScience III: Programming for Geospatial Analysis (4)
or GEOG 472. Geovisualization: Geovisual Analytics (3)
Senior Year (up to 27)
Fall (8)
GEOG 407. Seminar (1)
GEOG 450. Land Use in the American West (3)
or GEOG 440. Water Resources Management in the United States (3) or GEOG 463. GIScience IV: Spatial Modeling (4)
GEOG 480. Remote Sensing I: Principles and Applications (4)

## Winter (10)

GEOG 410. Internship (1-16)
or GEOG 401. Research (1-16) or GEOG 403. Thesis (3)
GEOG 423. Snow Hydrology (3)
or GEOG 424. Hydrology for Water Resources Management (3)
or GEOG 441. International Water
Resources Management (3)
or GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 481. Remote Sensing II: Digital Image Processing (4)

## Spring (9)

GEOG 430. Resilience-Based Natural Resource Management (3) or GEOG 452. Sustainable Site Planning (3)
or GEOG 472. Geovisualization: Geovisual Analytics (3)
GEOG 464. Geospatial Perspectives on
Intelligence, Security, and Ethics (3)
GEOG 495. Field Geography of Oregon I (3)

## SAMPLE TWO-YEAR PLAN: GEOGRAPHY AND GEOSPATIAL SCIENCE

Up to 29 transfer credits may be accepted representing the equivalent of:
GEOG 102. *Physical Geography (4) or GEO 202. *Earth Systems Science (4)
GEOG 103. *Human Geography (3) or GEOG 203. *Human-Environment Geography (3)
GEOG 105. *Geography of the Non-Western World (3)
or GEOG 106. * Geography of the Western World (3)
GEOG 201. *Foundations of Geospatial Science and GIS (4)
GEOG 240. *Climate Change, Water, and Society (3)
or GEOG 250. *Land Use Planning for Sustainable Communities (3)
or GEOG 251. *Geography of Disaster
Management (3)
MTH 112. *Elementary Functions (4)
ST 351. Introduction to Statistical Methods (4)
and ST 352. Introduction to Statistical Methods (4)
Junior Year (up to 42)

Fall (14)
GEOG 295. Introduction to Geographic Field Research (3)
GEOG 300. *Sustainability for the Common Good (3)
or GEOG 331. *Population, Consumption, and Environment (3)
or GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 370. Geovizualization: Cartography (4)

Winter (14)
GEOG 300. *Sustainability for the Common Good (3)
or GEOG 330. *^Geography of
International Development and Globalization (3)
or GEOG 350. *Geography of Natural Hazards (3)
GEOG 361. GIScience II: Analysis and Applications (4)
GEOG 371. Geovisualization: Web Mapping (4)

GEOG 423. Snow Hydrology (3)
or GEOG 424. Hydrology for Water
Resources Management (3)
or GEOG 441. International Water
Resources Management (3)

## Spring (14)

GEOG 300. *Sustainability for the Common Good (3)
or GEOG 340. *Introduction to Water Science and Policy (3)
or GEOG 430. Resilience-Based Natural
Resource Management (3)
or GEOG 440. Water Resources
Management in the United States (3)
GEOG 323. ^Climatology
or GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 431. Global Resources and Development (3)
or GEOG 432. Geography of Food and Agriculture (3)
GEOG 462. GIScience III: Programming for Geospatial Analysis (4)
or GEOG 472. Geovisualization: Geovisual Analytics (3)

## Senior Year (up to 27)

Fall (8)
GEOG 450. Land Use in the American West (3)
or GEOG 440. Water Resources Management in the United States (3) or GEOG 463. GIScience IV: Spatial
Modeling (4)
GEOG 480. Remote Sensing I: Principles
and Applications (4)
GEOG 507. Seminar (1)

## Winter (10)

GEOG 410. Internship (3)
or GEOG 401. Research (3)
or GEOG 403. Thesis (3)
GEOG 423. Snow Hydrology (3)
or GEOG 424. Hydrology for Water Resources Management (3) or GEOG 441. International Water Resources Management (3) or GEOG 451. Planning Principles and Practices for Resilient Communities (4)

GEOG 481. Remote Sensing II: Digital
Image Processing (4)

## Spring (9)

GEOG 430. Resilience-Based Natural Resource Management (3) or GEOG. 440. Water Resources Management in the United States (3) or GEOG 452. Sustainable Site Planning (3) or GEOG 472. Geovisualization: Geovisual Analytics (3)
GEOG 464. Geospatial Perspectives on
Intelligence, Security, and Ethics (3)
GEOG 495. Field Geography of Oregon I (3)
Major Code: 896

## INTERNATIONAL STUDIES <br> (BA, HBA)

See International Programs for information on the International Studies Degree.
Major Code: 910

## SUSTAINABILITY (BS, HBS)

## Also available via Ecampus.

OSU Main Campus Contact: Ann
Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.

OSU-Cascades Campus Contact: Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@ osucascades.edu.

## Sustainability Core (17-20)

All Sustainability Majors and Minors must take the five courses that make up the Sustainability Core: SUS 304, SUS
350, an ecological sustainability course
(SUS 102 recommended), a social sustainability course (choose one below), and an economic sustainability course (choose one below):
SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)

## Ecological Dimensions of

## Sustainability (3-4)

## Select 3 to 4 credits from the

following:
BI 301. *Human Impacts on Ecosystems (3)
SUS 102. *Introduction to Environmental
Science and Sustainability (4)

## Social Dimensions of Sustainability

(3-4)
Select 3 to 4 credits from the following:
SOC 381. Social Dimensions of
Sustainability (4)(Ecampus only)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/FES/ANS/FW 485. *Consensus and
Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)(Ecampus, Cascades Campus)

## Economic Dimensions of

Sustainability (3-4)
Select 3 to 4 credits from the

## following:

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 351. *Natural Resources Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)

## Practicum (3-12)

Sustainability majors are required to complete a minimum of 3 Practicum credits. Before registering for a practicum students must get practicum approved by Sustainability Double Degree advisor. Email: Sus.advising@oregonstate.edu.
SUS 401. Research (3-12)
SUS 410. Internship (3-12)
SUS 499. Special Topics (3-12)
Note: SUS 410 credits may be achieved by participation in an $\mathrm{IE}_{3}$ Global Internship with advisor approval.

## Remaining Elective Credits (4-16)

In addition to the required credits specified above, students must work with the sustainability program advisor to select courses relevant to their discipline and career path interests.

## Credits total=36

Classes that can be used to fulfill remaining requirements are listed below. Students are NOT limited to taking courses within their primary major of study. The Sustainability advisor(s) will approve courses not listed here if they have an obvious link to sustainability and fulfill the intent of the double degree. See the OSU Sustainability Office list of sustain-ability-related courses.

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 465. *Systems Thinking and Practice (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 311. Intermediate Microeconomic Theory (4)
ECON 315. Intermediate Macroeconomic Theory (4)
MGMT 452. Leadership (4)

## Engineering

BEE 221. Fundamentals of Ecological Engineering (3)

BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering
Fundamentals (4)
ENVE 322. Fundamentals of Environmental Engineering (4)
HEST 310. *Introduction to Community
Engagement and Community-Based Design (3)

## Natural Sciences

ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ATS 320. *The Changing Climate (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 348. *Human Ecology (3)
BI 370. Ecology (3)
BRR 325. *Energy Technology and Social Change (3)
BRR 350. Introduction to Regional
Bioenergy (2)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
DHE/WSE 415. *Renewable Materials in the Modern Age (3)
FES 341. Forest Ecology (3)
FES 354. Communities, Natural Areas, and
Sustainable Tourism (3)
FES 355. Management for Multiple Resource Values (3)
FES 360. Collaboration and Conflict Management (3)
FES 365. *Issues in Natural Resources Conservation (3) Ecampus or Cascades campus only
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FES/FW 445. Ecological Restoration (4)
FES/HORT 455. Urban Forest Planning,
Policy and Management (4) Ecampus only
FES/NR/RNG 477. *Agroforestry (3)
FES/SOC/ANS/FW 485. *Consensus and Natural Resources (3)
FOR 462. Natural Resource Policy and Law (3)
FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information
Systems in Natural Resource (3)
FW 321. Applied Community and
Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in
Natural Resources (3)
FW 350. *Endangered Species, Society, and Sustainability (3)
FW 435. ^Wildlife in Agricultural Ecosystems (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 309. *Environmental Justice (3)

GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and
Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
SOIL 475. Soil Resource Potentials (4)
SOIL 499. Special Topics (1-16)
SUS 103. *Introduction to Climate Change (4)

WSE 111. Renewable Materials for a Green Planet (2)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 392. *Bamboolooza: The Fascinating World of Bamboo (3)
WSE 453. ^Global Trade in Renewable Materials (3)
WSE 455. Marketing and Innovation in Renewable Materials (4)
WSE 473. Bioenergy and Environmental Impact (3)
WSE 475. Environmental Assessment of Building Materials (4)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy, and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ANTH 481. *Natural Resources and
Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and
Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature, Culture and the Environment (4)
FES/SOC/ANS/FW 485. *Consensus and Natural Resources (3)
HEST 310. *Introduction to Community Engagement and Community-Based Design (3)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)

PHL/REL 443. *World Views and
Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion, and Politics (4)
PS 374. *Sustainable Living: Practices and
Policies (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)
PS 477. International Environmental Politics and Policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
WGSS 440. *Women and Natural Resources (3)

WGSS 450. Ecofeminism (3)

## Footnotes:

* Bacc Core Course (BCC)
^ Writing Intensive Course (WIC)
Major Code: $\mathbf{8 7 0}$


## UNDERGRADUATE MINORS

## EARTH SCIENCES MINOR

The Earth Sciences minor is designed for students who have a broad interest in Earth Sciences. Earth Science majors and Environmental Sciences majors are restricted from taking this minor.

## Required ( 15 credits)

ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
GEO 201. *Physical Geology (4)
or GEO 101. *The Solid Earth (4)
or GEO 221. *Environmental Geology (4)
GEO 202. *Earth Systems Science (4)
or GEOG 102. *Physical Geography (4)
OC 201. *Oceanography (4)
Select 4 courses from the following
list (total upper-division elective credits must be 12):
ATS 210. Introduction to Atmospheric Sciences (3)
GEO 305. *Living with Active Cascade Volcanoes (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 307. *National Park Geology and Preservation (3)
GEO 308. *Global Change and Earth
Sciences (3)
GEOG 323. ${ }^{\wedge}$ Climatology (4)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 340. *Introduction to Water Science and Policy (3)
GEO 380. *Earthquakes in the Pacific Northwest (3)
GEOG 431. Global Resources and
Development (3)
GEOG 441. International Water Resources Management (3)
OC 332. Coastal Oceanography (3)
OC 333. Oceans, Coasts and People (3)
OC 334. ^Polar Oceanography (3)

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Minor Code: 835


## ENYIRONMENTAL SCIENCES MINOR

## Also available via Ecampus.

Courses taken in the "Humans and the Environment" section of the Environmental Sciences minor must be unique to the minor and cannot be used to satisfy major or other minor requirements. Course substitutions must be selected in consultation with an environmental sciences advisor. Substitutions must cover material in the same course category (natural environmental systems or humans and the environment) at a similar or higher level. Credits must sum to a minimum of 27.

## Core: Natural Environmental

## Systems (12-14)

ATS 210. Introduction to the Atmospheric Sciences (3)
or ATS 420. Principles of Climate: Physics
of Climate and Climate Change (4)
or GEOG 323. ^Climatology (4)
BI 370. Ecology (3)
or FES 341. Forest Ecology (3)
GEO 202. *Earth Systems Science (4)
or GEO 221. *Environmental Geology (4)
or SOIL 205. *Soil Science (3)
or SOIL 395. *World Soil Resources (3)
OC 201. *Oceanography (4)
or FW 456. Limnology (5)
or GEO 487. Hydrogeology (4)
or GEOG 340. *Introduction to Water
Science and Policy (3)

## Humans and the Environment (15-19)

Select at least one course in each of the following five categories to bring the total number of credits to 27 or more.
One course in economics, selected from the following:
AEC 250. *Introduction to Environmental Economics and Policy (3)
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
FW 462. Ecosystem Services (3)
One course in environmental law and policy, selected from the following:
AEC 253. *Environmental Law, Policy, and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 432. Environmental Law (4)
FOR 462. Natural Resource Policy and Law (3)

FW 415. Fisheries and Wildlife Law and Policy (3)
PS 475. Environmental Politics and Policy (4)
PS 476. *Science and Politics (4)
PS 477. International Environmental Politics and Policy (4)
SOC 360. *Population Trends and Policy (4)
One course in ethics and
environmental ethics, selected from the following:

ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ANTH 481. *Natural Resources and
Community Values (3)
CH 374. *Technology, Energy and Risk (3)
FES/MCB/TOX 435. *Genes and Chemicals
in Agriculture: Value and Risk (3)
FW 340. *Multicultural Perspectives in
Natural Resources (3)
GEO 309. *Environmental Justice (3)
PHL 325. *Scientific Reasoning (4)
PHL 439. Philosophy of Nature (3)
PHL 443. *World Views and Environmental Values (3)
PHL/ES 448. Native American Philosophies (4)

PS 461. Environmental Political Theory (4)
SOC 456. *Science and Technology in Social Context (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
WGSS 440. *Women and Natural Resources (3)

One course in the human
environment, selected from the following:
AG 301. *Ecosystem Science of Pacific NW Indians (3)
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 301. *Human Impacts on Ecosystems (3)
BI 348. *Human Ecology (3)
ENSC 479. *^Environmental Case Studies (3)

FW 325. *Global Crises in Resource Ecology (3)

GEO 308. *Global Change and Earth Sciences (3)
GEOG 300. *Sustainability for the Common Good (3)
HST 481. *Environmental History of the
United States (4)
HSTS/FW 470. *Ecology and History:
Landscapes of the Columbia Basin (3)
SOIL 395. *World Soil Resources (3)
Ecampus only.
Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)
One course in environmental management, selected from the following:
BI/FW/Z 464. Marine Conservation Biology (3)

BOT 415. Forest Insect and Disease Management (5) [Terminated winter 2017]
FES 352. Wilderness Management (3)
FES 355. Management for Multiple Resource Values (3)
FES 365. *Issues in Natural Resources Conservation (3) Ecampus only.
FES/FW 445. Ecological Restoration (4)
FOR 346. Topics in Wildland Fire (3)
FW 251. Principles of Fish and Wildlife Conservation (3)
FW 323. Management Principles of Pacific Salmon in the Northwest (3)
FW 326. Integrated Watershed Management (3)

FW 435. ${ }^{\wedge}$ Wildlife in Agricultural
Ecosystems (3)
FW 479. Wetlands and Riparian Ecology (3) GEO 306. *Minerals, Energy, Water and the Environment (3)

GEOG 431. Global Resources and Development (3)
GEOG 440. Water Resources Management in the United States (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 452. Sustainable Site Planning (3)
HORT/FES 350. Urban Forestry (3) Ecampus only.
NR 455. Natural Resource Decision Making (4)

PH 313. *Energy Alternatives (3)
RNG 341. Rangeland Ecology and
Management (3)
RNG 355. Desert Watershed Management (4)

RNG 421. Wildland Restoration and Ecology (4)
RNG 490. Rangeland Management Planning (4)

## Total Credits=Minimum of 27

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)


## Minor Code: 758

## GEOGRAPHY MINOR

## Also available via Ecampus.

The Geography minor will allow interested non-majors to explore:

- how the Earth works,
- the people who live on its surface,
- the value of accessing and properly using geographic information, and
- how to bring concepts of relative location, pattern, and spatial process to bear on key societal questions.
The minor consists of 14 credits of core courses and at least 13 credits of elective courses for a total of 27 credits. Students must complete a minimum of 14 unique credits in the minor that do not fulfill requirements of majors, minors, options or certificates.


## Core Requirements (14)

One course in each of the following areas:
Human and Regional Geography (choose one):
GEOG 103. *Human Geography (3) EC
GEOG 105. *Geography of the Non-Western

## World (3) EC

GEOG 106. *Geography of the Western World (3) EC
GEOG 203. *Human-Environment Geography (3) EC

## Physical Geography (choose one):

GEO 202. *Earth Systems Science (4)
GEO 203. *Evolution of Planet Earth (4)
GEO 221. *Environmental Geology (4) EC
GEOG 102. *Physical Geography (4) EC
OC 103. *Exploring the Deep: Geography of the World's Oceans (4) EC

## Sustainability

GEOG 300. *Sustainability for the Common Good (3) EC

## Geographic Techniques (choose one):

GEOG 201. *Foundations of Geospatial
Science and GIS (4) EC

GEOG 360. Geographic Information
Systems and Theory (4) EC
GEOG 370. Geovisualization: Cartography (4) $E C$

GEOG 371. Geovisualization: Web Mapping (4)

## Electives (13)

Select any combination of additional courses from the list below totaling at least 13 credits. Courses are grouped below by focus area; students may choose courses from one or more focus areas.

## Physical Geography:

FE 430. Watershed Processes (4) EC
GEO 306. *Minerals, Energy, Water, and the
Environment (3) EC
GEOG 323. ^Climatology (4) EC
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 423. Snow Hydrology (3)

## International Studies

GEOG 311. *Geography of Africa (3)
GEOG 313. *Geography of Asia (3)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 431. Global Resources and Development (3)

## Water Resources

GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 423. Snow Hydrology (3)
GEOG 424. Hydrology for Water Resources Management (3)
GEOG 440. Water Resources Management in the United States (3)
GEOG 441. International Water Resources Management (3)

## Resources, Hazards, and Planning

GEO 305. *Living with Active Cascade Volcanoes (3) EC
GEO 308. *Global Change and Earth Sciences (3) EC
GEO 380. *Earthquakes in the Pacific Northwest (3) EC
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 350. *Geography of Natural Hazards (3)

GEOG 430. Resilience-based Natural
Resource Management (3)
GEOG 432. Geography of Food and Agriculture (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
Total = 27
Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
EC Also available via Extended Campus


## Minor Code: 545

## GEOLOGY MINOR

The undergraduate Geology minor provides a means for students majoring in physics, chemistry, civil engineering, forest engineering, and related fields to develop a strong geology background as part of their program.

Students must complete a minimum
of 14 unique credits in the minor that do not fulfill requirements of majors, mi-

## nors, options or certificates.

## Required (16 credits)

GEO 201. *Physical Geology (4)
or GEO 101. *The Solid Earth (4)
GEO 202. *Earth Systems Science (4)
or GEO 102. *The Surface of the Earth (4)
or GEOG 102. *Physical Geography (4)
GEO 203. *Evolution of Planet Earth (4)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
Plus 11 credits from electives below:
GEO 310. Earth Materials I: Mineralogy (4)
GEO 315. Earth Materials II: Petrology (4)
GEO 322. Surface Processes (4)
GEO 340. Structural Geology (4)
GEO 370. Stratigraphy and Sedimentology (4)
GEO 412. Igneous Petrology (4)
GEO 415. Earth Materials III: Petrography (4)
GEO 427. ^Volcanology (4)
GEO 430. Geochemistry (4)
GEO 432. Applied Geomorphology (3)
GEO 463. ^Geophysics and Tectonics (4)
GEO 481. Glacial Geology (4)
GEO 487. Hydrogeology (4)
GEO 488. Quaternary Stratigraphy of North America (3)

## Total=27-28

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 550

## OCEANOGRAPHY MINOR

Must complete a minimum of 14 unique credits in the minor that do not fulfill requirements of majors, minors, options or certificates.
Required Core (16-17)
OC 201. *Oceanography (4)
OC 332. Coastal Oceanography (3)
OC 333. Oceans, Coasts, and People (3)

## Take two of the following:

OC 430. Principles of Physical Oceanography (4)
OC 440. Biological Oceanography (4)
OC 450. Chemical Oceanography (3)
OC 460. Geological Oceanography (3)

## Electives (10-11)

Select from the following (or the two other 400-level courses above) to bring the credit total to 27. Courses are grouped by focus area, but students may choose courses from one or more area.

## Ocean and Climate Science

ATS 420. Principles of Climate (4)
ATS 421. Climate Modeling (4)
GEO 433. Coastal Geomorphology (3)
OC 334. ^Polar Oceanography (3)
OC 433. Coastal and Estuarine
Oceanography (3)
OC/FW 434. Estuarine Ecology (4)

## Biological Science

BI 370. Ecology (3)
BI/FW 421. Aquatic Biological Invasions (4)
FW 426. Coastal Ecology and Resource
Management (5) [Taught at HMSC]
FW 431. Dynamics of Marine Biological

Resources (4) [Taught at HMSC or via Ecampus]
FW 497. ^Aquaculture (3) [Taught at HMSC]
Z 461. Marine and Estuarine Invertebrate
(4) [Taught at HMSC]

## Total=27

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
HMSC=Hatfield Marine Science Center in Newport, OR


## Minor Code: 660

## SUSTAINABILITY MINOR

Available on the Corvallis and OSU-Cascades campuses, and via Ecampus.
OSU Main Campus Contact: Ann Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.

OSU-Cascades Campus Contact: Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@ osucascades.edu.

The Sustainability minor includes core sustainability courses (5) and tailored elective courses to expand students' knowledge and experience of their primary major in the context of sustainability principles and frameworks. Courses from a student's major course of study will not count towards minor requirements. Completion of the Sustainability minor requires 27 credits beyond the 180-credit minimum for graduation.

## Sustainability Core (17-20)

All Sustainability students must take (8):
SUS 304. *Sustainability Assessment (4) SUS 350. *Sustainable Communities (4)
Social Dimensions of Sustainability:

## Select 3 to 4 credits from the

 following:SOC 381. Social Dimensions of
Sustainability (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC 485/ANS 485/FES 485/FW 485.
*Consensus and Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)
Ecological Dimensions of

## Sustainability:

## Select 3 to 4 credits from the

 following:BI 306. *^Environmental Ecology (3)
SUS 102. *Introduction to Environmental
Science and Sustainability (4)
Economic Dimensions of

## Sustainability:

## Select 3 to 4 credits from the

 following:AEC 250. *Introduction to Environmental
Economics and Policy (3)
AEC/ECON 352. *Environmental

Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)

## Sustainability Individualized Study/

## Elective Credits (7-10)

Students will work with their primary academic advisor and the Sustainability academic advisor to select electives in the theme relevant to their interests for a total of 7-10 credits. Students should discuss with Sustainability advisor to apply elective courses that may not be listed below.

## Total Credits=27

## Elective Courses:

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. Introduction to
Macroeconomics (4)
ECON 315. Intermediate Macroeconomic Theory (4)

## Engineering

BEE 221. Fundamentals of Ecological Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative
Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Electric Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering
Fundamentals (4)
ME 312. Thermodynamics (4)

## Natural Sciences

ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 370. Ecology (3)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FOR 462. Natural Resource Policy and Law (3)

FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information

Systems in Natural Resource (3)
FW 321. Applied Community and Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society and Sustainability (3)
FW 435. ${ }^{\wedge}$ Wildlife in Agricultural
Ecosystems (3)
FW/ANS/FES/SOC 485. *Consensus and
Natural Resources (3)
FW 488. Problem Solving in Fisheries and Wildlife Science (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water and the Environment (3)
GEO 309. *Environmental Justice (3)
GEO 453. Resource Evaluation Methods/ EIS (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and
Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 322. Physical and Mechanical
Properties of Renewable Materials (4)
SOIL 499. Special Topics [Organic Farming] (1-16)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)
ANTH 481. *Natural Resources and
Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and

Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature,
Culture and the Environment (4)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL 443. *World Views and Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion and Politics (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)
PS 477. International Environmental
Politics and policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 381. Social Dimensions of
Sustainability (4)
SOC 480. *Environment Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/ANS/FES/FW 485. *Consensus and
Natural Resources (3)

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 871

## GRADUATE MAJORS

GEOGRAPHY (MA, MS, PhD)
Graduate Areas of Concentration
Geographic information science, physical geography, resource geography
Geography is the study of human use and interaction with the Earth and the identification of spatial and temporal variation in natural and human processes. Geography uses principles of mathematics, social science, and natural science to analyze and interpret change in the environment. Many geographic studies require a combination of field, laboratory, and computational work. Geography plays an important role in urban and land use planning, resource evaluation, environmental analysis, education, and cartography.

Majors in geography develop a background in regional geography, resource geography, geographic information science, and physical geography and in statistics and disciplines related to geography such as geology, forestry, and anthropology. Course offerings combined with excellent facilities and supportive electives allow students to develop particular interests such as resource management, environmental analysis, land use planning and cartography/geographic information systems/remote sensing.

The program has an applied orientation, placing emphasis on the application of geographic information science to environmental and resource utilization and problem solution. Master's degree candidates may elect a thesis or nonthesis option. No foreign language is
required for the MS degree. One foreign language is required for the PhD degrees.

Contact Program Director Julia Jones, 541-737-1224, jonesj@geo.oregonstate. edu, for additional information.

## Major Code: 5450

## GEOLOGY (MA, MS, PhD, MAIS)

Graduate Areas of Concentration
Solid Earth processes and history
(volcanology, igneous petrology, economic geology); surface Earth processes and history (Earth system history, hydrogeology and hydrology, geomorphology and surface processes, climate and biogeochemical cycles)
Geology is the study of the materials, processes, and history of the solid Earth and its fluid envelopes. Geology is an integrative field, drawing on mathematics, chemistry, physics and biology to understand the interactions of the lithosphere, biosphere, atmosphere and hydrosphere. Studies in geology commonly combine observations and measurements from field, laboratory, and computational studies. Geology plays an important role in decisions about resource use, slope stability and the safety of building projects, natural hazards standards, mineral exploration and extraction, the basic workings of the Earth, and the understanding of the effects and rates of natural and human-induced change in the environment.

Most graduate research in the geology program includes field study. An approved field course of at least 9 quarter credits or equivalent experience is prerequisite to candidacy for a graduate degree. No foreign language is required.
Contact Program Director Ed Brook, 541-737-8197, brooke@geo.oregonstate. edu, for additional information.

Students who seek training in a combination of field and laboratory techniques applying a variety of scientific problems will find very few places with the number of opportunities or the variety of facilities that are available at Oregon State. Research in the department falls under three broad areas: Solid Earth Processes and History; Surface Earth Processes and History; and Human Interaction with the Earth.

Programs of study in the Geology graduate major lead to the Master of Science or Master of Arts and Doctor of Philosophy degrees
Master of Science (MS) and Master of Arts (MA) Degrees:
The master's degree requires successful completion of at least 45 credits of appropriate courses including a thesis. The thesis presents a written summary of research findings and conclusions. All master's programs include a final oral examination. Each graduate program is supervised by a committee of at least three members of the graduate faculty who col-
laborate with the student in developing a program of study and research leading to the final oral examination. The examination is conducted and approved by the student's graduate committee.
The MA degree requires a foreign language proficiency equivalent to that attained at the end of a second-year university course in that language with a grade of C (2.00) or better.
Doctor of Philosophy (PhD) Degree: The doctor of philosophy (PhD) degree is granted for proven ability in research and mastery of an area within the discipline of geology. This is demonstrated through successful performance in at least 108 credits of appropriate course work and research. The pursuit of the PhD also requires passing qualifying exams that advance a student to candidacy. The doctoral program includes original research in a major topic in one of the department's areas of specialization submitted as a dissertation that is presented and defended orally. A committee of at least four members of the graduate faculty assist the major professor in supervising and examining the PhD student. PhD candidates must complete at least three of four consecutive terms with at least 36 credits taken on the OSU campus.

## Graduate Minor

Advanced degree programs in geology may include an optional minor subject area. It may be in a single discipline or an integrated grouping of courses organized around a theme. In developing minors, students commonly combine courses from several campus departments.

## Major Code: 5500

## MARINE RESOURCE

## MANAGEMENT (MA, MS)

Graduate Areas of Concentration Marine resource management
Marine Resource Management (MRM) is a science-based, interdisciplinary master's program based in College of Earth, Ocean, and Atmospheric Sciences (CEOAS). The program provides students with the interdisciplinary training necessary to function confidently and effectively in professional resource management positions. Marine and coastal issues are technically and politically complex, involving many interests, perspectives and stakeholders. To deal effectively with these issues, marine resource managers need a broad-based background in both physical and social sciences. Graduates from the program are trained to bridge the gap between science and policy.
The program offers two tracks, professional and a thesis:

Professional track students develop a project and defend a report on that work, based on either an internship or a research project.

Thesis track students are expected to produce a more extensive and rigorous piece of original work and analysis, and must meet additional requirements set by the Graduate School and advisor. Applicants must meet the general admission requirements of the college.
More than 40 faculty members from CEOAS, other university departments, and outside institutions participate in MRM. These partnerships include departments of Fisheries and Wildlife, Applied Economics, and Anthropology; the School of Public Policy; Sea Grant Extension specialists; and scientists and management professionals from state and federal agencies. The program consists of required courses in oceanography, atmospheric science, and marine law. Typical elective courses include resource economics, fisheries science, political science, anthropology, sociology, and communications. Each program of study is adjusted to the needs of the individual. Applicants must meet the general admission requirements of the college.

Contact Flaxen Conway, 541-7371339, fconway@coas.oregonstate.edu, for more information.

## Major Code: 6550

## OCEAN, EARTH AND ATMOSPHERIC SCIENCES (MA, MS, PhD, MAIS)

Graduate Areas of Concentration Atmospheric sciences, geological oceanography, geophysics, ocean ecology and biogeochemistry, physical oceanography
Ocean, Earth and Atmospheric Sciences (OEAS) is an interdisciplinary graduate major that first introduces students to the elements of the Earth system and the processes of mass and energy flow among them through a set of core/breadth courses:

- OEAS 500. Cascadia Field Trip (3)
- OEAS 520. The Solid Earth (4)
- OEAS 530. The Fluid Earth (4)
- OEAS 540. The Biogeochemical Earth (4)

Students then pursue focused graduate course work and research in the following concentration areas, directed by their program committee.

## OEAS CONCENTRATION AREAS

## Atmospheric Sciences

The atmospheric sciences are concerned with dynamics, physics and processes, including the interactions of the atmosphere with soil physics, hydrology and oceanic circulation. The atmospheric sciences concentration in the College of Earth, Ocean, and Atmospheric Sciences prepares students for careers in teaching and research through advanced study and participation in research projects directed by faculty members. MA, MS and

PhD degrees are offered.
Applicants should have an undergraduate degree in physics, mathematics, engineering, chemistry or atmospheric science, with strength in mathematics. All applicants should have completed one year each of chemistry and physics with calculus, and courses in vector calculus and in differential equations.

Students perform thesis research on a wide range of problems including the study of global climate change, clouds and the earth's radiation budget, the structure and dynamics of turbulent flows, air-sea interaction, planetary atmospheres, the optimal use and economic value of weather and climate forecasts, and the study of acid rain and its effects on terrestrial ecosystems. In addition to theoretical, numerical, and observational methods of analysis, approximately onefourth of the research projects either use or are developing methods for obtaining meteorological information from satellites.
Opportunities exist for PhD candidates to conduct some of their thesis research in Europe or at the National Center for Atmospheric Research. Most research projects involve collaboration with other scientists, either on the Oregon State University campus or at major domestic or international research centers.

## Geophysics

Geophysics is concerned with physical processes within and on Earth, especially the internal physical constitution of the planet, and seismic, gravitational, geothermal, geoelectrical, geomagnetic phenomena and their relation to geological processes. The geophysics concentration offers graduate work toward MA, MS, and PhD degrees. Candidates should have an undergraduate degree in physics, mathematics, engineering, geology, or geophysics. Mathematics through differential equations is required and mathematical physics is desirable. Graduate Record Exam scores are required of all applicants. Opportunities for research exist on a wide range of geophysical problems in marine and continental regimes, emphasizing experimental, applied, and theoretical aspects.

## Oceanography

Oceanography, the application of the sciences to the study of the oceans, is an interdisciplinary environmental science concerned with all processes: biological, chemical, geological, and physical, as well as the interactions between the ocean. The College of Earth, Ocean, and Atmospheric Sciences graduate major offers MA, MS, and PhD degrees with a concentration in oceanography.

For all areas in oceanography, applicants should have a strong quantitative background and an undergraduate degree in a relevant field of science or engineer-
ing and one year each of chemistry, physics, and calculus. Prior background in oceanography is not essential.
In geological oceanography (marine geology), a broad range of geological processes that influence the ocean is studied. Fields of interest include plate tectonics and the structure of the ocean basins, igneous petrology and geochemistry, paleoceanography and paleoclimatology, and coastal sedimentary processes. Candidates show strength in one or more of these fields: earth science, chemistry, physics, biology or mathematics.
Physical oceanography research covers the physical processes in the sea, exchange of energy and momentum at the air-sea interface, and the transmission and absorption of energy in the sea (e.g., light, heat, and sound). Circulation, tides, waves, heat content and density distributions are some of the other phenomena of particular interest. Candidates should have an undergraduate major in physics, mathematics, or engineering.
Contact Robert Allan, 541-737-1340, rallan@coas.oregonstate.edu, for more information.

## Major Code: 5001

## GRADUATE MINORS

## GEOGRAPHY GRADUATE MINOR

A Geography graduate minor consists of a minimum of 15 credits of Geography graduate course work, including courses in physical geography and resource geography. A student interested in Geographic Information Science should pursue the Graduate Certificate in Geographic Information Science.
Contact Program Director Julia Jones, 541-737-1224, jonesj@geo.oregonstate. edu, for additional information.

## Minor Code: 5450

## GEOLOGY GRADUATE MINOR

Contact Program Director Ed Brook, 541-737-8197, brooke@geo.oregonstate.edu, for additional information.

## Minor Code: 5500

MARINE RESOURCE MANAGEMENT GRADUATE MINOR
Contact Robert Allan, 541-737-1340, rallan@coas.oregonstate.edu, for more information.
Minor Code: 6550

## OCEAN, EARTH AND ATMOSPHERIC SCIENCES GRADUATE MINOR

Contact Robert Allan, 541-737-1340, rallan@coas.oregonstate.edu, for more information.
Minor Code: 5001

## RISK AND UNCERTAINTY QUANTIFICATION IN EARTH SYSTEMS GRADUATE MINOR

Marine and coastal scientific and management issues are technically and socially complex, involving many forms of science, interests, perspectives, and stakeholders. There is much uncertainty in modeling forecast and policy outcomes associated with climate change and global markets. This interdisciplinary graduate minor will provide students with knowledge and skills to quantify and communicate risk and uncertainty derived from the analyses of large data in earth system science.

The graduate minor focuses on marine science and resource management, yet will be relevant to students from a variety of fields. Students will extend their ability to perceive and solve problems in a transdisciplinary context related to statistical inference, uncertainty quantification, risk analyses, earth system science, and social systems. Students will also acquire professional skills in communication and collaboration. The world is changing. Join us in becoming more resilient. The graduate minor is open to all OSU graduate students.

## Learning Goals

## Social Systems

The "social or human system" component is one of the key elements of a coupled natural human system. Specifically, it encompasses the social, cultural, economic, management, and policy aspects of the system, and how they interact with each other and with their environment. Disciplinary approaches to the human system include anthropology, sociology, policy, economics, etc. The goal of the "social systems" training component of the graduate R\&U minor is to learn about social science methods, theory and/or applications as they relate to a marine, coupled natural human system. Risk and Uncertainty graduate minor students are expected to complete the requirements by taking at least one course in this area. The course must allow students to: (1) Recognize the perspective of the particular discipline or area of study, (2) Understand and respect the various methodological approaches used in the social sciences (qualitative and/or quantitative), their possibilities and limitations, and how these may be best integrated to the earth systems, big data or R\&U component of the minor, (3) Explain and extract the scalar nature of the course material, whether it is related to cultural, social, institutional, management, or policy aspects of a system, (4) Critically assess gaps or opportunities for inclusion of social, cultural, or economic elements of a natural system, and vice versa.

## Risk and Uncertainty

The goal of the risk and uncertainty quantification training component of the graduate R\&U minor is to understand and acquire mastery of some of the fundamental mathematical/computational and statistical methods for quantifying uncertainty and analyzing risk for decision making. NRT (National Research Traineeship) students seeking the graduate minor are expected to acquire (mathematical/computational/statistical) tools that can be used to describe and assess risk and uncertainty in problems related to the marine, coupled natural human system. Students have options to choose from a variety of courses dealing with the mathematical foundations of risk and uncertainty involving mathematical techniques in (i) decision making under uncertainty, (ii) ruin probabilities, (iii) measures of variability, (iv) probabilities of rare events and large deviations, (v) Monte Carlo simulation, (vi) optimization and dynamic programming, (vii) stochastic models in biology pertaining to spread of disease and related phenomena. Students are expected to acquire experience in a combination of computational, simulation and/or theoretical approaches. NRT students with a social science or human dimension component will be expected to understand and become literate and conversant in the quantitative aspects of risk and uncertainty quantification.

## Earth Systems

Students will develop an integrated understanding of the Earth System, including biological, physical and geological mechanisms that affect Earth climate, species dynamics and interactions, elemental cycles and ecosystem services. The emphasis will be on understanding the linkages between physics, biology, geology, and chemistry from a system theory perspective, and on how these linkages affect Earth's biogeochemical processes. Disciplinary components of the Earth System module include biological, chemical and physical oceanography, biogeochemestry, geology, climate and atmospheric sciences, and ecology.

## Big Data

Issues surrounding massive data sets ("big" data) are intertwined with data-enabled science and engineering. The goals of the big data training component are for students (1) to acquire computational and data-management skills necessary for handling and processing large data sets, and (2) to assess the value of information obtained from big data with respect to such issues as observation bias, signal versus noise, spurious relationships, and incidental endogeneity. Much of the training in big data management and processes is acquired through hands-on experiences. Specific components of the
big data module include handling and processing massive datasets; being able to identify and articulate the limitations of big data sets; implementing classification, clustering and/or network analyses as appropriate.
Graduate PhD students are required to complete at least 18 credits, MS students complete 15 credits.
All students complete the professional development requirement ( 6 credits).

Additional credits are taken from these four following specializations:

1. Big Data and Uncertainty

Quantification
2. Risk Analyses
3. Earth Systems
4. Social Systems

## Mentoring Requirements

There must be a minor professor in the student's committee. The minor professor is in any of the fields where course designators fall but must not be from the student's major.

## Classes for Minor

Graduate PhD students are required to complete at least 18 credits, MS students are required to complete at least 15 credits for the minor.

PhD students take one course from each of the four remaining areas: Big data and Uncertainty Quantification, Risk Analyses, Earth Systems, and Social Systems.

MS students take one course in Social Systems and one in Earth Systems and choose one course from either Big Data and Uncertainty Quantification or Risk Analysis.

## Professional Development

MRM 525. Special Topics in Marine Resource Management (6) (2 credits each fall, winter, and spring term in sequence):
a. Marine and Earth Systems Science: Foundations in Risk and Uncertainty (2)
b. Marine and Earth Systems Science: Collaborative Working Structures in Risk and Uncertainty (2)
c. Marine and Earth Systems Science: Communication of Risk and Uncertainty (2)

## Big Data and Uncertainty

 Quantification Specialization:CS 515. Algorithms and Data Structure (4)\#
CS 534. Machine Learning (4) \#
GEOG 565. Spatio-Temporal Variation in
Ecology and Earth Science (4)
GEOG 566. Advanced Spatial Statistics and GIScience (4)
ST 538. Modern Analytical Methods
for Large and Complex Datasets (3)
(Pending Approval)
ST 599. Special Topics: Big Data and Uncertainty Quantification (3)

## Risk Analysis Specialization:

FW 544. Quantitative Decision Analysis for Fish and Wildlife Mgmt (4)

ME 515. Risk and Reliability Analysis in Engineering Design (4)
MTH 527. Introduction to Mathematical Biology (3)
MTH 563. Probability I (3)
MTH 567. Actuarial Mathematics (3)
MTH 599. Special Topics: Risk Analysis (3)

## At least one class from Earth

## Systems Specialization:

ATS 520. Principles of Climate: Physics of Climate and Climate Change (4)
GEO 550. Coastal Hazards: Processes, Response, and Adaptation (3)
GEO/SOIL 684. Global Biogeochemical Cycles (4)
OC 523. Ocean Ecological Dynamics (4)
OC 533. Coast and Estuarine Oceanography (3)

OC/FW. 534 Estuarine Ecology (4)
OC 599. Special Topics [Earth Systems Science] (3)
OEAS. 520 The Solid Earth (4)\#
OEAS. 530 The Fluid Earth (4)\#
OEAS. 540 Bio-Geochemical Earth (4)\#
At least one class from Social

## Systems Specialization :

AEC/MRM 552. Marine Economics (3)
ANTH 581. Natural Resources and Community Values (4)
COMM 599. Special Topics: Policy Conflict and Public Participation (3)
MRM 530. Principles and Practice of Marine Resource Management (3)
PPOL 545. International Marine Policy (4)
PPOL 546. The Policy and Law of United States Coastal Governance (4)
PPOL 548. Marine Policy in the United States (4)
SOC 581. Society and Natural Resources (4)

## Footnote:

\# Classes where a more advanced listing can be substituted.
Minor Code: 5050

## WATER CONFLICT MANAGEMENT AND TRANSFORMATION GRADUATE MINOR

Graduate Areas of Concentration Water conflict management and transformation
The graduate minor in Water Conflict Management and Transformation is designed to accommodate the needs of professionals and graduate students. It offers an integrative approach that explicitly integrates human and policy dimensions of water resources within the framework of scientific and technological solutions. The graduate minor is a flexible, coherent program that offers critical and underemphasized skills essential to preventing and resolving water conflicts. It helps facilitate dialogue on critical water issues across diverse values and perspectives, and it serves OSU students, citizens and officials in Oregon, the United States and internationally.

The curriculum centers around casebased, interactive course and field work
to provide an in-depth look at water conflict, conflict transformation, and prevention issues and strategies across four distinct and overlapping themes: water governance, water and ecosystems, water and society, and water and economics. Each theme incorporates several topics critical to understanding water conflicts. A highlight of the minor is the capstone course coupled with an intersession practicum working with watershed councils, landowners, and agencies in Northeast Oregon; and a guided and critiqued project in which two teams take on, for example, the roles of Jordan and Israel to negotiate a treaty for water resource allocation in a simulated water negotiation. These techniques will hone student skills, understanding and thought development. Students will also take part in fieldwork in a watershed or basin at risk of, or in, water conflict.

Through this minor, students will learn about and practice conflict transformation skills, explore what new institutional networks and relationships are needed, and how these can be achieved through role-playing, in-class exercises, and guest lectures. Students will also be introduced to leadership skills for guiding this type of change.

Contact Lynette de Silva, 541-7377013, desilval@geo.oregonstate.edu, for additional information.

All students seeking a graduate minor are subject to all general policies governing the courses for the master's degree. As such, these students will be required to take a minimum of 50 percent graduate stand-alone courses. The remaining credits may be the 500-component of 400/500 slash courses.

## Capstone Course Work (3 credits required)

COMM 542. Bargaining and Negotiation Processes (3)
COMM 546. Communication in International Conflict and Disputes (3) WRP 521. Water Conflict Management and Transformation (3)

## Capstone Practicum/Internship (3 <br> credits required)

WRP 509. Practicum (3)
WRP 510. Internship (3)

## Water Governance (3 credits required)

AEC 532. Environmental Law (4)
COMM 540. Theories of Conflict and Conflict Management (3)
FOR 562. Natural Resource Policy and Law (3)
FOR 563. Environmental Policy and Law Interactions (3)
GEOG 540. Water Resources Management
in the United States (3)
GEOG 541. International Water Resources Management (3)
PS 575. Environmental Politics and Policy (4)
PS 577. International Environmental
Politics and Policy (4)
WRP 599. Special Topics [Oregon Water Law

## and Policy] (3)

## Water and Society ( 3 credits <br> required)

ANTH 581. Natural Resources and
Community Values (4)
ENVE 531. Fate and Transport of Chemicals
in Environmental Systems (4)
ENVE 532/OC 532. Aquatic Chemistry:
Natural and Engineered Systems (4)
ENVE 554. Groundwater Remediation (4)
ENVE 556. Sustainable Water Resources
Development (3)
FES/FW/SOC 585. Consensus and Natural Resources (3)
GEOG 530. Resilience-Based Natural
Resource Management (3)
H 512. Introduction to Environmental \&
Occupational Health Sciences (3)
H 514. Environment, Safety and Health Seminar (1)
H 527. Critical Assessment of International
Health Programs (3)
H 528. Global Health Issues (3)
H 529. International Health (3)
H 540. Water and Human Health (3)
H 541. Air Quality and Human Health (3)
PHL 540. Environmental Ethics (3)
PHL/REL 543. World Views and
Environmental Values (3)
PS 577. International Environmental Politics and Policy (4)
SNR 520. Social Aspects of Sustainable Natural Resources (3)
SOC 580. Environmental Sociology (4)
SOC 581. Society and Natural Resources (4)
WRP 524. Sociotechnological Aspects of Water Resources (3)

## Water and Ecosystems (3 credits

## required)

BEE 512. Physical Hydrology (3)
BEE 558. Nonpoint Source Pollution
Assessment and Control (3)
FE 530. Watershed Processes (4)
FE 532. Forest Hydrology (4)
FW 526. Coastal Ecology and Resource
Management (5)
FW 579. Wetlands and Riparian Ecology (3)
GEOG 523. Snow Hydrology (3)
MNR 511. Introduction to Sustainable
Natural Resources (3)
SNR 530. Ecological Principles of
Sustainable Natural Resources (3)
SNR 540. Global Environment Change (3)
WRS 532. Applied Field Problems (3)
WRS 536. Fundamentals of Hydrology (3)

## Water and Economics (3 credits <br> \section*{required)}

AEC 505. Reading and Conference (3) or AEC 507. Seminar (3)
AEC 534. Environmental and Resource Economics (3)
AEC 550. Environmental and Natural Resource Economics (4)
AEC 551. Applications of Environmental and Natural Resource Economics (4)
SNR 521. Economics of Sustainable Natural Resource Management (3)
WRP 523. Environmental Water
Transactions (3)
WRP 599. Special Topics [The Business of Water] (3)
Total=18

## Minor Code: 1006

## CERTIFICATES

## GEOGRAPHIC INFORMATION

 SCIENCE CERTIFICATEAlso available via Ecampus.
Kuuipo Walsh, Director
GIScience Certificate Program
134 Wilkinson Hall
College of Earth, Ocean, and
Atmospheric Sciences
Oregon State University
Corvallis, OR 97331
541-737-3795
FAX 541-737-1200
Email: kuuipo.walsh@oregonstate.edu Website: http://ceoas.oregonstate.edu/ giscience
Oregon State University offers an undergraduate and graduate certificate in Geographic Information Science. Geographic Information Science ("GIScience") is a discipline that combines theory and principles underlying:

- geospatial data collection (remotely sensed imagery from satellites, aircraft, and drones, social media, telemetry, GPS, etc.);
- technologies to manage, analyze, and visualize geospatial data (geographic information systems);
- computational, statistical, and mathematical methods to analyze and model geospatial data (machine learning, Big Data, spatial statistics, spatial modeling, geovisual analytics, etc.);
- digital cartography and geovisualization (the science and practice of creating maps); and
- cognitive, social, and environmental implications of GIScience (professional ethics, privacy, digital divide, etc.).
The OSU GIScience certificate can help lead to certification as a nationally-recognized geographic information systems (GIS) professional (GISP). GIS professionals are in high demand for jobs in government, NGOs, and the private sector, and have rewarding careers in natural resource management, online and interactive mapping, business, planning, and many others.


## Required Core (19-20 credits)

FE 208. Forest Surveying (4)
GEOG 201. *Foundations of Geospatial
Science and GIS (4)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
or FE 257. GIS and Forest Engineering Applications (3)
or CE 202. Civil Engineering: Geospatial Information and GIS (3)
GEOG 370. Geovisualization I: Cartography (4)

GEOG 480. Remote Sensing I: Principles and Applications (4) EC

## Electives (7-8)

CE 413. GIS in Water Resources (3)
CROP/HORT 414. Precision Agriculture (4)
ECE 468. Digital Image Processing (3)
ENSC 410. Internship (1 or more)
or FOR 410. Internship (1 or more)
or GEO 410. Internship (1 or more)
or GEOG 410. Internship (1 or more)
FE 209. Forest Photogrammetry and Remote Sensing (4)
FE 310. Forest Route Surveying (4)
FE 423. Unmanned Aircraft System Remote Sensing (3)
FW 303. Survey of Geographic Information
Systems in Natural Resource (3)
GEO 401. Research (1-4)
or GEOG 401. Research (1-4)
GEO 403. Thesis (1-4)
or GEOG 403. Thesis (1-4)
GEOG 361. GIScience II: Analysis and Applications (4) EC
GEOG 371. Geovisualization: Web Mapping (4)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 462. GIScience III: Programming For Geospatial Analysis (4)
GEOG 463. GIScience IV: Spatial Modeling (4)

GEOG 464. Geospatial Perspectives on
Intelligence, Security, and Ethics (3)
GEOG 472. Geovisualization: Geovisual Analytics (3)
GEOG 481. Remote Sensing II: Digital
Image Processing (4) EC
RNG 430. Applied GIS in Rangeland Science (4)

SOIL 468. Soil Landscape Analysis (4)

## Footnotes:

* Baccalaureate Core Course (BCC)

EC signifies the course can also be completed through Ecampus - Distance Education

## Major Code: C540

GEOGRAPHIC INFORMATION SCIENCE GRADUATE CERTIFICATE
Kuuipo Walsh, Director
GIScience Certificate Program
134 Wilkinson Hall
College of Earth, Ocean, and
Atmospheric Sciences
Oregon State University
Corvallis, OR 97331
541-737-3795
FAX 541-737-1200
Email: kuuipo.walsh@oregonstate.edu
Website: http://ceoas.oregonstate.edu/ giscience/

## Also available via Ecampus.

Oregon State University offers an undergraduate and graduate certificate in Geographic Information Science. Geographic Information Science (GIScience) is a discipline that combines theory and principles underlying:

- geospatial data collection (remotely sensed imagery from satellites, aircraft, and drones, social media, telemetry, GPS, etc.);
- technologies to manage, analyze, and
visualize geospatial data (geographic information systems);
- computational, statistical, and mathematical methods to analyze and model geospatial data (machine learning, Big Data, spatial statistics, spatial modeling, geovisual analytics, etc.);
- digital cartography and geovisualization (the science and practice of creating maps); and
- cognitive, social and environmental implications of GIScience (professional ethics, privacy, digital divide, etc.).
The OSU GIScience certificate can help lead to certification as a nationally-recognized geographic information systems (GIS) professional (GISP). GIS professionals are in high demand for jobs in government, NGOs, and the private sector, and have rewarding careers in natural resource management, online and interactive mapping, business, planning, and many others.

Students must have completed the following background course or have equivalent experience: introductory cartography (GEOG 370). This course can either be completed prior to starting the certificate program or pursued in tandem with the other courses in the certificate.

## Background Course

GEOG 370. Geovisualization: Cartography (4) EC

## Required Core ( 8 credits)

GEOG 560. GIScience I: Introduction to
Geographic Information Science (4) EC GEOG 580. Remote Sensing I: Principles and Applications (4) EC

## Electives (11 credits)

CE 513. GIS in Water Resources (3)
CE 562. Digital Terrain Modeling (4)
CE 566. 3D Laser Scanning and Imaging (4)
CS 553. Scientific Visualization (4)
CS 554. Geometric Modeling in Computer Graphics (4)
FE 523. Unmanned Aircraft System Remote Sensing (3)
FOR 510. Internship (1 or more credits, advisor approval)
or GEOG 510. Internship (1 or more
credits, advisor approval) $\mathbf{E C}$
GEOG 551. Planning Principles and
Practices for Resilient Communities (4)
GEOG 561. GIScience II: Analysis and Applications (4) EC
GEOG 562. GIScience III: Programming for Geospatial Analysis (4) EC
GEOG 563. GIScience IV: Spatial Modeling (4)

GEOG 564. Geospatial Perspectives on
Intelligence, Security, \& Ethics (3) EC
GEOG 565. Spatio-Temporal Variation in
Ecology and Earth Science (4)
GEOG 566. Advanced Spatial Statistics and GIScience (4)
GEOG 571. Geovisualization: Web Mapping (4)

GEOG 572. Geovisualization: Geovisual Analytics (3)

GEOG 581. Remote Sensing II: Digital
Image Processing (4)
H 547. GIS and Public Health (3)
H 592. Spatial Epidemiology (3)
OC 678. Ocean Remote Sensing (4)
SOIL 568. Soil Landscape Analysis (4)
ST 565. Time Series (3)
ST 567. Spatial Statistics (3)
The following courses may count towards elective credits after consulting with and receiving approval from the program director:
CE 501. Research (3-4)
CE 560. Selected Topics in Geomatics Engineering (3-4)
CS 519. Topics in Computer Science (3-4)
CS 549. Selected Topics in Information-
Based Systems (3-4)
GEO 501. Research (3-4)
GEOG 501. Research (3-4)
GEOG 599. Special Studies (3-4)
GEOG 699. Special Studies (3-4)
Footnote:
EC= Delivered via Ecampus
Major Code: CG03
WATER CONFLICT
MANAGEMENT AND TRANSFORMATION GRADUATE CERTIFICATE
Lynette de Silva, Director
Program in Water Conflict Management and Transformation
Oregon State University
College of Earth, Ocean, and
Atmospheric Sciences
256 Wilkinson Hall
Corvallis, OR 97331
Phone: 541-737-7013
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Email: desilval@geo.oregonstate.edu Web: http://www.transboundarywaters. orst.edu/

## Also available via Ecampus.

The graduate certificate in Water Conflict Management and Transformation is an 18 -credit interdisciplinary program. It is designed to provide graduate students, non-degree students, water professionals and decision-makers with the required specialized resources and skills to address the water demands and challenges of the 21st Century, in Oregon, across the United States and internationally.

The curriculum centers around casebased, interactive course and field work to provide an in-depth look at water conflict, conflict transformation, and prevention issues and strategies across four distinct and overlapping themes:

- Water Governance
- Water and Ecosystems
- Water and Society
- Water and Economics

Each theme incorporates several topics critical to understanding water conflicts.

The curriculum for the graduate certificate in Water Conflict Management and Transformation is as follows:

## Capstone Course Work (3 credits required)

COMM 542. Bargaining and Negotiation Processes (3)
COMM 546. Communication in
International Conflict and Disputes (3)
WRP 521. Water Conflict Management and Transformation (3)

## Capstone Practicum/Internship (3

credits required)
WRP 509. Practicum (3)
WRP 510. Internship (3)

## Water Governance ( 3 credits

 required)AEC 532. Environmental Law (4)
COMM 540. Theories of Conflict and
Conflict Management (3)
FOR 562. Natural Resource Policy and Law (3)
FOR 563. Environmental Policy and Law Interactions (3)
GEOG 540. Water Resources Management in the United States (3)
GEOG 541. International Water Resources Management (3)
PS 575. Environmental Politics and Policy (4)
PS 577. International Environmental Politics and Policy (4)
WRP 599. Special Topics: Oregon Water Law and Policy (3)

## Water and Society ( 3 credits

required)
ANTH 581. Natural Resources and Community Values (4)
ENVE 531. Fate and Transport of Chemicals in Environmental Systems (4)
ENVE 532/OC 532. Aquatic Chemistry:
Natural and Engineered Systems (4)
ENVE 554. Groundwater Remediation (4)
ENVE 556. Sustainable Water Resources Development (3)
FES/FW/SOC 585. Consensus and Natural Resources (3)
GEOG 530. Resilience-Based Natural Resource Management (3)
H 512. Introduction to Environmental \& Occupational Health Sciences (3)
H 514. Environment, Safety and Health Seminar (1)
H 527. Critical Assessment of International Health Programs (3)
H 528. Global Health Issues (3)
H 529. International Health (3)
H 540. Water and Human Health (3)
H 541. Air Quality and Human Health (3)
PHL 540. Environmental Ethics (3)
PHL/REL 543. World Views and
Environmental Values (3)
PS 577. International Environmental Politics and Policy (4)
SNR 520. Social Aspects of Sustainable Natural Resources (3)
SOC 580. Environmental Sociology (4)
SOC 581. Society and Natural Resources (4)
WRP 524. Sociotechnological Aspects of Water Resources (3)

## Water and Ecosystems (3 credits <br> \section*{required)}

BEE 512. Physical Hydrology (3)
BEE 558. Nonpoint Source Pollution
Assessment and Control (3)
FE 530. Watershed Processes (4)
FE 532. Forest Hydrology (4)

FW 526. Coastal Ecology and Resource Management (5)
FW 579. Wetlands and Riparian Ecology (3)
GEOG 523. Snow Hydrology (3)
MNR 511. Introduction to Sustainable
Natural Resources (3)
SNR 530. Ecological Principles of
Sustainable Natural Resources (3)
SNR 540. Global Environment Change (3)
WRS 532. Applied Field Problems (3)
WRS 536. Fundamentals of Hydrology (3)
Water and Economics ( 3 credits required)
AEC 505. Reading and Conference (3) or AEC 507. Seminar (3)
AEC 534. Environmental and Resource Economics (3)
AEC 550. Environmental and Natural Resource Economics (4)
AEC 551. Applications of Environmental and Natural Resource Economics (4)
SNR 521. Economics of Sustainable Natural Resource Management (3)
WRP 523. Environmental Water
Transactions (3)
WRP 599. Special Topics: The Business of Water (3)

## Total=18

Advisor guidance and approval is required for each student's certificate program of study. All students seeking a graduate certificate are subject to all general policies governing the courses for the master's degree. As such, these students will be required to take a minimum of $50 \%$ graduate stand-alone courses. The remaining credits may be the 500 component of 400/500 slash courses.
Non-degree students, and those requiring additional information and advising should contact Lynette de Silva at desilval@geo.oregonstate.edu.

## Major Code: CG06

## MARINE RESOURCE <br> MANAGEMENT GRADUATE <br> CERTIFICATE

The management of our marine resources encompasses both biophysical and human dimensions. Marine management professionals need to understand these dimensions, utilizing both physical and social sciences to tackle challenging issues, and effectively communicate best management practices to scientists, decision makers, and stakeholders.
The Marine Resource Management graduate certificate offers a blend of sci-ence- and management-oriented courses that prepare participants (professionals, decision-makers, and graduate students) to become leaders in marine resource management.

## Certificate Overview and Requirements:

- Completion of core courses in marine policy and law,
- Two courses from the human dimensions area, and
- Two courses from the ocean and coastal science area.


## Course Examples:

- Ocean Law
- Rights-Based Fisheries Management
- Ecological Policy
- Physical Oceanography
- Marine Pollution

Current graduate students must notify the Marine Resource Management program of their intention to pursue this certificate. Upon consultation with MRM faculty, they will be given instructions regarding listing courses on their programs of study and obtaining the required signature for that form.

Professionals and other stu-
dents must notify the Marine Resources Management program of their intention to pursue this certificate.

Contact Robert Allan, 541-737-1340, rallan@coas.oregonstate.edu, for more information.

## Required Courses

MRM 520. Coastal Law (3)
or MRM 521. Ocean Law (3)
MRM 530. Principles and Practice of Marine Resource Management (3)

## Human Dimensions Subject Area <br> Select 2 courses for at least 6 credits

 from below:AEC 534. Environmental and Resource Economics (3)
ANTH 581. Natural Resources and Community Values (4)
COMM 540. Theories of Conflict and Conflict Management (3)
COMM 542. Bargaining and Negotiation
Processes (3)
COMM 544. Third Parties in Dispute
Resolution: Mediation/Arbitration (3)
FW 520. Ecology and Management of
Marine Fishes (3)
FW/BI 564. Marine Conservation Biology (3)
FW 620. Ecological Policy (3)
MRM 535. Rights-Based Fisheries
Management (3)
PS 575. Environmental Politics and Policy (4)
PS 577. International Environmental
Politics and Policy (4)
SOC 580. Environmental Sociology (4)
SOC 581. Society and Natural Resources (4)
Ocean and Atmospheric Systems

## Science Subject Area

Select 2 courses for at least 6 credits from below:
ATS 520. Principles of Climate: Physics of Climate and Climate Change (4)
FW 531. Dynamics of Marine Biological Resources (4)
OC 533. Coastal and Estuarine
Oceanography (3)
OEAS 520. The Solid Earth (4)
OEAS 530. The Fluid Earth (4)
OEAS 540. The Biogeochemical Earth (4)

## Total=18 credits

Other courses may be substituted upon approval of the certificate director.

Note: The Marine Resource Management graduate certificate is not eligible for federal financial aid if it is not part of a master's degree-seeking program.

The certificate is not eligible if taken as a stand-alone program. The MRM graduate certificate is eligible for federal financial aid if it is part of a master's degree-seeking program.

## Major Code: CG07 <br> ATMOSPHERIC SCIENCES COURSES

ATS 201. *CLIMATE SCIENCE (4). Physical laws governing the Earth's climate and their interactions with chemical and biological processes on land and in the atmosphere, oceans, and cryosphere. Past, present, and potential future climate changes due to natural and human causes are assessed using a variety of observations, models, and laboratory exercises. (Bacc Core Course)
ATS 210. INTRODUCTION TO THE ATMOSPHERIC SCIENCES (3). Physical basis of atmospheric phenomena on small, medium and large scales; introduction to atmospheric dynamics and thermodynamics; examination of atmospheric circulation systems; introduction to atmospheric physics and chemistry. Offered every term. PREREQS: College algebra and elementary functions.
ATS 295. OBSERVING CLIMATE (3). One-week course taught during Spring Break at field sites near Corvallis, with ten hours of preparatory meetings on campus. Make and analyze observations of properties of the atmosphere, ocean, biosphere, and cryosphere that reflect processes relevant to regional and global climate. Serves as an introduction to upper-division course work in climate science. Field trip(s) required; transportation fee charged. Lec/lab. PREREQS: ATS 201 [C-] or ATS 320 [C-]
ATS 301. CLIMATE DATA ANALYSIS (4).
Quantitative methods to characterize the physical climate system and detect change. Interpret data based on source timescale, and statistics; communicate conclusions and uncertainties regarding past climate and future changes. PREREQS: ATS 201 [C-] and ST 351 [C-]
ATS 310. METEOROLOGY (4). The study of the atmosphere, in particular atmospheric phenomena that we experience as weather. In this class key physical concepts in meteorology are introduced and explored. The physics of the atmosphere necessary to understand why atmospheric phenomena occur and how these are forecast is discussed. Meteorological data from observations and models will be analyzed to explore concepts introduced in the context of the weather we experience. PREREQS: (MTH 251 [C-] or MTH 251 H [C-]) and (MTH $252^{*}$ [C-] or MTH $252 \mathrm{H}^{*}$ [C-] ) and (PH 201 [D-] or PH 201H [D-] or PH 211 [D-] or PH 211H [D-]) and (PH 202* [D-] or PH 202H* [D-] or PH 212* [D-] or PH 212H* [D-] )
ATS 320. *THE CHANGING CLIMATE (3). Survey of Earth's climate and the factors that influence climate. Examine causes of changes in atmospheric composition, the expected consequences of these changes, problems predicting future changes, and what can be done about the changes. Offered annually in fall. (Bacc Core Course)
ATS 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 12 credits.
ATS 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 12 credits. PREREQS: Honors College approval required.
ATS 401. RESEARCH (1-16). This course is repeatable for a maximum of 24 credits.
ATS 403. THESIS (1-16). This course is repeatable for a maximum of 24 credits.
ATS 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

ATS 406. PROJECTS (1-16). This course is repeatable for a maximum of 24 credits.
ATS 407. SEMINAR (1). One-credit sections. Graded P/N. This course is repeatable for a maximum of 12 credits.
ATS 410. INTERNSHIP (1-12). Pre-career professional experience under joint faculty and employer supervision. Graded P/N. This course is repeatable for a maximum of 48 credits. PREREQS: 12 credits of upper-division college courses and approval required.
ATS 411. THERMODYNAMICS AND CLOUD
MICROPHYSICS (4). Thermodynamic processes in the atmosphere, and an introduction to cloud microphysics. Offered annually. PREREQS: ((MTH 254 [D-] or MTH 254H [D-] ) and PH 213 [D-] )
ATS 412. ATMOSPHERIC RADIATION (3).
Radiative transfer in the earth and planetary atmospheres, absorption and scattering of sunlight, absorption and emission of terrestrial radiation, absorption and scattering cross sections for molecules, cloud droplets and aerosols. Applications include enhancement of photochemical reaction rates in clouds, remote sensing, and the earth's radiation budget, radiative-convective equilibrium, radiative forcing due to changes in atmospheric composition and climate change. PREREQS: ((MTH 254 [D-] or MTH 254H [D-] ) and (MTH 256 [D-] or MTH 256H [D-] ) and PH 213 [D-] )
ATS 413. ATMOSPHERIC CHEMISTRY (3).
Principles of atmospheric chemistry; chemical
fundamentals, sampling principles, sources, reactions, scavenging, and deposition of sulfur, nitrogen, ozone, and carbon compounds. Atmospheric aerosol size distribution, mechanics, optics, and scavenging. Offered annually.
PREREQS: (CH 121 or CH 201 or CH 221 or CH 231 or CH 231 H or CH 224 ) and (MTH 251 or MTH 241)
ATS 420. PRINCIPLES OF CLIMATE: PHYSICS OF CLIMATE AND CLIMATE CHANGE (4). Physics of climate past, present and future. Covers radiative processes, thermodynamics, and dynamics, as well as the paleoclimate record and mechanisms driving this variability. Current modes of climate variability (e.g., ENSO) will also be surveyed. Climate models, ranging from 0 - to 3-dimensional, will be examined and projections for the future assessed. PREREQS: MTH 252 and (PH 202 or PH 202H or PH 212 or PH 212H)
ATS 421. CLIMATE MODELING (4). Numerical models of the physics, chemistry, biology, and geology of the climate system. A range of climate models from a simple, single equation to complex state-of-the-science systems used for future projections. Theoretical concepts will be linked to practical applications through hands-on programming exercises and data analysis. Lec/lab. PREREQS: ATS 420/ATS 520 (recommended, talk to instructor if not taken); no prior programming knowledge required.
ATS 475. PLANETARY ATMOSPHERES (3). Origin and evolution of planetary atmospheres; vertical structure of atmospheres; hazes and clouds; atmospheric motions and general circulation. Presentation of recent observations and current research issues, focusing on Venus, Earth, Mars, Jupiter, Saturn, and Titan. Emphasis on comparative aspects and simple models. PREREQS: ((MTH 254 [D-] or MTH 254H [D-] ) and PH 213 [D-] )
ATS 499. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ATS 501. RESEARCH (1-16). This course is repeatable for a maximum of 24 credits.
ATS 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
ATS 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

ATS 506. PROJECTS (1-16). This course is repeatable for a maximum of 72 credits.

ATS 507. SEMINAR (1). One-credit sections. Graded P/N. This course is repeatable for a maximum of 48 credits.

## ATS 511. THERMODYNAMICS AND CLOUD

MICROPHYSICS (4). Thermodynamic processes in the atmosphere, and an introduction to cloud microphysics. Offered annually. PREREQS: MTH 254 and PH 213

## ATS 512. ATMOSPHERIC RADIATION (3).

Radiative transfer in the earth and planetary atmospheres, absorption and scattering of sunlight, radiation, absorption and emission of terrestrial absorption and scattering cross sections for molecules, cloud droplets and aerosols. Applications include enhancement of photochemical reaction rates in clouds, remote sensing, and the earthיs radiation budget, radiative-convective equilibrium, radiative forcing due to changes in atmospheric composition and climate change. PREREQS: MTH 254 and MTH 256 and PH 213

ATS 513. ATMOSPHERIC CHEMISTRY (3). Principles of atmospheric chemistry; chemical fundamentals, sampling principles, sources, reactions, scavenging, and deposition of sulfur, nitrogen, ozone, and carbon compounds. Atmospheric aerosol size distribution, mechanics, optics, and scavenging. Offered annually. PREREQS: (CH 121 or CH 201 or CH 221 or CH 231 or CH 231 H or CH 224) and (MTH 251 or MTH 241)
ATS 515. ATMOSPHERIC DYNAMICS I (4).
Derivation of equations governing atmospheric motions; shallow atmosphere approximation and the primitive equations. Simple balanced flows; vertical motion, circulation, vorticity and potential vorticity; Ekman layer dynamics; prototypical atmospheric waves; geostrophic adjustment; quasi-geostrophic motions; analysis of structure of synoptic-scale systems; baroclinic instability. Offered alternate years. PREREQS: MTH 256 and PH 213
ATS 516. ATMOSPHERIC DYNAMICS II (4).
Review of basic equations; scale analysis and approximations. Turbulence and boundary layers. Dry and moist convection; convective storms. Frontogenesis; symmetric instability; internal gravity waves and mountain waves; differentially heated circulations including sea breezes. Slope flows and urban circulations. Offered alternate years. PREREQS: ATS 515 [C] and /or equivalent.

## ATS 520. PRINCIPLES OF CLIMATE: PHYSICS

 OF CLIMATE AND CLIMATE CHANGE (4). Physics of climate past, present and future. Covers radiative processes, thermodynamics, and dynamics, as well as the paleoclimate record and mechanisms driving this variability. Current models of climate variability (e.g., ENSO) will also be surveyed. Climate models, ranging from 0 - to 3-dimensional, will be examined and projections for the future assessed. PREREQS: MTH 252 and (PH 202 or PH 202H or PH 212 or PH 212H)ATS 521. CLIMATE MODELING (4). Numerical models of the physics, chemistry, biology, and geology of the climate system. A range of climate models from a simple, single equation to complex state-of-the-science systems used for future projections. Theoretical concepts will be linked to practical applications through hands-on programming exercises and data analysis. Lec/lab. PREREQS: ATS 420/ATS 520 (recommended, talk to instructor if not taken); no prior programming knowledge required.

## ATS 546. EXPERIMENTAL ENERGY AND

GAS EXCHANGE (4). Experimental methods to quantify the atmospheric carbon dioxide, water, methane, heat, momentum, and radiative exchange at the vegetation-land-ocean-air interface. Techniques include bulk and gradient approaches, and eddy covariance. The central activity consists of student teams designing
and conducting a field experiment, analyzing and interpreting observations, and presenting results. Lec/lab/discussion/activity. PREREQS: (ATS 516 or ATS 564 or FS 564 or ATS 516) or equivalent. Talk to instructor when no theoretical and conceptional background exists; basic programming skills in Matlab or IDL desirable.

ATS 564. INTERACTIONS OF VEGETATION AND ATMOSPHERE (3). Quantitative treatment of radiation, heat, mass, and momentum exchange between vegetation and atmosphere; forest, natural and agricultural ecosystem examples. Physical and biological controls of carbon dioxide and water vapor exchange; remote sensing of canopy processes; models of stand-scale evaporation, photosynthesis and respiration; landscape and regional scale exchanges; vegetation and planetary boundary layer coupling; vegetation in global climate models. PREREQS: MTH 251 and PH 201

ATS 575. PLANETARY ATMOSPHERES (3). Origin and evolution of planetary atmospheres; vertical structure of atmospheres; hazes and clouds; atmospheric motions and general circulation. Presentation of recent observations and current research issues, focusing on Venus, Earth, Mars, Jupiter, Saturn, and Titan. Emphasis on comparative aspects and simple models. PREREQS: MTH 254 and PH 213
ATS 590. SPECIAL TOPICS (1-4). Maximum of 12 credits may be used in a graduate program. This course is repeatable for a maximum of 24 credits.

ATS 601. RESEARCH (1-16). This course is repeatable for a maximum of 36 credits.

ATS 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

ATS 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
ATS 606. PROJECTS (1-16). This course is repeatable for a maximum of 84 credits.
ATS 607. SEMINAR (1). One-credit sections. Graded P/N. This course is repeatable for a maximum of 48 credits.
ATS 615. LARGE-SCALE INTERACTIONS OF THE OCEAN AND ATMOSPHERE (3). Oceanatmosphere circulations in the time-mean and seasonal cycles, equatorial wave modes, El NinoSouthern Oscillation, Madden-Julian oscillation, teleconnections and atmospheric bridges, midlatitude air-sea interactions, Pacific and Atlantic decadal variability, the North Atlantic oscillation/ Arctic oscillation. PREREQS: (ATS 515 [C] or OC 670 [C] ) and /or instructor approval.
ATS 630. CLIMATE DYNAMICS (3). Physical basis of climate and climatic change; radiation budget, surface energy budget, atmosphere and ocean circulation; energy balance models and their application to problems in climate change. Offered alternate years. PREREQS: MTH 254 and PH 213
ATS 655. MESOSCALE NUMERICAL
MODELING (3). Review and classification of governing equations, finite difference approaches, Galerkin methods, truncation error and accuracy of solutions. Analysis of numerical stability, boundary conditions, and gridding methods focusing on issues relevant to mesoscale modeling such as nesting and terrain-following coordinate systems. Discussion of elliptical systems and methods for pressure solution. Study of current models with emphasis on turbulence parameterization, microphysics and initialization. Development of simple models and application of existing model systems. PREREQS: ((ATS 515 [C] and ATS 516 [C] ) or OC 671 [C] ) and /or instructor approval.
ATS 690. SELECTED TOPICS (1-16). Maximum of 12 credits may be used in a graduate program. This course is repeatable for a maximum of 12 credits.

## ■ ENVIRONMENTAL SCIENCES COURSES

ENSC 101. ENVIRONMENTAL SCIENCES ORIENTATION (1). Introduction to the Environmental Sciences Program and related professional and educational opportunities. Recommended for all freshman and first-year transfer environmental sciences majors, but open to all students interested in learning about career options in the environmental sciences. Graded P/N.
ENSC 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

ENSC 401. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 24 credits. PREREQS: Instructor and departmental approval required.
ENSC 402. INDEPENDENT STUDIES (1-16). This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.
ENSC 403. THESIS (1-16). This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.
ENSC 405. READING AND CONFERENCE (1-12). This course is repeatable for a maximum of 16 credits. PREREQS: Instructor and departmental approval required.
ENSC 406. PROJECTS (1-16). This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.
ENSC 407. SEMINAR (1-16). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.
ENSC 407H. SEMINAR (1-16). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required. Honors College approval required.
ENSC 408. WORKSHOP (1-16). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.
ENSC 410. ENVIRONMENTAL SCIENCE
INTERNSHIP (1-12). Supervised practical experience working with professionals at selected cooperating institutions, agencies, laboratories, or companies. Graded P/N. This course is repeatable for a maximum of 48 credits. PREREQS: Instructor and departmental approval required.
ENSC 479. *^ENVIRONMENTAL CASE STUDIES (3). Improves students' ability to ask questions, gather and synthesize information, and communicate ideas on environmental topics. Instruction and information necessary for the course is entirely Web based. (Bacc Core Course) (Writing Intensive Course) PREREQS: One year of college biology or chemistry and junior standing required.

ENSC 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

ENSC 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENSC 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
ENSC 505. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ENSC 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENSC 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENSC 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

ENSC 510. INTERNSHIP (1-12). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.

ENSC 515. ENVIRONMENTAL PERSPECTIVES AND METHODS (3). Unique perspective or method each quarter. Possibilities include: remote sensing, modeling over a range of scales in time, space, and levels of system organization; and risk analysis.

ENSC 520. ENVIRONMENTAL ANALYSIS (3).
Develop analytical thinking, explore analytical approaches, enhance writing skills, and gain experience in oral communication about environmental issues.
ENSC 530. RESEARCH PROFILES (1-2). Faculty and graduate student environmental research presentations.

ENSC 599. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ENSC 601. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENSC 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
ENSC 605. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ENSC 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
ENSC 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENSC 630. RESEARCH PROFILES (1-2). Faculty and graduate student environmental research presentations.
ENSC 699. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## GEOSCIENCES COURSES

GEO 100. *NATURAL DISASTERS:
HOLLYWOOD VERSUS REALITY (4).
Introduction to natural hazards, as seen through the lens of popular media. Course will explore the causes and consequences of natural disasters via in-class exercises and activities designed to develop students, skills in scientific analysis and problem solving. (Bacc Core Course)
GEO 101. *THE SOLID EARTH (4). Solid earth processes and materials. Earthquakes, volcanoes, earth structure, rocks, minerals, ores. Solid earth hazard prediction and planning. Geologic time. Lec/lab. (Bacc Core Course)
GEO 199. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.
GEO 201. *PHYSICAL GEOLOGY (4). Study of earth's interior. Tectonic processes and their influence on mountains, volcanoes, earthquakes, minerals, and rocks. Field trip(s) required; transportation fee charged. Lec/lab. (Bacc Core Course)
GEO 202. *EARTH SYSTEMS SCIENCE (4).
Surficial processes (glaciers, rivers), climate, soils, vegetation, and their interrelationships. Field trip(s) required; transportation fee charged. Lec/lab. (Bacc Core Course)
GEO 203. *EVOLUTION OF PLANET EARTH (4). History of earth and life as interpreted from fossils and the rock record. Field trip(s) required; transportation fee charged. Lec/lab. (Bacc Core Course)
GEO 221. *ENVIRONMENTAL GEOLOGY (4). Introductory geology emphasizing geologic hazards (volcanoes, earthquakes, landslides, flooding), geologic resources (water, soil, air,
mineral, energy), and associated environmental problems and mitigation strategies. Lec/lab. (Bacc Core Course)
GEO 295. INTRODUCTION TO FIELD GEOLOGY
(3). Two-week course taught in the fall program in various locations throughout the west. Collect field data to make geological maps, cross-sections, columns, and reports. Serves as an introduction to upper-level course work for Geology degree. Lec/ lab. PREREQS: GEO 201 [C-]
GEO 305. *LIVING WITH ACTIVE CASCADE
VOLCANOES (3). The impact of volcanic activity on people, infrastructure, and natural resources; how and why volcanic activity in the Cascade Range occurs; volcano monitoring and hazard assessment. Field trip required, transportation fee charged. (Bacc Core Course)
GEO 306. *MINERALS, ENERGY, WATER, AND THE ENVIRONMENT (3). Geologic occurrences, environmental consequences, and future of non-renewable earth resources, including metals, materials, oil, soil, and groundwater. (Bacc Core Course)
GEO 307. *NATIONAL PARK GEOLOGY
AND PRESERVATION (3). National parks as classrooms to study geological processes and the importance of preserving natural landscapes. Field trip(s) required; transportation fee charged. (Bacc Core Course)

GEO 307H. *NATIONAL PARK GEOLOGY AND PRESERVATION (3). National parks as classrooms to study geological processes and the importance of preserving natural landscapes. Field trip(s) required; transportation fee charged. (Bacc Core Course) PREREQS: Honors College approval required.

GEO 308. *GLOBAL CHANGE AND EARTH SCIENCES (3). Study of global change over different time scales during the history of the earth, with emphasis on evolution of its atmosphere, plate tectonics, paleoclimates, and mass extinctions. (Bacc Core Course)
GEO 309. *ENVIRONMENTAL JUSTICE (3).
Technical and social issues surrounding the unequal exposure to environmental hazards based on race and the environmental justice movement that has grown to address charges of such environmental racism. (Bacc Core Course) PREREQS: (WR 121 [C-] or WR 121H [C-] ) and sophomore standing
GEO 310. EARTH MATERIALS I: MINERALOGY
(4). Principles of crystal morphology, and structure. Characteristics, identification, and origins of minerals. Lec/lab. PREREQS: (GEO 201 [D-] or GEO 221 [D-] ) and ((CH 121 [D-] or (CH 231 [D-] and CH 261 [D-] ) or (CH 231H [D-] and CH 261H [D-] )))
GEO 315. EARTH MATERIALS II: PETROLOGY
(4). Origin, identification and classification of igneous, sedimentary, and metamorphic rocks Field trip(s) required, transportation fee charged. Lec/lab. PREREQS: GEO 310 [D-]
GEO 322. SURFACE PROCESSES (4).
Examination of surficial processes and terrestrial landforms of the earth, including slopes, rivers, glaciers, deserts, and coastlines. Field trip(s) required; transportation fee charged. Lec/lab. PREREQS: (GEO 102 [D-] or GEO 102H [D-] or GEO 202 [D-] ) and (MTH 251 [C-] or MTH 251H [C-] ) and (PH 201 [D-] or PH 201H [D-] or PH 211 [D-] or PH 211 H [D-])
GEO 329. *GEOGRAPHY OF THE UNITED
STATES AND CANADA (3). Cultural, economic, political, and settlement geography. Emphasis on regional patterns and problems. Analysis of recent and projected changes. (Bacc Core Course)

GEO 340. STRUCTURAL GEOLOGY (4).
Analysis of geometry and kinematics of geologic structures including brittle and ductile faults, folds, joints, deformation fabrics. Field trip(s) required; transportation fee charged. Lec/lab. PREREQS: GEO 201 [D-]

GEO 352. *OREGON: GEOLOGY, PLACE, AND LIFE ON THE RING OF FIRE (4). Provides an overview of the geology of Oregon in the context of the Pacific Northwest including tectonic setting, geologic features and landscapes, as well as topics and concepts of interest to society in general. Lessons will include discussion of the relationship between people and the landscape, incorporating the concept of ethnographic landscapes--geologic structures, natural resources and geologic hazards that are part of the identity of a place. Emphasizes written and graphic communication skills. Field trip required, transportation fee charged. Lec/lab. (Bacc core course) PREREQS: Introductory science course recommended.
GEO 352H. *OREGON: GEOLOGY, PLACE, AND LIFE ON THE RING OF FIRE (4). Provides an overview of the geology of Oregon in the context of the Pacific Northwest including tectonic setting, geologic features and landscapes, as well as topics and concepts of interest to society in general. Lessons will include discussion of the relationship between people and the landscape, incorporating the concept of ethnographic andscapes--geologic structures, natural resources and geologic hazards that are part of the identity of a place. Emphasizes written and graphic communication skills. Field trip required, transportation fee charged. Lec/lab. (Bacc core course) PREREQS: Introductory science course recommended.

## GEO 370. STRATIGRAPHY AND

SEDIMENTOLOGY (4). Basic principles of sedimentology and stratigraphy. Sedimentology is largely concerned with classifying and interpreting the origin of sedimentary rocks. Stratigraphy provides formal rules and strategies for organizing sedimentary (and other) rocks into a temporal framework. Reconstruction of Earth history with various approaches centered on paleoclimatology, paleogeography, paleooceanography, and tectonics. Lec/lab. PREREQS: GEO 201 [D-]
GEO 380. *EARTHQUAKES IN THE PACIFIC NORTHWEST (3). Earthquake hazards in the Northwest; responses to reducing earthquake risk at state, local, and personal levels. (Bacc Core Course)
GEO 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
GEO 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
GEO 400. FIELD TRIPS (1-16). Participation in group field trips that are not a part of any other course. Transportation fee is charged. Students may prepare guides for trips. Faculty sponsor must be prearranged. Graded P/N. This course is repeatable for a maximum of 48 credits. PREREQS: Departmental approval required.
GEO 401. RESEARCH (1-16). Independent, original research subjects guided by faculty conferences and resulting in a brief written report. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.
GEO 403. THESIS (1-16). Independent, original study that culminates in a senior thesis. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.
GEO 405. READING AND CONFERENCE (116). Independent reading in specialized topics guided by and discussed in faculty conferences. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GEO 407. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required. GEO 408. WORKSHOP (1-16). This course is repeatable for a maximum of 12 credits.

PREREQS: Departmental approval required.
GEO 410. INTERNSHIP (1-15). Pre-career professional experience under joint faculty and employer supervision. Graded P/N. This course is repeatable for a maximum of 48 credits. PREREQS: 12 credits of upper-division geosciences and departmental approval required.
GEO 412. IGNEOUS PETROLOGY (4).
Petrogenesis of igneous rocks. Petrographic analysis using polarizing microscopes. Field trip may be required, transportation fee charged. Lec/ lab. PREREQS: GEO 315 [D-] and GEO 415

## GEO 415. EARTH MATERIALS III:

PETROGRAPHY (4). Microscope-based study of minerals and igneous, sedimentary and metamorphic rocks. Representation and interpretation of geological processes based on microscopic observation. Lec/lab. PREREQS: GEO 201 [D-] and GEO 310 [D-] and GEO 315 [D-]
GEO 427. ^ VOLCANOLOGY (4). A survey of volcanoes: their distribution, forms, composition, eruptive products, eruptive styles, and associated phenomena. Field trip may be required; transportation fee charged. Offered alternate years. Lec/lab. (Writing Intensive Course) PREREQS: GEO 315 [D-]
GEO 430. GEOCHEMISTRY (4). Principles of geochemistry applied to problems of earth science. Field trip(s) may be required; transportation fees charged. Lec/rec. PREREQS: GEO 315* [D-] and ((CH 121 [D-] and CH 122 [D-] ) or ( $(\mathrm{CH} 231$ [D-] or CH 231 H [D-] ) and (CH 261 [D-] or CH 261 H [D-] ) and (CH 232 [D-] or CH 232H [D-] ) and (CH 262 [D-] or CH 262H [D-] )))
GEO 431. ENVIRONMENTAL GEOCHEMISTRY
(3). An introduction to natural processes at and near the earth's surface, as well as an examination of the impact of human activities on the natural environment. Study includes discussion of the sources, transformations, transport, and fate of contaminants. Field trip(s) required; transportation fee charge. PREREQS: (CH 121 [D-] and CH 122 [D-] and CH 123 [D-]) or ( (CH 231 [D-] or CH 231H [D-]) and (CH 232 [D-] or CH 232 H [D-] ) and (CH 233 [D-] or CH 233H [D-] ))
GEO 432. APPLIED GEOMORPHOLOGY
(3). Effect of landform processes upon human activity; consequences of resource management strategies on erosional balance within landscape; identification of mitigation of natural hazards; role of geomorphic process studies in environmental planning. Taught as seminar, themes TBA. Field trip(s) may be required; transportation fee charged. PREREQS: GEO 322
GEO 433. COASTAL GEOMORPHOLOGY (3). Morphodynamic approach to coastal landforms, processes and evolution including the impacts and response of humans to coastal change. PREREQS: ((PH 211 [D-] or PH 211H [D-] ) and (PH 212 [D-] or PH 212H [D-] ) and GEO 322 [D-] ) and MTH 251 and MTH 252 or equivalent.
GEO 440. ECONOMIC GEOLOGY (4). Principles of the origin, distribution, and importance of metallic mineral deposits formed by magmatic, hydrothermal, and sedimentary processes. Lec/ lab. PREREQS: GEO 315 [D-] and GEO 340
GEO 461. GEOLOGY OF EARTHQUAKES (3). Tectonics of the present day as based on surface geology, geodesy, seismicity, and crustal structure; description of active faults and folds; use of neotectonics in evaluation of earthquake hazard. Field trip(s) may be required; transportation fee charged. Offered alternate years. PREREQS: GEO 340 [D-]
GEO 463. ${ }^{\wedge}$ GEOPHYSICS AND TECTONICS
(4). Geophysical observations as constraints on geologic interpretation. Lec/lab. (Writing Intensive Course) PREREQS: MTH 251 and (PH 202 or PH 212) or equivalent.

GEO 481. GLACIAL GEOLOGY (4). Mass balance of glaciers, physics of glacial flow, processes of glacial erosion and deposition, glacial meltwater, glacial isostasy and eustasy, and Quaternary stratigraphy. Field trip(s) may be required; transportation fee charged. Lec/lab. Offered alternate years. PREREQS: GEO 202

GEO 484. INTRODUCTION TO
BIOGEOCHEMISTRY (3). Interdisciplinary course, applying concepts from chemistry, physics, biology and geology to Earth systems including terrestrial, ocean and freshwater environments; water and energy cycles; carbon, nitrogen, phosphorus and sulfur cycles; biogeochemical cycles through Earth history. PREREQS: MTH 111 [D-] and ((CH 121
[D-] and CH 122 [D-] ) or (CH 231 [D-] and CH 261 [D-] and CH 232 [D-] and CH 262 [D-] ))
GEO 486. QUATERNARY PALEOCLIMATOLOGY (3). Introduction to geochronology, climate proxies, climate forcing, and climate modeling applied to paleoclimate problems. Emphasis on Quaternary climate history. PREREQS: (GEO 202 [D-] or GEO 203 [D-] ) and (CH 122 [D-] or CH 222 [D-] or ((CH 232 [D-] or CH 232 H [D-] ) and (CH 262 [D-] or CH 262H [D-] or CH 272 [D-] ))) and PH 201 or PH 211 or equivalent.

GEO 487. HYDROGEOLOGY (4). Movement of water through porous media. Darcy's Law and groundwater flow equation. Development of groundwater resources. Computer models. Lec/ lab. PREREQS: (MTH 252 [D-] or MTH 252H [D-] and GEO 202

GEO 488. QUATERNARY STRATIGRAPHY OF NORTH AMERICA (3). Stratigraphic principles applied to Quaternary deposits. Survey Quaternary dating methods. Proxy records of glaciation and climate change. Quaternary stratigraphy of North America, emphasizing stratigraphic records of ice sheets, glaciers, and pluvial lakes. Offered alternate years. PREREQS: (GEO 481 or GEO 581) or instructor approval required.
GEO 495. ADVANCED FIELD GEOLOGY (6).
Six-week summer program in central Oregon. Collect field data to make geological maps, crosssections, columns, and reports. Fee charged. PREREQS: GEO 295 [C-] and GEO 315 [C-] and GEO 340 [C-] and GEO 370 [C-] and GEO 295
GEO 497. FIELD MAPPING OF ORE DEPOSITS (3). Eight-day field trip over spring vacation to a mineral district in the western United States, emphasizing detailed mapping of outcrops, trenches, and underground workings. Students prepare final maps and a report suitable for presentation to management or publication during spring term. Transportation fee charged. Not offered every year. PREREQS: (GEO 440 or GEO 540) and GEO 495

GEO 499. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

GEO 500. FIELD TRIPS (1-16). Participation in group field trips that are not a part of any other course. Transportation fee is charged. Students may prepare guides for trips. Faculty sponsor must be prearranged. Graded P/N. This course is repeatable for a maximum of 48 credits.
PREREQS: Departmental approval required.
GEO 501. RESEARCH (1-16). Independent, original research subjects guided by faculty conferences and resulting in a brief written report. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.

GEO 503. THESIS (1-16). Independent, original study that culminates in a senior thesis. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
GEO 505. READING AND CONFERENCE (1-
16). Independent reading in specialized topics guided by and discussed in faculty conferences. Faculty sponsor must be prearranged. This
course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GEO 507. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 48 credits. PREREQS: Departmental approval required.
GEO 508. WORKSHOP (1-16). This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.
GEO 510. INTERNSHIP (1-15). Pre-career professional experience under joint faculty and employer supervision. May not be used to meet minimum credit hour requirements for graduate degrees in geosciences. Graded P/N This course is repeatable for a maximum of 16 credits. PREREQS: 12 credits of upper-division geosciences.
GEO 512. IGNEOUS PETROLOGY (4).
Petrogenesis of igneous rocks. Petrographic analysis using polarizing microscopes. Field trip may be required, transportation fee charged. Lec/ lab. PREREQS: GEO 315 and GEO 415
GEO 516. INTERPRETATION OF GEOLOGIC MAPS (3). Development of skills in formulating geologic problems, using geologic maps, and developing solutions by the scientific method. PREREQS: GEO 495

GEO 518. GEOSCIENCE COMMUNICATION (3). Professional development of the skills of technical editing and writing for geoscientists. Practice the craft of presentation development and delivery, and the broader issues of problem development, and manuscript and proposal writing specific to geoscience graduate students.
GEO 527. VOLCANOLOGY (4). A survey of volcanoes: their distribution, forms, composition, eruptive products, eruptive styles, and associated phenomena. Field trip may be required; transportation fee charged. Offered alternate years. Lec/lab. PREREQS: GEO 315
GEO 530. GEOCHEMISTRY (4). Principles of geochemistry applied to problems of earth science. Field trip(s) may be required; transportation fees charged. Lec/rec. PREREQS: GEO 315 and ( $(\mathrm{CH} 121$ and CH 122 ) or ( $(\mathrm{CH} 231$ or CH 231 H ) and ( CH 261 or CH 261 H ) and ( CH 232 or CH 232 H ) and (CH 262 or CH 262 H$)$ ))
GEO 531. ENVIRONMENTAL GEOCHEMISTRY (3). An introduction to natural processes at and near the earth's surface, as well as an examination of the impact of human activities on the natural environment. Study includes discussion of the sources, transformations, transport, and fate of contaminants. Field trip(s) required; transportation fee charged. PREREQS: (CH 121 and CH 122 and CH 123 ) or ((CH 231 or CH 231 H$)$ and (CH 232 or CH 232 H ) and (CH 233 or CH 233 H ))
GEO 532. APPLIED GEOMORPHOLOGY
(3). Effect of landform processes upon human activity; consequences of resource management strategies on erosional balance within landscape; identification of mitigation of natural hazards; role of geomorphic process studies in environmental planning. Taught as seminar, themes TBA. Field trip(s) may be required; transportation fee charged. PREREQS: GEO 322
GEO 533. COASTAL GEOMORPHOLOGY (3). Morphodynamic approach to coastal landforms, processes and evolution including the impacts and response of humans to coastal change. PREREQS: MTH 251 and MTH 252 and PH 211 and PH 212 or equivalent and GEO 322 or equivalent.

GEO 535. GEOCHEMICAL ANALYSIS
TECHNIQUES (3). An introduction to the theory, techniques and instrumentation used for the chemical analysis of earth materials, with emphasis on analysis of solid earth material samples (predominantly, but not restricted to, rocks). Includes discussions of laboratory safety, relevant statistical approaches, basic physical and chemical principles of analysis, sample
preparation techniques and data processing and reporting. Course also includes a large componen of hands-on experience with instrumentation available in-house in the College of Earth, Ocean, and Atmospheric Sciences. Lec/lab. PREREQS: GEO 530 [C] and /or equivalent.
GEO 536. STRUCTURAL AND NEOTECTONIC FIELD METHODS (3). Field-intensive mapping experience emphasizing a topical issue in active tectonics, neotectonics, earthquake geology, or structural geology. One-week field trip required transportation fee charged. Weekly discussions during quarter. Offered alternate years.
PREREQS: GEO 495
GEO 537. TECTONIC GEOMORPHOLOGY
(3). Exploration of linkages between patterns of erosion, crustal deformation, and landscape evolution from geomorphic, geologic, geophysical, and modeling perspectives. Field trip required; transportation fee charged. Offered alternate years. PREREQS: GEO 322 and GEO 340

GEO 540. ECONOMIC GEOLOGY (4). Principles of the origin, distribution, and importance of metallic mineral deposits formed by magmatic, hydrothermal, and sedimentary processes. Lec/ lab. PREREQS: GEO 315 and GEO 340
GEO 550. COASTAL HAZARDS: PROCESSES, RESPONSE, AND ADAPTATION (3). Coastal hazards and the associated risks they pose to rapidly expanding coastal communities. Examination of coastal hazards from a transdisciplinary perspective including the physical processes, the coastal response, and coastal adaptation/management options for dealing with the hazards. Emphasizes probabilistic and other user-inspired approaches for assessing coastal vulnerability to the various hazards. PREREQS: College-level calculus, physics and geology recommended.

GEO 561. GEOLOGY OF EARTHQUAKES (3). Tectonics of the present day as based on surface geology, geodesy, seismicity, and crustal structure description of active faults and folds; use of neotectonics in evaluation of earthquake hazard Field trip(s) may be required; transportation fee charged. Offered alternate years. PREREQS: GEO 340

GEO 563. GEOPHYSICS AND TECTONICS
(4). Geophysical observations as constraints on geologic interpretation. Lec/lab. PREREQS: MTH 251 and (PH 202 or PH 212) or equivalent
GEO 577. ALGORITHMS FOR GEOGRAPHIC INFORMATION SCIENCE (4). Introduction to algorithms and data models for the manipulation and visualization of geospatial data. Students are introduced to object-oriented programming using the Java programming language. PREREQS:
GEO 545 [C] and GEO 565 [C] and GEO 578 [C] and /or equivalent courses and programming experience.

GEO 581. GLACIAL GEOLOGY (4). Mass balance of glaciers, physics of glacial flow, processes of glacial erosion and deposition, glacial meltwater, glacial isostasy and eustasy, and Quaternary stratigraphy. Field trip(s) may e required; transportation fee charged. Lec/lab Offered alternate years. PREREQS: GEO 202

## GEO 583. SNOW HYDROLOGY (3)

Fundamentals of snow hydrology. Physical principles of snow formation, snowpack accumulation, energy balance, snowcover-climate interactions, snow metamorphism, snowpack ablation, snowpack/snowmelt chemistry, remote sensing of snow, avalanches, field methods, snowmelt/runoff modeling techniques, and watershed processes.
GEO 586. QUATERNARY PALEOCLIMATOLOGY
(3). Introduction to geochronology, climate proxies, climate forcing, and climate modeling applied to paleoclimate problems. Emphasis on Quaternary climate history. PREREQS: ((GEO 202 or GEO 203) and ( CH 122 or CH 222 or $(\mathrm{CH} 232$ and CH 262) or ( CH 232 H and CH 262 H )) ) and ( PH 201 or

HH 211) or equivalent
GEO 588. QUATERNARY STRATIGRAPHY OF NORTH AMERICA (3). Stratigraphic principles applied to Quaternary deposits. Survey Quaternary dating methods. Proxy records of glaciation and climate change. Quaternary stratigraphy of North America, emphasizing stratigraphic records of ice sheets, glaciers, and pluvial lakes. Offered alternate years. PREREQS: (GEO 481 or GEO 581) or instructor approval required
GEO 597. FIELD MAPPING OF ORE DEPOSITS
(3). Eight-day field trip over spring vacation to a mineral district in the western United States, emphasizing detailed mapping of outcrops, trenches, and underground workings. Students prepare final maps and a report suitable for presentation to management or publication during spring term. Transportation fee charged. Not offered every year. PREREQS: (GEO 440 or GEO 540) and GEO 495

GEO 599. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 24 credits.

GEO 600. FIELD TRIPS (1-16). Participation in group field trips that are not part of any other course. Transportation fee charged. Students may prepare guide for trips. Faculty sponsors must be arranged. Graded P/N. This course is repeatable for a maximum of 84 credits.

GEO 601. RESEARCH (1-16). This course is repeatable for a maximum of 36 credits.

GEO 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits

GEO 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
GEO 606. PROJECTS (1-16). This course is repeatable for a maximum of 84 credits.
GEO 607. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 48 credits
GEO 608. WORKSHOP (1-16). This course is repeatable for a maximum of 24 credits.
GEO 622. IGNEOUS PETROLOGY (3). Controls on the distribution of major and trace elements; theory, applications, and examples. Field trip(s) may be required; transportation fee charged Offered alternate years. PREREQS: GEO 412 or GEO 512
GEO 633. GEOCHRONOLOGY AND ISOTOPE GEOLOGY (3). Measurements of cosmic and geologic time by radioactive decay. Use of radiogenic and stable isotopic tracers in geology. Offered alternate years. PREREQS: Graduate standing in geology or related fields.
GEO 684. GLOBAL BIOGEOCHEMICAL CYCLES (4). An in-depth treatment of global biogeochemical cycles, focusing on cycles of carbon, oxygen, nitrogen, phosphorus, and sulfur in the atmosphere, hydrosphere, and lithosphere CROSSLISTED as SOIL 684. PREREQS: One year of college-level physics and chemistry, including introductory biology or equivalent. One year of graduate course work in soil, earth, ocean, atmospheric, or forest science or equivalent or consent of instructor.

## GEO 691. MASS AND HEAT TRANSPORT IN

 THE ENVIRONMENT (4). Quantitative treatment of processes affecting transport in lakes, streams, and groundwater: advection; diffusion; dispersion. Lec/lab. Offered alternate years. PREREQS: (GEO 487 or CE 412) or equivalent and MTH 256GEO 694. TOPICS IN ORE GENESIS (1-3). In-depth examination of published research on selected mineral deposits to build an understanding of environments and processes of ore formation. Offered alternate years. This course is repeatable for a maximum of 6 credits

GEO 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 24 credits.

## GEOGRAPHY COURSES

GEOG 100. *CLIMATE JUSTICE (3). Unequal distribution of social, economic and political power that creates winners and losers from climate change. Case studies of climate-change-related environmental degradation, conflict, conservation, climate denial, renewable energy, and investment. Concepts and actions to promote climate justice. Lec/rec. (Bacc Core Course)
GEOG 102. *PHYSICAL GEOGRAPHY (4).
Processes that shape the earth's surface.
Weathering, mass movement, landforms, river systems, groundwater, biogeography, human effects on the landscape. Use of maps and imagery. (Bacc Core Course) Equivalent course is GEO 102.

GEOG 103. *HUMAN GEOGRAPHY (3).
Introduction to how human activity affects or is influenced by the earth's surface, including languages, religions, migration, development, and resources. (Bacc Core Course)

GEOG 105. *GEOGRAPHY OF THE NON-
WESTERN WORLD (3). An introduction to the rich variety of environments, population and settlement dynamics, cultures, geopolitical changes, and economies in Africa, the Middle East, and Asia Lec/lab/rec. (Bacc Core Course) Equivalent course is GEO 105.

GEOG 106. *GEOGRAPHY OF THE WESTERN
WORLD (3). An introduction to the rich variety of environments, population and settlement dynamics, cultures, geopolitical changes, and economics in Europe and Russia, Australia and Oceania, and the Americas. Lec/rec. (SS) (Bacc Core Course) Equivalent course is GEO 106.

GEOG 199. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.

GEOG 201. *FOUNDATIONS OF GEOSPATIAL
SCIENCE AND GIS (4). Basic physical science principles underlying geospatial technologies such as GPS, mobile devices, and online mapping and navigation tools used in GIS, remote sensing, and geovisualization. Concepts and applications in government, business, and the environment. (Bacc Core Course) Equivalent course is GEO 301.

GEOG 203. *HUMAN-ENVIRONMENT
GEOGRAPHY (3). How human societies manage resources, physical limits to sustainability, role of science in the use and management of resources, and how societal resource use adversely affects other societies, in human history and across spatial scales. Lec/rec. (Bacc Core Course)
GEOG 240. *CLIMATE CHANGE, WATER AND
SOCIETY (3). Introduction to social, ecological and economic impacts of climate change induced water problems in various geographic regions and cultures. Approaches to climate change mitigation and adaptation in various parts of the world. (Bacc Core Course) Equivalent course is GEO 204.
GEOG 250. *LAND USE PLANNING FOR SUSTAINABLE COMMUNITIES (3). Overview of the history and current practices of land use and community planning. Use basic geospatial tools to assess land use patterns and planning processes. (Bacc Core Course)
GEOG 251. *GEOGRAPHY OF DISASTER MANAGEMENT (3). Introduction to the geographic concepts and processes for effective disaster management, including response, recovery, mitigation and preparedness. Risk assessment and evidence-based best practices to prepare and respond to emergencies in a variety of geographic contexts. (Bacc Core Course) Equivalent course is GEO 205

GEOG 295. INTRODUCTION TO GEOGRAPHIC FIELD RESEARCH (3). Two-week course taught in the fall program in various locations throughout the west. Collect and analyze data associated with both human and physical geography. Field trip required, transportation fee charged. Lec/lab.

Equivalent course is GEO 296
GEOG 299. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.
GEOG 300. *SUSTAINABILITY FOR THE COMMON GOOD (3). Geography of human relationships to the earthיs systems with an emphasis on individual impacts and collective efforts to achieve environmental sustainability. Lec/ rec. (SS) (Bacc Core Course) Equivalent course is GEO 300 PREREQS: Upper-division standing.

GEOG 311. *GEOGRAPHY OF AFRICA (3). An introduction to the physical, historical, cultural, political, and development geography of Africa south of the Sahara. (NC) (Bacc Core Course) Equivalent course is GEO 325.
GEOG 313. *GEOGRAPHY OF ASIA (3). Geographic analysis of Asia's lands and peoples. Emphasis on regional physical environments, resources and development potentials, population trends, and international importance to the United States. Offered once every other year. (NC) (Bacc Core Course) Equivalent course is GEO 327.
GEOG 314. *GEOGRAPHY OF LATIN AMERICA (3). Focuses on the diverse landscapes, peoples and cultural traditions of Latin America, a vast region extending from the United States-Mexican border to the southern tip of South America. (NC) (Bacc Core Course)
GEOG 323. ^CLIMATOLOGY (4). Systematic analysis of global and regional climates. Physical principles of climate, climate classifications, and distribution and characteristics of climate regimes. Lec/lab. (Writing Intensive Course) PREREQS: GEOG 102 [D-] or GEO 202 [D-] or GEO 102 [D-] GEOG 324. GEOGRAPHY OF LIFE: SPECIES DISTRIBUTIONS AND CONSERVATION (4). Plant, animal, and biotic community distribution and dynamics. Effect of climate, tectonics, disturbance on extinction, speciation, and succession. Field trip(s) required; transportation fee charged. Lec/lab. Equivalent course is GEO 324.

GEOG 330. *^GEOGRAPHY OF
INTERNATIONAL DEVELOPMENT AND
GLOBALIZATION (3). Introduction to the geography of global wealth and inequality with a focus on contemporary development, underdevelopment, and globalization problems in Asian, African, Caribbean, Latin American, and Pacific Island countries. (Bacc Core Course) (Writing Intensive Course) Equivalent course is GEO 330. PREREQS: GEOG 105 [D-] or GEOG 106 [D-] or GEO 105 [D-] or GEO 106 [D-] and or consent of instructor.
GEOG 331. *POPULATION, CONSUMPTION, AND ENVIRONMENT (3). An examination of population patterns and trends, emphasizing historical growth and more recent demographic changes; using geographic tools to understand patterns of spatial distribution, to use and analyze data sources, and to gain experience interpreting and displaying data about population structure and dynamics; and developing the ability to evaluate the relationship between population, consumption, resources, and quality of life. Patterns of consumption, as individuals and societies will be examined and different future scenarios will be examined with reference to environmental, social and economic sustainability. (Bacc Core Course) Equivalent course is GEO 350.

## GEOG 340. *INTRODUCTION TO WATER

SCIENCE AND POLICY (3). Policy and science of the hydrologic cycle. Emphasis on interaction between water's natural time-space fluctuations and human uses. (Bacc Core Course) Equivalent course is GEO 335 and SOIL 335.

## GEOG 340H. *INTRODUCTION TO WATER

SCIENCE AND POLICY (3). Policy and science of the hydrologic cycle. Emphasis on interaction between water's natural time-space fluctuations and human uses. (Bacc Core Course) PREREQS: Honors College approval required.

GEOG 350. *GEOGRAPHY OF NATURAL
HAZARDS (3). Introduction to the geography of risk, natural hazards, and disasters, focusing on concepts of vulnerability, adaptation and resilience of human society in the Pacific Northwest and globally. Equivalent course is GEO 304.
GEOG 360. GISCIENCE I: GEOGRAPHIC INFORMATION SYSTEMS AND THEORY (4).
Fundamentals of spatial data, geographic information systems (GIS), and introductory spatial analysis, programming, and modeling. Equivalent course is GEO 365 and GEO 465.
GEOG 361. GISCIENCE II: ANALYSIS AND APPLICATIONS (4). Applications-based course. Development and conduct of geospatial analyses using various spatial data structures, techniques and models. Students acquire, clean, integrate, manipulate, visualize and analyze geospatial data through laboratory work. Lec/lab. Equivalent course is GEO 480. PREREQS: GEOG 360 [C-] and MTH 112 [C-] and (ST 201 [C-] or ST 351 [C-] )

## GEOG 370. GEOVISUALIZATION:

CARTOGRAPHY (4). Basic cartographic principles. Design, compilation, and construction of maps. Equivalent course is GEO 360. PREREQS: GEOG 201 [D-] or GEO 301 [D-]
GEOG 371. GEOVISUALIZATION: WEB MAPPING (4). Current developments in Internet mapping and advanced cartographic skills applied to web-based maps. Techniques of Internet mapping and principles of web-based cartography, including multimedia, animation, 3D visualization, and user interface design. Lec/lab. PREREQS: GEOG 201 [D-] or GEO 301 [D-]
GEOG 399. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.
GEOG 399H. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
GEOG 400. FIELD TRIPS (1-16). Participation in group field trips that are not a part of any other course. Transportation fee is charged. Students may prepare guides for trips. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 48 credits. PREREQS: Departmental approval required
GEOG 401. RESEARCH (1-16). Independent, original research subjects guided by faculty conferences and resulting in a brief written report. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.
GEOG 403. THESIS (1-16). Independent, original study that culminates in a senior thesis. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.
GEOG 405. READING AND CONFERENCE
(1-16). Independent reading in specialized topics guided by and discussed in faculty conferences. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GEOG 407. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

GEOG 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GEOG 410. INTERNSHIP (1-16). Pre-career professional experience under joint faculty and employer supervision. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: 12 credits of upper-division geography and departmental approval required.
GEOG 423. SNOW HYDROLOGY (3).
Fundamentals of snow hydrology. Physical principles of snow formation, snowpack accumulation, energy balance, snowcover-climate
interactions, snow metamorphism, snowpack ablation, snowpack/snowmelt chemistry, remote sensing of snow, avalanches, field methods, snowmelt/runoff modeling techniques, and watershed processes. Equivalent course is GEO 483.

GEOG 424. HYDROLOGY FOR WATER RESOURCES MANAGEMENT (3). A quantitative introduction to surface and subsurface hydrology with a focus on decision making for the water resource professional PREREQS: MTH 251 [C-] and /or consent of instructor
GEOG 430. RESILIENCE-BASED NATURAL RESOURCE MANAGEMENT (3). Causes and consequences of conflict over natural resource management at local to global scales; principles for managing social-ecological systems for resilience. Field trip(s) may be required; transportation fee charged. Equivalent course is GEO 420.

GEOG 431. GLOBAL RESOURCES AND
DEVELOPMENT (3). Examines resource development issues and strategies in the Global South. Issues and strategies from agriculture, forestry, fisheries, energy, wildlife management, mineral development, land use, and health are examined. Equivalent course is GEO 426.

GEOG 432. *GEOGRAPHY OF FOOD AND AGRICULTURE (3). Overview of food and agriculture in relation to production and consumption regions as a basis for distinguishing different types of food and agricultural systems. Local and global examination of the geographic aspects of breeding, location in agricultural systems, and adaptation in agro-ecosystems using field study, explorations of literature, and lecture. Field trip required, transportation fee charged. (Bacc Core Course) Equivalent course is GEO 449.

GEOG 440. WATER RESOURCES
MANAGEMENT IN THE UNITED STATES (3). An investigation of the various approaches to water resources geography within the U.S. Explores the disciplines that address water resources management, their tools, and their limitations. Topics include engineering, law, economics, risk assessment, game theory, conflict resolution, and the fine arts. Equivalent course is GEO 425. PREREQS: 9 credits of upper-division geography and any course dealing with the hydrologic cycle.
GEOG 441. INTERNATIONAL WATER
RESOURCES MANAGEMENT (3). An
investigation of the various approaches to water resources geography at the international level. Explores the interaction between water science and policy through issues of current "hydropolitics" and water resources development. Topics include water quality, dams and development, conflict and cooperation, climate change, and water institutions. Equivalent course is GEO 424. PREREQS: 9 credits of upper-division geography and any course dealing with the hydrologic cycle.
GEOG 450. LAND USE IN THE AMERICAN
WEST (3). Development of a conceptual framework for land use study; analysis of land as a resource, land use trends, land use principles, and management issues as related to planning, focusing on the American West, the fastest growing region in the nation. Equivalent course is GEO 423.

GEOG 451. PLANNING PRINCIPLES AND PRACTICES FOR RESILIENT COMMUNITIES
(4). Applies GIS skills and techniques to determine and analyze future land uses. Determine suitable land uses that incorporate community goals, site constraints and minimize use conflicts. Regulatory and market-based implementation strategies for land uses will also be discussed. Lec/lab.
Equivalent course is GEO 452. PREREQS: GEOG 360 [C-] or GEOG 560 [C-] or GEO 365 [C-] or GEO 465 [C-]
GEOG 452. SUSTAINABLE SITE PLANNING (3). Use of geographic concepts and techniques in
site planning to create sustainable management reports for local sites. Inventory of environmental characteristics and human uses, conceptual design for future uses of the site, principles of green infrastructure and sustainable building practices. Local field trip required, transportation fee charged. Equivalent course is GEO 451. PREREQS: GEOG 250 recommended

GEOG 462. GISCIENCE III: PROGRAMMING FOR GEOSPATIAL ANALYSIS (4). Introduction to the extension of geographic information systems (GIS) through programming. No prior programming experience is expected. Teaches a pragmatic approach to design and write programs for geospatial analysis. Equivalent course is GEO 578. PREREQS: GEOG 361 [C-] or GEOG 561 [C-] or GEO 480 [C-]
GEOG 463. GISCIENCE IV: SPATIAL
MODELING (4). Introduction to spatial simulation models representing attraction, segregation, individual entities, and processes of spread, applied to contemporary problems in human and physical geography. PREREQS: GEOG 462 [C-] or GEOG 562 [C-] or GEO 578 [C-]
GEOG 464. GEOSPATIAL PERSPECTIVES ON INTELLIGENCE, SECURITY, AND ETHICS (3). Applications and implications of geospatial science (GIS, remote sensing, and spatial analysis) in intelligence, human, environmental, and ethical domains. Concepts and practices of ethics in geospatial science, including data access, management, visualization, and decision-making. Equivalent course is GEO 567. PREREQS: GEOG 360 [C-] or GEOG 560 [C-] or GEO 365 [C-] or GEO 465 [C-] and senior standing
GEOG 472. GEOVISUALIZATION: GEOVISUAL
ANALYTICS (3). Concepts and techniques underlying the production of maps by computer. Practical experience with a variety of computer mapping packages. Lec/lab. Equivalent course is GEO 445. PREREQS: GEOG 370 [C-] or GEOG 371 [C-] or GEO 360 [C-]
GEOG 480. REMOTE SENSING I: PRINCIPLES AND APPLICATIONS (4). Fundamentals of satellite remote sensing and image analysis. Topics include physical principles of remote sensing from the ultraviolet to the microwave, sensors and sensor technology, and environmental applications of remote sensing through image analysis. Lec/lab. Equivalent course s GEO 444. PREREQS: GEOG 201 [C-] or GEO 301 [C-]
GEOG 481. REMOTE SENSING II: DIGITAL IMAGE PROCESSING (4). Digital analysis of remote sensor data. Image display enhancement, classification, and rectification principles. Practical experience with an image processing system. Equivalent course is GEO 466. PREREQS: (GEOG 480 [C-] or GEOG 580 [C-] or GEO 444 [C-] or GEO 544 [C-] ) and (ST 202 [D-] or ST 352 [D-] )
GEOG 495. FIELD GEOGRAPHY OF OREGON
I (3). Designed as a capstone experience. Challenges students to assess the origins of the physical features of a landscape, and evaluate the impacts of features on the area's human geography, and vice versa. Three weekend field trips required, transportation fee charged Equivalent course is GEO 435. PREREQS: GEOG 295 [C-] or GEO 295 [C-] and junior or senior standing. Restricted to Earth Science and Geography majors.
GEOG 499. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.
GEOG 500. FIELD TRIPS (1-16). Participation in group field trips that are not a part of any other course. Transportation fee charged. Students may prepare guides for trips. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 48 credits. PREREQS: Departmental approval required

GEOG 501. RESEARCH (1-16). Independent,
original research subjects guided by faculty conferences and resulting in a brief written report. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.
GEOG 503. THESIS (1-16). Independent, original study that culminates in a thesis. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 999 credits.

GEOG 505. READING AND CONFERENCE (1-16). Independent reading in specialized topics guided by and discussed in faculty conferences. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

GEOG 507. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

GEOG 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

GEOG 510. INTERNSHIP (1-15). Pre-career professional experience under joint faculty and employer supervision. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Pre-career experience under joint faculty and employer supervision. May not be used to meet minimum credit hour requirements for graduate degrees in geography.
GEOG 511. HISTORY AND PHILOSOPHY OF GEOGRAPHY (3). The historical development of research traditions in the discipline of geography. This includes an examination of changes in conceptual structures and current trends. Equivalent course is GEO 515. PREREQS: Graduate standing in geography (or related field).
GEOG 512. SOCIAL-ECOLOGICAL SYSTEMS (3). Exploration of critical debates surrounding theories associated with social-ecological systems, resilience, vulnerability, adaptation, social learning, transformation, adaptive governance. Equivalent course is GEO 554. PREREQS: 9 credits of graduate study.
GEOG 523. SNOW HYDROLOGY (3). Fundamentals of snow hydrology. Physical principles of snow formation, snowpack accumulation, energy balance, snowcover-climate interactions, snow metamorphism, snowpack ablation, snowpack/snowmelt chemistry, remote sensing of snow, avalances, field methods, snowmelt/runoff modeling techniques, and watershed processes. Equivalent course is GEO 583.

## GEOG 524. HYDROLOGY FOR WATER

RESOURCES MANAGEMENT (3). A quantitative introduction to surface and subsurface hydrology with a focus on decision making for the water resource professional. PREREQS: MTH 251 or consent of instructor

GEOG 530. RESILIENCE-BASED NATURAL RESOURCE MANAGEMENT (3). Causes and consequences of conflict over natural resource management at local to global scales; principles for managing social-ecological systems for resilience. Field trip(s) may be required; transportation fee charged. Equivalent course is GEO 520.
GEOG 531. GLOBAL RESOURCES AND
DEVELOPMENT (3). Examines resource development issues and strategies in the Global South. Issues and strategies from agriculture, forestry, fisheries, energy, wildlife management, mineral development, land use, and health are examined. Equivalent course is GEO 526.

## GEOG 532. GEOGRAPHY OF FOOD AND

AGRICULTURE (3). Overview of food and agriculture in relation to production and consumption regions as a basis for distinguishing different types of food and agricultural systems. Local and global examination of the geographic aspects of breeding, location in agricultural systems, and adaptation in agro-ecosystems using field study, explorations of literature, and
lecture. Field trip required, transportation fee charged. Equivalent course is GEO 549.

GEOG 540. WATER RESOURCES
MANAGEMENT IN THE UNITED STATES (3). An investigation of the various approaches to water resources geography within the U.S. Explores the disciplines that address water resources management, their tools, and their limitations. Topics include engineering, law, economics, risk assessment, game theory, conflict resolution, and the fine arts. Equivalent course is GEO 525. PREREQS: 9 credits of upper-division geography and any course dealing with the hydrologic cycle.

GEOG 541. INTERNATIONAL WATER
RESOURCES MANAGEMENT (3). An
investigation of the various approaches to water resources geography at the international level. Explores the interaction between water science and policy through issues of current "hydropolitics" and water resources development. Topics include water quality, dams and development, conflict and cooperation, climate change, and water institutions. Equivalent course is GEO 524. PREREQS: 9 credits of upper-division geography and any course dealing with the hydrologic cycle.

GEOG 546. ADVANCED LANDSCAPE AND SEASCAPE ECOLOGY (4). Pattern-process interactions in large scale ecological and physical systems, including terrestrial, aquatic, and marine/ ocean ecosystems. Principles of pattern-process interactions from genetic to community levels of ecological organization applied to design of conservation reserves. Hypothesis testing, field techniques, spatial models/statistics, GIS/remote sensing. Lec/lab. Equivalent course is GEO 546.
GEOG 550. LAND USE IN THE AMERICAN
WEST (3). Development of a conceptual framework for land use study; analysis of land as a resource, land use trends, land use principles, and management issues as related to planning, focusing on the American West, the fastest growing region in the nation. Equivalent course is GEO 523.
GEOG 551. PLANNING PRINCIPLES AND PRACTICES FOR RESILIENT COMMUNITIES (4). Applies GIS skills and techniques to determine and analyze future land uses. Determine suitable and uses that incorporate community goals, site constraints and minimize use conflicts. Regulatory and market-based implementation strategies for land uses will also be discussed. Lec/lab. Equivalent course is GEO 552. PREREQS: GEOG 360 [C] or GEOG 560 [C]
GEOG 552. SUSTAINABLE SITE PLANNING (3).
Use of geographic concepts and techniques in site planning to create sustainable management reports for local sites. Inventory of environmental characteristics and human uses, conceptual design for future uses of the site, principles of green infrastructure and sustainable building practices. Local field trip required, transportation fee charged. Equivalent course is GEO 551. PREREQS: GEOG 250 recommended.

GEOG 560. GISCIENCE I: INTRODUCTION TO GEOGRAPHIC INFORMATION SCIENCE (4). Introduction to modern spatial data processing, development, and functions of geographic information systems (GIS); theory, concepts and applications of geographic information science (GIScience). Equivalent course is GEO 565.
GEOG 561. GISCIENCE II: ANALYSIS AND APPLICATIONS (4). Applications-based course. Development and conduct of geospatial analyses using various spatial data structures, techniques and models. Students acquire, clean, integrate, manipulate, visualize and analyze geospatial data through laboratory work. Lec/lab. Equivalent course is GEO 580. PREREQS: GEOG 560 [C]
GEOG 562. GISCIENCE III: PROGRAMMING FOR GEOSPATIAL ANALYSIS (4). Introduction to the extension of geographic information systems (GIS) through programming. No prior programming experience is expected. Teaches a
pragmatic approach to design and write programs or geospatial analysis. Equivalent course is GEO 578. PREREQS: GEOG 361 [C] or GEOG 561 [C]

## GEOG 563. GISCIENCE IV: SPATIAL

MODELING (4). Introduction to spatial simulation models representing attraction, segregation, individual entities, and processes of spread, applied to contemporary problems in human and physical geography. PREREQS: GEOG 462 [C] or GEOG 562 [C]
GEOG 564. GEOSPATIAL PERSPECTIVES ON INTELLIGENCE, SECURITY, AND ETHICS (3). Applications and implications of geospatial science (GIS, remote sensing, and spatial analysis) in intelligence, human, environmental, and ethical domains. Concepts and practices of ethics in geospatial science, including data access, management, visualization, and decision-making. Equivalent course is GEO 567. PREREQS: GEOG 360 [C] or GEOG 560 [C] and senior standing
GEOG 565. SPATIO-TEMPORAL VARIATION IN ECOLOGY AND EARTH SCIENCE (4). Objectives and techniques of spatial and temporal analysis. Point patterns, geostatistics, spectral analysis, wavelet analysis, interpolation, and mapping. Equivalent course is GEO 541.
GEOG 566. ADVANCED SPATIAL STATISTICS
AND GISCIENCE (4). Provides advanced graduate students from a variety of disciplines in earth science and ecology the opportunity to structure and conduct spatio-temporal analyses using available software tools and their own datasets for their graduate research. Equivalent course is GEO 584.

## GEOG 571. GEOVISUALIZATION: WEB

MAPPING (4). Overview of methods and applications in interactive, dynamic cartographic visualization. Design and construction of customized user interfaces to geographic information. Lec/lab. Equivalent course is GEO 568. PREREQS: GEOG 370

GEOG 572. GEOVISUALIZATION: GEOVISUAL
ANALYTICS (3). Concepts and techniques underlying the production of maps by computer. Practical experience with a variety of computer mapping packages. Lec/lab. Equivalent course is GEO 545. PREREQS: GEOG 370 or GEOG 371
GEOG 580. REMOTE SENSING I: PRINCIPLES AND APPLICATIONS (4). Fundamentals of satellite remote sensing and image analysis. Topics include physical principles of remote sensing from the ultraviolet to the microwave, sensors and sensor technology, and environmental applications of remote sensing through image analysis. Lec/lab. Equivalent course is GEO 544. PREREQS: GEOG 201 or GEO 301
GEOG 581. REMOTE SENSING II: DIGITAL IMAGE PROCESSING (4). Digital analysis of remote sensor data. Image display enhancement, classification, and rectification principles. Practical experience with an image processing system.
Equivalent course is GEO 566. PREREQS: GEOG 580 [C] and (ST 352 or ST 202)
GEOG 595. FIELD GEOGRAPHY OF OREGON
II (3). Designed to introduce students to the widest possible range of topics on all aspects of Oregon geography within a limited time, then turn that experience into a viable research proposal. While physical processes are the primary topic, resource and environmental effects are stressed. Field trip required, transportation fee charged. Equivalent course is GEO 534.

## GEOG 596. FIELD RESEARCH IN

 GEOMORPHOLOGY AND LANDSCAPEECOLOGY (3). Natural history interpretation of disturbance and recovery processes and management implications in forest-stream landscapes of western Oregon. Course consists of field experience and several seminars. Transportation and lodging fee charged. Equivalent course is GEO 548. PREREQS: 9 graduate credits in sciences or engineering.

GEOG 599. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 24 credits.

GEOG 600. FIELD TRIPS (1-16). Participation in group field trips that are not a part of any other course. Transportation fee charged. Students may prepare guides for trips. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 48 credits. PREREQS: Departmental approval required

GEOG 601. RESEARCH (1-16). Independent, original research subjects guided by faculty conferences and resulting in a brief written report. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 36 credits. PREREQS: Departmental approval required.

GEOG 603. THESIS (1-16). Independent, original study that culminates in a thesis Faculty sponsor must be prearranged. This course is repeatable for a maximum of 999 credits.
GEOG 605. READING AND CONFERENCE
(1-16). Independent reading in specialized topics guided by and discussed in faculty conferences. Faculty sponsor must be prearranged. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GEOG 607. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GEOG 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GEOG 699. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 24 credits.

## GEOPHYSICS COURSES

GPH 501. RESEARCH (1-16). Original research work that will not be part of the data used in a thesis. Graded P/N. This course is repeatable for a maximum of 24 credits.
GPH 503. THESIS (1-16). Thesis research and writing. This course is repeatable for a maximum of 999 credits.

GPH 505. READING AND CONFERENCE (1-16). Independent reading and library research on specialized topics in geophysics, guided by discussions with supervising faculty. A written report may be required. This course is repeatable for a maximum of 16 credits. PREREQS: Instructor and topic approval required before registration.
GPH 507. SEMINAR (1-16). This course is repeatable for a maximum of 48 credits.
GPH 601. RESEARCH (1-16). Original research work that will not be part of the data used in a thesis. Graded P/N. This course is repeatable for a maximum of 36 credits.

GPH 603. THESIS (1-16). Thesis research and writing. This course is repeatable for a maximum of 999 credits.

GPH 605. READING AND CONFERENCE (1-16). Independent reading and library research on specialized topics in geophysics guided by discussions with supervising faculty. A written report may be required. This course is repeatable for a maximum of 16 credits. PREREQS: Instructor and topic approval required before registration.
GPH 607. SEMINAR (1-16). This course is repeatable for a maximum of 48 credits.
GPH 630. ELEMENTS OF SEISMOLOGY (4). Survey of basic concepts in global seismology: world seismicity; elastic structure of the earth; seismic wave paths in the earth; locating earthquakes; earthquake focal mechanisms, magnitudes, stress drop, energy; stress and strain, elasticity, wave equation, plane waves in homogeneous and layered media, surface waves, free oscillations; ray theory; seismometry; earthquake prediction. Laboratory
exercises include interpretation and analysis of seismograms from global seismographic networks. PREREQS: Differential equations.
GPH 632. CRUSTAL SEISMOLOGY (3). Structure of the earth's crust and upper mantle from seismic reflection and large offset (refraction, wide-angle reflection) data. Methods of data collection, data processing theory and practice, modeling and interpretation techniques, correlation of seismic results with laboratory measurements of rock properties, and regional case studies. PREREQS: GPH 630 [C]
GPH 640. GEODESY (4). Physical and observational geodesy, including the Earth's gravity field and potential and determination of the Earth's geoid. Interpretation of geoid, geoid anomalies, and isostatic compensation. Gravity, point-position and remote sensing geodetic measurement techniques, including GPS, InSAR, VLBI, leveling, triangulation/trilateration, and low-Earth orbit gravity satellite missions are covered as are geodetic reference frames. Offered alternate years.
GPH 641. ELECTROMAGNETIC METHODS IN GEOPHYSICS (3). Survey of electromagnetic (EM) methods in geophysics. Review of electromagnetic theory, Maxwellis equations in the quasi-static limit, the diffusion of EM fields in a layered conductor, qualitative discussion of EM fields in 2- and 3-D conductors. EM techniques, including DC resistivity, magnetotellurics, controlled source EM, induced polarization, and long-period magnetometer array methods. Applications to exploration, to basic research on crustal structure and to studies of upper-mantel conductivity. PREREQS: Upper-division EM course.

GPH 642. EARTH MAGNETISM (3).
Geomagnetism and magnetic potential: general morphology and secular change; internal and external sources; principles of paleomagnetism, including field and laboratory procedures; origin of remnant magnetism in rocks and the controlling physical and chemical processes; the origin of the Earth's magnetic field. PREREQS: Instructor approval required.
GPH 650. GEOPHYSICAL INVERSE THEORY
(4). Survey of the theory and applications of inverse methods currently used in the geophysical sciences for the interpretation of inaccurate and inadequate data. Backus-Gilbert inverse theory, resolution, regularization methods (such as damped least squares) for linear and non-linear problems, stochastic inversion, and extremal models. Applications to seismic, gravity, magnetic and electromagnetic data. PREREQS: Linear algebra, instructor approval required.
GPH 651. GEODYNAMICS I (3). Application of the techniques of continuum mechanics to geological problems. Thermal and subsidence history of the lithosphere; stress and strain in the earth; elasticity and flexure of the lithosphere; gravitational compensation. Offered alternate years. PREREQS: Instructor approval required.
GPH 665. GEOPHYSICAL FIELD TECHNIQUES
(3). Instrumentation, field methods and interpretation of gravimetric, magnetic, electrical and seismic prospecting techniques. Students will be required to collect, reduce, analyze, and interpret data.
GPH 689. SPECIAL TOPICS IN GEOPHYSICS
(1-4). Special topics of current interest in geophysics, not covered in detail in other courses. May be repeated on different topics for credit. This course is repeatable for a maximum of 16 credits.

## 1 MARINE RESOURCE <br> MANAGEMENT COURSES

MRM 501. RESEARCH AND SCHOLARSHIP (1-16). Graded P/N. This course is repeatable for a maximum of 24 credits.
MRM 503. THESIS (1-16). This course is
repeatable for a maximum of 999 credits.
MRM 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

MRM 506. PROJECTS (1-16). This course is repeatable for a maximum of 72 credits.

MRM 507. SEMINAR (1-16). This course is repeatable for a maximum of 48 credits.

MRM 508. WORKSHOP (1-16). This course is repeatable for a maximum of 24 credits.

MRM 510. INTERNSHIP (1-9). Planned and supervised resource management experience with selected cooperating governmental agencies, private organizations, or business firms. Supplementary conferences, reports and evaluations. Graded $P / N$. This course is repeatable for a maximum of 16 credits. PREREQS: For marine resource management majors only.
MRM 520. COASTAL LAW (3). Examines federal and state judicial and legislative protection of public beach access rights; ownership and use of tide and submerged lands, including the public trust doctrine and the federal and state navigation servitudes; federal and state protection of wetlands; and the Federal Coastal Zone Management Act.

## MRM 525. SPECIAL TOPICS IN MARINE

RESOURCE MANAGEMENT (1-4). Subjects of current interest in marine resource management not covered in depth in other courses. May be repeated for credit when topic varies. This course is repeatable for a maximum of 24 credits.

## MRM 530. PRINCIPLES AND PRACTICE

## OF MARINE RESOURCE MANAGEMENT

(3). Introduces learners to the core concepts/ skills required for guiding the management of the interactions between human and natural marine systems. Particular attention is given to the concept and framework of EcosystemBased Management, the goal of which is to conserve, maintain and restore ecosystem functions to promote the economic and ecological sustainability of marine ecosystems and human communities that depend on the services they provide. Tomorrow's marine resource managers must be capable of identifying, requesting, analyzing, synthesizing, and combining natural and social science with experiential knowledge and human/social capital to generate meaningful policy and management recommendations and strategies.
MRM 534. OCEANS IN CRISIS (3). Explores the state of the world's oceans and coasts, whether or not they are indeed in crisis, and what, if any management responses can be reasonably expected to halt and restore our oceans.

## MRM 535. RIGHTS-BASED FISHERIES

MANAGEMENT (3). Clear, appropriate and enforceable fishing entitlements and responsibilities are a cornerstone of sustainable fisheries management. Rights-based management tools such as dedicated access privileges, community quotas, co-management and cost recovery will be explored as ways of promoting individual and collective responsibility for sustainable fisheries management. High seas fisheries will also be addressed.
MRM 552. MARINE ECONOMICS (3). Economic aspects of marine resource utilization and management will be analyzed. Topics include open access aspect of marine resources; conflict and allocation of marine resources, marine resource markets, marine recreation, pollution, and aquaculture, with special emphasis on commercial fisheries. CROSSLISTED as AEC 552 PREREQS: AEC 351 or AEC 352 or AREC 351 or AREC 352

MRM 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 24 credits.

## ■ OCEANOGRAPHY COURSES

## OC 103. *EXPLORING THE DEEP:

GEOGRAPHY OF THE WORLD'S OCEANS (4). Introduces non-science students to the oceans, including marine geology and chemistry, ocean currents, coastal and biological processes. Field trip required, transportation fee charged. Lec/lab. (Bacc Core Course)
OC 199. SPECIAL TOPICS IN OCEANOGRAPHY
(1-4). Introduction to topics of current interest in oceanography for lower-division undergraduates. May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits.
OC 201. *OCEANOGRAPHY (4). Plate tectonics and the geological structure of ocean basins; physical and chemical properties of seawater; Earth's energy budget; large-scale circulation of the atmosphere and ocean; marine sediment properties and transport; Earth history recorded in marine sediments; the carbon cycle in the atmosphere and sea; and the ecology of pelagic and benthic systems. Lec/lab. (Bacc Core Course)

## OC 295. INTRODUCTION TO FIELD

OCEANOGRAPHY (3). One-week course taught during Spring Break at Hatfield Marine Science Center, with ten hours of preparatory meetings on the Corvallis campus. Collect oceanographic data and samples from ships and coastal marine habitats and conduct preliminary analysis of data and samples. Serves as an introduction to upperdivision course work in ocean science. Field trip(s) required; transportation fee charged. PREREQS: OC 201 [D-] or OC 332 [D-] or OC 332H [D-] OC 332. COASTAL OCEANOGRAPHY (3). Physics, geology, biology and hydrology of coastal oceans. How coastal waters respond to forcing by heating, cooling, winds, tides, waves, rain, evaporation, river runoff and freezing. Geography and geology of coastlines: erosion and deposition processes, beach dynamics. Coastal equilibrium cells as sources and sinks of sediment. Rocky shore, beach, mudflat, estuarine, and coastal biotic communities; animal migrations. Law of the Sea rights and responsibilities of coastal states. Fisheries and mariculture in coastal seas. Pollution and coastal ocean resources. Using a matrix to define environmental problems; pathways that pollutants take through the coastal ecosystem. Offered annually.
OC 333. OCEANS, COASTS, AND PEOPLE
(3). Contemporary issues related to human interactions with the oceans and coastal zones, including living and energy resources, geohazards and impacts of global change. Content presented in lectures, readings and group discussions, with project oral presentations. PREREQS: OC 201 is recommended.

OC 334. ${ }^{\wedge}$ POLAR OCEANOGRAPHY (3). Explores the physical, chemical and biological oceanography of the Arctic and Antarctic and examines the impacts of man's activities both directly through resource utilization, and indirectly through climate change. Introduction to polar oceanography through a series of lectures, interactive classes, written assignments and a case study. (Writing Intensive Course) PREREQS: OC 201 [D-]
OC 399. SPECIAL TOPICS IN OCEANOGRAPHY (1-4). This course is repeatable for a maximum of 16 credits.

OC 399H. SPECIAL TOPICS IN
OCEANOGRAPHY (1-4). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
OC 401. RESEARCH PROJECTS (1-16). Field and laboratory research in oceanography for undergraduates, resulting in a written report. This course is repeatable for a maximum of 24 credits. PREREQS: Instructor and topic approval required before registration.
OC 403. THESIS (1-16). Independent, original study that culminates in a senior thesis. Faculty
sponsor must be prearranged. Graded P/N. This course is repeatable for a maximum of 24 credits. PREREQS: College approval required.
OC 405. READING AND CONFERENCE (1-4). Independent library research and reading in specialized topics in oceanography for undergraduates, guided by discussions in conferences with faculty. A written report may be required. This course is repeatable for a maximum of 16 credits. PREREQS: Instructor and topic approval required before registration.
OC 407. SEMINAR (1-3). Undergraduate seminar on current developments in the oceanographic research literature, with student presentations and group discussions. A written report may be required. This course is repeatable for a maximum of 12 credits.
OC 407H. SEMINAR (1-3). Undergraduate seminar on current developments in the oceanographic research literature, with student presentations and group discussions. A written report may be required. This course is repeatable for a maximum of 12 credits. PREREQS: Honors College approval required.
OC 410. INTERNSHIP (1-16). Pre-career professional experience under joint faculty and employer supervision. Graded P/N. This course is repeatable for a maximum of 48 credits. PREREQS: 12 credits of upper-division college courses and approval required.
OC 430. PRINCIPLES OF PHYSICAL OCEANOGRAPHY (4). Fundamental principles of physical oceanography; conservation of mass, heat, momentum and vorticity; equations governing motion in the ocean; geostrophy; planetary boundary layers; wind-driven and thermohaline circulation. Descriptive oceanography; application of the fundamental principles to the ocean; examination of the major current systems; water mass analysis. Offered annually. PREREQS: One year each of college physics and college calculus.
OC 433. COASTAL AND ESTUARINE OCEANOGRAPHY (3). Circulation of the coastal ocean including continental shelf circulation, upwelling, coastal jets, undercurrents, coastaltrapped waves. Fundamentals of surface waves and tides; tsunamis, wind generation, breaking waves. Estuary classification and circulation patterns; shallow-water processes and beach morphology. Offered alternate years. PREREQS: One year of college physics and one year of calculus.
OC 434. ESTUARINE ECOLOGY (4). Integrated and synthetic training in the ecological processes of estuarine environments, with emphases on ecological interactions among organisms and the biogeochemical cycling of carbon and nitrogen. Topics include geomorphology, estuarine physics and chemistry, primary and secondary producers, ecosystem metabolism, element cycling, food webs, fisheries, restoration management, and impacts of climate. Field trip required, transportation fee charged. CROSSLISTED as FW 434/FW 534. Offered on Corvallis campus via interactive video from HMSC campus.
OC 440. BIOLOGICAL OCEANOGRAPHY (4). An advanced examination of the ocean as an ecosystem with emphasis on the processes affecting the production and structure of oceanic communities. Starting with the physical and chemical characteristics of the ocean environment, lectures and labs examine the flow of energy and matter from primary producers through primary consumers up to higher trophic levels. Microbial and benthic processes are examined. Current topics, such as hypoxia, ocean acidification and harmful algal blooms are discussed. Lec/lab. PREREQS: OC 201 [C-] and two terms of collegelevel biology or instructor approval.
OC 450. CHEMICAL OCEANOGRAPHY (3).
Chemical properties and processes in the oceans. Composition, origin and evolution of sea
water; thermodynamic and kinetic predictions for reactions in sea water; major and minor element reservoirs and fluxes; vertical and horizontal transport of materials; isotopic clocks and tracers; nutrients; chemical processes and fluxes across major marine interfaces, including estuaries, atmosphere, sediments, suspended particles and hydrothermal systems. Offered annually PREREQS: One year of college-level general chemistry.
OC 460. GEOLOGICAL OCEANOGRAPHY (3). Structure of ocean basins, plate tectonics and sea floor spreading, marine sedimentation, history of ocean basins, and analysis of geological and geophysical data. Offered annually. PREREQS: One year each of physics and chemistry or science background.
OC 499. SPECIAL TOPICS IN OCEANOGRAPHY (1-4). Subjects of current interest in oceanography, not covered in depth in other courses. May be repeated for credit when topic varies. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Varies with current topic. For upper-division undergraduates.
OC 501. RESEARCH (1-16). Original research work that will not be part of the data used in a thesis. Graded P/N. This course is repeatable for a maximum of 24 credits. PREREQS: Instructor approval required.
OC 503. THESIS (1-16). Thesis research and writing. This course is repeatable for a maximum of 999 credits.
OC 505. READING AND CONFERENCE (1-16) Independent reading and library research on specialized topics in oceanography, guided by discussions with supervising faculty. A written report may be required. This course is repeatable for a maximum of 16 credits. PREREQS: Instructor and topic approval required before registration.
OC 506. PROJECTS (1-16). This course is repeatable for a maximum of 72 credits.

OC 507. SEMINAR (1-3). Student presentations and discussions of current research literature or personal research results. Original research presentations by visiting scientists, OSU faculty and graduate students presenting final thesis results. Other sections and specific topics by arrangement. This course is repeatable for a maximum of 48 credits.

OC 508. WORKSHOP (1-16). This course is repeatable for a maximum of 24 credits.

## OC 512. BASIC MATLAB FOR

## ENVIRONMENTAL SCIENTISTS AND

ENGINEERS (2). MATLAB desktop environment will be introduced and basic programming and data analysis skills will be developed, with an emphasis on writing optimized routines to analyze data sets utilizing matrix algebra and vectorization of functions. Basic graphics and visualization will be covered, including two-dimensional and threedimensional graphing, contouring and movies.

OC 515. OREGON COAST MATH CAMP (3). Selected topics from differential calculus, integral calculus, ordinary and partial differential equations, statistics, linear algebra and vector calculus. Two-week course taught at Hatfield Marine Science Center in Newport, Oregon, before fall term begins. Graded P/N. PREREQS: Differential and integral calculus and linear algebra highly recommended or consent of instructor.

## OC 521. APPLICATIONS IN OCEAN

ECOLOGY AND BIOGEOCHEMISTRY (4).
Methodological underpinnings of marine ecology and biogeochemistry. Students will learn about both new and traditional methods of seawater analysis and biological rate determinations. They will evaluate methods by analyzing observations and samples, and assessing the interpretive effectiveness of approaches. Lec/lab. PREREQS: OEAS 540 [C] COREQS: OC 522, OC 523

OC 522. OCEAN BIOGEOCHEMICAL DYNAMICS (4). Examines what keeps ocean systems in balance, and determines their response to perturbation. The course relies on connections between physical transport and biogeochemical reaction rates and energetics, taught from the perspective of key ocean biogeochemical cycles. PREREQS: Bachelor's degree in scientific field or consent of instructor. OEB students are required to also take OC 523, Ocean Ecological Dynamics, and OC 521, Applications in Ocean Ecology and Biogeochemistry, as part of first-year Tier Two curriculum. COREQS: OC 521, OC 523
OC 523. OCEAN ECOLOGICAL DYNAMICS (4). Major characteristics of ocean biota and ocean ecosystems. Main themes will be centered on the bioenergetics of marine systems at levels ranging from the individual to ocean biomes, and on how ocean biota facilitates diverse marine biogeochemical processes. Lec/rec.
OC 528. MICROPROBE ANALYSIS (3). Theory and application of electron microprobe analysis to problems in geology, engineering, chemistry, physics, and biology.

OC 533. COASTAL AND ESTUARINE
OCEANOGRAPHY (3). Circulation of the coastal ocean including continental shelf circulation, upwelling, coastal jets, undercurrents, coastaltrapped waves. Fundamentals of surface waves and tides; tsunamis, wind generation, breaking waves; shallow-water processes and beach morphology. Offered alternate years. PREREQS: One year of college physics and one year of calculus.
OC 534. ESTUARINE ECOLOGY (4). Integrated and synthetic training in the ecological processes of estuarine environments, with emphases on ecological interactions among organisms and the biogeochemical cycling of carbon and nitrogen. Topics include geomorphology, estuarine physics and chemistry, primary and secondary producers, ecosystem metabolism, element cycling, food webs, fisheries, restoration management, and impacts of climate. Field trip required, transportation fee charged. CROSSLISTED as FW 434/FW 534.

## OC 561. IGNEOUS AND TECTONIC

PROCESSES IN THE OCEAN (3). An integrated view of the igneous and tectonic processes responsible for the formation and evolution of the ocean basins. The course is organized by tectonic environment including ridge crest, ridge flank, ocean basins, seamounts, and active and passive margins. PREREQS: One year each physics, calculus and geology.

OC 562. SEDIMENTARY PROCESSES IN THE OCEAN BASINS (3). An integrated view of sediment processes in the ocean basins from a source to sink perspective, with a special emphasis on the interpretation of the historical record. PREREQS: OC 550 and one year each physics and calculus and geology.
OC 574. EARLY LIFE HISTORY OF FISHES (4). Overview of diversity of development patterns in fishes; emphasis on morphology, life history, and evolution. Offered alternate years. CROSSLISTED as FW 574. PREREQS: FW 315 or equivalent.
OC 599. SPECIAL TOPICS IN OCEANOGRAPHY
(1-4). Subjects of current interest in oceanography, not covered in depth in other courses. May be repeated for credit when topic varies. This course is repeatable for a maximum of 24 credits. PREREQS: Varies with current topic.
OC 601. RESEARCH (1-16). Original research work that will not be part of the data used in a thesis. Graded P/N. This course is repeatable for a maximum of 36 credits. PREREQS: Instructor approval required.
OC 603. THESIS (1-16). Thesis research and writing. This course is repeatable for a maximum of 999 credits.

OC 605. READING AND CONFERENCE (1-16).
Independent reading and library research on specialized topics in oceanography, guided by discussions with supervising faculty. A written report may be required. This course is repeatable for a maximum of 16 credits. PREREQS: instructor and topic approval required before registration.
OC 606. PROJECTS (1-16). This course is repeatable for a maximum of 84 credits.
OC 607. SEMINAR (1-3). Student presentations and discussion of current research literature or personal research results. Original research presentations by visiting scientists, OSU faculty and graduate students presenting final thesis results. Other sections and specific topics by arrangement. This course is repeatable for a maximum of 48 credits.
OC 608. WORKSHOP (1-16). This course is repeatable for a maximum of 24 credits.
OC 630. OCEAN WAVE MECHANICS I (3). Linear wave boundary value problem formulation and solution, water particle kinematics, shoaling, refraction, diffraction, and reflection. Linear long wave theory with applications to tides, seiching, and storm surge. CROSSLISTED as CE 630. Lec/ lab.
OC 631. OCEAN WAVE MECHANICS II (3).
Second in the sequence of ocean engineering wave mechanics, covers the following topics: introduction to long wave theory, wave superposition, wave height distribution, and the wind-wave spectrum, introduction to wave forces, and basic nonlinear properties of water waves. May include additional selected topic in wave mechanics. CROSSLISTED as CE 631. PREREQS: (CE 630 [C] or OC 630 [C] )
OC 634. LONG WAVE MECHANICS (3). Theory of long waves. Depth-integrated Euler's equation and its jump conditions. Evolution equations and their solutions. Nonlinear shallow-water waves, the Korteweg-deVries equation and Boussinesq equation. Boundary-layer effects. Shallow-water waves on beaches. Applications of the fundamentals to problems of tsunamis. CROSSLISTED as CE 634. PREREQS: (OC 630 [C] and CE 631 [C] ) and OC 670 or equivalent.

OC 635. APPLIED MODELING OF NEARSHORE
PROCESSES (4). An introduction to numerical modeling of the nearshore ocean, providing hands-on experience with state-of-the-art numerical models for wave propagation, nearshore circulation, planform shoreline evolution and bathymetric profile evolution. Focuses on review of model requirements, detailed study of several specific models for several domains of interest, application to coastal phenomena, interpretation of model results. Lec/lab. Offered alternate years. CROSSLISTED as CE 635.

## OC 646. PHYSICAL/BIOLOGICAL

 INTERACTIONS IN THE UPPER OCEAN (4). Variability in physical oceanic processes in the upper ocean and relationship to spatial and temporal variations in biomass, growth rates, and other biological patterns in the organisms of ocean surface waters. The relationship between variability in ocean physical phenomena and ecosystem dynamics, including the requirements of sampling design for upper ocean ecological studies. Time and space scales of physical and biological phenomena in the upper ocean. Offered alternate years. Offered alternate years, typically fall term. PREREQS: (OEAS 530 [C] and OEAS 540 [C] ) and /or instructor approval required.OC 647. MARINE MICROBIAL PROCESSES (4). Roles of procaryotic and eukaryotic microbes in the biological and chemical processes of the sea, with emphasis on pelagic ecosystems. Functional and taxonomic types and distribution of marine micro- organisms. Biochemical and physiological processes of major groups of microbes as these relate to geochemical cycles of biologically
active elements in the sea. Heterotrophic and mixotrophic protists in pelagic foodwebs. Discussion of current experimental approaches to determining aspects of microbial activity and production. Offered alternate years. PREREQS: OC 540 [C] and two years of biology or instructor approval required.

OC 649. SPECIAL TOPICS IN BIOLOGICAL OCEANOGRAPHY (1-4). Special topics of current interest in biological oceanography not covered in detail in other courses. May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits.

OC 657. SEDIMENT BIOGEOCHEMISTRY (3).
An overview of early diagenetic processes in marine sediments and the interdisciplinary approaches used to quantify material transformations at the seafloor. PREREQS: OC 550 is recommended.

## OC 659. SPECIAL TOPICS IN CHEMICAL

 OCEANOGRAPHY (1-4). Special topics of current interest in chemical oceanography not covered in detail by other courses. May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits.OC 660. PALEOCEANOGRAPHY (3). Largescale changes in the oceanic and atmospheric system, as recorded in marine sediments, and their implications for understanding global environment changes. Chemical, physical, and biological proxies for oceanic and atmospheric processes in the geologic record period. Evidence for changing global climate at time scales longer than the historical record; the oceanic history of the Late-Cenozoic ice ages, long term evolution of climate change patterns, catastrophic global environmental events, and application of quantitative models to the past. Current research topics in paleoceanography. Offered alternate years. PREREQS: OC 560 or instructor approval required.
OC 662. NEARSHORE HYDRODYNAMICS (3). Briefly reviews wave processes in the nearshore, and concentrates on the wave-averaged circulation with an eye towards it potential effects on bathymetric change. PREREQS: Approach will often be quantitative; previous courses related to water wave mechanics and differential equations is recommended.
OC 664. NEARSHORE SEDIMENT TRANSPORT
(3). To study the dynamics of a nearshore wave field propagating over a shoaling bathymetry, the response of sediments and morphology to those motions, emergent morphology due to the coupled system, anthropogenic influences and mitigation. PREREQS: General physics, integral and differential calculus; nearshore hydrodynamics.

OC 665. APPLIED GEOSTATISTICS (4). Spatial and stratigraphic characteristics of geologic data; geologic data bases; application of matrix theory o the solution of geologic problems; descriptive models, predictive models, spatial models, and stratigraphic and time-series models. Offered alternate years. PREREQS: One year of statistics and one year of computer science.
OC 666. ISOTOPIC MARINE GEOCHEMISTRY
(3). Radiogenic and light stable isotopes and application to composition and evolution of the suboceanic mantle, petrogenesis of the oceanic crust, sediment provenance and sedimentary processes, geochronology, seawater chemical dynamics and paleoclimatology. Offered alternate years.
OC 668. THEORETICAL PETROLOGY (3). Theoretical aspects of igneous petrology in marine petrochemical processes. Igneous and metamorphic geology; hydrothermal solutions. Principles of energy, enthalpy, entropy. Equilibrium processes of melting, crystallization, mineral chemistry, geothermometers, geobarometers. Offered alternate years. PREREQS: Petrology.
OC 669. SPECIAL TOPICS IN GEOLOGICAL OCEANOGRAPHY (1-4). Subjects of current
interest in geological oceanography not covered in depth in other courses. May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits.

OC 670. FLUID DYNAMICS (4). Fundamentals of fluid dynamics: conservation laws of mass, momentum, and energy; inviscid and viscous flows; boundary layers; vorticity dynamics; irrotational and potential flow. Offered annually. PREREQS: One year of college physics; mathematics through differential equations and vector calculus.
OC 671. GEOPHYSICAL FLUID DYNAMICS (4). Dynamics of rotating and stratified fluids, potential vorticity, geostrophic motion; inviscid shallowwater theory, Poincare, Kelvin, and Rossby waves; geostrophic adjustment, quasigeostrophic approximation, Ekman layers, two-layer and continuously stratified models. Offered annually. PREREQS: OC 670 [C]

OC 672. THEORY OF OCEAN CIRCULATION
(4). Theory of steady and time-dependent arge-scale circulation in ocean basins. Effects of earth's curvature: the beta-plane approximation. The wind-driven Sverdrup circulation, western boundary currents, eastern boundary upwelling; the effects of friction. Linear theory and nonlinear theory; inertial gyres. Effects of buoyancy forcing; heating, cooling, evaporation, precipitation; density stratification. Wind- and buoyancy-forced circulation in the thermocline; ventilation. Potential vorticity conservation and homogenization. Offered annually. PREREQS: (OC 670 [C] and OC 671 [C] )

## OC 673. DESCRIPTIVE PHYSICAL

OCEANOGRAPHY (4). Fundamental mass, force, and energy balances of the ocean; geostrophy; planetary boundary layers; wind-driven and thermohaline circulation; vorticity; air-sea fluxes of heat, salt, moisture and momentum. Application of these balances through descriptive examination of the ocean-global heat budget; surface current systems; abyssal circulation. Study of variability on a variety of time and space scales. instrumentation and platforms used for observing the ocean. Offered annually. PREREQS: (OC 530 [C] or OC 670 [C] or ATS 515 [C] )
OC 674. TURBULENCE (4). Governing equations, turbulent kinetic energy, vorticity dynamics; turbulent transports of mass and momentum; statistical description of turbulent flows, spectral dynamics; turbulent boundary layers, planetary boundary layers in the atmosphere and ocean, convective mixed layers, stable boundary layers; deep ocean turbulence. Offered alternate years. PREREQS: OC 670 [C]

OC 675. NUMERICAL MODELING IN OCEAN CIRCULATION (4). Review of theoretical models of ocean circulation, including shallow water, barotropic, quasigeostrophic, and primitive equation models; adjustment times, internal length and time scales; the role of advection, bathymetry, and coastlines; global models, basin models, regional models and models of jets, eddies and boundary currents. Review of numerical techniques and problems specific to ocean modeling. Local facilities are used to develop models on remote supercomputers. PREREQS: OC 670 [C] and /or equivalent and a working knowledge of FORTRAN.
OC 676. INVERSE MODELING AND DATA
ASSIMILATION (4). Survey of methods for combining oceanographic observations and observing systems with numerical models of ocean circulation. Topics include: finitedimensional least squares theory with inequality constraints; optimal interpolation; the representation theory of smoothing; the Kalman smoother and filter; gradient descent methods for minimization; spatial and temporal regularity of filters and smoothers; linear theory of array design; nonlinear optimization, practical assimilation methods. PREREQS: Strong background in linear algebra and advanced calculus, geophysical
fluid dynamics, numerical modeling of ocean circulation.

OC 678. OCEAN REMOTE SENSING (4). Theory and applications of satellite remote sensing observations of the ocean with emphasis on strengths and limitations in the measurements Topics include review of electricity and magnetism, absorption and scattering in the atmosphere (radiative transfer), satellite orbital mechanics, measurements of ocean color, infrared remote sensing, microwave radiometry, scatterometry, and satellite altimetry. Offered alternate years. PREREQS: MTH 252 and PH 212

OC 679. SPECIAL TOPICS IN PHYSICAL OCEANOGRAPHY (1-4). Subjects of current interest in physical oceanography, not covered in depth in other courses. May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits.
OC 680. STABILITY OF GEOPHYSICAL FLUID
FLOWS (4). Linear perturbation analysis applied to geophysical flows. These methods provide both quantitative and conceptual insight into the formative stages of turbulent flow. Emphasis is on practical numerical methods for the solution of differential eigenvalue problems. Examples are drawn from a wide range of geophysical flow instabilities, based in part upon student interests. PREREQS: OC 670 [C] and COREQ: OC 670 and multivariate calculus, matrix calculus, Matlab.

OC 681. GEOPHYSICAL WAVES (4).
Fundamentals of wave dynamics applied to geophysical fluids. Hyperbolic waves--linear and nonlinear; characteristics; shock waves. Dispersive waves--linear waves, dispersion relations, group velocity; isotropic and anisotropic dispersion; nonlinear solitary waves. Application o geophysical waves--surface gravity, capillary, internal gravity, Kelvin, planetary, coastal. Offered alternate years. PREREQS: OC 670 [C]

## OC 682. DATA ANALYSIS IN THE TIME AND

 SPACE DOMAINS (4). Theory of classical and modern techniques for analysis of data in the time and space domains with applications to real oceanographic and atmospheric data. Topics include correlation analysis, regression analysis, EOF analysis, objective mapping, interpolation, filtering, sampling errors, and confidence tests. Offered alternate years. PREREQS: MTH 341 and MTH 342 and MTH 418 and OC 608 and ST 314 and a working knowledge of Matlab, IDL, or FORTRAN, or consent of instructor.OC 683. DATA ANALYSIS IN THE FREQUENCY
AND WAVE NUMBER DOMAINS (4). Theory of classical and modern techniques for analysis of data in the frequency and wavenumber domains with applications to real oceanographic and atmospheric data. Topics include sampling theory, one-dimensional autospectral analysis, multidimensional autospectral analysis, coherence and phase analysis, bi-spectral analysis, wavelet analysis, and confidence tests. Offered alternate years. PREREQS: MTH 341 and MTH 342 and MTH 418 and OC 608 and ST 314 and a working knowledge of Matlab, IDL, or FORTRAN, or consent of instructor.

OC 691. PROPOSAL WRITING (3). Teaches the use of NSF Fastlane. Includes a discussion of ethics and fairness in reviewing, a review of real proposals by faculty, a simulated NSF funding panel, and then development of a real proposal, for review purposes. This will relate directly to the student's current thesis or project. The course enables graduate students from all disciplines to develop rigorous, well thought-out proposals. It should be taken early enough in the program so that the proposal process contributes to their research progress.

OC 808. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

## ■ OCEAN, EARTH, AND

## ATMOSPHERIC SCIENCES

## COURSES

OEAS 500. CASCADIA FIELD TRIP (2-4). A field course to various locations within the Cascade volcanic arc, Coast Range and Oregon Coast. Introduction to the range of physical and biological science topics to be covered in OEAS 520,
OEAS 530 and OEAS 540 in field settings; the linkages between these topics, and their impact on humans, with case examples. Students will practice math skills, and collect samples and data to be used in laboratory sessions in the later courses. Offered annually. Transportation fee charged. Graded P/N. This course is repeatable for a maximum of 4 credits.
OEAS 520. THE SOLID EARTH (4). Movement of mass and energy within the Earth and into/out of its outer surface, expressed as plate tectonics, earthquakes, heat flow, volcanoes, geomagnetic field; composition, structure, hydrology and aging of ocean crust; lithosphere creation, recycling and mantle overturn. Marine sedimentation, sources and transport, continental weathering, tectonicsclimate interactions, glacial history and sea level response. Geohazards, storm events, beach and estuary processes. Offered annually. Lec/lab. PREREQS: One year each of physics, chemistry, calculus, or instructor permission.
OEAS 530. THE FLUID EARTH (4). Fundamental principles of fluid circulation in the atmosphere and ocean. Atmospheric chemistry, radiation, thermodynamics, and dynamics. Conservation of mass, heat, momentum and vorticity in the ocean; equations governing motion; geostrophy; planetary boundary layers; wind-driven and thermohaline circulation. Air-sea fluxes and global circulation models; climate change. Offered annually. Lec/lab. PREREQS: One year each of physics, chemistry, calculus, or science background and permission of instructor; field course.
OEAS 540. THE BIOGEOCHEMICAL EARTH (4). Integrating fundamental concepts in biological and chemical oceanography to understand energy and material transformations in estuarine, coastal and open ocean habitats. Topics include structure and function of marine ecosystems, biogeochemical cycles, and human impacts. Offered annually. Lec/ lab. PREREQS: One year of physics, chemistry, and calculus, or instructor permission.

The College of Education develops multiculturally competent researchers, scholars, learning leaders and practitioners who make a difference by promoting innovation, social justice, and lifelong learning with a focus on STEM and cultural and linguistic diversity. Our research and professional preparation foster scholarship, intellectual stimulation, openness, flexibility, and a sense of community.

$\square$he College of Education offers an undergraduate Education Double Degree and graduate degrees and programs to prepare teachers, counselor educators, and other educational professionals for careers in schools, community colleges, business and industry, and other postsecondary settings. In addition, there are electives for undergraduate students who wish to explore education as a career choice.
All programs reflect research-based approaches to education and counseling developed by university faculty, prekindergarten through adult teachers and administrators, counselors and leaders from business and industry. Students gain experience through extensive internships in their field of study.

## AUTHORIZATION AND ACCREDITATION

The College of Education is authorized by the State Board of Higher Education to offer teacher education and counseling programs and by the Oregon Teacher Standards and Practices Commission (TSPC) to recommend teacher and counselor candidates for initial licensure.
The Teacher Standards and Practices Commission (TSPC) listing of endorsements that OSU is authorized to approve is on the Web at http://www.tspc. state.or.us/program_list.asp.

All teacher education programs are fully accredited by the Council for the Accreditation of Educator Preparation (CAEP) and by the Oregon Teacher Standards and Practices Commission. Counselor education programs are fully accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP).
Applicants for teacher and counselor licensure must meet TSPC requirements in effect at the time of admission to a licensure program. Licensure rules are regulated by TSPC and may change. Students should consult regularly with their advisor.

## ADVISING

Early and continuous advising is an important aspect of an education in both the undergraduate and graduate programs in the College of Education. Students pursuing an undergraduate degree shall meet with a professional academic advisor in the centralized advising office, while graduate students shall be assigned a faculty advisor. Undergraduates pursuing the undergraduate Double Degree in Education are urged to declare their interest immediately in order to work for the preferred 3.0 GPA entry requirement and to graduate in a timely manner. It is important for undergraduates to work concurrently with both the College of Education academic advisor and the academic advisor for their primary degree to ensure knowledge of academic progress,
degree requirements, and educational opportunities in their chosen field.

## SCHOLARSHIPS

The College of Education offers a variety of scholarships and fellowships to deserving students. A listing of the many opportunities can be found at http://education. oregonstate.edu/education-scholarships-and-fellowships. Students who have declared their major in education are sent an email application to consider applying during winter term each year. Additional state and private scholarship information are available at the OSU Office of Financial Aid and Scholarships.

## FACULTY

Professors Bell, Dierking, Flick, Ng, Russ-Eft, Storksdieck
Associate Professors Bouwma-
Gearhart, Ciechanowski, Crisp, Dykeman, Elliott, Rowe, Rubel
Assistant Professors Aaron, Arellano, Bottoms, Colomer, Giamellaro, Johnson, Lara, Tevis, Thompson
Instructors Adams, Aduviri, Aguilera, Biles, Boyd-Berman, Cabot, CazaresCervantes, Clemens, Cornwall, Eakin, Ford, Golya, Helback, Hoffman, Johnson, Knapp, Lee, Leija, Meyers, Nyman, M. O'Malley, N. O'Malley, Platt, Reese, Sánchez-Aragon, Schamp, Schuetz, L. White, Wright

## EMERITUS FACULTY

Copa, Courtney, Duvall, Falk, Higgins, Moule, Niess, Sanchez, Stern, Ward, Winograd

## PROGRAM COORDINATORS

Aguilera, Cabot, Eakin, Hoffman, Johnson, Lee, Nyman, Platt, Schuetz, White, Zeller

Undergraduate Major
Education (BA, BS, HBA, HBS)

## Options

Advanced Mathematics Teaching
Basic Mathematics Teaching
Biology Teaching
Chemistry Teaching
Early Childhood/Elementary Teaching
Family and Consumer Sciences Teaching
Health Teaching
Integrated Science Teaching
Language Arts Teaching
Physics Teaching
Social Studies Teaching

## Undergraduate Minor

Education

## Graduate Majors

Adult and Higher Education (EdD, EdM, MAIS, PhD)

Graduate Options
Community College Leadership

104 Joyce Collin
Furman Hall Oregon State University
Corvallis, OR
97331-3502
541-737-4661
Website: http:// education. oregonstate.edu

## Administration

## Toni Doolen,

 DeanRandy L. Bell,
Associate Dean of Academic Affairs

## Jana BouwmaGearhart,

Associate Dean of Research

Julie Gess-
Newsome,
Interim Dean of Academic Programs, OSU-Cascades, Associate Dean for Human Health and Wellness, 541-322-2045, julie. gess-newsome@ osucascades.edu

## Jennifer

Bachman,
Director of Online Education

## Kristin Kinman,

Administration Manager

Nell O'Malley,
Director of Education Licensure and Field Services

Karla Rockhold,
Academic Advisor
and Recruiting
Specialist
Jordan
Zardinejad,
Admissions Advisor

Leadership in Higher Education<br>Counseling (MCoun, PhD)<br>Graduate Options<br>Clinical Mental Health Counseling<br>Counselor Education [Pending approval]<br>School Counseling<br>Education (EdD, EdM, MS, PhD, MAIS)<br>Graduate Options<br>Advanced Science and Mathematics Education (EdM)<br>Agriculture Education (PhD)<br>Free-Choice Learning (EdM)<br>Language Equity and Educational Policy (PhD)<br>Mathematics Education (MS)<br>PK-12 English to Speakers of Other Languages (ESOL) (EdM)<br>Science Education (MS)<br>Science/Mathematics Education (PhD)<br>Social Justice in Education (EdM)<br>Mathematics Education (MA, MS, PhD)<br>[To be suspended, pending approval]<br>Graduate Areas of Concentration<br>Elementary School Mathematics<br>Free-choice Learning<br>Mathematics Education<br>Middle School Mathematics<br>Secondary Mathematics<br>Science Education (MA, MS, PhD) [To be suspended, pending approval]<br>Graduate Areas of Concentration<br>Elementary School Science<br>Free-choice Learning<br>Middle School Science<br>Science Education<br>Secondary Science<br>Teaching (MAT)<br>\section*{Graduate Options}<br>Clinically Based Elementary<br>Elementary<br>Language Arts<br>Mathematics<br>Music<br>Science<br>Social Studies

## Graduate Minors

Adult Education
Counseling
Education
Mathematics Education [To be suspended pending submission and approval of a proposal]
Graduate Areas of Concentration
Elementary school science, free-choice learning, middle school science, science education, secondary science
Science Education [To be suspended pending submission and approval of a proposal]
Graduate Areas of Concentration Elementary school science, free-choice learning, middle school science, science education, secondary science

## DECREES \& PROCRAMS WHANI THE COLLECE OF EDUCATION <br> UNDERGRADUATE MAJORS WITH OPTIONS

## EDUCATION (BA, BS, HBA, HBS)

The undergraduate Education Double Degree program enables students to earn two undergraduate degrees concur-rently-one in their chosen field and the second in Education (BA or BS degree). The Education Double Degree in teacher education is an undergraduate pathway to teacher preparation available to all OSU students. The BA/BS in Education can only be obtained in conjunction with a BA/BS in a student's chosen field.
The Double Degree program has two stages. The first stage, Pre-Education, allows students to take foundational education courses and required contentspecific classes without prerequisites. These classes can meet baccalaureate core requirements and elective credits. The second stage, Professional Level, consists of 40 credits focusing on a particular authorization level. The Professional Level includes pedagogy classes and student teaching. Students earn their second degree (Education BS/BA) and simultaneously earn an Oregon Preliminary Teaching License in their chosen content area and authorization level.
First-years, sophomores, juniors, and seniors may enroll in one or more of the pre-education courses at any time during any year of their studies. There are no initial prerequisites for these courses and they may help students decide whether teaching is right for them. To enter the Professional Level of the Double Degree students need to have completed required course work, pass a content exam, and pass the Civil Rights in the Educational Environment Exam. The full application information is on the College of Education website. It is strongly recommended that students meet with the College of Education Double Degree advisor early in the Pre-Education level and at least a year prior to their application to the Professional Level.

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## Education (Double Degree) K-12 Classrooms Pathway

## Level I: Pre-Education

Classes Required for Admission to Professional Level-these classes can be taken any time prior to application to Level II.

## ED 216. *Purpose, Structure, and Function

 of Education in a Democracy (3)ED 219. Civil Rights and Multicultural Issues in Education (3)
ED 253. Learning Across the Lifespan (3)+

ED 309. Field Practicum (3)
or ED 409 Practicum/Clinical Experience (3)
ED 472. Foundations of ESOL Education (3)
ED 479. Linguistics for Teachers (3)

## Completion of First Degree

Content Specific Courses for Subject Area Teaching (Content Mastery Sheets are available on the College of Education website or in the Student Services Office in Furman Hall.)

## Level II: Professional Level

Admission (Cohort Year)
Application is due April 1, the spring before beginning cohort year.

## Early Childhood/Elementary

## Authorizations

Fall Term
ED 340. ^Supportive Differentiated
Environments (3)
ED 409. Practicum/Clinical Experience (3)
ED 410. Internship/Work Experience (2)
ED 457. Teaching Elementary Mathematics for Understanding (3)
SED 459. Science and the Nature of Inquiry (3)

Winter Term
ED 407. Seminar (2)
ED 410. Internship/Work Experience (2)
ED 456. Strategies for Teaching Language
Arts and Social Studies (3)
ED 473. Instructional Approaches for ESOL Education (3)
ED 483. Developmental Reading (3)

## Spring Term

ED 410. Internship/Work Experience (10)
ED 424. Teacher as Reflective Practitioner (2)

## Middle/High School Authorizations

Fall Term
ED 340. ^Supportive Differentiated
Environments (3)
ED 409. Practicum/Clinical Experience (3)
ED 410. Internship/Work Experience (2)
ED 412. Learning Styles and Needs in Adolescence (2)
ED 491 Content Standards and Curriculum Development for Mid Level 9 (3) or ED 494 Content Standards and Curriculum Development for High School (3)
or SED 473 Science Pedagogy and Technology I (4) or SED 474 Mathematics Pedagogy and Technology I (4)

## Winter Term

ED 407. Seminar (1)
ED 410. Internship/Work Experience (2)
ED 425. Curriculum Implementation and Instructional Strategies 7-12 (4)
or SED 476 Math Pedagogy and Technology II
ED 427. Alternative Assessment for Middle and High School Teaching (2)
ED 493. Reading, Literature, and Language Development in the Content (2) or ED 473. Instructional Approaches for ESOL Education (3)

## Spring Term

ED 410. Internship/Work Experience (10)
ED 424. Teacher as Reflective Practitioner (2)

## Footnotes:

+ If you have taken HDFS 211, 311, 313, 314 and have a 3.0 GPA or higher, you do not need to take ED 253.
\# With junior or senior standing
* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Pre-Education Major Code: 232
Major Code: 233


## OPTIONS

## ADVANCED MATHEMATICS TEACHING OPTION

This option is for students wanting to earn their bachelor's degree in Education and qualify for an Oregon Teaching License to teach advanced mathematics at the middle school (grades 5-9) and high school (grades 9-12) levels.

## Pre-Education Level

Students at this level will be taking general education prerequisite courses and required content course work.

Note: Pre-Education students should meet with the Double Degree Advisor at least once a year in order to ensure they are on track to meet the prerequisite and content mastery requirements prior to applying to the Professional Level.

## Pre-Education General Course Work

 (18 credits)Completed prior to Professional Level:
ED 216. *Purpose, Structure, \& Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)
ED 253. Learning Across the Lifespan (3)
(Not required if you have taken HDFS 311,
313 and 314 with a 3.0 or higher GPA)
ED 309. Field Practicum (3) (Can be waived with 60 hours supervised/documented volunteer service)
ED 472. Foundations of ESOL Education (3)
ED 479. Linguistics for Teachers (3)

## Advanced Mathematics Content

 Mastery Requirements (47 credits)To be completed prior to Professional Level. These requirements are based on standards from the National Council of Teachers of Mathematics for teaching grades 7-12. Most of these classes will also meet requirements for a student's first degree.

- Must have 3.0 accumulative GPA on all course work to fulfill content mastery requirements.
- All grades must be taken as A-F graded courses; no P/N or S/U grades accepted for content mastery courses
Standard 1. Calculus (12 cr)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 254. Vector Calculus I (4)
Standard 2. Discrete Math (3 cr)
MTH 355. Discrete Mathematics (3)
Standard 3. Statistics (4 cr)
ST 351. Introduction to Statistical Methods (4)

Standard 4. Probability (3 cr)
MTH 361. Introduction to Probability (3)
Standard 5. Geometry (3 cr)
MTH 338. ^Non-Euclidean Geometry (3)
Standard 6. Linear Algebra (3 cr)
MTH 341. Linear Algebra I (3)
Standard 7. Abstract Algebra (3 cr)
MTH 343. Introduction to Modern Algebra (3)

## Standard 8. Algebraic and

Geometric Transformations (9 cr)
MTH 491, MTH 492, MTH 493. Algebra and Geometric Transformations $(3,3,3)$
Standard 9. Math Electives (7 cr)
SED 414. Inquiry in Mathematics and Mathematics Education (3)
Choose one from below (4):
MTH 253. Infinite Series and Sequences (4)

MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4)
MTH 306. Matrix and Power Series Methods (4)
MTH 311. Advanced Calculus (4)
MTH 312. Advanced Calculus (4)
Statistics or Engineering Course as approved by Double Degree Advisor

## Professional Level

To be accepted into the Professional Level, a student must have completed the required Pre-Education General Courses and the Content Mastery Requirements with a minimum 3.0 GPA or by special petition. In addition, students need two letters of recommendation and passing scores on required licensure exams.

## Professional Level Course Work (37-38 credits)

Taken during the Professional year-long program:
ED 340. ${ }^{\wedge}$ Supportive Differentiated
Environments (3)
ED 407. Seminar (1)
ED 409. Practicum/Clinical Experience (2)
(September Experience)
ED 409. Practicum/Clinical Experience (3) (Fall Practicum)
ED 410. Internship/Work Experience (3) (Part-time Student Teaching)
ED 410. Internship/Work Experience (10)
(Full-time Student Teaching)
ED 412. Learning Styles and Needs in Adolescence (2)
ED 424. Teacher as Reflective Practitioner (2)
ED 425. Curriculum Implementation and
Instructional Strategies 7-12 (4)
ED 427. Alternative Assessment for Middle and High School (2)
ED 493. Reading, Literature, and Language Development in the Content (2) or ED 473. Instructional Approaches for ESOL Education (3)
ED 494 Content Standards and Curriculum Development for High School (3)

## Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course (WIC)
Option Code: 60


## BASIC MATHEMATICS TEACHING OPTION

This option is for students wanting to earn a bachelor's degree in Education and qualify for an Oregon Teaching License to teach basic mathematics at the middle school (grades 5-9) and only grade 9 in high school.

## Pre-Education Level

Students at this level will be taking general education prerequisite courses and required contact course work.

Note: Pre-Education students should meet with the Double Degree Advisor at least once a year in order to ensure they are on track to meet the prerequisite and content mastery requirements prior to applying to the Professional Level.
Pre-Education General Course Work ( 18 credits)
Complete prior to Professional Level:
ED 216. *Purpose, Structure, \& Function of
Education in a Democracy (3)
ED 219. Civil Rights and Multicultural
Issues in Education (3)
ED 253. Learning Across the Lifespan (3)
(Not required if you have taken HDFS 311,
313 and 314 with a 3.0 or higher GPA)
ED 309. Field Practicum (3) (Can be waived with 60 hours supervised/documented volunteer service.)
ED 472. Foundations of ESOL Education (3) ED 479. Linguistics for Teachers (3)

## Basic Mathematics Content

Mastery Requirements (37 credits)
To be completed prior to beginning the Professional Level. These requirements are based on standards from the National Council of Teachers of Mathematics for teaching grades $7-12$. Most of these courses will also meet requirements for student's first degree.

- Must have 3.0 accumulative GPA on all course work to fulfill content mastery requirements.
- All grades must be taken as A-F graded courses; no P/N or S/U grades accepted for content mastery courses.


## Standard 1. Algebra/Trigonometry

 (4 cr)MTH 112.*Elementary Functions (4)
Standard 2. Calculus (4 cr)
MTH 241. *Calculus for Management and Social Science (4)
or MTH 251. *Differential Calculus (4)
Standard 3. Foundations in
Elementary Mathematics (12 cr)
MTH 211. *Foundations of Elementary Mathematics (4)
MTH 212, MTH 390. Foundations of
Elementary Mathematics $(4,4)$

## Standard 4. Statistics and

Probability ( $8 \mathbf{c r}$ )
ST 201. Principles of Statistics (4)
ST 202. Principles of Statistics (4)
Standard 5. Math Electives (at least 6 cr )
Choose at least 2 courses (at least 6 credits):

MTH 245. *Mathematics for Management,
Life, and Social Sciences (4)
MTH 252. Integral Calculus (4)
MTH 341. Linear Algebra I (3)
Any Statistics (ST) Course

## Standard 6. Mathematics Education (3 cr) <br> SED 414. Inquiry in Mathematics and Mathematics Education (3) (Elementary or Secondary Section)

## Professional Level

To be accepted into the Professional Level, a student must have completed the required Pre-Education General Courses and the Content Mastery Requirements with a minimum 3.0 GPA or by special petition. In addition, students need two letters of recommendation and passing scores on required licensure exams.

## Professional Level Course Work

 (37-38 cr)Taken during the Professional year-long program:
ED 340. ^Supportive Differentiated
Environments (3)
ED 407. Seminar (1)
ED 409. Practicum/Clinical Experience (2) (September Experience)
ED 409. Practicum/Clinical Experience (3)
(Fall Term Practicum)
ED 410. Internship: Part-time Student Teaching (3)
ED 410. Internship/Work Experience (10)
ED 412. Learning Styles and Needs in Adolescence (2)
ED 424. Teacher as Reflective Practitioner (2)
ED 425. Curriculum Implementation and Instructional Strategies 7-12 (4)
ED 427. Alternative Assessment for Middle and High School (2)
ED 493. Reading, Literature, and Language Development in the Content (2) or ED 473. Instructional Approaches for ESOL Education (3)
ED 494. Content Standards and Curriculum Development for High School (3)

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 61


## BIOLOGY TEACHING OPTION

This option is for students wanting to earn a bachelor's degree in Education and qualify for an Oregon Teaching License to teach biology at the high school level (grades 9-12).

## Pre-Education Level

Students at this level will be taking general education prerequisite courses and required content course work.

Note: Pre-Education students should meet with the Double Degree Advisor at least once a year in order to ensure they are on track to meet the prerequisite and content mastery requirements prior to applying to the Professional Level.
Pre-Education General Course Work (18 cr)
Taken prior to Professional Level:

ED 216. *Purpose, Structure, \& Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)
ED 253. Learning Across the Lifespan (3)
(Not required if you have taken HDFS 311, 313 and 314 with a 3.0 or higher GPA)
ED 309. Field Practicum (3) (Can be waived with 60 hours supervised/documented volunteer service)
ED 472. Foundations of ESOL Education (3)
ED 479. Linguistics for Teachers (3)

## Biology Content Mastery

## Requirements (49 cr)

To be completed prior to the Professional Level. Most of these courses will also meet requirements for student's first degree.

- Must have 3.0 accumulative GPA on all course work to fulfill content mastery requirements.
- All grades must be taken as A-F graded courses; no P/N or S/U grades accepted for content mastery courses.
Standard 1. Biology Sequence (12 cr)
BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)


## Standard 2. Chemistry Sequence

( 15 cr )
CH 231, CH 232, CH 233. *General
Chemistry ( $4,4,4$ ) and CH 261, CH 262,
CH 263. *Laboratory for Chemistry 231,
232, 233 (1,1,1)
Standard 3. Physics Sequence (10 cr)
PH 201, PH 202. *General Physics $(5,5)$

## Standard 4. Other Life Science <br> Disciplines ( 9 cr )

Choose 9 credits of upper-division

## courses from more than 1 area:

Anatomy and Physiology
Botany
Ecology
Evolution
Genetics
History of Science
Microbiology
Oceanography
Philosophy of Science
Zoology
Standard 5. Science Education (3 cr)
SED 413. Inquiry in Science and Science Education (3) (Secondary Section)

## Professional Level

To be accepted into the Professional Level, a student must have completed the required Pre-Education General Courses and the Content Mastery Requirements with a minimum 3.0 GPA or by special petition. In addition, students need two letters of recommendation and passing scores on all required Oregon licensure exams.

## Professional Level Course Work

 (37-38 cr)Taken in order during the Professional year-long program.
Taken during the Professional year-long program.
ED 340. ${ }^{\wedge}$ Supportive Differentiated

Environments (3)
ED 407. Seminar (1)
ED 409. Practicum/Clinical Experience (2) (September Experience)
ED 409. Practicum/Clinical Experience (3) (Fall Practicum)
ED 410. Internship/Work Experience (3) (Part-time Student Teaching)
ED 410. Internship/Work Experience (10)
(Full-time Student Teaching)
ED 412. Learning Styles and Needs in Adolescence (2)
ED 424. Teacher as Reflective Practitioner (2)
ED 425. Curriculum Implementation and
Instructional Strategies 7-12 (4)
ED 427. Alternative Assessment for Middle and High School (2)
ED 493. Reading, Literature, and Language Development in the Content (2) or ED 473. Instructional Approaches for ESOL Education (3)
ED 494. Content Standards and Curriculum Development for High School (3)

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 62


## CHEMISTRY TEACHING OPTION

This option is for students wanting to earn a bachelor's degree in Education and qualify for an Oregon Teaching License to teach chemistry at the high school level (grades 9-12).

## Pre-Education Level

Students at this level will be taking general education prerequisite courses and required content course work.
Note: Pre-Education students should meet with the Double Degree Advisor at least once a year in order to ensure they are on track to meet the prerequisite and content mastery requirements prior to applying to the Professional Level.

## Pre-Education General Course Work

(18 cr)
Taken prior to Professional Level:
ED 216. *Purpose, Structure, \& Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)
ED 253. Learning Across the Lifespan (3)
(Not required if you have taken HDFS 311,
313 and 314 with a 3.0 or higher GPA)
ED 309. Field Practicum (3) (Can be waived with 60 hours supervised/documented volunteer service)
ED 472. Foundations of ESOL Education (3)
ED 479. Linguistics for Teachers (3)

## Chemistry Content Mastery

Requirements (52-53 cr)
To be completed prior to the Professional Level. These requirements are based standards from the National Science Teachers Association standards for teaching grades $7-12$. Most of these courses will also meet requirements for student's first degree.

- Must have 3.0 accumulative GPA on all course work to fulfill content mastery requirements.
- All grades must be taken as A-F graded courses; no P/N or S/U grades accepted for content mastery courses. No class with a grade below a C- will be accepted.
Standard 1. Physical Science (15 cr):
Choose 1 series from below (15):
PH 201, PH 202, PH 203. *General Physics (5,5,5)
PH 211, PH 212, PH 213. *General Physics with Calculus ( $4,4,4$ ) and PH 221, PH 222, PH 223. Recitation for Physics 211, 212, 213 (1,1,1)


## Standard 2. Chemistry Sequence

( 15 cr )
CH 231, CH 232, CH 233. *General Chemistry $(4,4,4)$ and CH 271 , CH 272, CH 273. *Laboratory for CH 231, CH 232, CH 233 (1,1,1)
Standard 3. Biochemistry or Physical Chemistry Sequence (7-9 cr)
Choose 1 series from below (7-9):
BB 450, BB 451. General Biochemistry $(4,3)$
CH 440, CH 441, CH 442. Physical Chemistry ( $3,3,3$ )

## Standard 4. Organic Chemistry

Sequence (9-12 cr)
Choose 1 chemistry series from below (9-12):
CH 331, CH 332. Organic Chemistry $(4,4)$ and CH 337. Organic Chemistry Laboratory (4)
CH 334, CH 335, CH 336. Organic Chemistry ( $3,3,3$ ) and CH 337. Organic Chemistry Laboratory (4) or CH 361. Experimental Chemistry I (3)
Standard 5. Science Education (3 cr)
SED 413. Inquiry in Science and Science Education (3)

## Professional Level

To be accepted into the Professional Level, a student must have completed the required Pre-Education General Courses and the Content Mastery Requirements with a minimum 3.0 GPA or by special petition. In addition, students need two letters of recommendation and passing scores on all required Oregon licensure exams.

## Professional Level Course Work

 (37-38 cr)Taken during the Professional year-long program.
ED 340. ^Supportive Differentiated
Environments (3)
ED 407. Seminar (1)
ED 409. Practicum/Clinical Experience (2) (September Experience)
ED 409. Practicum/Clinical Experience (3) (Fall Practicum)
ED 410. Internship/Work Experience (3) (Part-time Student Teaching)
ED 410. Internship/Work Experience (10)
(Full-time Student Teaching)
ED 412. Learning Styles and Needs in Adolescence (2)
ED 424. Teacher as Reflective Practitioner (2)
ED 425. Curriculum Implementation and
Instructional Strategies 7-12 (4)
ED 427. Alternative Assessment for Middle and High School (2)

ED 493. Reading, Literature, and Language Development in the Content (2)
or ED 473. Instructional Approaches for ESOL Teachers (3)
ED 494. Content Standards and Curriculum
Development for High School (3)

## Footnotes:

*Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 63

## EARLY CHILDHOOD/ ELEMENTARY TEACHING OPTION

This option is for students wanting to earn a bachelor's degree in Education and qualify for an Oregon Teaching License to teach multiple subjects at the early childhood/elementary (grade PreK-6 in a self-contained classroom) levels.

## Pre-Education Level

Students at this level will be taking general education prerequisite courses and required content course work.

Note: Pre-Education students should meet with the Double Degree Advisor at least once a year in order to ensure they are on track to meet the prerequisite and content mastery requirements prior to applying to the Professional Level.

## Pre-Education General Course Work

## ( 18 cr )

Taken prior to Professional Level:
ED 216. *Purpose, Structure, \& Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)
ED 253. Learning Across the Lifespan (3)
(Not required if you have taken HDFS 311, 313 and 314 with a 3.0 or higher GPA)
ED 309. Field Practicum (3) (Can be waived with 60 hours supervised/documented volunteer service)
ED 472. Foundations of ESOL Education (3)
ED 479. Linguistics for Teachers (3)

## Early Childhood/Elementary

Content Mastery Requirements

## (66-67 cr)

Completed prior to Professional Level.
These requirements are based on the National Board for Professional Teaching Standards/Generalist, Standard II: Knowledge of Content and Curriculum. Most of these courses will also meet requirements for student's first degree.

- Must have 3.0 accumulative GPA on all course work to fulfill content mastery requirements.
- All grades must be taken as A-F graded courses; no P/N or S/U grades accepted for content mastery courses.
- All classes must be passed with a Cor above.


## Standard 1. English Language Arts

## (15 cr)

Know the important themes, ideas,
concepts, and strategies central to learning how to read, write, speak, view and listen.

A minimum of 6 credits of English:
Any two ENG courses
A minimum of 6 credits of writing required:
WR 121. *English Composition (3) required
WR 222. *English Composition (3)
or any ${ }^{\wedge}$ WIC Course (3)
A minimum of 3 credits speaking,
viewing, listening - choose 1 course:
COMM 111. *Public Speaking (3)
COMM 218. *Interpersonal
Communication (3)
or any other communication/speech course (3)
Standard 2. Social Studies (10-11 cr)
Know the major issues, concepts, themes and ideas in social studies.
A minimum of 4 credits of US history

- choose 1 course from below:

HST 201. *History of the United States (4)
HST 202. *History of the United States (4)
HST 203. *History of the United States (4)
Note: These history courses need not be taken in sequence.
$A$ minimum of 3 credits of geography, political science, economics, or civics - choose 1 course from below:
GEOG 105. *Geography of the Non-Western World (3)
GEOG 106. *Geography of the Western
World (3)
or any civics, economics or other geography course (3)
A minimum of 3 credits of Difference, Power, and Discrimination or equity focused classes - choose 1 course from below:
DHE 270. *Appearance, Power and Society (4)
ENG/FILM 220. *Topics in Difference,
Power, and Discrimination (4)
ES 351. *Ethnic Minorities in Oregon (4)
ES/ANTH/WLC 459. Language, Race and
Racism in the U.S.: Advanced Study (4)
HDFS 201. *Contemporary Families in the US (3)
PHL 280. *Ethics of Diversity (4)
SOC 206. *Social Problems and Issues (3)
SOC 312. *Sociology of the Family (4)
SOC 426. *Social Inequality (4)
WGSS 325. *Disney: Gender, Race, Empire (3)

Standard 3. Mathematics (15 cr)
Know the major concepts, procedures, processes, and ideas of mathematics that define number systems and number sense, computation, geometry, algebra, measurement, and statistics and probability.
All 4 courses are required (15):
MTH 211. *Foundations of Elementary Mathematics (4)
MTH 212. Foundations of Elementary Mathematics (4)
MTH 390. Foundations of Elementary Mathematics (4)
SED 414. Inquiry in Mathematics and Mathematics Education (3) (Elementary Section)

## Standard 4. Science (15 cr)

Draw on own knowledge of fundamental
ideas and concepts in Earth and space science, life science, and physical science and their relationship to one another and/or other disciplines.
All 4 science courses are required (15):

BI 101. *General Biology (4)
GEO 201. *Physical Geology (4)
PH 111. *Inquiring into Physical Phenomena (4)
SED 413. Inquiry in Science and Science Education (3) (Elementary Section)

## Standard 5. The Arts or Technology in Teaching ( $\mathbf{3} \mathbf{~ c r}$ )

- Understand the intrinsic value of the arts and their usefulness in providing insight into other disciplines.
- Understand uses of technology in classroom teaching.
- A minimum of 3 credits in any art, music, theater arts or educational technology course.


## Standard 6. Educational

Foundations (8 cr)
In addition to the above content requirements, a knowledge of early childhood/ elementary learners.
HDFS 311. Infant and Child Development (4)

HDFS 313. Adolescent Development (4)

## Professional Level

To be accepted into the Professional Level, a student must have completed the required Pre-Education General Courses and the Content Mastery Requirements with a minimum 3.0 GPA or by special petition. In addition, students need two letters of recommendation and passing scores on all required Oregon licensure exams.
Professional Level Course Work (40 cr)
Taken during the Professional year-long program.
ED 340. ^Supportive Differentiated
Environments (3)
ED 407. Seminar (2)
ED 409. Practicum/Clinical Experience (2)
(September Practicum)
ED 409. Practicum/Clinical Experience (3)
(Fall Practicum)
ED 410. Internship/Work Experience (3)
(Part-time Student Teaching)
ED 410. Internship/Work Experience (10)
(Full-time Student Teaching)
ED 424. Teacher as Reflective Practitioner (2)
ED 456. Strategies for Teaching Language Arts and Social Studies (3)
ED 457. Teaching Elementary Mathematics for Understanding (3)
ED 473. Instructional Approaches for ESOL Education (3)
ED 483. Developmental Reading (3)
SED 459. Science and the Nature of Inquiry (3)

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 64


## FAMILY AND CONSUMER

 SCIENCES TEACHING OPTIONThis option is for students wanting to earn a bachelor's degree in Education and qualify for an Oregon Teaching License to teach Family and Consumer Sciences (FACS) at the middle school (grades 6-9) and/or high school (grades 9-12) levels.

Family and Consumer Science students are encouraged to add an optional, but highly recommended, Career and Technical Education (CTE) Endorsement. This endorsement can be added during or after the degree program so one can begin working on it at any time. The following CTE endorsements are compatible with Family and Consumer Sciences:
a. Hospitality and Tourism (food, hotel, etc.)
b. Human Services (counseling, personal finance, childcare, care of disabled, personal health and fitness, etc.)
c. Education and Related Fields (preschool, teacher, administration in education-related fields, training and other)
The CTE Endorsement is earned with 1,800 hours in the industry at one workplace or 600 hours working in a variety of work settings including job shadows, internships, volunteer work and paid work.

Check with the Double Degree Advisor for more information about how to add this endorsement.

## Pre-Education Level

Students at this level will be taking general education prerequisite course work and required content course work. Students at this level will be taking general education prerequisite courses and required content course work.

Note: Pre-Education students should meet with the Double Degree Advisor at least once a year in order to ensure they are on track to meet the prerequisite and content mastery requirements prior to applying to the Professional Level.

## Pre-Education General Course Work

 (18 cr)Completed prior to Professional Level:
ED 216. *Purpose, Structure and Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)
ED 253. Learning Across the Lifespan (3)
(Not required if you have taken HDFS 311,
313 and 314 with a 3.0 or higher GPA)
ED 309. Field Practicum (3) (Can be waived with 60 hours supervised/documented volunteer service)
ED 472. Foundations of ESOL Education (3)
ED 479. Linguistics for Teachers (3) Prerequisite ED 472

## Family and Consumer Science

Content Requirements (33-37 cr)
To be completed prior to beginning the Professional Level. Most of these courses
will also meet the student's first degree requirements. Students will most likely be earning a degree in HDFS, Nutrition (Dietetics or food systems management), DHE, or Public Health.

- Must have 3.0 accumulative GPA on all course work to fulfill content mastery requirements.
- All grades must be taken as A-F graded courses; no P/N or S/U grades accepted for content mastery courses.
- Work or volunteer experiences in these standards may be considered in place of course work.
Standard 1. Career, Community,
and Family Connections (3-4 cr)
Choose 1 course from the following (3-4):
HDFS 201. *Contemporary Families in the U.S. (3)

HDFS 341. Family Studies (4)
HDFS 431. Family, School, and Community Collaboration (3)
SOC 312. *Sociology of the Family (4)
SOC 412. Sociology of Work and Family (4)
Standard 2. Consumer Services and
Family Resources (Major or 11-12 cr)
DHE Major
or
Choose 1 course from each group A, B, and C:
A)

DHE 227. Apparel Design and Construction I (4)
DHE 240. Survey of Design in the Near Environment (3)
DHE 270.*Appearance, Power and Society (4)
DHE 331. Contemporary Issues in Housing
(3)
B)

ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
C)

BA 215. Fundamentals of Accounting (4)
MRKT 492. Consumer Behavior (4)
MTH 245. *Mathematics for Management, Life, and Social Sciences (4)
ST 201. Principles of Statistics (4)
ST 202. Principles of Statistics (4)
Standard 3. Human Development and Interpersonal Relationships
(Major or 18-20 cr)

## HDFS Major

or
Choose 6 credits from the
following:
BA 351. Managing Organizations (4)
COMM 218. *Interpersonal
Communication (3)
ED 253. Learning Across the Lifespan (3)
HDFS 201. *Contemporary Families in the U.S. (3)

HDFS 240. *Human Sexuality (3)
HDFS 444. Family Violence and Neglect (4)
HDFS 447. *Families and Poverty (4)
MGMT 453. Human Resources Management
(4)

PSY 201. *General Psychology (3)
PSY 202. *General Psychology (3)
PSY 350. Human Lifespan Development (4)
SOC 206. *Social Problems and Issues (3)
SOC 312. *Sociology and the Family (4)
SOC 412. Sociology of Work and Family (4)
Documented Training in Child Abuse (3 credit equivalent)
Standard 4. Nutrition, Food, and Wellness (at least 6 cr)
Nutrition Major and Food Handlers Card
or
Choose 2 courses from below:
H 225. *Social and Individual Health Determinants (4)
H 320. Introduction to Human Disease (3)
H 344. Foundations of Environmental Health (3)
NUTR 216. *Food in Non-Western Culture (3)
NUTR 225. General Human Nutrition (3)
NUTR 235. Science of Foods (5)
NUTR 240. Human Nutrition (3)
NUTR 312. *Issues in Nutrition and Health (3)

NUTR 325. Nutrition Through the Life Cycle (3)
and Food Handlers Card

## or

12 credits from LBCC Culinary Arts Program
CA 101. Culinary Arts Practicum I (7)\#
CA 102. Culinary Arts Practicum II (8)\#
CA 103. Culinary Arts Practicum III (8)\#
CA 111. Food Service Safety and Sanitation (1)

CA 112. Station, Tools and Culinary Techniques (3)
CA 201. Culinary Arts Career Planning (1) and Food Handlers Card
\#Can be substituted for one NUTR or H course above.

## Professional Level

To be accepted into the Professional Level, a student must have completed the required Pre-Education General Courses and the Content Mastery Requirements with a minimum 3.0 GPA or by special petition. In addition, students need two letters of recommendation and passing scores on all required Oregon licensure exams

## Professional Level Course Work <br> (37-38 cr)

Taken in order during the Professional year-long program.

## Fall Term (13)

ED 340. ${ }^{\wedge}$ Supportive Differentiated Environments (3)
ED 409. Practicum/Clinical Experience (2) (September Practicum)
ED 409. Practicum/Clinical Experience (3) (Fall Practicum)
ED 412. Learning Styles and Needs in Adolescence (2)
ED 491. Content Standards and Curriculum Development for Mid Level (3) or ED 494. Content Standards and Curriculum Development for High School (3)

## Winter Term (12-13)

ED 407. Seminar (1)
ED 410. Internship/Work Experience (3)
ED 425. Curriculum Implementation and
Instructional Strategies 7-12 (4)
ED 427. Alternative Assessment for Middle and High School Teaching (2)
ED 493. Reading, Literature, and Language Development in the Content (2)
or ED 473. Instructional Approaches for ESOL Education (3)

## Spring Term (12)

ED 410. Internship/Work Experience (10) (Full-time Student Teaching)
ED 424. Teacher as Reflective Practitioner (2)

## Footnotes:

*Baccalaureate Core Course
^ Writing Intensive Course (WIC)

## Option Code: 65

## HEALTH TEACHING OPTION

This option is for students wanting to earn a bachelor's degree in Education and qualify for an Oregon Teaching License to teach health at the middle school (grades 6-9) and/or the high school (grades 9-12) levels.
Health students are encouraged to add a Career and Technical Education (CTE) Endorsement in Health Sciences. This endorsement qualifies one to teach specialized career training courses at the secondary level. The CTE endorsement is earned by working 1,800 hours in the health industry or working 600 hours in a variety of health industry experiences including job shadows, internships, volunteer work and paid work. This endorsement can be added during or after the degree program so one can begin working on it at any time. For more information, check with the Double Degree Advisor.

## Pre-Education Level

Students at this level will be taking general education prerequisite course work and required content course work. Note: Pre-Education students should meet with the Double Degree Advisor at least once a year in order to ensure they are on track to meet the prerequisite and content mastery requirements prior to applying to the Professional Level.

## Pre-Education General Education

 courses ( 18 cr )
## Completed prior to Professional

 Level:ED 216. *Purpose, Structure and Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural
Issues in Education (3)
ED 253. Learning Across the Lifespan (3)
(Not required if you have taken HDFS 311,
313 and 314 with a 3.0 or higher GPA)
ED 309. Field Practicum (3) (Can be waived with 60 hours supervised/documented volunteer service)
ED 472. Foundations of ESOL Education (3)
ED 479. Linguistics for Teachers (3)
Prerequisite ED 472

## Health Content Mastery

requirements (48-54 cr)
To be completed prior to beginning the Professional Level. Most of this course work will also meets the student's first degree.

- Must have 3.0 accumulative GPA on all course work to fulfill content mastery requirements.
- All grades must be taken as A-F graded courses; no P/N or S/U grades accepted for content mastery courses.
- Experiences in these areas are highly valued and may be considered in place of course work.
Standard 1. Knowledge and
Understanding of Substance Use


## and Abuse ( 6 cr )

Choose 2 courses or practicum:
H 120. *Health and Culture: Using Theatre to Promote Health (3)
H 349. Peer Helper Skills Development (3)
H 364. Drugs, Society and Human Behavior (3)

SOC 442. Sociology of Drug Use and Abuse (4)

Or practicum experience that focuses on
substance abuse and health and HHS 231,
*Lifetime Fitness for Health (2)

## Standard 2. Knowledge and

Understanding of Nutrition ( $\mathbf{3} \mathbf{c r}$ )
Choose 1 course from below (3):
NUTR 225. General Human Nutrition (3)
NUTR 240. Human Nutrition (3)
NUTR 312. *Issues in Nutrition and Health (3)

LBCC: HE 204. Exercise and Weight Management (3)
LBCC: HE 205. Diet and Nutrition: Active Lifestyle (3)

## Standard 3. Knowledge and Understanding of Disease Prevention (6-7 cr)

H 320. Introduction to Human Disease (3)
And choose 1 additional course (3-4):
H 210. *Introduction to the Health Care System (3)
H 225. *Social and Individual Health Determinants (4)
HDFS 314. Adult Development and Aging (4)
SOC 350. Health, Illness and Society (4) or Practicum Experience that focuses on substance abuse and health
or two LBCC Courses:

## HE 225. Social and Individual

Determinants of Health (3)
HE 253. Aids and Sexually Transmitted Diseases (3)

## Standard 4. Knowledge and Understanding of Environmental Health (3-4 cr)

Choose 1 course (3-4):
H 344. Foundations of Environmental Health (3)
H 220. Introduction to Health Data Analysis (3)

HDFS 444. Family Violence and Neglect (4)
LBCC: HE 125. Occupational Safety and Health (3)

Standard 5. Knowledge and Understanding of Safety and Injury Prevention (2-3 cr and First Aid Certification)
Required: Current Certification in First Aid, CPT and/or AED
Choose 2 courses from below (2-3):
HHS 241. *Lifetime Fitness (1)
HHS 243. *Lifetime Fitness: Resistance Training (1)
HHS 244. *Lifetime Fitness: Weight
Management (1)
KIN 158. Care and Prevention of Athletic Injuries (3)
PAC 304. ALI: Backpacking (1)
PAC 320. ALI: Mountaineering I (1)
PAC 325. ALI: Wilderness First Aid (1)
PAC 329. ALI: Wilderness First Responder (2)

## Standard 6. Personal Health,

Growth, and Development (13 cr)
BI 231. Introduction to Human Anatomy and Physiology (3)
H 225. *Social and Individual Health Determinants (4)
And choose 2 courses from below (3-4):
BI 232. Introduction to Human Anatomy and Physiology (3)
BI 233. Introduction to Human Anatomy and Physiology (3)
HDFS 311. Infant and Child Development (4)
HDFS 313. Adolescent Development (4)
KIN 230. Introduction to Adventure Programs (3)
KIN 312. *Sociocultural Dimensions of Physical Activity (3)
KIN 370. Psychology of Sport and Physical Activity (3)

## Standard 7. Mental and Emotional <br> Health (11 cr)

ED 216. *Purpose, Structure, and Function of Education in a Democracy (3)
ED 253. Learning Across the Lifespan (3)
And choose 2 courses from below (3-4):
H 421. Mental Health (3)
HDFS 432. Children and Youth with Special Needs (3)
HDFS 447. *Families and Poverty (4)
PSY 201. *General Psychology (3)
PSY 202. *General Psychology (3)
PSY 330. Brain and Behavior (4)
PSY 360. Social Psychology (4)
SOC 204. *Introduction to Sociology (3) or Child Abuse Training with Certificate of Completion
Standard 8. Human Sexuality and Family Life Education ( 3 cr)
Choose 1 course from below (3-4):
HDFS 240. *Human Sexuality (3)
HDFS 312. Parenting Research and
Application (4)
SOC 312. *Sociology of the Family (4)

## Professional Level

To be accepted into the Professional Level, a student must have completed the required Pre-Education General Courses and the Content Area Mastery course work with a minimum 3.0 GPA or by special petition. In addition, students need two letters of recommendation and
passing scores on all exams required for Oregon licensure.

## Professional Level Course Work (38-39 cr)

Credits taken in order during the Professional year-long program.

## Fall Term (13 credits)

ED 340. ^Supported Differentiated Environments (3)
ED 409. Practicum/Clinical Experience (2) (September Experience)
ED 409. Practicum/Clinical Experience (3) (Fall Practicum)
ED 412. Learning Styles and Needs in Adolescence (2)
ED 494. Content Standards and Curriculum Development for High School (3)
or ED 491. Content Standards and
Curriculum Development for Mid Level (3)

## Winter Term (12-13 credits)

ED 407. Seminar (1)
ED 410. Internship/Work Experience (3)
(Part-time Student Teaching)
ED 425. Curriculum Implementation and
Instructional Strategies 7-12 (4)
ED 427. Alternative Assessment for Middle and High School Teaching (2)
ED 493. Reading, Literature, and Language Development in the Content (2) or ED 473. Instructional Approaches for ESOL Education (3)

## Spring Term (12 credits)

ED 410. Internship/Work Experience (10)
(Full-time Student Teaching)
ED 424. Teacher as Reflective Practitioner (2)

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Option Code: 66

## INTEGRATED SCIENCE TEACHING

 OPTIONThis option is for students wishing to earn a bachelor's degree in Education and qualify for an Oregon Teaching License to teach integrated science at the middle school (grades 6-9) and/or high school (grades 9-12) levels.

## Pre-Education Level

Students at this level will be taking general education prerequisite courses and required content course work.
Note: Pre-Education students should meet with the Education Double Degree Advisor at least once a year to ensure they are on track to meeting prerequisite and content mastery requirements prior to applying for the Professional Level.
Pre-Education General Course Work (18 credits)
Taken prior to admission to the Professional Level:
ED 216. *Purpose, Structure, \& Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)
ED 253. Learning Across the Lifespan (3)
(Not required if you have taken HDFS 311,
313 and 314 with a 3.0 or higher GPA)
ED 309. Field Practicum (3) (Can be waived
with 60 hours supervised/documented volunteer service)
ED 472. Foundations ESOL Education (3) ED 479. Linguistics for Teachers (3)

## Integrated Science Content

## Mastery Requirements (49-54

## credits)

To be completed prior to beginning the Professional Level. Most of this course work will meet student's first degree requirements.

- Must have 3.0 accumulative GPA on all course work to fulfill content mastery requirements.
- All grades must be taken as A-F graded courses; no P/N or S/U grades accepted for content mastery courses; no grade below C- accepted for content mastery courses.
Note: Integrated Science students must demonstrate an emphasis in one of the four content areas below. In the emphasis area, the student must complete the full introductory sequence as well as a minimum of 6 upper-division course credits. All remaining content areas require a minimum of two courses in the introductory sequence.


## Standard 1. Introductory Physics

## Sequence (9-10 credits/15 credits

## for emphasis)

Choose a full series if this is your area of emphasis. If not your area of emphasis, choose two courses from either one of the series.
PH 201, PH 202, PH 203. *General Physics
$(5,5,5)$
or PH 211, PH 212, PH 213. *General
Physics with Calculus $(4,4.4)$

## Optional:

You may replace either PH 203 or PH 213 of the above series with one of the following astronomy courses:
PH 104. *Descriptive Astronomy (4)
PH 205. *Solar System Astronomy (4)
PH 206. *Stars and Stellar Evolution (4)
PH 207. *Galaxies, Quasars, and Cosmology (4)

Standard 2. Introductory Chemistry Sequence ( 10 credits/15 credits for emphasis)
Choose full series if this is your area of emphasis. If not your area of emphasis, choose two courses from series.
CH 231, CH 232, CH 233. *General Chemistry $(4,4,4)$
and CH $261 .{ }^{*}$ Laboratory for CH 231, CH 232, CH 233 (1,1,1)

## Standard 3. Introductory Biology

Sequence ( 8 credits/ 12 credits for emphasis)
Choose full series if this is your area of emphasis. If not your area of emphasis, choose 2 courses from either series.
BI 101, BI 102, BI 103. *General Biology (4,4,4)
or BI 211, BI 212, BI $213 *$ Principles of
Biology (4,4,4)

## Standard 4. Geosciences Sequence

 (7-8 credits/15 credits for emphasis)For the purpose of licensure, geosciences include geology (excluding geography and geographic information systems) as well as appropriate atmospheric science and oceanography courses. Choose full series plus 1 additional course if this is your area of emphasis. If not your area of emphasis, you must include a minimum of 1 course from the introductory sequence.

## Introductory Sequence:

GEO 201. *Physical Geology (4)
GEO 202. *Earth Systems Science (4)
GEO 203. *Evolution of Planet Earth (4)
Other choices for an additional course(s):

## Geology:

GEO 221. *Environmental Geology (4)
GEO 305. *Living with Active Cascade Volcanoes (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 307. *National Park Geology and Preservation (3)
GEO 308. *Global Change and Earth Sciences (3)
GEO 352. *Oregon: Geology, Place, and Life on the Ring of Fire (4)
Atmospheric Sciences:
ATS 210. Introduction to the Atmospheric Sciences (3)
ATS 320. *The Changing Climate (3)
Standard 5. Upper-division course work in your emphasis area (6 credits)
Standard 6. Science Education (3 cr)
SED 413. Inquiry in Science and Science Education (3)

## Professional Level

To be accepted into the Professional Level, a student must have completed the required Pre-Education General Courses and the Content Mastery Requirements with a minimum 3.0 GPA or by special petition. In addition, students need two letters of recommendation and passing scores on all required Oregon licensure exams.
Professional Level Course Work
(37-38 credits)
Taken during the Professional year-long program.
ED 340. ${ }^{\wedge}$ Supportive Differentiated Environments (3)
ED 407. Seminar (1)
ED 409. Practicum/Clinical Experience (2)
(September Practicum)
ED 409. Practicum/Clinical Experience (3) (Fall Practicum)
ED 410. Internship/Work Experience (3) (Part-time Student Teaching)
ED 410. Internship/Work Experience (10)
(Full-time Student Teaching)
ED 412. Learning Styles and Needs in Adolescence (2)
ED 424. Teacher as Reflective Practitioner (2)

ED 425. Curriculum Implementation and Instructional Strategies 7-12 (4)
ED 427. Alternative Assessment for Middle and High School (2)
ED 493. Reading, Literature, and Language Development in the Content (2)
or ED 473. Instructional Approaches for ESOL Education (3)
ED 494. Content Standards and Curriculum Development for High School (3)

## Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course (WIC)
Option Code: 67


## LANGUAGE ARTS TEACHING OPTION

This option is for students wanting to earn a bachelor's degree in Education and qualify for an Oregon Teaching License to teach English language arts at the middle school (grades 6-9) and/or high school (grades 9-12) levels.

## Pre-Education Level

Students at this level will be taking general education prerequisite courses and required content course work.

Note: Pre-Education students should meet with the Double Degree Advisor at least once a year in order to ensure they are on track to meet the prerequisite and content mastery requirements prior to applying to the Professional Level.

## Pre-Education General Course Work

## (18 credits)

Taken prior to Professional Level:
ED 216. *Purpose, Structure \& Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)
ED 253. Learning Across the Lifespan (3)
(Not required if you have taken HDFS 311,
313 and 314 with a 3.0 or higher GPA)
ED 309. Field Practicum (3) (Can be waived with 60 hours supervised/documented volunteer service)
ED 472. Foundations of ESOL Education (3) ED 479. Linguistics for Teachers (3)

## Language Arts Content Mastery

 Course Work (68-71 credits)To be completed prior to beginning the Professional Level. These Standards are based on the National Council of Teachers of English Program Standards for Initial Preparation of Teachers of English Language Arts for Middle and High School Teaching (http://www.ncte.org/ standards/common-core).

- Must have 3.0 accumulative GPA on all course work to fulfill content mastery requirements.
- All grades must be taken as A-F graded courses; no P/N or S/U grades accepted for content mastery courses.
- Experiences in these areas are highly valued and may be considered in place of course work.


## Standard 1. Knowledge and

Understanding of the English

## Language (3 credits)

WR 330. *Understanding Grammar (3)
Standard 2. Knowledge of the Practices of Oral, Visual, and
Written Literacy (9-11 credits)
Choose 1 course from each area:
Communication (3-4): Any COMM Course
Writing (3): Any 200-Level Writing Course

## Film (3-4):

COMM 380. Image and Myth in Film (3)
FILM 110. *Introduction to Film Studies: 1895-1945 (3)
FILM 125. *Introduction to Film Studies: 1945-Present (3)
FILM 245. *The New American Cinema (4)
FILM 265. *Films for the Future (4)
FILM 452. ^Studies in Film (4)
Standard 3. Knowledge and
Understanding of the Reading

## Process (8 credits)

ENG 345. Introduction to Literary Criticism and Theory (4)
ENG 488. Literature and Pedagogy (4)

## Standard 4. Knowledge and

 Understanding of Different Composing Processes ( 8 credits)WR 411. ^The Teaching of Writing (4) and another upper-division writing course (3-4)
Standard 5. Knowledge and
Understanding of an Extensive
Range of Literature ( 32 credits)
American Literature Sequence (8):
ENG 253. *Survey of American Literature: Colonial to 1900 (4)
ENG 254. *Survey of American Literature: 1900 to Present (4)
Shakespeare - choose 1 course (4):
ENG 201. *Shakespeare (4)
ENG 202. *Shakespeare (4)
World Literature - choose 2 courses (8):

ENG 204. *Survey of British Literature: Beginnings to 1660 (4)
ENG 205. *Survey of British Literature: Restoration to Romantic Era (4)
ENG 206. *Survey of British Literature: Victorian Era to 20th Century (4)
ENG 210. *Literatures of the World: Asia (4)
ENG 211. *Literatures of the World: Africa (4)

ENG 212. *Literatures of the World: Meso/
South American, Caribbean (4)
ENG 213. *Literatures of the World: Middle East (4)
ENG 215. *Classical Mythology (4)
ENG 221. *African-American Literature (4)
Literature before 1800 (4): Choose 1 upper-division course
Literature after 1800 (8): Choose 2 upper-division courses
Standard 6. Knowledge and Understanding of the Range and Influence of Print and Nonprint Media and Technology in Contemporary Culture (3-4 credits)
Choose 1 course from below (3-4):
COMM 482. The Media in Culture and Society (3)

ENG 495. Language, Technology, and Culture (4) [Terminated spring 2017]
NMC 260. New Media Futures (3)
WR 414. Advertising and Public Relations Writing (4)
WR 495. ^Introduction to Literacy Studies (4)
WR 497. Digital Literacy and Culture (4)

## Standard 7. Knowledge and <br> Understanding of Research

 Knowledge, Understanding of Research Theory, and Findings in English Language Arts (5 credits)ENG 200. Library Skills for Literacy Study (1) ENG 488. Literature and Pedagogy (4)

## Professional Level

To be accepted into the Professional Level, a student must have completed the required Pre-Education General Courses and the Content Mastery Requirements with a minimum 3.0 GPA or by special petition. In addition, students need two letters of recommendation and pass-
ing scores on all required Oregon

## licensure exams.

## Professional Level Course Work

 (37-38 credits)Taken in order during the professional year-long program.
ED 340. ${ }^{\wedge}$ Supported Differentiated Environments (3)
ED 407. Seminar (1)
ED 409. Practicum/Clinical Experience (2) (September Experience)
ED 409. Practicum/Clinical Experience (3)
(Fall Practicum)
ED 410. Internship/Work Experience (3) (Part-time Student Teaching)
ED 410. Internship/Work Experience (10) (Full-time Student Teaching)
ED 412. Learning Styles and Needs in Adolescence (2)
ED 424. Teacher as Reflective Practitioner (2)
ED 425. Curriculum Implementation and Instructional Strategies 7-12 (4)
ED 427. Alternative Assessment for Middle and High School (2)
ED 493. Reading, Literature, and Language Development in the Content (2) or ED 473. Instructional Approaches for ESOL Education (3)
ED 494. Content Standards and Curriculum Development for High School (3)
or ED 491. Content Standards and
Curriculum Development for Mid Level (3)

## Footnotes:

*Baccalaureate Core Course
^ Writing Intensive Course (WIC)

## Option Code: 68

## PHYSICS TEACHING OPTION

This option is for students wanting to earn a bachelor's degree in Education and qualify for an Oregon Teaching License to teach physics at the high school level (grades 9-12).

## Pre-Education Level

Students at this level will be taking general education prerequisite courses and
required content course work
Note: Pre-Education students should meet with the Double Degree Advisor at least once a year in order to ensure they are on track to meet the prerequisite and content mastery requirements prior to applying to the Professional Level.

## Pre-Education General Course Work

## (18 credits)

Taken prior to Professional Level:
ED 216. *Purpose, Structure, \& Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)
ED 253. Learning Across the Lifespan (3)
(Not required if you have taken HDFS 311,
HDFS 313, and HDFS 314 with a 3.0 or higher GPA)
ED 309. Field Practicum (3) (Can be waived with 60 hours supervised/documented volunteer service)
ED 472. Foundations of ESOL Education (3)
ED 479. Linguistics for Teachers (3)

## Physics Content Mastery Courses

 (50-51 credits)Complete prior to the Professional Level. Most of this course work will meet student's first degree requirements.

- Must have 3.0 accumulative GPA on all course work to fulfill content mastery requirements.
- All grades must be taken as A-F graded courses; no P/N or S/U grades accepted for content mastery courses. All grades must be at C- or above.
Standard 1. Introductory Physics
Sequence (15 Credits)
Choose 1 series from below (15):
PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
PH 211, PH 212, PH 213. *General Physics with Calculus $(4,4,4)$
and PH 221, PH 222, PH 223. Recitation
for Physics 211, 212, $213(1,1,1)$


## Standard 2. Introductory Chemistry

## Sequence (15 Credits)

CH 231, CH 232, CH 233. *General Chemistry $(4,4,4)$
CH 261, CH 262, CH 263. *Laboratory for Chemistry 231, 232, 233 ( $1,1,1$ )
Standard 3. Advanced Physics (10

## Credits)

Choose 5 courses from below (10 credits):
PH 422. Paradigms in Physics: Static Fields (3)

PH 423. Paradigms in Physics: Energy and Entropy (3)
PH 424. Paradigms in Physics: Oscillations and Waves (3)
PH 425. Paradigms in Physics: Quantum Fundamentals (3)
PH 426. Paradigms in Physics: Central Forces (3)
PH 427. Paradigms in Physics: Periodic Systems (3)
PH 429. Paradigms in Physics: Reference
Frames (2) [Terminated winter 2017]
Standard 4. Modern Physics and Electives (7-8 Credits)
PH 314. Introductory Modern Physics (4)

## [Terminated fall 2018]

Choose 1 additional course (3-4):
PH 411. Electronics (3)
PH 415. Computer Interfacing and
Instrumentation (3)
PH 465. Computational Physics (3)
PH 481. Physical Optics (4)
PH/ECE 482. Optical Electronic Systems (4)
PH/ECE 483. Guided Wave Optics (4)
Standard 5. Science Education (3 cr)
SED 413. Inquiry in Science and Science Education (3)

## Professional Level

To be accepted into the Professional Level, a student must have completed the required Pre-Education General Courses and the Content Mastery Requirements with a minimum 3.0 GPA or by special petition. In addition, students need two letters of recommendation and passing scores on all required Oregon licensure exams.

## Professional Level Course Work

 (37-38 credits)Taken during the Professional year-long program.
ED 340. ${ }^{\wedge}$ Supportive Differentiated
Environments (3)
ED 407. Seminar (1)
ED 409. Practicum/Clinical Experience (2)
(September Practicum)
ED 409. Practicum/Clinical Experience (3) (Fall Practicum)
ED 410. Internship/Work Experience (3)
(Part-time Student Teaching)
ED 410. Internship/Work Experience (10) (Full-time Student Teaching)
ED 412. Learning Styles and Needs in Adolescence (2)
ED 424. Teacher as Reflective Practitioner (2)

ED 425. Curriculum Implementation and Instructional Strategies 7-12 (4)
ED 427. Alternative Assessment for Middle and High School (2)
ED 493. Reading, Literature, and Language Development in the Content (2) or ED 473. Instructional Approaches for ESOL Education (3) (Optional alternative for ESOL Endorsement)
ED 494. Content Standards and Curriculum Development for High School (3)

## Footnotes:

* Baccalaureate Core Course
^ Writing Intensive Course (WIC)
Option Code: 69


## SOCIAL STUDIES TEACHING

OPTION
This option is for students wanting to earn a bachelor's degree in Education and qualify for an Oregon Teaching License to teach social studies at the middle school (grades 6-9) and/or the high school (grades 9-12) levels.

## Pre-Education Level

Students at this level will be taking general education prerequisite courses and required content course work.

Note: Pre-Education students should meet with the Double Degree Advisor at least once a year in order to ensure they are on track to meet the prerequisite and content mastery requirements prior to applying to the Professional Level.

## Pre-Education General Course Work

## (18 credits)

Taken prior to Professional Level:
ED 216. *Purpose, Structure, \& Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)
ED 253. Learning Across the Lifespan (3)
(Not required if you have taken HDFS 311, 313 and 314 with a 3.0 or higher GPA)
ED 309. Field Practicum (3) (Can be waived with 60 hours supervised/documented volunteer service)
ED 472. Foundations of ESOL Education (3)
ED 479. Linguistics for Teachers (3)
Social Studies Content Mastery Requirements (57-67 credits) Completed prior to Professional Level. These Standards are based on the National Council for the Social Studies (revised 2010), http://www.socialstudies. org/. Most of these courses will also meet requirements for student's first degree.

- Must have 3.0 accumulative GPA on all course work to fulfill content mastery requirements.
- All grades must be taken as A-F graded courses; no $\mathrm{P} / \mathrm{N}$ or $\mathrm{S} / \mathrm{U}$ grades accepted for content mastery courses.
- Experiences in these areas are highly valued and may be considered in place of course work.
You need depth and breadth of knowledge including both analytical and methodological expertise in at least one social studies discipline. Met with a major in one of the following disciplines:
- Anthropology
- Economics
- Ethnic Studies
- Geography
- History
- Liberal Studies
- Political Science
- Psychology
- Sociology

You are required to have extensions of learning into a non-campus environment or new culture. (6 credits or 180 volunteer hours): Internship or one term abroad at 6 credits or 180 hours of volunteer experience. This should be documented with transcripted hours or with a letter from a supervisor verifying volunteer hours.

## Standard 1: Culture and Cultural

 Diversity (3-4 credits)Social studies program should include experiences that provide for the study of culture and cultural diversity.

[^1]ANTH 251. *Language in the USA (3)
GEOG 105. *Geography of the Non-Western World (3)
GEOG 106. *Geography of the Western World (3)
HST 106. *World History III: The Modern and Contemporary World (3)
PS 345. *Politics of Developing Nations (4)
WGSS 480. *International Women (3)
Standard 2: Time, Continuity, and Change ( 3 credits)
Social studies programs should include experiences that provide for the study of the past and its legacy.
1 course from below or approved* alternative (3-4):
ANTH 230. Time Travelers (3)
ANTH 240. Introduction to Biological
Anthropology (3)
ANTH 330. *Evolution of People,
Technology, and Society (3)
ANTH 433. First Americans, Last Frontiers (4)

## Standard 3: People, Places, and

## Environments (3-4 credits)

Social studies programs should include experiences that provide for the study of people, places, and environments.
1 course from below or approved* alternative (3-4):
ANTH 477. Ecological Anthropology (4)
ANTH 481. *Natural Resources and
Community Values (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 309. *Environmental Justice (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 430. Resilience-Based Natural Resource Management (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)
HST 481. *Environmental History of the United States (4)
PHL/REL 443/543. *World Views and Environmental Values (3)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)
PS 477. International Environmental Politics and Policy (4)
SOC 480. *Environmental Sociology (4)
SOC/ANS/FES/FW 485. *Consensus and Natural Resources (3)

## Standard 4: Individual <br> Development and Identity (3-4 credits)

Social studies programs should include experiences that provide for the study of individual development and identity.
1 course from below or approved* alternative (3-4):
PSY 202. *General Psychology (3)
PSY 350. Human Lifespan Development (4)
PSY 370. Personality (4)
SOC 340. Deviant Behavior and Social Control (4)
SOC 440. Juvenile Delinquency (4)
WGSS 223. *Women: Self and Society (3)
WGSS 224. *Women: Personal and Social Change (3)
WGSS 490. Self Esteem and Personal Power (3)

## Standard 5: Individuals, Groups, and Institutions (3-4 credits)

Social studies programs should include experiences that provide for the study of interactions among individuals, groups, and institutions.
1 course from below or approved* alternative (3-4):
COMM 322. Small-Group Problem Solving (3)

COMM 324. Communication in
Organizations (3)
COMM 326 Intercultural Communication (3)

PS 206. *Introduction to Political Thought (4)

PS 365. American Political Thought (4)
PSY 360. Social Psychology (4)
SOC 205. *Institutions and Social Change (3)
SOC 424. Social Psychology (4)
Standard 6: Power, Authority, and Governance (3-4 credits)
Social studies programs should include experiences that provide for the study of how people create, interact with and change structures of power, authority, and governance.
1 course from below or approved* alternative (3-4):
ANTH/ES/WGSS/WLC 373. Approaches to Social Justice (3)
HST 392. *Modern China and Japan (4)
HST 460. American Thought and Culture (4)
HST 461. American Thought and Culture (4)
HST 462. American Thought and Culture (4)
HST/REL 485/585. *Politics and Religion in the Modern Middle East (4)
HST 495. China in the Twentieth Century (4)
PS 201. *Introduction to United States
Government and Politics (4)
PS 204. *Introduction to Comparative Politics (4)
PS 313. Campaigns and Elections (4)
PS 331. *State and Local Politics (4)
SOC 426. *Social Inequality (4)
SOC 448. Law and Society (4)
Standard 7: Production,
Distribution, and Consumption (6-8 credits)
Social studies programs should include experiences that provide for the study of how people organize for the production, distribution, and consumption of goods and services.
2 courses from below or approved* alternative(s) (6-8):
ANTH 471. Cash, Class and Culture:
Hunter-Gatherers to Capitalism (4)
ANTH 484. *Wealth and Poverty (3)
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 311. Intermediate Microeconomic Theory (4)
ECON 315. Intermediate Macroeconomic Theory (4)
ECON 383. *The Economics of
Discrimination (4)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 204/GEOG 240. *Climate Change,

Water and Society (3)
GEOG 330. *^Geography of International Development and Globalization (3)
PS 345. *The Politics of Developing Nations (4)

PS 371. Public Policy Problems (4)
PS 473. US Energy Policy (4)
SOC 481. *Society and Natural Resources (4)

## Standard 8: Science, Technology, and Society (3-4 credits)

Social studies programs should include experiences that provide for the study of relationships among science, technology, and society.
1 course from below or approved* alternative (3-4 credits):
ANTH 330. *Evolution of People, Technology, and Society (3)
CS 391. *Social and Ethical Issues in
Computer Science (3)
ES 445. *Native American Science and Technology (4)
HST 428. History of Western Thought (4)
HST 430. History of Western Thought (4)
HST 462. American Thought and Culture (4)
PS 473. US Energy Policy (4)
PS 476. *Science and Politics (4)
SOC 456. *Science and Technology in Social Context (4)
WGSS 340. *Gender and Science (3)

## Standard 9: Global Connections

(14-16 credits)
Social science programs should include experiences that provide for the study of global connections and interdependence.
2 courses from non-Western cultures
and 2 additional courses from any one area below. You may substitute equivalent approved* courses (14-16):
ANTH 313. *Peoples of the World-Latin America (3)
ANTH 314. *Peoples of the World-Middle East (3)
ANTH 315. *Peoples of the World-Africa (3)
ANTH 316. *Peoples of the World-South and Southeast Asia (3)
ANTH 317. *Peoples of the World-Pacific (3)
ANTH 318. *Peoples of the World-China (3)
ANTH 319. *Peoples of the World-Japan and Korea (3)
CHN 332. *Chinese Culture II (3)
[Terminated summer 2017]
ECON 340. *International Economics (4)
GEOG 311. *Geography of Africa (3)
GEOG 313. *Geography of Asia (3)
GEOG 314. *Geography of Latin America (3)
GEOG 330. *^Geography of International
Development and Globalization (3)
HST 320. *Ancient Near East (4)
HST 323. Roman Empire (4)
HST 331. History of Early Modern Europe (4)

HST 335. Nineteenth-Century Europe (4)
HST 336. Twentieth-Century Europe (4)
HST 341. History of Russia (4)
HST 345. Society in Modern Russia (4)
HST/REL 350. *Modern Latin America (4)
HST 366. History of the American Indian (4)
HST 381. *History of Africa (4)
HST/REL 387. *Islamic Civilization (4)
HST 391. *Traditional China and Japan (4)

HST 392. *Modern China and Japan (4)
HST/REL 425/525. *The Holocaust in its History (4)
HST 433. English History (4)
HST 436. History of Modern Germany (4)
HST 452. Modern Mexico (4)
HST 456. Problems in Latin American History (4)
HST/REL 485/585. *Politics and Religion in the Modern Middle East (4)
HST 494. Modern Japan: A Cultural History (4)

HST 495. China in the Twentieth Century (4)
JPN 332. *Japanese Culture (3)
[Terminated summer 2017]
PS 204. *Introduction to Comparative Politics (4)
PS 205. *Introduction to International Relations (4)
PS 341. *European and EU Politics (4)
PS 343. *Russian Politics (4)
PS 344. *Latin American Politics (4)
PS 345. *The Politics of Developing Nations (4)

PS 348. *Chinese Politics (4)
PS 350. *Japanese Politics (4)

## Standard 10: Civic Ideals and

Practices (15-16 credits)
Social science programs should include experiences that provide for the study of the ideals, principles, and practices of citizenship in a democratic republic.
4 courses from below or substitute equivalent approved* courses (15-16):
ES 101. *Introduction to Ethnic Studies (3)
HST 201. *History of the United States (4)
HST 202. *History of the United States (4)
HST 203. *History of the United States (4)
HST 362. Women in United States History (4)
HST 363. Women in United States History (4)
HST 365. *The Civil Rights Movement in
the Modern U.S. (4)
HST 368. *Lesbian and Gay Movements in Modern America (4)
HST 460. American Thought and Culture (4)
HST 461. American Thought and Culture (4)
HST 462. American Thought and Culture (4)
HST 467. History of the American West (4)
HST 468. History of the American West (4)
HST 469. History of the Pacific Northwest (4)
HST 471. Colonial America (4)
HST 472. Colonial America (4)
HST 473. The Era of the American Revolution (4)
HST 474. Jeffersonian and Jacksonian Democracy (4)
HST 475. Civil War and Reconstruction (4)
HST 477. The Progressive and New Deal Eras (4)
HST 478. The United States Since 1939 (4)
PS 201. *Introduction to United States
Governments and Politics (4)
PS 311. Congressional Politics (4)
PS 312. Presidential Politics (4)
PS 313. Campaigns and Elections (4)
PS 315. *The Politics of Media (4)
PS 316. Public Opinion and Politics (4)
PS 321. Constitutional Law: Government Powers and Constraints (4)
PS 322. *Constitutional Law: Civil Rights and Liberties (4)

PS 323. Constitutional Law: Rights of the Accused (4)
PS 331. *State and Local Politics (4)
PS 363. *Gender and Race in American Political Thought (4)
PS 375. *The Civil Rights Movement and Policies (4)
PS 425. *Gender and the Law (4)
SOC 426. *Social Inequality (4)
SOC 448. Law and Society (4)
SOC 450. Sociology of Education (4)
SOC 470. Collective Behavior (4)
*Alternative classes are reviewed on
a case by case basis, by petition,
and approved jointly by the
Double Degree Advisor, the Social
Studies Liaison, and the Double
Degree Program Coordinator.

## Professional Level

To be accepted into the Professional Level, a student must have completed the required Pre-Education General Courses and the Content Mastery Requirements with a minimum 3.0 GPA or by special petition. In addition, students need two letters of recommendation and passing scores on all required Oregon licensure exams.

## Professional Level Course Work <br> (37-38 credits)

Taken in the Professional year-long program.
ED 340. ${ }^{\wedge}$ Supportive Differentiated
Environments (3)
ED 407. Seminar (1)
ED 409. Practicum/Clinical Experience (2)
(September Experience)
ED 409. Practicum/Clinical Experience (3) (Fall Practicum)
ED 410. Internship/Work Experience (3)
(Part-time Student Teaching)
ED 410. Internship/Work Experience (10)
(Full-time Student Teaching)
ED 412. Learning Styles and Needs in Adolescence (2)
ED 424. Teacher as Reflective Practitioner (2)
ED 425. Curriculum Implementation and Instructional Strategies 7-12 (4)
ED 427. Alternative Assessment for Middle and High School (2)
ED 493. Reading, Literature, and Language Development in the Content (2) or ED 473. Instructional Approaches for ESOL Education (3)
ED 494. Content Standards and Curriculum Development for High School (3)
or ED 491. Content Standards and
Curriculum Development for Mid Level (3)

## Footnotes:

* Baccalaureate Core Course
^ Writing Intensive Course (WIC)
Option Code: 70


## EDUCATION MINOR

Also offered via Ecampus.
The Education undergraduate minor is composed of a selection of courses that represent careers and key topics in educa-tion-related fields. The minor is open and intended for majors outside of education to obtain an overview of educational
careers and concepts. An undergraduate minor in education would be valuable to anyone interested in education and workplace training in their chosen field or in doing outreach education. This degree is not part of a licensure program and does not result in a teaching or counseling license.
A grade of C - or better is required for all courses used to complete minor requirements. Such courses cannot be taken for an S/U grade.

## Core Courses ( 9 credits)

ED 216. *Purpose, Structure, \& Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)
ED 253. Learning Across the Lifespan (3)

## Electives (18 credits)

Select 18 credits from the nonlicensure undergraduate courses offered though the College of Education. These include but are not limited to:
COUN 441. Introduction to Professional Counseling (3)
ED 309. Field Practicum (3-6)
ED 411. Educational Psychology, Learning, and Development (3)
ED 412. Learning Styles and Needs in Adolescence (2)
ED 472. Foundations of ESOL Education (3)
ED 476. Partnerships and Ideologies in ESOL Education (3) (For Corvallis oncampus students only)
ED 479. Linguistics for Teachers (3)
SED 413. Inquiry in Science and Science Education (3)
SED 414. Inquiry in Mathematics and Mathematics Education (3)
SED 431. Overview of Free-Choice Learning (3)

Additional undergraduate Counseling (COUN) and Adult and Higher Education (AHE) courses will be added as electives in AY 2017-18.
Total $=27$
Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
Minor Code: 495


## GRADUATE MAJORS

## ADULT AND HIGHER EDUCATION

 (EdD, EdM, PhD, MAIS)
## Offered via Ecampus only.

The College of Education offers graduate work leading to Master of Education (EdM), Doctor of Education (EdD), and Doctor of Philosophy (PhD) degrees with a major in Adult and Higher Education, as well as Masters of Arts in Interdisciplinary Studies (MAIS).

## Master of Education (EdM)

The Masters of Education (EdM) degree in Adult and Higher Education is a professional program designed for working adults to enhance their current knowledge, skills, and abilities in work-
place adult and community education. The program prepares professionals in education, curriculum development, and training to be able to work with adult learners in the following areas: human resources within for-profit corporations and not-for-profit agencies, organizations involved in systems development, developmental education programs in community colleges, and in a variety of additional higher education settings. This program is guided by the Academy of Human Resource Development Standards, a professional organization recognized internationally.

The EdM degree in Adult and Higher Education is a cohort-based that meet face-to-face and online, and designed to be completed within a three to four-year period.
The EdM in Adult Education degree requires a minimum of 45 credits beyond the baccalaureate degree to complete the program.

## Core Courses

AHE 522-AHE 525. Instructional
Technology I-IV ( $1,1,1,1$ )
AHE 531. Instructional Design (4)
AHE 532. Program Evaluation (4)
AHE 533. Needs Assessment and Research (4)
AHE 534. Organizations and Systems
Theory (4)
AHE 547. Instructional Strategies for Adult Learners (4)
AHE 549. Ethical and Professional Issues (4)
AHE 553. Adult Learning and Development (4)

AHE 567. Leadership Development and Human Relations (4)

## Additional Requirements

AHE 506. Project (4)
AHE 510. Internship (5)

## Admission to the EdM Degree

Admission is selective and competitive.
Factors considered in making admission decisions include completion of a bachelor's degree, cumulative grade-point average ( 3.00 in the last 90 graded credits of the bachelor's degree and all postbaccalaureate course work), written and oral communication skills, career objectives and commitment, career experience, and professional references.

Applicants submit a letter of intent, résumé, transcripts, three letters of recommendation, writing sample, and application questionnaire. Following an initial screening, applicants may be interviewed by a member of the faculty by telephone or in person.

## EdD, PhD Degrees

The Adult and Higher Education major offers two options: Community College Leadership (CCL) and Leadership in Higher Education (LHE). Candidates will pursue their chosen option either in an EdD or PhD designation, depending upon the purpose and approach of their research study and the intended
role to be sought after successful completion of the degree. Both options require completion of courses in foundational and research cores, internship hours, and thesis courses. A minimum of 12 credits of content specialty courses must be taken for each option.

Note: Both options are part-time, cohort-based that meet face-to-face and online, and designed to be completed within a three- to four-year period.

## Doctor of Education (EdD) Degree

The Doctor of Education degree prepares professionals for faculty/administrative leadership roles in a variety of positions in community colleges or other higher education settings. Candidates must have appropriate professional experience that enables them to benefit from the stated program outcomes. Examples of experience include teaching, student services, administration, finance, curriculum specialist, support staff, or supervisor in an educational related setting.

## EdD Requirements

1. Complete a minimum of 114 graduate credits beyond the baccalaureate degree.
2. An earned master's degree. Up to 36 credits may be credited toward the required graduate credits.
3. At least 24 thesis/dissertation credits.
4. A mentored internship in an appropriate work setting for a minimum of 6 credits.

## Doctor of Philosophy (PhD) Degree

The Doctor of Philosophy degree prepares professionals for research, administration, and professorial roles in higher education settings. Candidates must have significant experience in an education or education-related setting such as teaching, leadership administration, curriculum specialist, supervisor, etc., where the primary function is education. Knowledge of educational research methodology is highly desirable.

## PhD Requirements

1. Complete a minimum of 120 graduate credits beyond the baccalaureate degree.
2. An earned master's degree. Up to 33 credits may be credited toward the required graduate credits.
3. A mentored internship in an appropriate work setting for a minimum of 3 credits.
4. At least 36 thesis/dissertation credits.

Major Code: 2075

## OPTIONS

## COMMUNITY COLLEGE <br> LEADERSHIP OPTION

An overview of the growing literature related to community colleges, with an emphasis on the role of research in understanding and interpreting the unique
nature of community college leadership. The option is committed to developing tomorrow's leaders based on the principle that leadership can be learned and enhanced. Effective leadership is a combination of commitment, management, and vision related to the role and mission of community colleges. This option is dedicated to developing student competencies in communications, resource management, organizational strategy, collaboration, leadership, and community college advocacy. Ethics and a commitment to social justice are critical foundations that undergird all course work.

This option is designed for the scholarpractitioner wanting to examine through research particular elements of community college organization, learning, and/ or leadership.

## Content Specialty (12 credits)

AHE 612. Research Perspectives in
Education (3)
AHE 613. Research Analysis and
Interpretation in Education (3)
AHE 614. Advanced Research Methods in Education (3)
AHE 615. Research Issues (3)

## Option Code: 2076

## LEADERSHIP IN HIGHER EDUCATION OPTION

An overview of the extensive literature related to four-year colleges and universities, with an emphasis on the role of research in understanding and interpreting the nature of higher education leadership. The option of leadership in higher education is committed to developing tomorrow's leaders based on the principle that leadership can be learned and enhanced. Effective leadership is a combination of commitment, management, and vision related to the role and mission of higher education institutions. This option is dedicated to developing student competencies in communications, resource management, organizational strategy, collaboration, leadership, and higher education advocacy. Ethics and a commitment to social justice are critical foundations that undergird all course work.

This option is designed for the scholarpractitioner wanting to examine through research particular elements of higher education organization, learning, and/or leadership.

## Content Specialty (12 credits)

AHE 672. Research Perspectives in Four-Year Higher Education (3)
AHE 673. Research Interpretation in FourYear Higher Education (3)
AHE 674. Advanced Research Methods in Four-Year Higher Education (3)
AHE 675. Four-Year Higher Education Research Issues (3)
Option Code: 2077

## COUNSELING (MCoun, PhD) Also available at OSU-Cascades and via Ecampus.

The mission of the Oregon State University graduate program in counseling is to prepare counseling professionals who promote the social, psychological and physical well-being of individuals, families, communities and organizations. We believe that such professional leaders stand for social, economic and political justice and therefore must be prepared to be proactive educators, change agents and advocates in the face of injustice. Counseling professionals are sensitive to life span developmental issues, demonstrate multicultural awareness and recognize a global perspective as integral to the preparation of counselors and counselor educators.

Two graduate degrees are offered in counseling: the Master of Counseling (MCoun) and the Doctor of Philosophy (PhD). The Master of Counseling has two transcript-visible graduate options, Clinical Mental Health Counseling, and School Counseling.

OSU's counselor education degree programs are accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP).

The School Counseling graduate option is accredited by the National Council for Accreditation of Teacher Education (NCATE) and by Oregon's Teacher Standards and Practices Commission (TSPC).

## Master of Counseling Degree (MCoun), School Counseling Option: Offered via Ecampus and OSU-Cascades

The Master of Counseling degree with a School Counseling option is a 75 -credit program offered through two campuses: on-campus through OSU-Cascades in Bend, or as a hybrid program 50 percent online through Ecampus and 50 percent at the Chemeketa Community College Center for Business and Industry in Salem. The OSU-Cascades program offers a two-year full-time or three-year parttime format while the Ecampus program is presented in a three-year part-time format for working individuals.

The Master of Counseling degree uses a competency-based approach to preparing school counselors. The program prepares the counselor to provide comprehensive school counseling programs that serve all students. Counselors will learn to utilize strategies to work with their students' academic, personal/social, and career development needs. Preparation consists of a sequential program that integrates academic knowledge and theory with closely supervised counseling practice. Self-exploration and personal development are integral components of the program.

Graduates are eligible for the Initial I School Counselor License upon completion of additional steps required by the Oregon Teacher Standards and Practices Commission.

## Master of Counseling Degree (MCoun), Clinical Mental Health

 Option: Offered via OSU-Cascades The Master of Counseling degree with a Clinical Mental Health Counseling option is a 90 -credit program offered at OSU-Cascades in a two year full-time or three-year part-time format.The Clinical Mental Health Counseling option is designed for individuals who want to work in community agencies, treatment programs, community colleges, and other counseling centers.

## Master of Counseling Degree (MCoun) Written Exam Requirement For students admitted to MCoun program prior to June 2017:

Students admitted to the MCoun degree program prior to June 2017 must successfully pass a written project portfolio that demonstrates mastery (G.L.O.b.) of the MCoun learning outcomes. Students will specifically address G.L.O.a. by describing how they have and/or how they would utilize research/evidencebased counseling practice in their clinical work. Students will address G.L.O.c. by describing an ethical dilemma they have faced in their clinical practice to date and include an ethical decision model when describing their ethical decision-making processes. The written project portfolio will assess the 8 CACREP areas, in which the MCoun learning outcome objectives are based. These areas include:

1. Human growth and development
2. Social and cultural foundations
3. Helping relationships
4. Group work
5. Career and lifestyle development
6. Appraisal
7. Research and program evaluation (G.L.O.a.)
8. Professional orientation and ethics (G.L.O.c.)

The student's major advisor and one additional faculty member from the unit will serve as the student's committee. A student shall receive a Pass when the grading committee unanimously grades the portfolio as a Pass. In cases where consensus is not reached (one member votes Pass and one member votes No Pass) a third faculty member will serve as a third voter. Two outcomes are then possible: the candidate has passed with one dissenting vote or the candidate has not passed (two or more negative votes). In cases where the student has not passed, the committee recommends, by majority vote, that the student's work toward the degree be terminated. The committee recommends, by majority vote, that the
student be allowed to resubmit a modified written project portfolio, but not before the end of the term in which the written project portfolio was completed. No more than two modified written project portfolios are permitted.

For students admitted to

## MCoun program beginning

June 2017: Students admitted to the MCoun degree program beginning June 2017 must successfully pass a nationally administered exam (i.e., Counselor Preparation Comprehensive Examination) as determined by program faculty. The written exam will evaluate all three G.LO.'s. Successful completion of the national exam will evidence the candidate's mastery of MCoun subject material (G.L.O.b.) covered in the program and assess the candidate's ability to apply research (G.L.Oa.) and ethical (G.L.O.c.) proficiencies on the exam. The exam will assess the 8 CACREP areas, in which the MCoun learning outcome objectives are based. These areas include:

1. Human growth and development
2. Social and cultural foundations
3. Helping relationships
4. Group work
5. Career and lifestyle development
6. Appraisal
7. Research and program evaluation
8. Professional orientation and ethics

The minimum passing score for the national exam is defined as one standard deviation below the national mean at the time of administration. Candidates who do not pass the national exam are allowed to take re-examination, but not before the end of the term in which the exam was administered. No more than two re-exams are permitted.

## Admission to the Master of Counseling (MCoun) Programs-

 The application must be made online via the Graduate School website, http:// gradschool.oregonstate.edu/admissions/ process. The minimal prerequisite is a bachelor's degree. Admission is not based exclusively on academic success in courses. Screening includes a minimum GPA of 3.00 and a personal interview in which the applicant's educational goals, experience, and employment background are reviewed. Academic background, personal and emotional stability, commitment to diversity, and educational and professional goals of each candidate are evaluated before admission is granted. Prior counseling-related academic work from an accredited institution may meet, in part, the requirements of the program. Admission is competitive, by cohort, and begins with the summer session.Academic performance is not the sole criterion for admission to and continuation in certain courses, such as practicum courses and internships. The university may evaluate an individual's
background to determine the likelihood that he or she will maintain standards of professional conduct necessary in the discipline. An evaluation may consider current performance along with past experiences and actions that could affect a student's ability to perform in the particular course or program.

It should also be noted that individuals who want to become school counselors but who do not have a teaching license are eligible to apply for the school counselor track.

## Doctor of Philosophy in

 Counseling: Offered via Ecampus The PhD degree in Counseling is designed to prepare experienced counseling professionals to extend their roles in the counseling profession. The doctoral program is appropriate for those whose career path is that of research and teaching in counselor preparation programs, in student development at a college or university level, or in supervisory or leadership positions in schools or agencies.
## Requirements for the PhD

A minimum of 150 credits is required beyond the baccalaureate degree. The program includes thesis, internship, and the balance of credits in specialty areas, including participation in doctoral seminars. Doctoral students can meet the majority of their residency and course requirements in two years of full-time study or three years of part-time study.

## Admission to the PhD Program

 It is expected that individuals entering the PhD program will have completed a master's degree in counseling that covers the nine areas of concentration required by the Council for Accreditation of Counseling and Related Educational programs (CACREP). The nine areas are human growth and development, social and cultural foundations, helping relationships, groups, career and lifestyle development, appraisal, research and program evaluation, professional orientation, and clinical instruction. Areas not covered in the student's master's program or through continuing higher education must be taken in doctoral study.Applicants are preferred who have a minimum of two years of post-master's experience as a counselor. Preference will be given to National Certified Counselors (NCCs), state Licensed Professional Counselors (LPCs), and those who are licensed through a school counseling licensing body, such as Oregon Teacher Standards and Practices. It is also expected that applicants will have participated in counseling as a client prior to admission to the program. Desirable, but not essential, is work in the field of education such as teaching, school administration, curriculum or instruction, and/or educationally related work in child, youth, or adult development programs.

The application must be made online via the Graduate School website, http:// gradschool.oregonstate.edu/admissions/ process. A personal interview is a final step in the application process.
Admission is by cohort to begin each summer term

## Counseling Major Core (54 credits):

COUN 513. Counseling Pre-Practicum (3)
COUN 514. Practicum in Counseling (1-3)
(n.b., taken 2 quarters for 6 credits total)

COUN 531. Developmental Perspectives in Counseling (3)
COUN 532. Social and Cultural Perspectives in Counseling (3)
COUN 533. Addictive Behavior Counseling (3)

COUN 541. The Counseling Profession (3)
COUN 551. Theory and Techniques of Counseling I (3)
COUN 552. Theory and Techniques of Counseling II (3)
COUN 567. Appraisal of the Individual (3)
COUN 568. Lifestyle and Career
Development (3)
COUN 571. Group Counseling Procedures (3)

COUN 575. Family Counseling (3)
COUN 577. Applied Psychopathology and Psychodiagnostics (3)
COUN 578. Crisis, Trauma, and Grief Counseling (3)
COUN 581. Cross-Cultural Counseling (3)
COUN 598. Counselor Consultation (3)
ED 562. Introduction to Educational Research (3)
Major Code: 2970

## OPTIONS

CLINICAL MENTAL HEALTH COUNSELING OPTION
Available only via Ecampus and at OSU-Cascades.
The Master of Counseling (MCoun) degree offers a Clinical Mental Health Counseling option for individuals who want to work in community agencies, treatment programs, community colleges and other counseling centers.

This is a 90 -credit option offered through different campuses and delivery methods: OSU-Cascades is an on-campus program which offers two-year full-time or three-year part-time formats at the Bend campus. Ecampus offers a part-time three to four year format as a hybrid program with online course work and face-to-face weekend meetings at a convenient Willamette Valley location.
Clinical Mental Health Counseling Option-Specialty Courses (36 credits)
COUN 515. Counseling Internship (24) (taken in clinical mental health settings over multiple quarters)
COUN 536. Applied Psychopharmacology for Counselors (3)
COUN 550. Foundations of Mental Health Counseling (3)
COUN 595. Group Counseling II (3)

COUN 597. Introduction to Counselor Supervision (3)

## Total credits=90

Option Code: 2975

## SCHOOL COUNSELING OPTION

Available via Ecampus and at OSUCascades.
The Master of Counseling (MCoun) degree offers a School Counseling option which prepares counselors to provide comprehensive school counseling programs that serve all students using a competency-based approach. Counselors learn to utilize strategies to work with their students' academic, personal/social and career development needs. Preparation consists of a sequential program that integrates academic knowledge and theory with closely supervised counseling practice. Self-exploration and personal development are integral components of the program.

This is a 75-credit option offered through two different campuses and delivery methods: OSU-Cascades is an on-campus program which offers twoyear full-time or three-year part-time formats at the Bend campus. Ecampus offers a three-year part-time format as a hybrid program with online course work and face-to-face meetings in Salem, OR.

Graduates are eligible for a School Counselor License upon completion of additional steps required by the Oregon Teacher Standards and Practices Commission.

## School Counseling Option-

Specialty Courses (21 credits)
COUN 515. Counseling Internship (15) (taken in school settings over multiple quarters)
COUN 546. Leadership of School
Counseling Programs (3)
COUN 548. Special Education Issues In Counseling (3)

## Total credits=75

Option Code: 2980

## EDUCATION (EdD, EdM, MS,

 PhD, MAIS)The College of Education offers graduate work leading to the Master of Education (EdM), Master of Science in Education (MS), Doctor of Education (EdD; not available at this time), and Doctor of Philosophy (PhD) degrees with a major in education.

## Master of Education (EdM) Degree (Ecampus)

The Master of Education (EdM) degree advances the knowledge and teaching of PK-12 teachers and other educators who are interested in continued professional development in the field of education in order to create inclusive, supportive learning environments that contribute to student learning and growth. Candidates
take courses in educational research, technology, cultural competency, and leadership. They also further their pedagogical content knowledge and instruction in a specific area/option.

The Master of Education degree requires completion of one graduate option for a total of 45 quarter credits. All options require completion of 18 credits of core courses, $12-15$ credits of content specialty courses, and 12-15 credits of elective courses from the other EdM options or OSU Colleges. Up to 15 graduate credits may be transferred if they meet OSU Graduate School requirements.

Note: Completion of this degree does not lead to initial (preliminary) teaching licensure; it is an advanced degree for continued professional development in targeted areas.

There are four EdM options, all online and approved by the Oregon Teacher Standards and Practices Commission (TSPC) and nationally accredited by NCATE.

1. Advanced Science and Mathematics Education
2. Free-Choice Learning
3. PK-12 English to Speakers of Other Languages (ESOL)
4. Social Justice in Education

Applicants to the EdM program must possess teaching experience in a $\mathrm{K}-12$ classroom or in an education-related setting. Because this major is practitionerbased, it requires access to a classroom or informal learning environment to apply educational research, theory, and pedagogical practices, and for completion of a final project.

All courses are offered online through Ecampus to meet the needs of working professionals.

## EdM Core Courses (18 credits)

ED 506. Projects (3)
ED 522. Racial and Cultural Harmony in the K-12 Classroom (3)
ED 542. Teacher Leadership (3)
or LEAD 542. Leadership Skills for Career Success (3)
ED 561. Action Research (3)
ED 562. Introduction to Educational Research (3)
ED 596. Technology for Educators (3) or SED 520. Technology for Math and Science Education (3)

## Content Specialty Courses (12-15 credits)

## Electives (12-15 credits)

Total Credits $=45$

## Master of Science Degree

The Master of Science (MS) in Education prepares candidates to be secondary science and mathematics teachers who are skilled professionals drawing upon current educational research to create innovative and inclusive science and math learning environments. Candidates work within a cohort of peers in science and
mathematics education and are taught by faculty who specialize in and conduct educational research in science, mathematics, and equity.

The program is comprised of a coherent set of courses that emphasize research-based instruction, educational equity, innovation, and communitypartnerships. Candidates work with community partners in public school settings during every term. As part of the program, candidates complete a master's project that integrates research, theory, and practice.
The program consists of 55 graduatelevel credits including 18 credits of core courses, 20 credits of practicum and internships, and 17 credits in a content specialty: Science Education or Mathematics Education. Both options are offered on-campus at OSU in Corvallis.

Upon completion of the program, candidates will have:

- A Master of Science degree in one option:
- Science Education
- Mathematics Education
- An Oregon preliminary teaching license; and
- One or more endorsements in Advanced Mathematics, Biology, Chemistry, Integrated Science or Physics.
- It is also possible to earn an ESOL endorsement which includes additional courses and field experiences beyond the required number of credits.


## Admission Requirements

- 60 hours of reflective classroom experience* (e.g., ED 309, ED 409)
- A course in technology for teaching mathematics or science* (e.g., SED 412/512)
- A course that addresses the connection between the discipline and the current standards in science and mathematics education* (e.g., SED 413/513 or SED 414/514)
- A course in adolescent psychology* (e.g., ED 412, ED 512, HDFS 313, HDFS 229 at LBCC)
- Passing scores on required state licensure tests
*These courses may be waived if the candidate has completed similar courses at OSU or other institutions.


## MS Core Courses (18 credits)

ED 520. Classroom Management (3)
ED 572. Foundations of ESOL Education (3)
ED 599. Special Topics: Funds of Knowledge (3)

SED 506. Projects: Science-Math Ed Research (3)
SED 511. Analysis of Classrooms I (3)
SED 550. High-Quality Science and Mathematics Instruction (3)

## Internship and Practicum (20 credits)

SED 509. Practicum (5)
SED 510. Internship (15)

## Content Specialty (17 credits)

Total Credits = 55
Doctor of Philosophy Degree
The Doctor of Philosophy (PhD) in Education provides advanced theory and methods in educational research and in specific content areas. This is a research-oriented degree intended for doctoral candidates interested in becoming educational researchers and assume professional positions in a variety of settings, including colleges and universities, non-profit organizations, and government agencies. This degree aims to prepare professional researchers, scholars, or other scholar practitioners. Candidates develop competencies in educational scholarship and research that focus on acquiring new knowledge.

The Education PhD degree requires at least 108 credits, including a core curriculum (48 credits) in quantitative and qualitative research, practicum, and dissertation/thesis, and 13-18 credits in a specialty area. Additional research methods and elective courses are approved by the major professor.

Candidates select from three PhD options. All options are offered on-campus at OSU in Corvallis:

1. Agricultural Education
2. Language Equity and Educational Policy
3. Science/Mathematics Education

This program is designed for can-
didates already possessing education beyond the undergraduate level (master's degree or equivalent). Applicants to the PhD program must have significant experience in an education-related setting such as teaching, leadership administration, curriculum specialist, supervisor, or in a setting where the primary function is education. Some knowledge of educational research methodology is highly desirable.
PhD Core Courses (48 credits)
SED 580. Research and Evaluation (3)
SED 603. Dissertation (36)
or AED 603. Dissertation (36)
or ED 603. Thesis (36)
SED 612. Quantitative Research Design and Critical Analysis (3)
SED 615. Practicum in Mathematics/Science in College Teaching (3)
or ED 609. Practicum/Clinical Experience (3)

SED 622. Qualitative Research Techniques (3)
Content Specialty Courses (13-18 cr)

## Electives

Total Credits = 108
Major Code: 2310

## options

## ADVANCED SCIENCE AND MATHEMATICS EDUCATION OPTION

This EdM option aims to prepare PK-12 teachers and educators to specialize in science and mathematics education in public or private schools or informal settings. Courses emphasize using theory to inform classroom practice and practice to inform understanding of educational research in the context of science and math education.
Content Specialty Courses (12 cr) SED 566. Fostering Reflective Discourse in Science and Math Contexts (3)
SED 594. Advanced Instructional Strategies in Science and Mathematics (3)
SED 595. Assessment and Evaluation (3)
SED 598. Mathematics and Science Curriculum (3)

## Electives

Select 15 elective credits. Must be approved by program advisor.

## Total Credits = 45

Option Code: 2311

## AGRICULTURAL EDUCATION OPTION

This option is for the PhD degree.
The Agricultural Education doctoral option has a primary focus of preparing candidates to assume faculty positions in colleges or universities in agricultural education programs. Candidates assemble an individual program of study that provides a comprehensive knowledge of the teaching and learning process with a strong theoretical foundation and practical research experience in agricultural education.

## Content Specialty (13 credits)

AED 501. Research (4)
AED 553. Applied Instructional Strategies (3)
AED 556. Link Research, Teaching, and
Practice (3)
AED 640. Instrumentation and Data
Collection in Social Science (3)

## Electives

Two additional research methods courses and other courses approved by the major professor.

## Option Code: 2312

## FREE-CHOICE LEARNING OPTION

This EdM graduate option prepares educators to support learning in museums, zoos and aquariums, national parks, on the Internet, libraries, afterschool programs and other informal settings and contexts. The program emphasizes the self-directed, voluntary and lifelong nature of learning and courses utilize current learning theory and research to further an understanding of the nature of learning and cultivate better practice.

Content Specialty Courses (12 cr)
SED 535. Communicating Ocean Science To Informal Audiences (3)
SED 582. Personal Dimensions of FreeChoice Learning (3)
SED 583. Socio-cultural Dimensions of FreeChoice Learning (3)
SED 584. Physical Dimensions of FreeChoice Learning (3)

## Electives

Select 15 elective credits. Must be approved by program advisor.

## Option Code: 2319

## LANGUAGE EQUITY AND

 EDUCATIONAL POLICY OPTIONThis option is for the PhD degree.
The Language Equity and Educational Policy (LEEP) PhD option has a primary focus of preparing candidates to assume various positions in post-secondary education, leadership in community education, faculty positions in colleges or universities, or teacher education programs. Working with faculty advisors, candidates create and implement a program of study that provides comprehensive knowledge of research with bi/multilingual communities, equity in education contexts, and educational policies.

## Content Specialty (14 credits) <br> ED 607. Seminar (2)

ED 650. Equity and Education Policy (3)
ED 651. Research Bilingualism and
Multilingualism (3)
ED 652. Ethnographic Methods (3)
ED 653. Discourse and Identity in Education (3)

## Electives

One additional research methods course and other courses approved by the major professor.
Option Code: 2313

## MATHEMATICS EDUCATION OPTION

This option is for the MS degree. This graduate option is for students wanting to earn both a Master's of Science degree in Education and qualify for an Oregon teaching license in advanced mathematics.
Content Specialty ( 17 credits)
SED 574. Mathematics Pedagogy and
Technology I (4)
SED 576. Mathematics Pedagogy and
Technology II (4)

## Electives

9 credits of 500 - or 600 -level mathematics (MTH) courses, or graduate level mathematics related courses in other disciplines with approval from advisor.
Total=17
Option Code: 2314

## PK-12 ENGLISH TO SPEAKERS OF OTHER LANGUAGES (ESOL) OPTION

This EdM option focuses on how to effectively work with children and adolescents who are learning English as an additional language. It is designed for pre-kindergarten through twelfth grade (PK-12) teachers in the United States. Courses incorporate state and national learning standards for PK-12 students, as well as state and national ESOL standards for PK-12 teacher preparation programs.

Candidates who wish to add the ESOL endorsement to a current Oregon teaching license need to contact the ESOL endorsement program coordinator in the College of Education regarding additional licensure requirements.

## Content Specialty Courses (12 cr)

ED 572. Foundations of ESOL Education (3)
ED 573. Instructional Approaches for ESOL Education (3)
ED 576. Partnerships and Ideologies in ESOL Education (3)
ED 579. Linguistics for Teachers (3)

## Electives

Select 15 elective credits. Must be approved by program advisor.
Total Credits = 45
Option Code: 2315

## SCIENCE EDUCATION OPTION

This option is for the MS degree.
This option is for students wanting to earn both a Master's of Science degree in Education and qualify for an Oregon teaching license in one or more of the following endorsements: biology, chemistry, integrated science, physics.

## Content Specialty (17 credits)

SED 573. Science Pedagogy and Technology I (4)
SED 577. Science Pedagogy and Technology II (4)

## Electives

9 credits of 500 - or 600 -level courses in the history or philosophy of science, or other graduate-level courses in the sciences with approval from advisor.

## Option Code: 2316

## SCIENCE/MATHEMATICS EDUCATION OPTION

This option is for the PhD degree.
The Science/Mathematics Education PhD option has a primary focus of preparing candidates to assume various positions in collegiate/university, K-12, or free-choice education organizations. Working with faculty advisors, candidates create and implement a program of study that fosters theory-based knowledge and skills and practical research experience necessary for future career ambitions in STEM education.
Content Specialty (18 credits)
SED 607. Seminar (6)

SED 611. Survey of Research on Teaching (3)
SED 613. Learning Theory (3)
SED 621. Survey of Research on Learning (3) SED 623. Curriculum Theory (3)

## Electives

Two additional research methods courses and other courses approved by the major professor.

## Option Code: 2317

## SOCIAL JUSTICE EDUCATION OPTION

This option is for the EdM degree.
This EdM option prepares PK-12 teachers and educators in informal settings to be agents of change for equity and social justice. Candidates will learn about social justice curriculum and teaching, will engage in effective collaboration with schools and community, and will become advocates for the educational success of all students.

## Content Specialty Courses (12 credits)

ED 544. Teaching Critical Literacy (3)
ED 549. Teaching in a Differentiated and Diverse Classroom (3)
ED 590. Social Justice in Education (3)
ED 599. Special Topics [Funds of
Knowledge] (3)

## Electives

Select 15 elective credits. Must be approved by program advisor.

## Total credits=45

Option Code: 2318
MATHEMATICS EDUCATION (MA, MS, PhD)
Graduate Areas of Concentration
Elementary school mathematics, freechoice learning, mathematics education, middle school mathematics, secondary mathematics
This graduate major to be suspended pending approval of 97910.

## Master of Science Program (MS)

The master's program offers three areas of concentration:

1. Free-Choice Learning-This concentration offers the study of learning across the life span in learning environments such as science centers; aquariums; outdoor education, broadcast media, and after-school programs.
2. Professional Teacher

Licensure-In this concentration, students earn a professional teaching license in mathematics for grades 5 through 12 and a concurrent master of science degree (MS).
3. School-Based EducationThis concentration offers study for specializing in mathematics education in K-12 schools.

## Doctor of Philosophy Program (PhD)

The doctoral program offers advanced study and preparation for research in three areas of concentrations.

1. Collegiate Education-Advanced study of science education or mathematics education at the collegiate level that includes but is not limited to curriculum, assessment, instruction and instructional design, student and teacher learning, psychological factors such as motivation or selfregulation.
2. Free-Choice Learning-Advanced study of science or mathematics free-choice learning includes but is not limited to investigations of personal dimensions of learning such as motivation and identity; sociocultural issues such as gender and culture; and environmental issues such as the influence of instructional design and setting.
3. School-Based EducationAdvanced study of science education or mathematics education at the precollege level that includes but is not limited to curriculum, assessment, instruction and instructional design, student and teacher learning, psychological factors such as motivation or self-regulation. All three concentrations require two years of research content courses and five quarters of research methods courses. A program of study typically involves graduate study in a cognate field. A dissertation is required.

## Major Code: 5620

## SCIENCE EDUCATION (MA, MS, PhD)

## Graduate Areas of Concentration

Elementary school science, free-choice learning, middle school science, science education, secondary science
This graduate major to be suspended pending approval of 97919 .

## Master of Science Program (MS)

The master's program offers three areas of concentration:

1. Free-Choice Learning-This concentration offers the study of learning across the life span in learning environments such as science centers; aquariums; outdoor education; broadcast media; national, state and local parks; and after-school programs.
2. Professional Teacher Licensure-In this concentration, students earn a professional teaching license in science (biology, chemistry, integrated sciences, physics) for grades 5 through 12 and a concurrent master of science degree (MS).
3. School-Based Education-

This concentration offers study for specializing in science or mathematics education in K-12 schools.

## Doctor of Philosophy Program

 (PhD)The doctoral program offers advanced study and preparation for research in three areas of concentrations.

1. Collegiate Education-Advanced study of science education or mathematics education at the collegiate level that includes but is not limited to curriculum, assessment, instruction and instructional design, student and teacher learning, psychological factors such as motivation or selfregulation.
2. Free-Choice LearningAdvanced study of science education or mathematics education freechoice learning includes but is not limited to investigations of personal dimensions of learning such as motivation and identity; sociocultural issues such as gender and culture; and environmental issues such as the influence of instructional design and setting.
3. School-Based EducationAdvanced study of science education or mathematics education at the precollege level that includes but is not limited to curriculum, assessment, instruction and instructional design, student and teacher learning, psychological factors such as motivation or self-regulation.
All three concentrations require two years of research content courses and five quarters of research methods courses. A program of study typically involves graduate study in a cognate field. A dissertation is required.

## Major Code: 6100

## TEACHING (MAT)

Completion of the Teaching program results in a Master of Arts in Teaching (MAT) and recommendation for an Oregon teaching license in a particular subject area or in multiple subjects (elementary). This program requires a minimum of 45 credits which includes a course in foundations of ESOL instruction and at least 15 credits in internships and/or practicum that provide classroom observation and teaching practice. In addition, a minimum of 3 credits is required in each of the InTASC categories:

- The Learner and Learning,
- Instructional Practice,
- Professional Responsibility, and
- Content Specialty.

Professional Teaching Core ( $\mathbf{3} \mathbf{~ c r}$ )
ED 572. Foundations of ESOL Education (3)

## Graduate Options:

Clinically Based Elementary (Only via Ecampus)

The graduate options below are only offered at OSU-Cascades:
Elementary
Language Arts
Mathematics
Music
Science
Social Studies
Major Code: $\mathbf{2 1 0 0}$

## OPTIONS

## CLINICALLY BASED

 ELEMENTARY OPTION
## Offered only via Ecampus

The Clinically Based Elementary option in the Masters of Arts in Teaching (MAT) is a two-year program that features culturally literate education, teaching for social justice, and science and math topics leading to a preliminary license. This option takes advantage of a partnership between a school district and the College of Education to put teacher candidates in district classrooms. Each term course work includes fully online courses, hybrid courses that are a combination of online and face-to-face learning in local districts, and field practicums in school district classrooms.
Only School Districts that have entered into a formal partnership with OSU are available for student placement. Please check with the program coordinator for a list of participating schools.

## Admission Requirements:

ED 216. *Purpose, Structure, \& Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)
ED 253. Learning Across the Lifespan (3)
Professional Core ( 3 credits)
ED 572. Foundations of ESOL Education (3)
Internship and Practicum (18 cr)
ED 509. Practicum $(1,1,1)$
ED 509. Practicum: Formative edTPA (1)
ED 509. Practicum: edTPA Preparation (2)
ED 510. Internship: Student Teaching (12)
The Learner and Learning ( $\mathbf{7} \mathbf{~ c r}$ )
ED 520. Classroom Management (3)
ED 548. Students with Special Needs (2)
ED 597. K-5 STEM Integration in Diverse Classrooms (2)

## Instructional Practice (9 cr)

ED 528. Assessment for Learning (3)
ED 590. Social Justice in Education (3)
ED 596. Technology for Educators (3)
Professional Responsibility ( $\mathbf{3} \mathbf{~ c r}$ )
ED 524. Teacher as Reflective Practitioner (3) (Project)

## Content Specialty (12 cr)

ED 559. Strategies for Teaching Humanities (3)

ED 582. Strategies for Developing Literacy (3)

SED 552. Mathematics Methods: Practicum I (3)
SED 553. Science Methods: Practicum I (3)
Total Credits=52
Footnote:

* Baccalaureate Core Course

Option Code: 2107

## ELEMENTARY OPTION

Offered at OSU-Cascades in Bend only.
The Elementary graduate option is for students wanting to earn both a Master of Arts in Teaching (MAT) degree in elementary education and qualify for an Oregon teaching license to teach multiple subjects in a self-contained classroom.
Professional Teaching Core ( $\mathbf{3} \mathbf{c r}$ ) ED 572. Foundations of ESOL Education (3)

## The Learner and Learning (11 cr)

ED 513. Learning Environments I: Fostering Class Engagement (3)
ED 514. Learning Environments II:
Advancing Every Student (2)
ED 515. Learning Environments III:
Cultures and Communities (2)
ED 594. Development and Differentiation K-12 (4)

## Instructional Practice (13 cr)

ED 550. The Effective Teaching Cycle I: Foundations and Planning (4)
ED 551. The Effective Teaching Cycle II: Assessment (4)
ED 552. The Effective Teaching Cycle III:
Data and Differentiation (3)
ED 592. Technology Tools for Teaching (2)
Professional Responsibility ( $6 \mathbf{c r}$ )
ED 518. Professional Practice in the
Teaching Community (2)
ED 519. Capstone: Teaching as a Profession (3)

## Content Specialty (12 cr)

ED 565. Elementary Methods: Literacy (4)
ED 566. Elementary Methods: Mathematics (4)

ED 567. Elementary Methods: Natural and Social Science (4)

## Internship and Practicum (17 cr)

ED 510. Internship (17)
Total Credits = $\mathbf{6 1}$
Option Code: 2101

## LANGUAGE ARTS OPTION

## Offered at OSU-Cascades in Bend

## only.

The Language Arts graduate option is for students wanting to earn both a Master of Arts in Teaching (MAT) degree in language arts and qualify for an Oregon teaching license in language arts.
Professional Teaching Core ( $\mathbf{3} \mathbf{~ c r}$ ) ED 572. Foundations of ESOL Education (3)

## The Learner and Learning (11 cr)

ED 513. Learning Environments I: Fostering Class Engagement (3)
ED 514. Learning Environments II:
Advancing Every Student (2)

ED 515. Learning Environments III: Cultures and Communities (2)
ED 594. Development and Differentiation K-12 (4)
Instructional Practice ( $\mathbf{1 3} \mathbf{~ c r}$ )
ED 550. The Effective Teaching Cycle I:
Foundations and Planning (4)
ED 551. The Effective Teaching Cycle II: Assessment (4)
ED 552. The Effective Teaching Cycle III:
Data and Differentiation (3)
ED 592. Technology Tools for Teaching (2)
Professional Responsibility (5 cr)
ED 518. Professional Practice in the
Teaching Community (2)
ED 519. Capstone: Teaching as a Profession (3)

Content Specialty (12 cr)
ED 584. Language Arts Methods I: Adolescent Literacy (4)
ED 585. Language Arts Methods II: Strategies for Grades 5-12 (4)
ED 586. Language Arts Methods III:
Curriculum and the Profession (4)
Internship and Practicum (17 cr)
ED 510. Internship (17)
Total Credits = $\mathbf{6 1}$
Option Code: 2102

## MATHEMATICS OPTION

## Offered at OSU-Cascades in Bend

 only.The Mathematics graduate option is for students wanting to earn both a Master of Arts in Teaching (MAT) degree in mathematics and qualify for an Oregon teaching license in mathematics.
Professional Teaching Core ( 3 cr) ED 572. Foundations of ESOL Education (3)
The Learner and Learning ( $11 \mathbf{c r )}$
ED 513. Learning Environments I: Fostering Class Engagement (3)
ED 514. Learning Environments II:
Advancing Every Student (2)
ED 515. Learning Environments III:
Cultures and Communities (2)
ED 594. Development and Differentiation K-12 (4)

## Instructional Practices (13 cr)

ED 550. The Effective Teaching Cycle I: Foundations and Planning (4)
ED 551. The Effective Teaching Cycle II: Assessment (4)
ED 552. The Effective Teaching Cycle III:
Data and Differentiation (3)
ED 592. Technology Tools for Teaching (2)
Professional Responsibility (5 cr)
ED 518. Professional Practice in the Teaching Community (2)
ED 519. Capstone: Teaching as a Profession (3)

## Content Specialty (12 cr)

ED 537. Mathematics Methods I:
Foundations of Numerical Thought (4)
ED 538. Mathematics Methods II: Cycles of Enactment (4)
ED 539. Mathematics: Methods III:
Mathematics for Every Learner (4)

## Internship and Practicum (17 cr)

ED 510. Internship (17)
Total Credits = $\mathbf{6 1}$
Option Code: 2103

## MUSIC OPTION

Offered at Corvallis Campus only.
The Music graduate option is an intensive, one-year graduate program for students wanting to earn both a Master of Arts in Teaching (MAT) degree in music and qualify for an Oregon teaching license in music.
Professional Teaching Core ( $\mathbf{3} \mathbf{~ c r}$ ) ED 572. Foundations of ESOL Education (3)
The Learner and Learning ( 3 cr ) Select one course from one of the following areas:
Education
Counseling
Psychology
Human Development and Family Sciences
Instructional Practice ( $\mathbf{6} \mathbf{c r}$ )
MUED 591. Curriculum Foundations in Music Education (3)
MUED 592. Curriculum Implementation and Evaluation (3)
Professional Responsibility (8-10 cr)
MUED 506. Projects (5-7)
MUED 562. Research in Music Education (3)

## Content Specialty ( $\mathbf{9} \mathbf{~ c r}$ )

MUED 574. Middle Level Music Education (3)

MUED 580. Secondary Vocal Music Education (3)
MUED 581. Secondary Instrumental Music Education (3)

## Internship and Practicum (19 cr)

MUED 507. Theory and Practicum Seminar (4)

MUED 510. Professional Internship (15)

## Elective Courses

Select relevant graduate-level Music courses including performance ensembles or lessons. You must get approval from your advisor before registering for these courses.
Total Credits $\mathbf{= 4 8 - 5 0}$
Option Code: 2104

## SCIENCE OPTION

Offered at OSU-Cascades in Bend only.
The Science graduate option is for students wanting to earn both a Master of Arts in Teaching (MAT) degree in science and qualify for an Oregon teaching license in one of the following areas: biology, chemistry, integrated science, physics.
Professional Teaching Core ( $3 \mathbf{c r}$ ) ED 572. Foundations of ESOL Education (3)
The Learner and Learning ( $\mathbf{1 1} \mathbf{~ c r}$ )
ED 513. Learning Environments I: Fostering Class Engagement (3)
ED 514. Learning Environments II:
Advancing Every Student (2)

ED 515. Learning Environments III: Cultures and Communities (2)
ED 594. Development and Differentiation K-12 (4)
Instructional Practice ( $\mathbf{1 3} \mathbf{~ c r}$ )
ED 550. The Effective Teaching Cycle I:
Foundations and Planning (4)
ED 551. The Effective Teaching Cycle II: Assessment (4)
ED 552. The Effective Teaching Cycle III:
Data and Differentiation (3)
ED 592. Technology Tools for Teaching (2)
Professional Responsibility (5 cr)
ED 518. Professional Practice in the
Teaching Community (2)
ED 519. Capstone: Teaching as a Profession (3)

## Content Specialty (12 cr)

ED 531. Science Methods I: Inquiry and the Nature of Science (4)
ED 532. Science Methods II: Supporting Students' Conceptual Change (4)
ED 533. Science Methods III: Science for All Learners (4)
Internship and Practicum (17 cr)
ED 510. Internship (17)
Total Credits = 61
Option Code: 2105

## SOCIAL STUDIES OPTION

## Offered at OSU-Cascades in Bend

 only.The Social Studies graduate option is for students wanting to earn both a Master of Arts in Teaching (MAT) degree in social studies and qualify for an Oregon teaching license in social studies.
Professional Teaching Core ( $3 \mathbf{c r}$ )
ED 572. Foundations of ESOL Education (3)
The Learner and Learning ( $11 \mathbf{c r}$ )
ED 513. Learning Environments I: Fostering Class Engagement (3)
ED 514. Learning Environments II:
Advancing Every Student (2)
ED 515. Learning Environments III:
Cultures and Communities (2)
ED 594. Development and Differentiation K-12 (4)

## Instructional Practice (13 cr)

ED 550. The Effective Teaching Cycle I: Foundations and Planning (4)
ED 551. The Effective Teaching Cycle II: Assessment (4)
ED 552. The Effective Teaching Cycle III:
Data and Differentiation (3)
ED 592. Technology Tools for Teaching (2)
Professional Responsibility (5 cr)
ED 518. Professional Practice in the
Teaching Community (2)
ED 519. Capstone: Teaching as a Profession (3)

Content Specialty (12 cr)
ED 587. Social Studies Methods I:
Adolescent Literacy (4)
ED 588. Social Studies Methods II: Strategies for Grades 5-12 (4)
ED 589. Social Studies Methods III:
Curriculum and the Profession (4)

Internship and Practicum (17 cr)
ED 510. Internship (17)
Total Credits = $\mathbf{6 1}$
Option Code: 2106

## GRADUATE MINORS

## ADULT EDUCATION GRADUATE MINOR

The Adult Education graduate minor is offered with focus areas in organization development and training, workforce development, and workplace development, and requires a minimum of 15 credits of approved course work.

## Minor Code: 2070

COUNSELING GRADUATE MINOR
For more details, see the program advisor.
Minor Code: 2970

## EDUCATION GRADUATE MINOR

For more details, see an advisor in the College of Education, 104 Furman Hall, 541-737-4661 or email the advisor at askcoed@oregonstate.edu.
Minor Code: 2310

## MATHEMATICS EDUCATION GRADUATE MINOR

Graduate Areas of Concentration Elementary school science, free-choice learning, middle school science, science education, secondary science
For more details, see the advisor.

## Minor Code: 5620

## SCIENCE EDUCATION GRADUATE MINOR

Graduate Areas of Concentration
Elementary school science, free-choice learning, middle school science, science education, secondary science
For more details, see the advisor.

## Minor Code: 6100

## ADULT EDUCATION <br> AND HIGHER EDUCATION <br> LEADERSHIP COURSES

AHE 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
AHE 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
AHE 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
AHE 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
AHE 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits.
AHE 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
AHE 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
AHE 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
AHE 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

AHE 410. INTERNSHIP/WORK EXPERIENCE (1-16). This course is repeatable for a maximum of 16 credits.

AHE 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

AHE 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
AHE 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits.
AHE 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits
AHE 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

AHE 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

AHE 507. SEMINAR (1-5). This course is repeatable for a maximum of 16 credits.

AHE 508. WORKSHOP (1-3). This course is repeatable for a maximum of 16 credits.

AHE 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

AHE 510. INTERNSHIP (1-18). By special permission and arrangement. This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required
AHE 517. EDUCATION AND WORK (3). Issues related to work in the U.S. and other countries. The role of public, private, corporate, government, military and other education and training programs in meeting changing individual, corporate, and social work-related needs.
AHE 520. MULTICULTURAL ISSUES IN HIGHER EDUCATION (3). Developing understanding knowledge, and skills of multiculturalism affecting the student affairs profession and careers in student affairs administration.

AHE 521. CROSS CULTURAL
COMMUNICATIONS (3). Cultural diversity in schools, work places and communities; serving all students or clients in a pluralistic society. This course is repeatable for a maximum of 9 credits.
AHE 522. INSTRUCTIONAL TECHNOLOGY I (1).
Explores technologies used in distance education to deliver content and facilitate active learning through learner creation of digital portfolios and artifacts using online tools and apps.
AHE 523. INSTRUCTIONAL TECHNOLOGY II (1). An overview of best practices in digital-age learning design, including implementation of backward design principles. PREREQS: AHE 522 [C]

AHE 524. INSTRUCTIONAL TECHNOLOGY III
(1). Students will develop the knowledge and skills needed to design and create complete online teachings/courses within a learning management system. PREREQS: (AHE 522 [C] and AHE 523 [C] )
AHE 525. INSTRUCTIONAL TECHNOLOGY
IV (1). Learners will research and demonstrate how to use a current innovative instructional technology, as well as develop skills in understanding trends and preparing for future innovations in instructional technology. PREREQS: (AHE 522 [C] and AHE 523 [C] and AHE 524 [C] )
AHE 531. INSTRUCTIONAL DESIGN (4). Designed for instructors, trainers, managers, organizational consultants or others who are responsible for the development of programs and courses in community colleges, the workplace or other settings. Using systems concepts and methods, students will learn to design learnercentered instructional programs and courses.
AHE 532. PROGRAM EVALUATION (4). Assessing outcomes in college curriculum and workplace training programs from a
systems perspective and evaluation of program effectiveness. Particular emphasis on formative and summative evaluation, frameworks for program evaluation, quantitative and qualitative methods and analysis, communicating and reporting evaluation findings, and the ethics and standards of evaluation practice.

AHE 533. NEEDS ASSESSMENT AND
RESEARCH (4). Introduces workplace learning needs assessment (WLNA) and research principles and practices for individual and collaborative learning groups. PREREQS: AHE 553 [C]

AHE 534. ORGANIZATIONS AND SYSTEMS
THEORY (4). Introduces principles and practices underlying individual and collaborative work group learning. Participants will learn how to create an environment that promotes effective and efficient workplace learning.
AHE 547. INSTRUCTIONAL STRATEGIES
FOR ADULT LEARNERS (4). Exploration of and practice using instructional strategies to enhance adult learning. Acquisition of an instructional strategy tool kit as well as a method for evaluating adult learning events. This course is repeatable for a maximum of 60 credits.
AHE 549. ETHICAL AND PROFESSIONAL
ISSUES (4). Focuses on issues facing professionals working with adult learners as well as ethical issues relevant to the practice and scholarship in the field. Combines instruction in inquiry-based teaching methods and learning theory with work in professional settings, such as for-profit and non-profit organizations and government agencies.
AHE 553. ADULT LEARNING \& DEVELOPMENT
(4). Introduce participants to key theories, orientations, models, and principles of learning and development in adulthood.
AHE 567. LEADERSHIP DEVELOPMENT AND HUMAN RELATIONS (4). Exploration of multiple theories of leadership in different organizational contexts; synthesize theory with experience to construct a personal framework for leadership practice.
AHE 575. EDUCATIONAL FINANCE (3). Finance, budgeting and accounting for sources of revenue; deferral, state and local financing, budgeting and accounting models, practical experience combined with examination of theory, trends and issues.
Focus in either public schools, community colleges or higher education through practical experience.
AHE 582. LEGAL ISSUES IN HIGHER
EDUCATION (3). A comprehensive presentation and discussion of the law governing administration within community colleges and college/universities with a special emphasis on student services administration.
AHE 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
AHE 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
AHE 602. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Departmental approval required.

AHE 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
AHE 605. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
AHE 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
AHE 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

AHE 608. WORKSHOP (1-16). This course
is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

AHE 609. PRACTICUM CLINICAL EXPERIENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
AHE 610. INTERNSHIP (1-15). This course is repeatable for a maximum of 15 credits. PREREQS: Departmental approval required.
AHE 611. QUANTITATIVE ANALYSIS IN EDUCATIONAL RESEARCH I (3). Foundational course to methods and statistics used in quantitative educational research. Examines data analysis, statistical procedures, and interpretation of results within postsecondary environments.
AHE 612. RESEARCH PERSPECTIVES IN EDUCATION (3). Research perspectives, how they are influenced by worldviews, and how these worldviews influence research. PREREQS: AHE 562; an introductory statistics course (may be taken concurrently).

## AHE 613. RESEARCH ANALYSIS AND

INTERPRETATION IN EDUCATION (3). Critical analysis of scholarly studies in education from a variety of research perspectives. PREREQS: AHE 612; an intermediate statistics course (may be taken concurrently).
AHE 614. ADVANCED RESEARCH METHODS
IN EDUCATION (1-3). Selected topics in research methods as appropriate for research perspectives in education. May be repeated. This course is repeatable for a maximum of 6 credits. PREREQS: AHE 613

AHE 615. RESEARCH ISSUES (3). A core course in the College of Education's doctoral program that focuses on research issues. PREREQS: (AHE 612 [C] and AHE 613 [C] and AHE 614 [C] )
AHE 616. QUANTITATIVE ANALYSIS IN EDUCATIONAL RESEARCH II (3). Develop conceptual and practical understanding of research and evaluation in higher education Course topics include basic statistics, survey design, data analysis, and assessment issues. As an advanced statistics course, students will have the opportunity to apply concepts and gain direct research experience by conducting an original research project. PREREQS: AHE 611 [C]

## AHE 618. QUALITATIVE ANALYSIS IN

 EDUCATIONAL RESEARCH (3). Introduces learners to a variety of qualitative research perspectives and methodologies. Participants will examine these approaches by critiquing a scholarly article containing qualitative methods; formulating qualitative questions; writing a short proposal; collecting, coding, and analyzing data; and writing a final synthesis paper.
## AHE 621. LEADERSHIP IN STUDENT

SERVICES (3). Exploration of significant issues in design and delivery of student services in community college and higher education settings. Group discussion, model building, problem posing, issues analysis, and theory applications are employed. Students will reflect on current and future practices in student services, including emerging approaches to leadership.

AHE 638. HISTORY OF HIGHER EDUCATION (3). Surveys American higher education across 200-plus years of American history, with a specific emphasis in this section on the American community college.
AHE 640. HIGHER EDUCATION
ADMINISTRATION (3). Current leadership and management theories and models, systems of organization, patterns of internal and external governance, and issues in institutional planning and advancement in higher education.
AHE 643. ORGANIZATION THEORY-HIGHER EDUCATION (3). An introduction to organizational theory (OT). The texts allow us to explore how systems thinking is applied to our world, and how we can use it to better understand the nature of
human social engagement. Both OT and living systems theories are deeply associated with improvement and change theories in higher education settings and business
AHE 645. ETHICAL PRACTICE (3). Reviews major ethical theories with an emphasis on practical applications related to community college professional practice.

AHE 653. INSTRUCTIONAL LEADER I (3). A core course in the College of Education's doctoral program. Introduces major theories, theorists, and theoretical principles that will assist the learner in the understanding and development of systemic frameworks for instructional leadership.
AHE 654. INSTRUCTIONAL LEADER II (3). Focuses on the current realities of instructional leadership in community and technical colleges at present. PREREQS: AHE 653 [C]
AHE 672. RESEARCH PERSPECTIVES IN FOUR-YEAR HIGHER EDUCATION (3). An overview of the extensive research related to four-year colleges and universities, with an emphasis on the role of research in understanding and interpreting the nature of higher education. Explore research epistemologies, theories, and approaches related to social science and higher education, and how these ideas influence worldview and subsequent research. Identify a significant research topic/problem statement which will carry forward into the second year research courses in moving toward the dissertation topic for research related to four-year higher education.
AHE 673. RESEARCH INTERPRETATION IN FOUR-YEAR HIGHER EDUCATION (3). Critical analysis and interpretation of journal articles and scholarly research related to a problem statement in four-year higher education organization, learning, and/or leadership. Refinement of Sections 1 (Research Focus and Problem Statement) and II (Manuscript and Literature Review) of a Dissertation Proposal in four-year higher education. PREREQS: AHE 672 [C]
AHE 674. ADVANCED RESEARCH METHODS IN FOUR-YEAR HIGHER EDUCATION (3). Identification and evaluation of an appropriate quantitative or qualitative study focused on fouryear higher education. This includes a requirement that students demonstrate the ability to analyze and interpret data associated with their research question(s) as identified in their research proposal and that they outline the methodology that will be used to answer their research question(s)/ proposal. PREREQS: AHE 673 [C]
AHE 675. FOUR-YEAR HIGHER EDUCATION RESEARCH ISSUES (3). Finalize a dissertation proposal related to a research question on fouryear education institutions that reflects research epistomologies, theories and approaches. Develop a dissertation draft for review by the student's dissertation committee outlining: (a) Purpose of the student's study and its significance within the context of research on four-year colleges and universities, (b) Review of related literature on the specific topic of the dissertation, and (c) Design of the dissertation study. PREREQS: AHE 674 [C]
AHE 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
AHE 805. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
AHE 808. WORKSHOP (1-4). This course is repeatable for a maximum of 16 credits.

## - COUNSELING COURSES

COUN 441. INTRODUCTION TO
PROFESSIONAL COUNSELING (3). Provides students with an overview of the counseling profession that includes the history and philosophical foundations of the profession and roles and functions of professional counselors. The course content will critically engage the privilege and responsibility of the counseling profession in
a multicultural society. PREREQS: Sophomore standing or higher.

COUN 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COUN 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COUN 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
COUN 505. READING AND CONFERENCE
(1-3). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

COUN 506. PROJECTS (1-3). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COUN 507. SEMINAR (1-3). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COUN 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COUN 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Admission to program. Departmental approval required.
COUN 510. INTERNSHIP (1-18). This course is repeatable for a maximum of 16 credits. PREREQS: By special permission and arrangement.
COUN 513. COUNSELING PRE-PRACTICUM
(3). Designed to develop competencies in basic counseling skills and processes. Self-critique, peer critique, and supervisor critique of videotaped interviews with peer clients. A pass requires at least This course is repeatable for a maximum of 6 credits. PREREQS: Admission to program.
COUN 514. PRACTICUM IN COUNSELING (1-3) Designed to develop competencies in basic skills, facilitative dimensions, and counseling process. Self-critique, peer-critique, and supervisor critique of videotaped interview. Written self-critique, oral case presentation and charting skills are learned. Practicals are graded on a pass/no pass credit basis only. A pass requires at least This course is repeatable for a maximum of 9 credits. PREREQS: Admission to program. Departmental approval required.
COUN 515. COUNSELING INTERNSHIP (1-15). The internship is the culminating field experience of the MS in Counseling program. It is designed to provide the student with an on-site placement in a public or private mental health or school setting that will create the necessary bridge between training and professionalism. Graded P/N. This course is repeatable for a maximum of 24 credits.

COUN 530. FUNDAMENTALS OF COUNSELING (3). A course designed for students planning on working in a human service profession, such as counseling, teaching, nursing, medicine, law. Exploration of basic helping processes appropriate in a variety of settings. Review of ethical standards of conduct. A variety of skills and techniques are demonstrated and practiced through videotape and role play.
COUN 531. DEVELOPMENTAL PERSPECTIVES IN COUNSELING (3). A study of affective, behavioral, cognitive, physical, and moral development for human growth and maturation. Theories of personality and learning that affect normal and non-normal development. Relationship of understanding human development to the counseling profession.
COUN 532. SOCIAL AND CULTURAL
PERSPECTIVES IN COUNSELING (3). Social and cultural factors effecting counseling. Includes studies of change, ethnic groups, subcultures, changing roles of women, sexism, urban and rural
societies, population patterns, cultural mores, use of leisure time, and differing life patterns. PREREQS: Admission to program.

## COUN 533. ADDICTIVE BEHAVIOR

COUNSELING (3). Techniques for addictive behavior assessment and counseling. Specific addictions covered include substance abuse, gambling, and eating disorders.
COUN 536. APPLIED
PSYCHOPHARMACOLOGY FOR
COUNSELORS (3). Acquaints counseling students with the fundamentals of psychotropic drugs. Basics of pharmacology, adverse effects, indications, and drug interactions will be discussed. Boundaries of practice and practical issues of assessment and referral will be covered. The overall aim of the course is to provide information about psychopharmacology to the non-medical mental health care provider so that she or he can be a more informed member of the mental health care team. This course does not purport to prepare the student to be any part of the pharmacological prescriptive process. That is the purview of the medically trained person.

## COUN 540. NEW VISION SCHOOL

COUNSELING: ACADEMIC ACHIEVEMENT (3).
Participants will be able to implement researchbased educational practices in: 1. Individual and group academic achievement counseling. 2. Consulting with parents, teachers, and schools regarding academic achievement. 3. Utilizing culturally competent practices in addressing academic achievement issues. 4. Applying the appropriate legal and ethical guidelines to work in the academic domain.
COUN 541. THE COUNSELING PROFESSION
(3). Provides the foundation for becoming a counselor and explores the psychological and philosophical ramifications of the counselor in a changing world. Topics will include values in counseling, ethical and legal issues in counseling, research in counseling, and maintaining a professional identity. PREREQS: Admission to program.

COUN 546. LEADERSHIP OF SCHOOL COUNSELING PROGRAMS (3). Designed to prepare school counselors to lead teams in the development and implementation of comprehensive school counseling programs. Principles of leadership, system change, and advocacy are introduced. State and National Comprehensive School Counseling models are examined. PREREQS: Admission to program.
COUN 548. SPECIAL EDUCATION ISSUES IN COUNSELING (3). Addresses various educational disability categories, the fundamentals of special education law, the special education assessment process, the special education definition of emotional/behavioral disorders, and the counselor's role in supporting children with special emotional needs. PREREQS: Admission to counselor education program.

COUN 550. FOUNDATIONS OF MENTAL HEALTH COUNSELING (3). Addresses the foundations of mental health counseling: (1) historical, philosophical, societal, cultural, economic, and political dimensions of, and current trends in, the mental health movement; (2) roles, functions, preparation standards, credentialing, licensure and professional identity of mental health counselors, (3) policies, laws, legislation, recognition, reimbursement, right-to-practice, and other issues relevant to mental health counseling.

## COUN 551. THEORY AND TECHNIQUES

OF COUNSELING I (3). Basic concepts and facilitative skills of helping relationships. Introduction and overview of counseling theories and their related processes and techniques. PREREQS: Admission to program.
COUN 552. THEORY AND TECHNIQUES OF COUNSELING II (3). Continued development of the theories and techniques of counseling including identification of the counseling process.

Emphasis on personality development and affective, behavioral and cognitive approaches. PREREQS: COUN 551

COUN 562. INTRODUCTION TO RESEARCH METHODS IN COUNSELING (3). An introductory course for master's level students. Explains basic evaluation, quantitative and qualitative research methods in the counseling profession; action research and the fundamental statistical procedures used in the interpretation and use of research studies.
COUN 567. APPRAISAL OF THE INDIVIDUAL
(3). Development of framework for understanding the individual; methods for data gathering and assessment; individual and group testing; case study approaches; observational, sociometric, and environmental procedures; study of individual differences. Ethnic, cultural, and sex factors are emphasized. PREREQS: Basic statistics course.
COUN 568. LIFESTYLE AND CAREER
DEVELOPMENT (3). Major theoretical approaches to career development; available resources for educational and occupational assessment; procedures to enhance career exploration, planning and placement. Emphasis is on the decision-making process and issues of career counseling with special populations.

COUN 571. GROUP COUNSELING PROCEDURES (3). A conceptual and experiential introduction to group dynamics. Group counseling approaches and models; issues of group leadership; styles of leadership and group facilitation skills. Consideration is given to group counseling goals, composition, phases and research. PREREQS: Admission to the program.
COUN 575. FAMILY COUNSELING (3). An overview of the major theoretical approaches to family counseling will be covered. Through the use of readings, demonstrations, and videos the student will become familiar with systems foundations, the history of family counseling, family roles, interaction patterns, and decisionmaking processes.
COUN 577. APPLIED PSYCHOPATHOLOGY AND PSYCHODIAGNOSTICS (3). Addresses the principles of diagnosis of psychopathology and the use of current diagnostic tools, including the current edition of the Diagnostic and Statistical Manual (DSM). Includes psychiatric terminology, treatment, current research, cross cultural impact, ethical implications, and goal planning related to mental health processes and case management. PREREQS: COUN 541 and COUN 551 and COUN 552.
COUN 578. CRISIS, TRAUMA, AND GRIEF
COUNSELING (3). The theory and pragmatics of crisis, trauma and grief counseling are addressed.
COUN 581. CROSS-CULTURAL COUNSELING (3). Cognitive and experimental study of social and psychological variables influencing the cross-cultural counseling relationship. Social and psychological experiences of selected subcultures Relevant assessment instruments and current literature, methods and outcome studies. PREREQS: Instructor approval required.
COUN 582. MULTICULTURAL COUNSELING II (3). Further explores multicultural counseling by studying in-depth the experience of specific student populations and their unique strengths and needs. Students will gain understanding of the specialized school programs and state and national regulations that support a variety of learners as well as the theories and research related to language acquisition to support ELL and bilingual students in the PK-12 system. Students will engage in authentic experiences and assignments to enrich their understanding of sub-populations of students and their families to enhance their cultural responsiveness with those specific groups of learners. PREREQS: COUN 581 [C]
COUN 591. STUDY OF SCHOOLS: K-12 (3).
Structured observation in selected K-12 school
sites. Total of 125 hours of observation, as required by the Oregon Teacher Standards and Practices Commission for persons without prior teaching experience. PREREQS: Admission to Track II program.
COUN 592. CLASSROOM INSTRUCTION FOR
COUNSELORS (3). 75 hours of supervised instruction in a public school setting. PREREQS: COUN 591.

COUN 595. GROUP COUNSELING II (3). Group counseling theories and pragmatics for clients with mental and emotional disorders.
COUN 597. INTRODUCTION TO COUNSELOR SUPERVISION (3). Introduction to the theory and pragmatics of counselor supervision.
COUN 598. COUNSELOR CONSULTATION
(3). Development of consultation skills as a supervisor and counselor educator. Consultation theory and practice are studied. Students practice consultation skills and receive feedback. PREREQS: Admission to master's program.
COUN 599. SPECIAL TOPICS (1-4). This course is repeatable for a maximum of 90 credits. PREREQS: Departmental approval required.
COUN 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COUN 602. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

COUN 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
COUN 605. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COUN 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COUN 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required. COUN 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COUN 609. PRACTICUM IN COUNSELING (1-12). Specialized counseling experiences supervised by a professional. Emphasis is on development of advanced skills in counseling specific to a population. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COUN 610. INTERNSHIP IN COUNSELING (1-15). Designed to provide experiences in development of teaching and supervision skills in preparation as a counselor educator and supervisor. This course is repeatable for a maximum of 15 credits. PREREQS: Departmental approval required.
COUN 612. RESEARCH PERSPECTIVES IN
EDUCATION (3). Research perspectives, how they are influenced by worldviews, and how these worldviews influence research. PREREQS: COUN 562 and an introductory statistics course (may be taken concurrently).
COUN 613. RESEARCH ANALYSIS AND
INTERPRETATION IN EDUCATION (3). Critical
analysis of scholarly studies in education from a variety of research perspectives. PREREQS: (TCE 612 or COUN 612) and an intermediate statistics course (may be taken concurrently).
COUN 614. ADVANCED RESEARCH METHODS IN EDUCATION (1-3). Selected topics in research methods as appropriate for research perspectives in education. This course is repeatable for a maximum of 6 credits. PREREQS: COUN 613

## COUN 616. UNIVERSITY LEVEL

INSTRUCTIONAL THEORY AND METHODS (3).
Addresses general university level instructional theory and methods as well as pedagogy specific to counselor education. PREREQS: Admission to PhD program in counseling or EdD in education.

## COUN 617. ADVANCED COUNSELOR

SUPERVISION (3). Advanced theory and techniques in counselor supervision. Pedagogical issues in training supervisors are addressed. PREREQS: Admission to PhD program in counseling.
COUN 618. PRACTICUM IN COUNSELING (1-12). Specialized counseling experiences supervised by a professional. Emphasis is on development of advanced skills in counseling specific to a population. This course is repeatable for a maximum of 16 credits. PREREQS:
Departmental approval required.
COUN 619. INTERNSHIP IN COUNSELING (1-12). Designed to provide experiences in development of teaching and supervision skills in preparation as a counselor educator and supervisor. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
COUN 621. ADVANCED TOPICS IN EDUCATION (3). Advanced critical study of theory and research related to specific topics of counseling and counselor education. This course is repeatable for a maximum of 18 credits.

COUN 632. ADVANCED COUNSELING THEORY
(3). The goal of this course is to develop in each student an advanced level of understanding and skill in emergent counseling models.

COUN 633. ADVANCED COUNSELING
PRACTITIONER I (3). Assists the advanced counseling practitioner with their knowledge and skills in training, leadership, and writing.

## COUN 634. ADVANCED COUNSELING

PRACTITIONER II (3). Addresses the theory, science, pragmatics and pedagogy of evidencebased practices in professional counseling.
COUN 662. COUNSELOR EDUCATION QUANTITATIVE RESEARCH METHODS I (3). Part I of a three-course sequence designed to prepare students to meet the CACREP doctoral standards for quantitative research methods in counselor education. Topics addressed in course I include application of the following in counselor education research: (1) data scales and scale transformation, (2) frequency distributions and histograms, (3) measures of central position,
(4) variability, (5) characteristics of data curves (6) normality, (7) measures of variability, (8) the statistical hypothesis, (9) statistical errors (Type I/ Type II), (10) power analysis, and (11) statistical correlation. PREREQS: COUN 562.

## COUN 663. COUNSELOR EDUCATION

QUANTITATIVE RESEARCH METHODS II (3).
Part II of a three-part course sequence designed to prepare students to meet the CACREP doctoral standards for quantitative research methods in counselor education. Topics addressed in course I include application of the following in counselor education research: (1) a review of the dependent variable, normal curve, Type I and Type II errors, power analysis, and criteria for selecting statistical tools, (2) significance tests, including Chi-square t-test, one-factor analysis of variance, multiple comparison tests (L.S.D. and Tukey's HSD), twofactor analysis of variance, statistical interaction (ordinal and disordinal), linear regression, factor analysis, and analysis of covariance.

## COUN 664. COUNSELOR EDUCATION

QUANTITATIVE RESEARCH METHODS III (3). Part III of a three-course sequence designed to prepare students to meet the CACREP doctoral standards for quantitative research methods in counselor education. Topics addressed in course III include application of the following in counselor education research: (1) multiple regression, (2) path analysis, (3) confirmatory factor analysis,
analysis, (4) logistic regression, (5) reliability and generalizability theory, (6) cluster analysis, (7) structural equation modeling, and (8) single subject designs.
COUN 665. PUBLICATION METHODS IN COUNSELOR EDUCATION (3). Teaches doctoral students how to write theses, grant reports, peerreviewed journal articles, and textbook chapters.

## COUN 667. ADVANCED ASSESSMENT IN

COUNSELING (3). Explores current issues in the use of assessment in counseling, best practices in instrument development, and best practices in assessment pedagogy. PREREQS: Admission to PhD program in counselor education.
COUN 668. ADVANCED CAREER
DEVELOPMENT AND CONSULTATION IN
COUNSELING (3). An advanced course surveying past, current, and possible future technical and philosophical perspectives concerning career development and counseling. Issues in consultation, social change theory, and advocacy action planning are also reviewed in light of their impact on future counseling practitioners Pedagogical methods for presenting current issues in career development, consultation, social change theory and advocacy action planning are a major focus of the class. PREREQS: COUN 568 and COUN 598

COUN 671. ADVANCED GROUP COUNSELING
(3). Provides learning experiences beyond the entry level in group counseling. Theoretical and pedagogical innovations in this area are discussed. PREREQS: Admission to doctoral program in counseling.

COUN 681. ADVANCED DIVERSITY AND SOCIAL JUSTICE IN COUNSELOR EDUCATION (3). Addresses pedagogy relevant to multicultural, diversity, and social justice issues and the role of racial, ethnic, and cultural heritage, nationality, socioeconomic status, family structure, age, gender, sexual orientation, religious and spiritual beliefs, occupation, physical, and mental status, local, regional, national, international perspective, and issues of equity such as oppression, power and privilege in counselor education. PREREQS: COUN 581

COUN 696. COUNSELOR EDUCATION (3). Orientation to the profession of counselor education. Specific topics include: (1) history and organization of the profession, (2) program accreditation standards and practices, (3) instructional theory and methods relevant to counselor education, and (4) ethical and legal considerations in counselor education

COUN 697. COUNSELOR SUPERVISION (3). Practical experience for counseling professionals who have responsibility directing personal and professional development of counselors, promoting counselor competency, and developing and implementing counseling services and programs. Theoretical models of supervision are utilized to develop supervisor roles. PREREQS: Admission to doctoral program.

## - EDUCATION COURSES

ED 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ED 216. *PURPOSE, STRUCTURE, AND FUNCTION OF EDUCATION IN A DEMOCRACY (3). Examines the system of education in a democratic society --past, present, and future. Historical, social, philosophical, political, legal, and economic foundations of education in Oregon, the USA, and other countries provide a framework for analyzing contemporary educational issues in schools, communities, and workplaces. (Bacc Core Course)

ED 219. CIVIL RIGHTS AND MULTICULTURAL ISSUES IN EDUCATION (3). Examination of the context of working with students, schools communities, and workplaces; the diversity of learning cultures (e.g., urban, suburban, rural) and
the diversity among learners within those different cultures; and the influence of culture on oness learning.

ED 253. LEARNING ACROSS THE LIFESPAN
(3). An exploration of how learning occurs at all ages from early childhood through adulthood. Covers major and emerging theories and styles, self-reflection on implications of how learning occurs for self and others, and the impact of these issues on the development and delivery of instruction.
ED 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ED 309. FIELD PRACTICUM (3-6). Placement in either an elementary, middle or secondary school. To assist students to develop competencies in dealing with children or adolescents according to the individual major of the university student. This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
ED 340. ^SUPPORTIVE DIFFERENTIATED ENVIRONMENTS (3). Addresses special abilities and needs of learners and helps prepare teachers to develop strategies and instructional practices for diverse learners and students with exceptionalities in a supportive and inclusive classroom. (Writing Intensive Course) PREREQS: Admission to the Education Double Degree Program.

ED 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

ED 401. RESEARCH (1-16). This course
is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ED 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ED 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ED 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ED 406. PROJECTS (1-3). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ED 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ED 408. WORKSHOP (1-3). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ED 408H. WORKSHOP (1-3). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required. Honors College approval required.
ED 409. PRACTICUM/CLINICAL EXPERIENCE (1-16). This course is repeatable for a maximum of 16 credits.
ED 410. INTERNSHIP/WORK EXPERIENCE (1-18). This course is repeatable for a maximum of 18 credits.
ED 411. EDUCATIONAL PSYCHOLOGY,
LEARNING AND DEVELOPMENT (3). An
opportunity to begin the transition from student to teacher. Explores the relationship between human development and learning through the life cycle.
ED 412. LEARNING STYLES AND NEEDS IN ADOLESCENCE (2). Exploration of the particular learning styles and needs of the adolescent, major and emerging learning theories, individual learning styles including oness own learning styles, self-reflection on implications of how learning occurs, and the impact of these issues on the development and delivery of instruction.
ED 416. FOUNDATIONAL PERSPECTIVES
IN EDUCATION (2). Introduction to historical, philosophical, social, and political foundations of
education in America providing the framework for analysis of educational issues. PREREQS: Admission to the Professional Teacher Education Program or instructor approval required.

ED 420. CLASSROOM MANAGEMENT (3). Build knowledge and learn techniques for cultivating a positive learning environment and for managing classrooms. Learn through examining the literature and observing relevant learning environments and classrooms. Explore factors that influence student behavior, including those associated with social and/or multicultural student populations.

## ED 424. TEACHER AS REFLECTIVE

PRACTITIONER (2-3). Designed to help teachers make complex judgments based upon their knowledge and understanding of their students, the curriculum, and larger social and cultural issues through reflective practice. Problem solving related to teaching with strong focus on generating new knowledge about teaching, learning, and assessment. This course is repeatable for a maximum of 3 credits. PREREQS: ED 407 [D-] or TCE 407 [D-]
ED 425. CURRICULUM IMPLEMENTATION AND NSTRUCTIONAL STRATEGIES 7-12 (4). The relationship of theory to practice in teaching the content areas in grades 7-12 is examined. Genera curriculum trends as well as content selection in specific endorsement/subject areas are explored. This course is preparation for and is coordinated with part-time student teaching. PREREQS: 1) Admission into the Education Double Degree Program. 2) Student is entering part-time student teaching in high school or middle school.

ED 427. ALTERNATIVE ASSESSMENT FOR MIDDLE AND HIGH SCHOOL (2). Introduces methods of assessment that encourage effective learning. Students will design assessments aligned to national, state, and local standards as they prepare and implement a teaching unit n their practicum. Taken concurrently with TCE 410, Part-Time Student Teaching in Middle or High School. PREREQS: (ED 491 or ED 494) and admission to the Education Double Degree Program.

ED 429. CURRICULUM, INSTRUCTION, AND ASSESSMENT FOR CTE (3). Build knowledge and skills in curriculum design, instructional strategies, and assessment for successful teaching in a Career and Technical Education and other specialty areas: (a) Agriculture Food and Natural Resource Systems, (b) Arts, Information and Communications, (c) Business Management, (d) Health Sciences (e) Human Resources, (f) Industrial and Engineering Systems, (g) Family and Consumer Sciences, (h) Career Trades.

## ED 456. STRATEGIES FOR TEACHING

## ANGUAGE ARTS AND SOCIAL STUDIES

(3). Exploration of language arts and social studies programs (e.g., children's literature, writing, special needs, spelling, and cultural factors). Development of research-based teaching strategies and assessment. Focuses on the development of inquiry approaches that reflect interdisciplinary curriculum as well as subjectspecific pedagogy in the teaching of both social studies and language arts. PREREQS: (ED 216 and ED 219 and ED 253) and admission to the Education Double Degree Program.
ED 457. TEACHING ELEMENTARY
MATHEMATICS FOR UNDERSTANDING (3). Part of the Education Double Degree. Explores the teaching of mathematics in K-8 classrooms in a manner consistent with state and national standards. Students learn teaching strategies that incorporate the development of mathematical models and mental constructs. PREREQS: (MTH 211 and MTH 212 and MTH 390) and admission to the Elementary Double Degree Program.

ED 458. STRATEGIES FOR TEACHING WELLNESS AND FINE ARTS (2). Exploration of recent trends in wellness and fine arts. Development of research-based practices in the teaching of wellness and fine arts. Emphasizes
the value of developing holistic learners through effective wellness and fine arts programs. PREREQS: (ED 216 and ED 219 and ED 253) and admission to the Education Double Degree Program.
ED 472. FOUNDATIONS OF ESOL EDUCATION (3). Examines characteristics of English language earners (ELLs), key theories in language acquisition, the role of culture in language development, and instructional program models for ELLs, while considering implications for classroom instruction.
ED 473. INSTRUCTIONAL APPROACHES FOR
ESOL EDUCATION (3). Examines characteristics of standards-based content-area instruction for emergent bilinguals. Includes integration of content and language development, classroombased assessment, and use of technology to support student learning. PREREQS: ED 472 [C]
ED 476. PARTNERSHIPS AND IDEOLOGIES IN ESOL EDUCATION (3). Considers social and political issues pertaining to educating English language learners. Focuses on exploring multiple deologies in ESOL and building partnerships across schools, families, and communities. PREREQS: ED 472 [C]

## ED 479. LINGUISTICS FOR TEACHERS

(3). Explores linguistic categories: phonology, morphology, syntax, semantics, pragmatics, and discourse. Focuses on teaching implications-from psycholinguistic, sociolinguistic, and critical perspectives--for emergent bilingual students in P-12 contexts. PREREQS: ED 472 [C]

ED 480. TEACHING MATH TO SECONDARY LEARNERS IN CONTEXT (3). Enhance and reinforce mathematics embedded within occupational-specific curricula taught at the secondary level to prepare Career and Technical Education teachers for licensure.

## ED 481. READING AND WRITING FOR

SECONDARY LEARNERS IN CONTEXT (3).
Enhance and reinforce the authentic reading and writing embedded within occupationally relevant materials to prepare Career and Technical Education teachers for licensure.
ED 483. DEVELOPMENTAL READING (3). Development of pedagogy in teaching of reading to elementary-aged students, including teaching of vocabulary, comprehension, phonics, fluency and motivation to read. Use of children’s literature, assessment approaches, and special needs students are also addressed. This is a PTCE course in the elementary Double Degree Program. PREREQS: Admission to the Education Double Degree Program required.
ED 484. INTRODUCTION TO CAREER AND TECHNICAL EDUCATION (3). A study of the history of Career and Technical Education, the impact of the educational reform on Career and Technical Education and workforce development. Topics include leaders in vocational education; legislative initiatives, social issues, and organizations involved in and impacting Career and Technical Education.

## ED 491. CONTENT STANDARDS AND

 CURRICULUM DEVELOPMENT FOR MID LEVEL (3). Exploration of content standards, materials, and methods appropriate for middle school students. Develops skills in work sample methodology through the design of effective instruction, integrating a variety of methods with existing understandings of content area, how people learn, and the diverse communities in which they work. PREREQS: Admission to the Education Double Degree Program required.ED 493. READING, LITERATURE, AND LANGUAGE DEVELOPMENT IN THE CONTENT (2). Examination of reading, literature, and language development methods that can be used by middle school and high school teachers to support students' learning of content area information. Development of specific reading strategies in content areas. PREREQS: Admission
to the Education Double Degree Program required.

ED 494. CONTENT STANDARDS AND CURRICULUM DEVELOPMENT FOR HIGH SCHOOL (3). Exploration of content standards, materials and methods appropriate for high school students. Develops skills in work sample methodology through the design of effective instruction, integrating a variety of methods with existing understandings of content area, how people learn, and the diverse communities in which they work. PREREQS: Admission to the Education Double Degree Program required.

ED 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

ED 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ED 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ED 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
ED 505. READING \& CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ED 506. PROJECTS (1-3). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ED 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ED 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ED 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.
ED 510. INTERNSHIP (1-18). By special permission and arrangement. This course is repeatable for a maximum of 40 credits.

ED 512. PSYCHOLOGY OF THE ADOLESCENT (3). Examines research from psychology, human development, and neuroscience to provide a holistic understanding of adolescents and learning with a focus on the middle/secondary student. nvestigates the influence of family, neighborhood, peer, and school contexts on brain development, dentity formation, and the challenges and opportunities of adolescence.
ED 513. LEARNING ENVIRONMENTS I:
FOSTERING CLASS ENGAGEMENT (3).
Creating a positive culture in the classroom, managing student behavior, and engaging students in critical learning discourse are challenges faced by all educators. Students will learn to develop the components of a productive and safe learning environment.
ED 514. LEARNING ENVIRONMENTS II:
ADVANCING EVERY STUDENT (2). Students will expand their knowledge about constructing a positive K-12 classroom environment to a productive learning environment accommodated to fit the needs of a diversified student population. PREREQS: ED 513 [B]
ED 515. LEARNING ENVIRONMENTS III: CULTURES AND COMMUNITIES (2). The third in a series of courses to assist the Teacher candidate in developing a classroom culture of learning that challenges every student to succeed and thrive. Teacher candidates will understand the important role that culture and community play in the teaching and learning process, and develop culturally responsive teaching practices. PREREQS: ED 513 [B] and ED 514 [B]
ED 517. ACADEMIC WRITING FOR MASTER'S STUDENTS (1). A writing refresher that addresses academic voice, style, tone, construction, conventions, and writing style appropriate for
master>s-level research papers and capstones This course is repeatable for a maximum of 2 credits.

## ED 518. PROFESSIONAL PRACTICE IN THE

 TEACHING COMMUNITY (2). The professional themes of communication, collaboration, reflection, knowledge of learners, professional ethics, social justice and cultural understanding will be explored and applied to teaching contexts, behaviors, dispositions, and actions.
## ED 519. CAPSTONE: TEACHING AS A

PROFESSION (3). Capstone course for the MAT in which teacher candidates further develop their educational philosophy and analyze their professional growth in alignment with national standards. PREREQS: Acceptance into the MAT program, permission of department.
ED 520. CLASSROOM MANAGEMENT AND DISCIPLINE K-12 (3). Knowledge of discipline and classroom management techniques through examination of the literature and school observations. Explore factors that influence behavior problems, including those associated with social and/or multicultural students populations
ED 522. RACIAL AND CULTURAL HARMONY IN THE K-12 CLASSROOM (3). An overview of many issues relevant to the increasingly diverse student population in public schools today. It explores how a culturally competent perspective can be incorporated into curriculum design, teaching strategies, and interactions with students and parents. The course is both self-directed and communal, requiring students to respond to the materials and each other, yet at their own pace.

## ED 524.TEACHER AS REFLECTIVE

PRACTITIONER (2-3). Designed to help teachers make complex judgements based upon their knowledge and understanding of their students, the curriculum, and larger social and cultural issues through reflective practice. Problem solving related to teaching with strong focus on generating new knowledge about teaching, learning, and assessment.
ED 528. ASSESSMENT FOR LEARNING (3).
Applies the formative learning cycle to through development of an assessment plan. Examines various formative assessment practices that promote higher order thinking and empower students to show evidence of their learning through self-assessment and feedback.
ED 531. SCIENCE METHODS I: INQUIRY AND THE NATURE OF SCIENCE (4). Introduction to (1) fundamentals of science teaching including the nature of science and inquiry, (2) designing instructional sequences and selecting curriculum resources aligned to state science standards and research-based learning progressions, (3) effective teaching moves, (4) supporting acquisition of academic language, and (5) productive and safe science learning environments
ED 532. SCIENCE METHODS II: SUPPORTING STUDENTS' CONCEPTUAL CHANGE (4). Development of skill in identifying and addressing misconceptions or naive conceptions as part of the individualized conceptual change process. Integration of technology tools for instruction and assessment. Development of high-leverage science teaching practices with a focus on enhancing classroom discourse and evidencebased argumentation with a survey of science curriculum models. PREREQS: ED 531 [B]
ED 533. SCIENCE METHODS III: SCIENCE FOR ALL LEARNERS (4). Teaching science as a community of practice means addressing the needs of all learners, particularly those underrepresented in science. Uses technology to enhance high-leverage teaching practices and practices safe and effective laboratory teaching methods. Explores contextualized and interdisciplinary approaches to science education. PREREQS: ED 531 [B] and ED 532 [B]

ED 537. MATHEMATICAL METHODS I: FOUNDATIONS OF NUMERICAL THOUGHT (4). Introduction to the fundamentals of mathematics teaching including the nature and goals of mathematical thinking, numeracy, inquiry, and related academic language of mathematics. Students are introduced to the high highleverage practices of ambitious mathematics teaching, designing instructional sequences and selecting curriculum resources aligned to state science standards and research-based learning progressions.

ED 538. MATHEMATICS METHODS II: CYCLES OF ENACTMENT (4). Teacher candidates create instructional units based on student knowledge and skill while attending to needed accommodations. Designed to help the teacher candidate select or modify instructional materials based on student prior knowledge, experience, and interests; make accommodations for students and provide for multiple representations across a unit of instruction. PREREQS: ED 537 [B]

## ED 539. MATHEMATICAL METHODS III:

MATHEMATICS FOR EVERY LEARNER (4).
Teacher candidates will develop practices that support all students, regardless of background or ability. The teacher candidate will design a unit of instruction with complex learning goals that are cross- and multi-disciplinary, draw on multiple perspectives, and invoke higher order thinking and communication skills. PREREQS: ED 537 [B] and ED 538 [B]

ED 542. TEACHER LEADERSHIP (3). Examines current conceptions, research, and philosophies of educational leadership. The goal is to promote teacher-leadership in effective teaching and learning and influence in local educational policies and programs.

ED 544. TEACHING CRITICAL LITERACY
(3). Examines literacy curriculum and teaching practices in various real world contexts, such as critical literacy, supporting second language earners, argumentation, reading engagement and social justice. While still addressing technical dimensions of literacy education, students write critical literacy curricula, take turns leading critical book discussions, and learn to critique text bias. Course challenges students to develop critical consciousness as teachers of literacy in a democracy.
ED 548. STUDENTS WITH SPECIAL NEEDS (2).
Explores the broad range of special needs that are represented in today's classrooms. Addresses various types and characteristics of disabilities as well as collaborating with specialists and families with children with special needs. Discussion strategies and instructional practices to enhance the learning of diverse students in the inclusive classroom.

## ED 549. TEACHING IN A DIFFERENTIATED

 AND DIVERSE CLASSROOM (3). Addresses the philosophical framework, strategies, and assessment of differentiation to meet the needs of all students in the classroom.
## ED 550. THE EFFECTIVE TEACHING CYCLE

 I: FOUNDATIONS AND PLANNING (4). The first of three courses examining the iterative cycle of curriculum planning, instruction, and assessment. An introduction to learning theory and the relationship between teaching and learning provides the foundation. An overview of the complete teaching cycle leads to a focus on curriculum planning based on state standards.ED 551. THE EFFECTIVE TEACHING CYCLE II: ASSESSMENT (4). The second of three courses examining the iterative cycle of curriculum planning, instruction, and assessment. Learning in this class will concentrate on assessment for and of learning and its importance to student engagement and advancement. PREREQS: ED 550 [B]

ED 552. THE EFFECTIVE TEACHING CYCLE III: DATA AND DIFFERENTIATION (3). The third of three courses examining the iterative cycle of curriculum planning, instruction, and assessment. The focus of this course is on data analysis to support whole class, group, and individual differentiated instruction and learning.

ED 559. STRATEGIES FOR TEACHING
HUMANITIES (3). Pedagogical approaches to teaching language arts and social studies in K-5, multiple subject classrooms. Focus on developing research-based daily lessons and unit plans that integrate curriculum, support national standards, and use an inquiry approach for student learning

ED 561. ACTION RESEARCH (1-3). Examines action research as a vehicle for teacher and administrator professional development. Specific topics of study include problem posing, data collection and analysis, theory building, and writing the report. This course is repeatable for a maximum of 3 credits.

## ED 562. INTRODUCTION TO EDUCATIONAL

RESEARCH (3). Explores the purpose and use of social science research in education with emphasis on action and applied research. Designed to help teachers and informal educators to critically read, interpret, and apply research findings to the diverse contexts in which they work, and to become informed consumers of educational research.

## ED 564. ADVANCED INSTRUCTIONAL

STRATEGIES (3). Addresses research-based
teaching strategies and collaboration with colleagues to improve instruction for all students in the standards-based classroom.

## ED 565. ELEMENTARY METHODS

LITERACY (4). Understanding the theoretical and developmental foundations for literacy programs K-9; targeted reading, writing, listening, vocabulary, and speaking skill development and needs assessments; organizational strategies for teaching literacy; and the integration of cultural diversity and social justice into literacy learning

## ED 566. ELEMENTARY METHODS:

MATHEMATICS (4). Exploration of the teaching of early childhood/elementary school mathematics with emphases on problem solving, connections, representation, communication, reasoning and proof. Course will incorporate the development of mathematical models and mental constructs. Research-based, developmentally appropriate and culturally relevant practices will be incorporated into lessons.

ED 567. ELEMENTARY METHODS: NATURAL AND SOCIAL SCIENCE (4). Inquiry approaches to the teaching and learning of the natural and social sciences are used to explore the structure of the disciplines and support the creation of instructional units that develop disciplinary knowledge and practices/skills while highlighting cross-cutting themes. Scientific literacy and civic competence are emphasized.
ED 572. FOUNDATIONS OF ESOL EDUCATION (3). Examines characteristics of English language learners (ELLs), key theories in language acquisition, the role of culture in language development, and instructional program models for ELLs, while considering implications for classroom instruction.
ED 573. INSTRUCTIONAL APPROACHES FOR
ESOL EDUCATION (3). Examines characteristics of standards-based content-area instruction for emergent bilinguals. Includes integration of content and language development, classroombased assessment, and use of technology to support student learning. PREREQS: ED 572 [C]
ED 576. PARTNERSHIPS AND IDEOLOGIES IN ESOL EDUCATION (3). Considers social and political issues pertaining to educating English language learners. Focuses on exploring multiple ideologies in ESOL and building partnerships across schools, families, and communities.
PREREQS: ED 572 [C]

## ED 579. LINGUISTICS FOR TEACHERS

(3). Explores linguistic categories: phonology, morphology, syntax, semantics, pragmatics, and discourse. Focuses on teaching implications-from psycholinguistic, sociolinguistic, and critical perspectives--for emergent bilingual students in P-12 contexts. PREREQS: ED 572 [C]

ED 582. STRATEGIES FOR DEVELOPING LITERACY (3). Focus on teaching of reading to K-5 students. Instruction in pedagogical techniques and assessment on teaching vocabulary, comprehension, phonics and fluency. Strategies related to motivation to read, integration of cultural diversity and social justice and the needs of diverse learners in literacy development are also addressed.
ED 584. LANGUAGE ARTS METHODS I: ADOLESCENT LITERACY (4). Teaching language arts to middle and high school students requires a deep understanding of how reading and writing to learn occur. Guided by current professional and state literacy standards, students will learn to assess and advance adolescent reading comprehension, and writing and speaking skills.

ED 585. LANGUAGE ARTS METHODS II: STRATEGIES FOR GRADES 5-12 (4). Explores the integration and implementation of curriculum and high leverage instructional practices that respond to the learning needs of adolescents in language arts classrooms. Examines the importance of metacognitive strategies in the teaching of content-related skills and concepts, and how to create school cultures that support high achievement.
ED 586. LANGUAGE ARTS METHODS III: CURRICULUM AND THE PROFESSION (4).
Learning to teach language arts as a community of practice including the development of highleverage instructional practices. Focus on enhancing classroom discourse and building student comprehension, meaning construction interpretation, and response to complex text. Integration of technology tools for instruction and assessment. PREREQS: ED 584 [B] and ED 585 [B]
ED 587. SOCIAL STUDIES METHODS I:
ADOLESCENT LITERACY (4). Teaching social studies to middle and high school students requires a deep understanding of how reading and writing to learn occur. Guided by current professional and state literacy standards, students will learn to assess and advance adolescent content reading comprehension, writing and speaking skills.

ED 588. SOCIAL STUDIES METHODS II: STRATEGIES FOR GRADES 5-12 (4). Explores the integration and implementation of curriculum and high leverage instructional practices that respond to the learning needs of adolescents in secondary social studies classrooms. Examines the importance of metacognitive strategies in the teaching of content-related skills and concepts, and how to create school cultures that support high achievement.
ED 589. SOCIAL STUDIES METHODS III: CURRICULUM AND THE PROFESSION (4). Learning to teach social studies as a community of practice including the development of highleverage instructional practices. Focus on curriculum strategies that provide opportunities for learners to develop and use facts, concepts, interpretations, and analyses to build and support arguments. Integration of technology tools for instruction and assessment. PREREQS: ED 587 [B] and ED 588 [B]
ED 590. SOCIAL JUSTICE IN EDUCATION (3). Examines social, environmental and ecological justice in educational settings focusing on bias critique in text, development of social justice curriculum, and creation of an action related to a social justice issue. The interconnectedness of social and ecological justice is also explored. Various international justice standards are used to
ground students' work in curriculum development.
ED 592. TECHNOLOGY TOOLS FOR TEACHING
(2). Exploration of how digital tools can be used in instruction, assessment, communication, and collaboration in educational settings to bring vibrant energy into student learning and engagement.
ED 593. READING AND WRITING IN THE MIDDLE AND SECONDARY SCHOOL (3).
Reading and writing methods that can be used by middle/secondary school teachers to individualize instruction, correct basic reading and writing skills in content area; promote learning and the use of reading materials as supplementary teaching materials.

ED 594. DEVELOPMENT AND
DIFFERENTIATION K-12 (4). Issues of K-12 learner socio/emotional/cognitive development across multiple areas of learning and motivation theory. The role of culture, language, and group dentification in learning will be examined and applied to the consideration of differentiated instructional strategies.
ED 596. TECHNOLOGY FOR EDUCATORS (3). Explore the integration of current and emerging technologies into $\mathrm{K}-12$ content areas by engaging students in real world issues and learning in a social context. Integrate technologies that promote critical thinking, communication, collaboration, and creativity. Discuss technologies in terms of cultural linguistic diversity. Gain transferrable skills. Taught via Ecampus only. PREREQS: Basic computer literacy.

ED 597. K-5 STEM INTEGRATION IN DIVERSE
CLASSROOMS (2). An investigation of theory and practice related to science teaching and learning in diverse classrooms through integration of science, math, literacy and social studies.
ED 599. SPECIAL TOPICS (1-4). This course is repeatable for a maximum of 90 credits. PREREQS: Departmental approval required.
ED 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ED 602. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ED 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
ED 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ED 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ED 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ED 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ED 609. PRACTICUM/CLINICAL EXPERIENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ED 610. INTERNSHIP (1-15). This course is repeatable for a maximum of 15 credits. PREREQS: Departmental approval required.
ED 621. SELECTED TOPICS IN EDUCATION (3). This course is repeatable for a maximum of 18 credits.
ED 650. EQUITY AND EDUCATION POLICY (3). Introduces students to key educational policy debates, with a particular focus on attempts to use education policy to advance equity. Examines different visions for the purpose of education and different definitions of equity. Explores the roles of
different actors within education policy, including legislators, courts, and non-governmental organizations. Provides students with frameworks for analyzing education policy, which students will then apply to analyze a current policy debate that is of interest to them.

ED 651. RESEARCH BILINGUALISM AND
MULTILINGUALISM (3). Develops critical research skills to create new knowledge in the field of multilingualism. Examines interdisciplinary and intersectional perspectives to consider notions of identity among multilinguals and explore the historical trajectory of bilingualism and multilingualism research. Provides a broad understanding of the theoretical and methodological frameworks used to study bilingualism and multilingualism in globalized contexts.

ED 652. ETHNOGRAPHIC METHODS (3). As an advanced qualitative method class, this course introduces theory and ethnographic research methods by presenting the various ways by which socio-cultural anthropologists observe and analyze phenomena, groups or individuals in everyday language and social practices in their local and global contexts, taking into account issues of language, equity and educational policy. Students will carry out an ethnographic research project of a particular phenomenon they wish to earn more about. PREREQS: SED 622 [B]

ED 653. DISCOURSE, IDENTITY AND
EDUCATION (3). Builds a foundation in discourse theory and its applications to identity and education. Includes empirical studies that draw from particular lenses of discourse theory, exemplifying how these scholars organize the design, implementation, and discussion of research around discourse theory. Develops knowledge of discourse theory to propose a study that could be conducted drawing from discourse analytic perspectives.
ED 808. WORKSHOP (1-4). This course is repeatable for a maximum of 16 credits.

## - SCIENCE AND MATHEMATICS EDUCATION COURSES

SED 321. TEACHING AND LEARNING WITH COMPUTER-BASED TECHNOLOGIES (3). Explore teaching that promotes the use of computer-based technologies as an integral component for learning within the context of academic subject matter. PREREQS: Basic computer and computer application knowledge.

SED 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

SED 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
SED 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
SED 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
SED 409. FIELD PRACTICUM: SCIENCE AND MATHEMATICS (3). Placement in middle or high school (grades 7-12) to assist in developing competencies with adolescents in science/ mathematics classes. This course is repeatable for a maximum of 18 credits.

## SED 410. PROFESSIONAL INTERNSHIP:

## SCIENCE OR MATHEMATICS EDUCATION

(1-16). Supervised teaching experience at the elementary, middle or high school level; students experience general classroom and professional responsibilities common to the regular science or mathematics teacher. This course is repeatable for a maximum of 16 credits.
SED 412. TECHNOLOGY FOUNDATIONS FOR TEACHING MATH AND SCIENCE (3). Integration of instructional technologies with other strategies to teach math and science in elementary, middle, and secondary schools in the 21st century.

SED 413. INQUIRY IN SCIENCE AND SCIENCE EDUCATION (3). Investigation of inquiry and the nature of inquiry in science as it relates to science education. Students will examine issues relating to integrating scientific understandings and practice into K-12 instruction.

## SED 414. INQUIRY IN MATHEMATICS

AND MATHEMATICS EDUCATION (3).
Investigation of mathematics as it relates to mathematics education. Students will examine issues related to integrating mathematical understanding, mathematics standards/curricula, and mathematics-specific strategies in K-12 instruction. Lec/lab.

## SED 416. INQUIRY IN SCIENCE AND

MATHEMATICS EDUCATION (3). Investigation of inquiry and the nature of inquiry in mathematics and science as it relates to education. Students will examine issue relating to integrating mathematical and scientific understandings and practices into K-12 education.

SED 417. QUANTITATIVE REASONING IN STEM (3). Provides students an overview of the content requirements in the Common Core Standards for Mathematics and the teaching practices that are central to those standards with a focus on the role of quantitative reasoning. Students experience content lessons and lessons focused on supporting students in developing understanding of that content. PREREQS: Participants should be a prospective pre-service teacher at any level, a K-12 teacher, a free-choice learning educator, or have access to an educational setting.

## SED 419. TEACHING MATHEMATICAL

MODELING IN STEM (3). Provides students an overview of the content requirements in the Common Core Standards for Mathematics and the teaching practices that are central to those standards with a focus on the role of mathematica modeling. Students experience content lessons and lessons focused on supporting students in developing understanding of that content. PREREQS: Participants should be a prospective pre-service teacher at any level, a K-12 teacher, free-choice learning educator or have access to an educational setting.

## SED 431. OVERVIEW OF FREE-CHOICE

LEARNING (3). Examines learning that occurs when people believe they have choices over what and how they learn, how much time they spend learning, and what their sources of information are. Covers current research on learning in museums, aquariums, zoos, botanical gardens, science centers, after-school programs, media and apprenticeships.
SED 435. COMMUNICATING OCEAN SCIENCES TO INFORMAL AUDIENCES (3). For students interested in improving their ability to communicate their scientific knowledge by helping general public and student audiences learn about ocean sciences in a wide variety of learning settings. Combines instruction in inquiry-based teaching methods and learning theory with work in student's local informal learning settings like museums, zoos, aquariums and libraries.
SED 459. SCIENCE AND THE NATURE OF INQUIRY (3). Focuses on inquiry approaches to the teaching and learning of science. Development of teaching strategies including materials and resources for teaching science using an inquiry approach as well as more teacher-directed approaches.

## SED 473. SCIENCE PEDAGOGY AND

TECHNOLOGY I (4). Development of
pedagogical content knowledge in grades 6-12 science instruction: learning theory, nature of science, technology integration, and reform recommendations. Lec/lab/rec.

## SED 474. MATHEMATICS PEDAGOGY

AND TECHNOLOGY I (4). Development of pedagogical content knowledge in grades 6-12 mathematics instruction: learning theory, nature of mathematics, technology integration, and reform
recommendations. PREREQS: SED Professional Teacher Licensure Cohort Only. Does not meet Graduate School's stand-alone requirement. Investigation of mathematics as it relates to mathematics education must be completed prior to SED 574. SED 414 is recommended; please speak to the program coordinator. SED 474 Restrictions: Prereq course SED 414 required prior to SED 474.
SED 476. MATHEMATICS PEDAGOGY AND TECHNOLOGY II (4). Development of additional pedagogical content knowledge in grades
6-12; stress on dominant themes of the school mathematics curriculum including problem solving, reasoning, communication, and connections as well as the integration of technology into the mathematics classroom. PREREQS: SED 474 [D-] and Education Double Degree only

## SED 477. SCIENCE PEDAGOGY AND

TECHNOLOGY II (4). Development of pedagogical content knowledge in grades 6-12; science instruction; learning theory, nature of science, technology integration, and reform recommendations. PREREQS: SED 473 [C] and Professional Teacher Education Master's Program.
sed 491. SCIENCE/MATH CONTENT
STANDARDS AND CURRICULUM
DEVELOPMENT FOR MIDDLE SCHOOL (3).
Exploration of curriculum development and teaching strategies appropriate for middle school students as well as a range of organizational structures to effectively organize middle school students for educational experiences. Explore how curriculum, instruction, and assessment are interrelated and how theory and practice must be combined to make appropriate decisions. Development of skills in designing effective curriculum and instruction integrating these methods with existing understandings of their content area, how people learn, and the diverse communities in which they work.
SED 494. SCIENCE/MATH CONTENT STANDARDS AND CURRICULUM DEVELOPMENT FOR HIGH SCHOOL (3).
Exploration of curriculum development and teaching strategies appropriate for high school students as well as a range of organizational structures to effectively organize high school students for educational experiences. Explore how curriculum, instruction, and assessment are interrelated and how theory and practice must be combined to make appropriate decisions. Development of skills in designing effective curriculum and instruction integrating these methods with existing understandings of their content area, how people learn, and the diverse communities in which they work.
SED 499. SPECIAL TOPICS (3). This course is repeatable for a maximum of 18 credits.
SED 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
SED 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
SED 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

SED 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

SED 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

SED 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
SED 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.
SED 510. PROFESSIONAL INTERNSHIP: SCIENCE OR MATHEMATICS EDUCATION
(1-16). Supervised teaching experience at the elementary, middle or high school level; students experience general classroom and professional responsibilities common to the regular science or mathematics teacher. This course is repeatable for

## a maximum of 16 credits.

SED 511. ANALYSIS OF CLASSROOMS I (3).
Observation and analysis of the complex science/ mathematics classroom (grades 3-12) and school culture and their impact on student learning.
SED 512. TECHNOLOGY FOUNDATIONS FOR TEACHING MATH AND SCIENCE (3). Integration of instructional technologies with other strategies to teach math and science in elementary, middle, and secondary schools in the 21st century.

SED 513. INQUIRY IN SCIENCE AND SCIENCE
EDUCATION (3). Investigation of inquiry and the nature of inquiry in science as it relates to science education. Students will examine issues relating to integrating scientific understandings and practice into K-12 instruction.

## SED 514. INQUIRY IN MATHEMATICS

AND MATHEMATICS EDUCATION (3).
Investigation of mathematics as it relates to mathematics education. Students will examine issues related to integrating mathematical understanding, mathematics standards/curricula, and mathematics-specific strategies in K-12 instruction. Lec/lab.

SED 516. INQUIRY IN SCIENCE AND
MATHEMATICS EDUCATION (3). Investigation of inquiry and the nature of inquiry in mathematics and science as it relates to education. Students will examine issue relating to integrating mathematical and scientific understandings and practices into K-12 education.

SED 517. QUANTITATIVE REASONING IN STEM (3). Provides students an overview of the content requirements in the Common Core Standards for Mathematics and the teaching practices that are central to those standards with a focus on the role of quantitative reasoning. Students experience content lessons and lessons focused on supporting students in developing understanding of that content. PREREQS: Participants should be a prospective pre-service teacher at any level, a K-12 teacher, a free-choice learning educator, or have access to an educational setting.

## SED 519. TEACHING MATHEMATICAL

MODELING IN STEM (3). Provides students an overview of the content requirements in the Common Core Standards for Mathematics and the teaching practices that are central to those standards with a focus on the role of mathematical modeling. Students experience content lessons and lessons focused on supporting students in developing understanding of that content. PREREQS: Participants should be a prospective pre-service teacher at any level, a K-12 teacher, free-choice learning educator or have access to an educational setting.
SED 520. TECHNOLOGY FOR MATH AND
SCIENCE EDUCATION (3). Explore current and emerging technologies applied to math and science learning that promote critical thinking, communication, collaboration, and creativity. Gain technology skills and resources that can be transferred to formal and informal learning environments. PREREQS: Basic computer literacy.

## SED 521. TEACHING MATH AND SCIENCE

## WITH DIGITAL AND VIDEO TECHNOLOGIES

(3). Examine and incorporate digital image and video technologies to support learners in becoming critical thinkers and creative producers of their knowledge and understanding in mathematics/science. PREREQS: Participants must be teachers of mathematics/science in K-12 formal or informal learning environments.

SED 522. DYNAMIC SPREADSHEETS AS LEARNING TOOLS IN SCIENCE AND MATH (3).
Provides opportunities to explore the algebraic reasoning involved when engaging students in learning with spreadsheets in science and mathematics classes. Students redesign units of instruction for grades 3-12 that integrate learning about designing dynamic and dependable spreadsheets as learning tools in science and mathematics. Explore how dynamic spreadsheets
encourage students to extend problems and considering alternative questions.

SED 523. SCIENCE/MATHEMATICS STRATEGIES AND ORGANIZATIONAL
STRUCTURES (4). Builds on content developed in SED 491. Students learn new instructional skills and deepen abilities with basic teaching skills from SED 491. Students develop in-depth lesson plans and coordinate instructional and assessment plans supporting a unit of science or mathematics content for middle level students. PREREQS: SED 491 and provisional admission to Professional Education Program
SED 525. SCIENCE/MATHEMATICS
CURRICULUM IMPLEMENTATION AND INSTRUCTIONAL STRATEGIES FOR HIGH
SCHOOL (4). Exploration of science/mathematics teaching strategies appropriate for high school science/mathematics learners as well as a range of organizational structures to effectively organize high school science/mathematics students for educational experiences. PREREQS: SED 494 and provisional admission to Professional Education Program
SED 531. OVERVIEW OF FREE-CHOICE LEARNING (3). Examines learning that occurs when people believe they have choices over what and how they learn, how much time they spend learning, and what their sources of information are. Covers current research on learning in museums, aquariums, zoos, botanical gardens, science centers, after-school programs, media and apprenticeships.

## SED 535. COMMUNICATING OCEAN

SCIENCES TO INFORMAL AUDIENCES (3). For students interested in improving their ability to communicate their scientific knowledge by helping general public and student audiences learn about ocean sciences in a wide variety of learning settings. Combines instruction in inquiry-based teaching methods and learning theory with work in studentss local informal learning settings like museums, zoos, aquariums and libraries.

SED 540. FIELD AND ONLINE LEARNING OF GEOSCIENCE CONCEPTS (3). Science content and pedagogy in learning and teaching standardsbased geologic content for K -12 teachers. This is a hybrid class combining distance learning and at least one field research trip. PREREQS: Participants should be either a K-12 teacher or a free-choice learning educator. Participants should be prepared to camp during field trips and able to walk moderate distances that may involve offtrail maneuvering. Participants should be able to integrate graphics and images into different media (e.g., PowerPoint, Prezi, video), acquire images from web pages and use Google Earth. Some instruction in using Google Earth will be provided.
SED 541. WEATHER CONCEPTS FOR SCIENCE AND MATH TEACHING (3). Science content and pedagogy in learning and teaching basic weather concepts. PREREQS: Participants should be either a K-12 teacher, free-choice learning educator or have access to an educational setting.
SED 550. HIGH QUALITY SCIENCE AND MATHEMATICS INSTRUCTION (3). Explores high quality science and mathematics instruction to prepare professional teachers in science and mathematics. Develops skills in highleverage instructional practices and reviews research literature that supports these practices. Investigates social justice issues related to systems of schooling in the United States.

## SED 552. MATHEMATICS METHODS:

PRACTICUM I (3). Theoretical background, practical knowledge, and skills for teaching in mathematics classrooms (grades 3-12). Instructional methods/modes, classroom management, contemporary curriculum goals and instructional planning.

SED 553. SCIENCE METHODS/PRACTICUM I
(3). Theoretical background, practical knowledge, and skills for teaching in science classrooms
grades 3-12). Instructional methods/modes, classroom management, contemporary curriculum goals and instructional planning.

## SED 564. ENGINEERING AND SCIENCE IN

 THE LIVES OF STUDENTS (3). Explore the use of construction engineering as a vehicle to make science and math more relevant and useful for the everyday life of students. PREREQS: Assignments assume the participant is a K -12 teacher, freechoice learning educator (in museum, science camp, etc.) and has access to an educational setting.
## SED 565. INQUIRING INTO SCIENCE AND

 MATHEMATICS LEARNING AND TEACHING (3).Participants prepare to lead instructional changes in their communities by planning inquiries into the learning they foster in their own contexts, critiquing relevant literature, making connections to national standards, and constructing a documentary Web site or writing a journal article that reports upon ways to foster science and/or mathematics learning. PREREQS: Student must be a licensed teacher, enrolled in a teacher education program, or have experience in working with youth in an educational setting.

SED 566. FOSTERING REFLECTIVE DISCOURSE IN SCIENCE AND MATH CONTEXTS (3). Examines ways of speaking that foster learning in science and mathematics contexts such as K -16 classrooms and free-choice learning settings (i.e., museums, zoos, science camps, etc.). Assignments assume the participant is a K -12 teacher or free-choice learning educator enrolled in a graduate licensure program or has access to an educational setting.
SED 568. ENHANCING LITERACY LEARNING IN SCIENCE AND MATH CONTEXTS (3). Examining ways of enhancing literacy learning will include analyzing research on learning to speak clearly, listen closely, write coherently, read with comprehension, and make and critique media resources competently in science and mathematics contexts. Settings include K-12 classrooms and free-choice learning environments such as zoos, museums and science camps.

## SED 573. SCIENCE PEDAGOGY AND

 TECHNOLOGY I (4). Development of pedagogical content knowledge in grades 6-12 science instruction: learning theory, nature of science, technology integration, and reform recommendations. Lec/lab/rec.
## SED 574. MATHEMATICS PEDAGOGY

 AND TECHNOLOGY I (4). Development of pedagogical content knowledge in grades 6-12 mathematics instruction: learning theory, nature of mathematics, technology integration, and reform recommendations. PREREQS: SED Professional Teacher Licensure Cohort Only. Does not meet Graduate School's stand-alone requirement. Investigation of mathematics as it relates to mathematics education must be completed prior to SED 574. SED 414 is recommended; please speak to the program coordinator. SED 474 Restrictions: Prereq course SED 414 required prior to SED 474.SED 576. MATHEMATICS PEDAGOGY AND TECHNOLOGY II (4). Development of additional pedagogical content knowledge in grades $6-12$; stress on dominant themes of the school mathematics curriculum including problem solving, reasoning, communication, and connections as well as the integration of technology into the mathematics classroom. PREREQS: SED 574 [C] and Education Double Degree only

## SED 577. SCIENCE PEDAGOGY AND

TECHNOLOGY II (4). Development of pedagogical content knowledge in grades 6-12; science instruction; learning theory, nature of science, technology integration, and reform recommendations. PREREQS: SED 573 [C] and Professional Teacher Education Master's Program

SED 580. RESEARCH AND EVALUATION (3). Analysis of qualitative and quantitative empirical
research in science education, mathematics education and education in general. Development of data collection instruments for use by researchers and teachers of science education, mathematics education and education in general, including portfolio and other forms of alternative assessment.

SED 581. PROFESSIONAL DEVELOPMENT AND PRACTICUM IN MATHEMATICS (3). Developing and implementing a program for continuing learning and evaluation in mathematics education.

## SED 582. PERSONAL DIMENSIONS OF

FREE-CHOICE LEARNING (3). Investigates
the fundamental roles that identity, motivation, interest, prior knowledge and experience, and choice and control play in supporting learning and how learning leaders can build on these dimensions of learning in order to successfully engage lifelong learners.

SED 583. SOCIO-CULTURAL DIMENSIONS OF FREE-CHOICE LEARNING (3). Investigates connections between theories of free-choice learning and the fundamental concepts of sociology, social psychology and anthropology: social stratification, social structure and interaction, social institutions, and cultural background. Real world examples will be included to support learning leaders, efforts to facilitate the socio-cultural dimensions of lifelong science and mathematics learning.
SED 584. PHYSICAL DIMENSIONS OF
FREE-CHOICE LEARNING (3). Learning is influenced by the interaction of variables within three contexts--personal, socio-cultural and physical. This course focuses on how macro-scale environmental factors (e.g. space, crowding, novelty) and micro-scale environmental factors (e.g. design elements, real objects, different media) support free-choice learning.
SED 588. MATHEMATICS CURRICULUM (3). Current trends, history of these trends, and the rationale for mathematics reform
SED 589. ADVANCED TOPICS: MATHEMATICS EDUCATION (3). Current issues in mathematics education. May be repeated for credit with different topics. Lec/lab. This course is repeatable for a maximum of 99 credits.

SED 592. PROFESSIONAL DEVELOPMENT AND PRACTICUM IN SCIENCE (3). Developing and implementing a program for continuing learning and evaluation in science education.
SED 593. ADVANCED STRATEGIES
SCIENCE (3). Provides additional exposure and development of instructional strategies and models of science teaching. Special emphasis is placed upon promoting critical thinking and decision making.

## SED 594. ADVANCED INSTRUCTIONAL

STRATEGIES IN SCIENCE AND MATHEMATICS
(3). Explore instructional strategies and skills or K-12 science and math teachers to support student learning rigorous content.

## SED 595. ASSESSMENT AND EVALUATION

(3). Examines education assessment focusing on formative assessment in multiple contexts across learning environments.
SED 596. METHODS OF COLLEGE TEACHING N MATHEMATICS AND SCIENCE (3). Focuses on methods and problems in planning and implementing mathematics or science instruction at the college level. Particular emphasis is placed upon selecting teaching strategies, organizing materials, and evaluating student assessment.
SED 597. PROFESSIONAL DEVELOPMENT IN MATHEMATICS AND SCIENCE EDUCATION (3). Development of strategies and skills for developing, implementing and evaluating a program of professional development for mathematics or science educators considering various choices of program settings.

SED 598. MATHEMATICS AND SCIENCE CURRICULUM (3). Current trends, history of these trends, and rationale for mathematics and science curriculum reform across learning environments.
SED 599. TOPICS IN SCIENCE EDUCATION
(3). Current issues, trends, and topics in science education. May be repeated for credit with different topics. This course is repeatable for a maximum of 18 credits.

SED 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
SED 603. DISSERTATION (1-16). This course is repeatable for a maximum of 999 credits.
SED 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
SED 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
SED 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
SED 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
SED 611. SURVEY OF RESEARCH ON TEACHING (3). Critical analysis of perspectives of research in science/math education with a focus on teaching as the unit of analysis. PREREQS: SED 580 [C]
SED 612. QUANTITATIVE RESEARCH DESIGN
AND CRITICAL ANALYSIS (3). A study of
quantitative research designs and analytical procedures with specific applications in science or mathematics education. PREREQS: SED 580* [C]

SED 613. LEARNING THEORY (3). Provides a critical overview and analysis of current theories of learning and development, beginning with a discussion about what learning is, how it has been viewed and studied over time, and how seminal theories inform an understanding of lifelong learning and its facilitation. PREREQS: SED 580* [C]
SED 615. PRACTICUM IN MATHEMATICS/ SCIENCE IN COLLEGE TEACHING (3).
Supervised field practicum in college
mathematics/science teaching. This course is repeatable for a maximum of 9 credits.

## SED 621. SURVEY OF RESEARCH ON LEARN

(3). Critical analysis of perspectives on student thinking and learning in science/math education. PREREQS: SED 580* [C]
SED 622. QUALITATIVE RESEARCH
TECHNIQUES (3). A study of qualitative
research designs and analytical procedures with specific applications in science and mathematics education. PREREQS: SED 580* [C]

## SED 623. CURRICULUM THEORY (3).

Establishes theoretical grounding of curriculum.
Includes theoretical background, practical
knowledge, and skills related to science and
mathematics curriculum, including the history, curriculum theory and practice. PREREQS: SED 580* [C]
SED 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
SED 808. WORKSHOP (1-16). This course is repeatable for a maximum of 99 credits.

Founded in 1889, our college endeavors to create solutions that promote strong economies, healthy people, and a sustainable natural environment. Our program has a long history of graduating world-class engineers who have made major impacts on civilization through significant contributions in science and technology. Alumni achievements include breakthrough innovations such as the first artificial heart valve, the computer mouse, and the concept of email.

By emphasizing authentic, experiential engineering experiences within our curriculum, we equip students with the knowledge, skills, and passion to advance innovative solutions to today's most complex engineering challenges. Through nearly 30 unique degree programs at the graduate and undergraduate level, we produce top-notch engineers who are grounded in integrity, ingenuity, and a keen understanding of the inter-relatedness of global economies, cultures, and natural systems. Our faculty collaborates across disciplines to leverage synergies in teaching, research, and innovation. And we cultivate strategic partnerships to turn research results into new companies and products that create jobs while helping people to lead better lives.

The College of Engineering offers degrees in engineering, computer science, construction engineering management, energy systems engineering, and radiation health physics. Students may choose engineering majors from biological, chemical, civil, ecological, electrical and computer, environmental, industrial, manufacturing, mechanical, and nuclear engineering. Educational preparation for land surveying, a licensed profession in all states, is offered through civil engineering. Forest engineering is offered by the College of Forestry.

## THE ENGINEERING PROFESSION

Engineering is the profession in which knowledge of the mathematical and natural sciences gained through education and practice is applied with judgment to develop ways to economically utilize the materials and forces of nature for the benefit of humankind. It is a licensed profession in all of the states of the USA, and educational programs must meet high professional standards. Engineers are not only responsible for planning, designing, manufacturing, construction, and management, but also for the safety and welfare of the public that relies on their work.

## MISSION AND GOALS

The college's undergraduate educational mission is to provide high quality engineering programs that prepare students for successful careers, lifelong learning, and service to their profession and society. OSU engineering graduates will be known for their technical competence
and creativity; for their ability to apply, adapt, and extend their knowledge to solve a wide variety of problems; and for their effective communication skills. Their education will provide them with an understanding of the ways in which the humanities, social sciences, basic sciences, and technology interact to affect society. These programs will foster an environment that stimulates learning and promotes diversity.

The college's undergraduate programs have four goals:

1. Educate students thoroughly in mathematics, basic science and engineering sciences relevant to their discipline's professional work, including fundamental concepts, experimental techniques, methods of analysis, and computational applications.
2. Develop the ability of students to communicate effectively and to work collaboratively in diverse team environments.
3. Develop in students an awareness of the historical evolution of knowledge and technical applications, the state of current professional practice, their need for lifelong learning, contemporary issues, and the impact of engineering actions and solutions in a societal and global context; and to develop an understanding of their professional and ethical responsibilities.
4. Develop the ability of students to formulate and solve problems, to integrate and synthesize knowledge, and to think creatively, leading to the capability to analyze and design components, processes, or systems; plan and carry out experiments effectively; and troubleshoot and modify processes and systems.

## PREPARING FOR AN ENGINEERING CAREER

To prepare for the practice of engineering, students complete an accredited program of study leading to a bachelor of science degree in an established engineering field. Most engineering curricula require 180 credits; exceptions include programs in chemical, ecological, environmental and bioengineering. All programs include a balance of course work in mathematics, science, liberal arts, engineering science, and engineering design.

Upon graduation, engineering students are eligible to take the Fundamentals of Engineering Examination of the State Board of Engineering Examiners in any state. After passing the examination and completing four years of progressively responsible engineering work, graduates are eligible to take the professional engineering license examination of the state in which they intend to practice.

101 Covell Hall Oregon State University Corvallis, OR 97331-2411 541-737-3101 Email: info@engr. oregonstate.edu Website: http:// engineering. oregonstate.edu/
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541-737-5236
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oregonstatate.edu
Website: http://
engineering.
oregonstate.edu/

## Administration

Scott Ashford,
Dean
James R. Lundy,
Executive Associate Dean
Irem Y. Tumer,
Associate Dean for Research
Carlos Jensen,
Associate Dean for undergraduate
Programs
Dorthe Wildenschild,
Associate Dean for Graduate Programs
Ellen Momsen,
Director of Women and Minorities in Engineering
Todd Shechter,
Director of
Information
Technology
Brett Jeter,
Head Advisor
Scott Paja,
Director of Leadership and
Professional
Development

Although some fields of industrial and government employment do not require formal professional licensure, the educational preparation for the bachelor's degree is a necessity for virtually all such employment.
Preparation for the professional practice of land surveying follows a pattern of education, experience, examination, and professional licensure similar to that required for professional engineering practice.

Students completing the BS in Radiation Health Physics degree will be eligible to take part I of the Certified Health Physics (CHP) Examination of the American Board of Health Physics after one year of applied health physics practice. After six years of responsible professional experience in health physics, graduates will be eligible to take part II of the CHP examination.

## CHOOSING A MAJOR

The selection of a major is often difficult for students who have not had close association with engineering activities. Students should not be overly concerned with this problem since the pre-professional curricula of all engineering programs during the first year are similar. This flexibility allows students to change majors during the first year without loss of progress. Engineering students who are unsure about their choice of a major are advised to register in pre-general engineering until they make a decision.

## HUMANITARIAN ENGINEERING MINOR (\#769)

The humanitarian engineering minor provides multidisciplinary academic course work for students interested in the application of engineering, science, and technology-based solutions to global development challenges such as access to basic resources (e.g., clean water, clean energy), improved quality of life, and increased ability to earn a livelihood particularly in rural, resource-limited or low-to-middle income settings. A core of course work in humanitarian engineering, science and technology (HEST) is required with an emphasis on engineering as demonstrated by completion of the engineering design class (with engineering prerequisites). Both in the core course work and in the electives, there is an emphasis on context including social, cultural, economic, resource, political, and environmental. For more information, see the Humanitarian Engineering minor page at http:// catalog.oregonstate.edu/MinorDetail. aspx?minor=769\&college=16.

## INTERNATIONAL ENGINEERING MINOR (\#476)

The minor in International Engineering offers undergraduate engineering
students an opportunity to certify their global competencies and demonstrate their understanding of the intercultural needs of modern engineers. By combining an engineering experience abroad, courses from a generalized global core, thematic elective courses, and the signature course for the minor, students may demonstrate their readiness for the increasingly global field of engineering. For more information, see the International Engineering minor page at http:// catalog.oregonstate.edu/MinorDetail. aspx?minor=476\&college=16.

## GRADUATE STUDY

Because of the growing complexity of modern engineering practice, graduate study is important for those students who wish to specialize. Students who have established satisfactory undergraduate records and who are looking for the greatest opportunity in their professional field should consider continuation of their education beyond the baccalaureate degree. Study for the Master of Science (MS) and Master of Engineering (MEng) degrees normally requires one or two years. The Doctor of Philosophy (PhD) degree requires three to four additional years.

## ACCREDITATION

The Bachelor of Science degrees in Bioengineering, Chemical, Civil, Ecological, Electrical and Computer, Energy Systems, Environmental, Industrial, Manufacturing, Mechanical, and Nuclear Engineering baccalaureate programs are accredited by the Engineering Accreditation Commission of the ABET, Inc. 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; 410-347-7700. The Construction Engineering Management program is accredited by the American Council for Construction Education. The Bachelor of Science degree in Computer Science-Computer Systems option is accredited by the Computing Accreditation Commission of the ABET, Inc. 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; 410-347-7700. The Bachelor of Science degree in Radiation Health Physics is accredited by the Applied Science Accreditation Commission of the ABET, Inc. 111 Market Place, Suite 1050, Baltimore, MD 21202-4012; 410-347-7700.

## PRE-PROFESSIONAL PROGRAM

 Courses included in the first and sophomore years comprise a pre-professional program of study that produces a solid foundation for professional program studies at the junior, senior, and advanced degree levels. The pre-professional program may be taken at Oregon State University or at any accredited college or university that offers equivalent courses transferable to OSU.The required pre-professional courses in the program listings are designated with a superscript ( $\mathbf{E}$ ). These courses must be completed before the student is eligible for admission to the professional program. The other courses listed are important and may constitute prerequisites for junior-level courses.
All engineering programs have similar required pre-professional courses. This allows the flexibility of selecting a major after one year of study. Other majors offered by the college have different required pre-professional courses appropriate to that major.

## PROFESSIONAL PROGRAM

The professional program consists of various curricula offered at the junior and senior levels that are designed to prepare students for a professional career.

Each curriculum provides an opportunity for specialization through judicious selection of elective courses; however, to become fully versed in a specialty requires additional study at the graduate level.

## ADMISSION REQUIREMENTS

## Pre-professional Program

Admission to the pre-professional program requires that students meet general university admission requirements, as published in the OSU General Catalog. Students admitted to the pre-professional program are assigned to the department or school of their choice after their first year for advising and program planning.

## Professional Program

Enrollment in professional program courses is restricted to those students who have clearly demonstrated an ability to achieve the high standards required for professional studies.
Students must apply to the College of Engineering for admission to starting professional level courses prior to starting professional level courses. To apply, grades of C or better and a minimum of 2.25 cumulative GPA must be earned in required classes. The minimum GPA for admissions will typically be higher than 2.25 , but will never be lower.

Students who have completed their pre-professional studies at a college or university other than Oregon State University must apply both to the OSU Office of Admissions for admission to OSU and to the College of Engineering for admission to the professional program. Application links and information on policies and programs are available from the College of Engineering.

## ENGINEERING SCIENCE

Each engineering curriculum includes a number of courses that are appropriate for all engineering students. Because of their commonality, these are called
engineering science courses.
Engineering sciences have their roots in mathematics and basic science and serve as a bridge between science and engineering. They involve the application of scientific methods to practical engineering situations and lead to solutions of problems that are fundamental in analysis, design, and synthesis.
"Sophomore standing in engineering" refers to a student registered in an accepted program, who has completed 45 credits (with minimum grades of C), including MTH 251 , MTH 252 , plus three additional science or mathematics courses listed in an engineering curriculum. Many engineering courses require sophomore standing in engineering as a prerequisite.

## FOREST ENGINEERING

See College of Forestry. Also see College of Forestry for information on the Forest Engineering-Civil Engineering program.

## GENERAL ENGINEERING

The first year of the general engineering curriculum meets the requirements of all other engineering curricula except bioengineering, chemical engineering, environmental engineering, and ecological engineering, which require a different chemistry sequence. Students who have not decided upon a major are encouraged to register in general engineering during their pre-professional studies.

## CURRICULUM

The pre-general engineering curriculum below will prepare students to enter many of the engineering department or school programs. Students may transfer into another program at any time during the first year; they must transfer by the end of the year.

## Pre-General Engineering (One-year

 Program, Major Code: 345)
## First Year

CH 201, CH 202. *Chemistry for
Engineering Majors ( $3^{\mathbf{E}}, 3$ )
COMM 111. *Public Speaking (3) ${ }^{\mathbf{E}}$
or COMM 114. *Argument and Critical Discourse (3) ${ }^{\mathbf{E}}$
ENGR 111. Engineering Orientation I (3)
ENGR 112. Introduction to Engineering Computing (3) ${ }^{\mathbf{E}}$
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC course (1-2)
MTH 251. *Differential Calculus (4) ${ }^{\mathbf{E}}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus I (4) ${ }^{\mathbf{E}}$
PH 211. *General Physics with Calculus (4) ${ }^{\text {E }}$
WR 121. *English Composition (3) ${ }^{\mathbf{E}}$
Biological science elective (4) ${ }^{1}$
Perspectives (9) ${ }^{1}$

## Footnotes:

* Baccalaureate Core Course
${ }^{\mathbf{E}}$ Required for entry into the professional
program.
${ }^{1}$ Must be selected to satisfy the requirements of the baccalaureate core.


## COLLEGE OF ENGINEERING <br> GRADING AND GPA

REQUIREMENTS

- All technical, writing and communications courses must be taken for letter grades (A through F): C or better grades are passing.
- Pre-engineering students must have at least a 2.25 Pre-core GPA for admission to the professional program.
- Professional engineering students must have at least a 2.25 Pro-core GPA and a 2.25 institutional GPA for graduation.
The Pre- and Pro-core GPAs are computed based on graded course work (only the second graded attempt is used for a repeated course). See the College of Engineering advising website for details.


## Satisfactory Academic Progress for Professional School Students

A student in good academic standing satisfies university, college, and program academic requirements. The university may change a student's status to warning, probation, or suspension following guidelines contained in the Schedule of Classes. The College of Engineering has a similar, but independent, process for students in the professional program.

At the conclusion of each term, pro-core term and cumulative GPA are calculated and academic standings are determined for students according to the criteria outlined below. Students whose standings evidence a lack of satisfactory progress will be warned of this condition and advised to seek help from their academic advisors.

1. Academic Warning: Students with a term pro-core GPA below 2.25 and fewer than 10 credits of procore course work will be placed on academic warning. The student must meet with their academic program advisor before they will be allowed to register for subsequent terms.
2. Academic Probation: Students who have completed 10 or more credits of pro-core course work and have a cumulative pro-core GPA below 2.25 will be placed on academic probation. A registration hold ("dean's hold") will be placed on the student's account until the student meets with an academic program advisor. The student and academic program advisor will complete an academic success agreement.
3. Academic Suspension: Students who are on academic probation and fail to meet the terms of their academic success agreement will be placed on academic suspension.

Students who are academically suspended are removed from the professional program and are not allowed to take additional upperdivision College of Engineering courses.
4. Reinstatement to the College: Suspended students may be reinstated to the professional program after one year, or completion of a minimum of 24 quarter credits of acceptable transferable college-level work at an accredited college or university, with a GPA of 2.5 or above. These 24 credits must be pre-approved in writing by the program head advisor. Students reinstated to the professional program who are subsequently suspended may only apply for reinstatement under the "one year" option.
Reinstatement requests from students will be considered by the College Committee on Reinstatement (CCR) made up of three College of Engineering school advisors and college head advisor (or their designee). Reinstatement guidelines are available electronically in the College of Engineering Undergraduate Policy Manual.

## GRADUATION REQUIREMENTS

To graduate with a baccalaureate degree in any of the engineering or computer science majors, a student must complete 180 credits; exceptions include programs in chemical, environmental, ecological, and bioengineering, which require 192 credits. In addition, students must have a minimum 2.25 institutional GPA and minimum 2.25 GPA in all professional core course work as defined in the respective major. A student must also meet all university degree requirements published each year in the printed and electronic "Academic Regulations and Procedures" section of the Registration Information Handbook and in the General Catalog.

## ACADEMIC DISHONESTY POLICY

Students that violate the academic honesty policy a second time will be suspended from the College of Engineering for a period of one year.

## BIOLOCICAL AND <br> ECOLOCICAL ENCINEERING

## John P. Bolte, Head

116 Gilmore Hall
Oregon State University
Corvallis, OR 97331-3906
541-737-2041
Email: info-bee@engr.orst.edu
Website: http://agsci.oregonstate.edu/bee

## FACULTY

Professors Bolte, CuencaI, English ${ }^{1}$, Godwin, Selker
Associate Professors Bachelet, Chaplen ${ }^{1}$, Ely ${ }^{1}$, Liu, Murthy, Tullos
Assistant Professors Fan, Guzy, Higgins, Vache
${ }^{I}$ Licensed Professional Engineer.

## Undergraduate Major

Ecological Engineering (BS, CRED, HBS)
Undergraduate Minor
Irrigation Engineering
Graduate Major
Biological and Ecological Engineering (MEng, MS, PhD)
Graduate Areas of Concentration
Bio-based Products and Fuels
Biological Systems Analysis
Bioprocessing
Ecosystems Analysis and Modeling
Water Quality
Water Resources

## Graduate Minor

Biological and Ecological Engineering
The Department of Biological and Ecological Engineering at OSU is involved in teaching, research and extended education relevant to the application of engineering analysis to biological, ecological and hydrological systems. The department has strength in graduate training and research and offers both an MS and PhD degree in Biological and Ecological Engineering. The graduate degree program is focused on the professional development of engineers and the analysis of environmental systems, hydrology and water resources. Activities within the department include water resource analysis, fate and transport of biologically relevant chemicals, bioreactor design and analysis, watershed analysis and resource management, simulation modeling of ecological and biological systems, regional and global hydrology, geographical information systems for environmental modeling, and the development of biobased products and fuels.

## ECOLOGICAL ENGINEERING

 (BS, CRED, HBS)Ecological engineering is the design of sustainable systems consistent with ecological principles that integrate human activities into the natural environment to the benefit of both. This approach emphasizes diversity, resilience, and adaptation to maintain sustainability. Ecological engineering deals with both fundamental processes and engineering applications on scales that range from microscopic to watersheds and beyond. This discipline is rapidly developing as an important new area of engineering based on the science of ecological systems, with a number of dedicated journals, national and international professional societies, and new application areas emerging over the last decade. The Biological and Ecological Engineering Department at OSU has considerable expertise in this area and is among the national leaders in this discipline.
The ABET Inc. Accredited Bachelor of Science degree in Ecological Engineering (EcoE) program is the first of its kind nationally, reflecting Oregon's leadership in this new and exciting multidisciplinary field. The curriculum is divided into an ecological engineering core and a set of upper-division science and engineering electives. The ecological engineering core contains the introductory and upperdivision course work that provides the common engineering and scientific basis for our students. The core consists of preprofessional courses, baccalaureate core requirements, required upper-division engineering courses, and required science courses. The upper-division engineering and science electives are presented as options. Selections are made to a total of 23 credits of engineering and science/ public policy electives. This organization provides students with considerable flexibility in selecting their degree path.

Graduates with an Ecological Engineering degree will work to optimize the interface between humankind and the environment. Specific activities undertaken might include riparian restoration, optimizing sensor arrays for ecological monitoring, improving agricultural water quality, mitigating toxic materials migration from landfills, developing sustainable industrial systems (agricultural and otherwise), developing closed systems for space travel, or dealing with issues associated with global climate change. Oregon State University has strong programs in many of the basic and engineering sciences that underpin the Ecological Engineering degree program.

Graduates with an ecological engineering skill set may find employment with industrial clients, engineering consulting companies, governmental agencies, and entrepreneurial start-ups.

For further information, please contact:
John P. Bolte
116 Gilmore Hall
Oregon State University
Corvallis, OR 97331-3906
541-737-2041
Email: info-bee@engr.orst.edu
Website: http://bee.oregonstate.edu/
Pre-Ecological Engineering, major code 654
Pre-Professional Core (52 Credits)
BEE 102. Ecological Engineering II (3) ${ }^{\mathbf{E}}$
CH 231. *General Chemistry (4) ${ }^{\text {E }}$
and CH 261. *Laboratory for Chemistry 231 (1) ${ }^{\text {E }}$
or CH 121 . General Chemistry (5) ${ }^{\mathbf{E}}$ for major transfers only, $B$ grade or better, must have completed CH 12 X sequence prior to transfer
or CH 201. Chemistry for Engineering Majors (3) ${ }^{\mathrm{E}}$ for major transfers only, with CH 202 and CH 205 only
COMM 111. *Public Speaking (3) ${ }^{\text {E }}$
or COMM 114. *Argument and Critical Discourse (3) ${ }^{\mathrm{E}}$
or COMM 218. *Interpersonal
Communication (3) ${ }^{\mathrm{E}}$
ENGR 211. Statics (3) ${ }^{\text {E }}$
ENGR 213. Strength of Materials (3) ${ }^{\text {E }}$
MTH 251. *Differential Calculus (4) ${ }^{\text {E }}$
MTH 252. Integral Calculus (4) ${ }^{\text {E }}$
MTH 254. Vector Calculus I (4) ${ }^{\mathbf{E}}$
MTH 256. Applied Differential Equations (4) ${ }^{\text {E }}$
MTH 306. Matrix and Power Series Methods (4) ${ }^{\mathbf{E}}$
or MTH 253. Infinite Series and Sequences (4) ${ }^{\mathbf{E}}$
and MTH 341. Linear Algebra I (3) or equivalent
PH 211, PH 212, PH 213. *General Physics with Calculus $(4,4,4)^{\mathbf{E}}$
WR 121. *English Composition (3)

## Additional Pre-Professional

Courses (44 Credits)
BEE 101. Ecological Engineering I (3)
BEE 221. Fundamentals of Ecological Engineering (3)
BEE 222. Ecological Engineering Computation (3)
BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
CH 232. *General Chemistry (4)
and CH 262. Laboratory for Chemistry 232 (1)
or CH 122. *General Chemistry (5) for major transfers only, $B$ grade or better, must have completed CH 12 X sequence prior to transfer
CH 233. *General Chemistry (4)
and CH 263. *Laboratory for Chemistry 233 (1)
or CH 123. *General Chemistry (5) for major transfers only, $B$ grade or better, must have completed CH 12 X sequence prior to transfer
HHS 231. *Lifetime Fitness for Health (2) and HHS 241. *Lifetime Fitness (1) or any PAC course (1-2)
SOIL 205. *Soil Science (3) and SOIL 206. *Soil Science Laboratory for Soil 205 (1)

ST 314. Introduction to Statistics for Engineers (3)
or ST 421, 422. Introduction to
Mathematical Statistics $(4,4)$
WR 327. *Technical Writing (3)

## Ecological Engineering, major code

 450
## Professional Core Courses (65 <br> Credits)

BEE 311. Ecological Fluid Mechanics (4)
BEE 312. Ecohydraulics (4)
BEE 313. Ecohydrology (4)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
BEE 361. Ecological Engineering Laboratory (3)

BEE 458. Nonpoint Source Pollution Assessment and Control (3)
BEE 468. Bioremediation Engineering (4)
BEE 469. ^Ecological Engineering Design I (4)
BEE 470. Ecological Engineering Design II (4)

BI 370. Ecology (3)
Upper-Division Science and
Engineering Electives (23)
Professional Skills Courses (11

## Credits)

BEE 415. Professional Development (1)
ENGR 391. Engineering Economics and Project Management (3)
FE 208. Forest Surveying (4)
FE 257. GIS and Forest Engineering Applications (3)

## Science and Public Policy Course

(3-4 Credits)
AEC 250. *Introduction to Environmental Economics and Policy (3)
or ECON 201. *Introduction to
Microeconomics (4)

## Ethics Course (3-4 Credits)

IE 380. *The Responsible Engineer (3) or PHL 205. *Ethics (4)

## Additional Perspectives and

Synthesis Courses (15 Credits)
*Cultural Diversity (3)
*Difference, Power, and Discrimination (3)
*Literature and the Arts (3)
*Western Culture (3)
*Social Policies and Institutions (3)
*Synthesis-Science, Technology, and Society (3)
*Synthesis-Contemporary Global Issues (3)

## Upper-Division Science and

Engineering Electives (23 Credits
Total)

## Engineering Electives

Select at least 10 non-blanket credits

## from below:

BEE 401. Research (3-6)
BEE 410. Ecological Engineering Internship (3-6)
BEE 433. Irrigation System Design (4)
BEE 446. River Engineering (4)
CE 411. Ocean Engineering (4)
CE 413. GIS in Water Resources (3)
CE 415. Coastal Infrastructure (3)

CE 417. Hydraulic Engineering Design (4)
CE 465. Oregon Land Survey Law (3)
CE 469. Property Surveys (3)
ENGR 248. Engineering Graphics and 3-D Modeling (3)
ENVE 421. Water and Wastewater
Characterization (4)
ENVE 422. Environmental Engineering Design (4)
ENVE 425. Air Pollution Control (3)
ENVE 431. Fate and Transport of Chemicals in Environmental Systems (4)
ENVE 456. Sustainable Water Resources Development (3)
FE 209. Forest Photogrammetry and Remote Sensing (4)
FE 310. Forest Route Surveying (4)
FE 315. Soil Engineering (4)
FE 316. Soil Mechanics (4)
FE 371. Harvesting Process Engineering (4)
FE 422. Forest Geomatics (4)
FE 423. Unmanned Aircraft System Remote Sensing (3)
FE 430. Watershed Processes (4)
FE 434. Forest Watershed Management (4)
FE 435. Forest Watershed Management Impacts (3)
FE/FOR 457. Techniques for Forest Resource Analysis (4)
FE/CE 479. Slope and Embankment Design (3)

Science and Public Policy Electives
Select at least 9 non-blanket credits

## from below:

AEC 351. *Natural Resource Economics and Policy (3)
AEC 432. Environmental Law (4)
ANS 121. *Introduction to Animal Sciences (4)

ANS 251. Principles of Animal Foods Technology (3)
ANS 315. *Contentious Social Issues in Animal Agriculture (3)
ANS 351. Advanced Principles of Animal Foods Technology (4)
ATS 320. *The Changing Climate (3)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BB 350. Elementary Biochemistry (4)
BI 301. *Human Impacts on Ecosystems (3)
BI 348. *Human Ecology (3)
BI 420 . *Viruses in Modern Society (3)
BOT 313. Plant Structure (4)
BOT 331. Plant Physiology (4)
BOT 341. Plant Ecology (4)
BOT 442. Plant Population Ecology (3)
CH 324. Quantitative Analysis (4)
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
COMM 444. Third Parties In Dispute Resolution: Mediation and Arbitration (3)
FE 460. Forest Operations Regulations and Policy Issues (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FES/FW 445. Ecological Restoration (4)
FES/ANS/FW/SOC 485. *Consensus and
Natural Resources (3)
FOR 330. Forest Resource Economics I (4)

FOR 441. Silviculture Principles (4)
FOR 460. ^Forest Policy (4)
FOR 462. Natural Resource Policy and Law (3)

FST 210. Fruit and Vegetable Processing (3)
FST 212. Dairy Processing (2)
FST 213. Dairy Processing Laboratory (1)
FST 421. *Food Law (3)
FST 460. Brewing Science (3)
FST 461. Brewing Analysis (3)
FST 466. Wine Production Principles (3)
FST/MB 479. Fermentation Microbiology (3)
FST 490. Food Processing Calculations (2)
FST 491. Food Processing Calculations Laboratory (1)
FW 251. Principles of Fish and Wildlife Conservation (3)
FW 326. Integrated Watershed Management (3)

FW 350. *Endangered Species, Society, and Sustainability (3)
FW 435. ^Wildlife in Agricultural
Ecosystems (3)
FW 456. Limnology (5)
FW 462. Ecosystem Services (3)
FW 479. Wetlands and Riparian Ecology (3)
GEO 202. *Earth Systems Science (4)
GEO 322. Surface Processes (4)
GEO 432. Applied Geomorphology (3)
GEO 481. Glacial Geology (4)
GEO 487. Hydrogeology (4)
GEOG 201. *Foundations of Geospatial
Science and GIS (4)
GEOG 370. Geovisualization: Cartography (4)

GEOG 423. Snow Hydrology (3)
GEOG 480. Remote Sensing I: Principles and Applications (4)
HORT 285. Permaculture Design and
Theory: Certificate Course (4)
HORT/CROP 300. Crop Production in
Pacific Northwest Agroecosystems (4)
HORT 318. ^Applied Ecology of Managed Ecosystems (3)
HORT 360. Irrigation and Drainage (4)
HORT/CROP 414. Precision Agriculture (4)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

MTH 351. Introduction to Numerical Analysis (3)
MTH 452. Numerical Solution of Ordinary Differential Equations (3)
MTH 481. Applied Ordinary Differential Equations (3)
MTH 482. Applied Partial Differential Equations (3)
OC/FW 434. Estuarine Ecology (4)
RNG 341. Rangeland Ecology and Management (3)
RNG 351. Range Ecology I-Grasslands (3)
RNG 352. Range Ecology II-Shrublands (3)
RNG 355. Desert Watershed Management (3)

RNG 421. Wildland Restoration and Ecology (4)
RNG 455. Riparian Ecohydrology and Management (4)
SOIL 335. *Introduction to Water Science and Policy (3)
SOIL 455. Biology of Soil Ecosystems (4)
ST 421, 422. Introduction to Mathematical Statistics $(4,4)$

SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)
TOX 430. Chemical Behavior in the Environment (3)
WSE 455. Marketing and Innovation in Renewable Materials (4)
Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)

## Total Credits for Ecological

Engineering Degree=192

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
${ }^{\text {E }}$ Required for entry into Professional School
FOUR-YEAR PLAN: ECOLOGICAL ENGINEERING (BS)


## Year 1

## Fall Term

BEE 101. Ecological Engineering I (3)
CH 231. *General Chemistry (4) ${ }^{\mathbf{E}}$ and CH 261. *Laboratory for Chemistry 231 (1)
MTH 251. *Differential Calculus (4) ${ }^{\text {E }}$
WR 121. *English Composition (3)

## Winter Term

CH 232. *General Chemistry (4) and CH 262. Laboratory for Chemistry 232 (1)
COMM 111. *Public Speaking (3) ${ }^{\text {E }}$
or COMM 114. *Argument and Critical Discourse (3) ${ }^{\mathbf{E}}$
HHS 231. *Lifetime Fitness for Health (2) and HHS 241. *Lifetime Fitness (1)
or any PAC course (1-2)
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$

## Spring Term

BEE 102. Ecological Engineering II (3) ${ }^{\mathbf{E}}$
CH 233. *General Chemistry (4)
and CH 263. *Laboratory for Chemistry 233 (1)
MTH 254. Vector Calculus I (4) ${ }^{\mathbf{E}}$
PH 211. *General Physics with Calculus (4) ${ }^{\mathbf{E}}$

## Year 2

## Fall Term

BI 211. *Principles of Biology (4)
MTH 256. Applied Differential Equations (4) ${ }^{\mathbf{E}}$

PH 212. *General Physics with Calculus (4) ${ }^{\mathbf{E}}$
SOIL 205. *Soil Science (3)
and SOIL 206. *Soil Science Laboratory for Soil 205 (1)

## Winter Term

BEE 221. Fundamentals of Ecological Engineering (3)
BI 212. *Principles of Biology (4)
ENGR 211. Statics (3) ${ }^{\mathbf{E}}$
PH 213. *General Physics with Calculus (4) ${ }^{\mathbf{E}}$
ST 314. Introduction to Statistics for Engineers (3)

## Spring Term

BEE 222. Ecological Engineering Computation (3)
BI 213. *Principles of Biology (4)
ENGR 213. Strength of Materials (3) ${ }^{\mathbf{E}}$
MTH 306. Matrix and Power Series Methods $(4)^{\mathbf{E}}$
WR 327. *Technical Writing (3)

## Year 3

## Fall Term

AEC 250. *Introduction to Environmental Economics and Policy (3)
ATS 320. *The Changing Climate (3)
BEE 311. Ecological Fluid Mechanics (4)
BEE 320. Biosystems Analysis and Modeling (4)

BI 370. Ecology (3)

## Winter Term

BEE 312. Ecohydraulics (4)
BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
FE 257. GIS and Forest Engineering
Applications (3)
IE 380. *The Responsible Engineer (3)
Engineering Elective I (3-4)

## Spring Term

BEE 313. Ecohydrology (4)
BEE 361. Ecological Engineering Laboratory (3)

ENGR 391. Engineering Economics and
Project Management (3)
*Difference, Power and Discrimination Bacc Core Elective (3)
Engineering Elective II (4)

## Year 4

## Fall Term

BEE 415. Professional Development (1)
BEE 469. ^Ecological Engineering Design I (4)
Engineering Elective III (4)
Science Elective I (3-5)
*Synthesis-Contemporary Global Issues
Bacc Core Elective (3)
Winter Term
BEE 468. Bioremediation Engineering (4)
BEE 470. Ecological Engineering Design II (4)
*Cultural Diversity Bacc Core Elective (3)
Engineering Elective IV (3-4)
*Literature and the Arts Bacc Core Elective (3)

## Spring Term

Engineering Elective V (4)
Science Elective (3-5)
Science Elective (3-5)
*Western Culture Bacc Core Elective (3)

## Pre-Ecological Engineering Major

 Code: 654
## IRRIGATION ENGINEERING

## MINOR

The Irrigation Engineering minor is available to any undergraduate student accepted into the professional engineering program. It exposes engineering students to agricultural, biological, and engineering sciences needed to specialize in agricultural and food-related industries.

## Engineering (17)

## Required

BEE 433. Irrigation System Design (4)
CE 311. Fluid Mechanics (4)
CE 313. Hydraulic Engineering (4

## Electives

BEE 529. Biosystems Modeling Techniques (3)

CE 412. Hydrology (4)
CE 417. Hydraulic Engineering Design (4)

ST 314. Introduction to Statistics for Engineers (3)

## Science (13)

## Required

CROP 200. Crop Science Basics (3)
CSS 305. Principles of Soil Science (4) EOU campus only.
or SOIL 205. *Principles of Soil Science (3)
CSS 306. Problem Solving: Soil Science
Applications (1) EOU campus only.

## Electives

BI 212. *Principles of Biology (4)
BOT 331. Plant Physiology (5)
MB 230. *Introductory Microbiology (4)
Total=30
Footnote:

* Baccalaureate Core Course (BCC)


## Minor Code: 304

## BIOLOGICAL AND ECOLOGICAL ENGINEERING (MEng, MS, PhD)

Graduate Areas of Concentration
Bio-based products and fuels,
bioprocessing, biological systems analysis, ecosystems analysis and modeling, water quality, water resources
The Department of Biological and Ecological Engineering offers graduate programs leading to the Master of Engineering, Master of Science, and Doctor of Philosophy degrees.

The Biological and Ecological Engineering program serves at the interface of life sciences and engineering. Bioresource engineering is the application of engineering and life science principles and problem-solving techniques to the optimum use and sustainability of biological resources. The curriculum is engineering-based with a strong emphasis on the life sciences. Courses focus on biological systems modeling, bioprocess engineering, thermophysical and molecular properties of biological materials, regional hydrologic analysis, groundwater systems, irrigation and water resource optimization. The department concentrates its research effort on two major thrusts: bioprocess engineering and water resources engineering. Specific research topics include biosensors, molecularlevel biosystems analysis, nanosensors, microbial fuel cells, biological hydrogen production, and bio-based products and fuels. Research topics in water resources engineering include constructed wetland treatment systems, crop growth modeling, optimum irrigation management, crop-water requirements, groundwater and subsurface contaminant transport, hydrologic modeling, agricultural and ecological systems analysis, geographical information systems, artificial intelligence technologies, livestock production odor control, livestock waste treatment, and non-point source water pollution control.

For more information write: John P.

Bolte, Head, Department of Biological and Ecological Engineering, OSU, Corvallis, OR 97331-3906.

## Major Code: 4500

## BIOLOGICAL AND ECOLOGICAL ENGINEERING GRADUATE MINOR

For more details, see the departmental advisor.

## Minor Code: 4500

## BIOLOGICAL AND ECOLOGICAL ENGINEERING COURSES

BEE 101. ECOLOGICAL ENGINEERING I (3). Introduction to engineering at OSU and the emerging field of ecological engineering. Topics include engineering analysis and problem solving, professional ethics, the design process and teamwork.

BEE 102. ECOLOGICAL ENGINEERING II (3). Introduction to common problems and solutions in ecological engineering, emphasizing the multiplicity of approaches to constraining, analyzing, and resolving challenges of ecosystem management. Two overnight field trips to local ecological monitoring and engineering sites will be required.
BEE 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
BEE 221. FUNDAMENTALS OF ECOLOGICAL
ENGINEERING (3). Introduction to the concepts and practice of ecological engineering including characteristics, classification, and modeling of ecosystems; ecosystem protection; and sustainable uses of ecosystems, including treatment wetlands, land treatment systems, and ecologically sensitive stormwater management, to meet the needs of human societies. PREREQS: (BI 211 [C] or BI 211H [C] ) and (MTH 256 [C] or MTH 256H [C] )

## BEE 222. ECOLOGICAL ENGINEERING

 COMPUTATION (3). Programming methods relevant to ecological engineering, including hardware/software integration. PREREQS: Sophomore standing, consent of instructor.BEE 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## BEE 311. ECOLOGICAL FLUID MECHANICS

(4). Fluid properties, fluid statics, fluid motion, conservation of mass, momentum and energy for incompressible fluids, dimensional analysis, ecological engineering applications. Lec/rec. PREREQS: Consent of instructor.

BEE 312. ECOHYDRAULICS (4). Theory and design of hydraulic systems for ecological engineering applications. Lec/rec. PREREQS: BEE 311 [C] or CE 311 [C] or CHE 331 [C] or CHE 331H [C]
BEE 313. ECOHYDROLOGY (4). Provides quantitative description of fundamental hydrologic processes and the hydrologic cycle, the interactions of water between atmosphere, soils, and plants, and models for estimating the generation and transport of water in the environment. Lec/rec. PREREQS: BEE 312 [C]
BEE 320. BIOSYSTEMS ANALYSIS AND
MODELING (4). An introduction to simulation modeling and analysis of a variety of biological and ecological systems. Systems approaches to describing ecological systems. PREREQS: MTH 256 and consent of instructor.
BEE 322. ECOLOGICAL ENGINEERING THERMODYNAMICS AND TRANSFER PROCESS (4). A study of the transport processes of fluid flow, heat transfer and mass transfer applied to biological organisms and ecological systems. PREREQS: BEE 320 [C]

BEE 361. ECOLOGICAL ENGINEERING
LABORATORY (3). Introduction to modern measurement methods for ecological and environmental applications includes sensors and systems for measuring soil, water and atmospheric properties. No final exam; field trip required. Lec/lab. PREREQS: Professional engineering program standing.
BEE 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
BEE 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
BEE 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
BEE 407. SEMINAR (1-16). Departmental seminars. Graded P/N. This course is repeatable for a maximum of 16 credits.
BEE 407H. SEMINAR (1-16). Departmental seminars. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required
BEE 410. ECOLOGICAL ENGINEERING
INTERNSHIP (1-12). Internship in ecological engineering to provide students with an opportunity to apply course work and theory to the real world. Requires internship opportunity dentification by student. This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required

## BEE 411. GLOBAL ENVIRONMENTAL

CHANGE: USING DATA TO INFORM DECISIONS (3). Empowers students interested in global change research to focus on the interactions between changes in human land use and climate. Using an innovative online data and mapping tool called Data Basin, students will explore topics accessing the highest quality datasets available in an all-in-one platform.

BEE 415. PROFESSIONAL DEVELOPMENT (1). Preparation for student professional careers. Students will interact with and hear seminars from professionals working in the ecological engineering field to learn from their experiences. PREREQS: Junior or senior standing.
BEE 433. IRRIGATION SYSTEM DESIGN (4).
Principles of soil physics and plant water use applied to irrigation system design. Design of gravity, pressurized, and trickle irrigation systems, improving on-farm water management, performance characteristics of pumps and other irrigation equipment. Lec/lab. Offered alternate years.

## BEE 439. IRRIGATION PRINCIPLES AND

 PRACTICES (4). Survey of irrigation systems, system configurations, factors that influence irrigation efficiency, crop water requirements, energy requirements, pumps, irrigation scheduling For non-engineers. Lec/lab/rec. PREREQS: MTH 111 [C]BEE 446. RIVER ENGINEERING (4).
Multipurpose river use; natural physical processes in alluvial rivers; channel modification practices; river structures; design practices; impact of river modification; problem analysis; and impact minimization. Offered alternate years. PREREQS: CE 313

BEE 458. NONPOINT SOURCE POLLUTION ASSESSMENT AND CONTROL (3). Problem solving in nonpoint source pollution. Methods for evaluating the extent, rate, timing, and fate of NonPoint Source (NPS) pollutants in agricultural and urban environments.

BEE 461. ECOLOGICAL ENGINEERING
LABORATORY (3). Introduction to modern measurement methods for ecological applications, includes sensors and systems for measuring soil, water and atmospheric properties. Lec/lab. PREREQS: One year college physics.

BEE 468. BIOREMEDIATION ENGINEERING
(4). Examines strategies for using a variety of biological processes for treating municipal, agricultural and industrial contaminants. Lec/lab. PREREQS: Must be a pro-school engineering student or graduate student.
BEE 469. ^ECOLOGICAL ENGINEERING
DESIGN I (4). Engineering design processes for ecological engineering applications, including specifications, performance criteria, timelines, and project logistics, principles and practices of working in engineering teams. (Writing Intensive Course) PREREQS: BEE 322 [C] and (ENGR 391 or ENGR 391H), senior standing or consent of instructor

BEE 470. ECOLOGICAL ENGINEERING
DESIGN II (4). Engineering design processes for ecological engineering applications, including specifications, performance criteria, timelines, and project logistics, principles and practices of working in engineering teams.

## BEE 472. INTRODUCTION TO FOOD

ENGINEERING PRINCIPLES (5). Fundamental engineering principles for scientists and nonprocess engineers. Topics include fluid flow, mass and energy transfer, and material and energy balances. Directed at food scientists and other majors who need or would like a working knowledge of food engineering principles. PREREQS: MTH 112 [C-] and (MTH 241 [C-] or MTH 251 [C-] or MTH 251H [C-] ) and PH 201 [C-]
BEE 473. INTRODUCTION TO FOOD ENGINEERING PROCESS DESIGN (3).
Fundamental engineering process design principles for food scientists and non-process engineers. Directed at those who need or would like a working knowledge of applied food engineering process design. Lec/rec. PREREQS: (BEE 472 or BEE 572) and consent of instructor.

BEE 499. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

BEE 499H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
BEE 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

BEE 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
BEE 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
BEE 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
BEE 507. SEMINAR (1). Section 1: Graduate Student Orientation Seminar to acquaint new graduate students with graduate school and departmental requirements, policies and expectations, and departmental research programs. Section 2: Graduate Research Publication Seminar to expose students to requirements for successful proposals and publication of research results. Section 3: Oral Presentation Improvement--A highly participatory educational effort designed to improve performance in presenting research reports, technical papers and in responding to oral examination questions. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 99 credits.
BEE 511. GLOBAL ENVIRONMENTAL
CHANGE: USING DATA TO INFORM DECISIONS (3). Empowers students interested in global change research to focus on the interactions between changes in human land use and climate. Using an innovative online data and mapping tool called Data Basin, students will explore topics accessing the highest quality datasets available in an all-in-one platform.
BEE 512. PHYSICAL HYDROLOGY (3).
Principles of hydrologic processes and the integration of these processes into the hydrologic cycle. Topics include atmospheric processes,
precipitation and runoff, storm response in streamflow on a watershed scale, and major concepts in groundwater systems. PREREQS: One year of calculus.
BEE 525. STOCHASTIC HYDROLOGY (3). Study the elements of randomness embedded in the hydrological processes with emphasis on time series analysis, stationarity, periodic/ trend component, stochastic component, time series synthesis, ARMA model, spatial sampling and scale variability. Offered alternate years. PREREQS: BEE 512
BEE 529. BIOSYS MODELING TECHNIQUES
(3). Development of mathematical models of biological and ecological systems; linear and nonlinear systems analysis; stochastic modeling and random processes; model solution and analysis techniques.
BEE 533. IRRIGATION SYSTEM DESIGN (4).
Principles of soil and plant water use applied to irrigation system design. Design of gravity, pressurized, and trickle irrigation systems, improving on-farm water management, performance characteristics of pumps and other irrigation equipment. Lec/lab. Offered alternate years. PREREQS: ENGR 332
BEE 542. VADOSE ZONE TRANSPORT (4).
Introduction to the physical and hydraulic properties involved in flow from the soil surface to groundwater. Classical infiltration equations will be derived and presented with exact and approximate solutions. Attention is focused on application to pollutant transport and recent advances in nonideal flow. PREREQS: MTH 254

BEE 544. OPEN CHANNEL HYDRAULICS (4). Steady, uniform, and nonuniform flow in natural and artificial open channels; unsteady flow; interaction of flow with river structures; and computational methods. Offered alternate years. PREREQS: CE 313

BEE 545. SEDIMENT TRANSPORT (4). Principles of sediment erosion, transportation and deposition in rivers, reservoirs, and estuaries; measurement, analysis, and computational techniques. Offered even years in winter term. CROSSLISTED as FE 545. PREREQS: CE 313 or FE 330

BEE 546. RIVER ENGINEERING (4).
Multipurpose river use; natural physical processes in alluvial rivers; channel modification practices; river structures; design practices; impact of river modification; problem analysis; and impact minimization. Offered alternate years. PREREQS: CE 313

BEE 549. REGIONAL HYDROLOGIC
MODELING (3). Challenges in regional-scale water resource analysis and management with emphasis on application to production agriculture. Application of geostatistical techniques to spatially variable systems and remote sensing to largescale water resource systems. Development of soil-water-atmosphere-plant models. Analysis of evapotranspiration estimating methods. Offered alternate years. PREREQS: BEE 512 and MTH 256
BEE 558. NONPOINT SOURCE POLLUTION
ASSESSMENT AND CONTROL (3). Problem solving in nonpoint source pollution. Methods for evaluating the extent, rate, timing, and fate of NonPoint Source (NPS) pollutants in agricultural and urban environments.
BEE 568. BIOREMEDIATION ENGINEERING (4)
Examines strategies for using a variety of biological processes for treating municipal, agricultural and industrial contaminants. Lec/lab. PREREQS: Must be a pro-school engineering student or graduate student.
BEE 572. INTRODUCTION TO FOOD ENGINEERING PRINCIPLES (5). Fundamental engineering principles for scientists and nonprocess engineers. Topics include fluid flow, mass and energy transfer, and material and energy balances. Directed at food scientists and other majors who need or would like a working knowledge of process engineering principles. PREREQS: MTH 112 and (MTH 241 or MTH 251 or MTH 251H) and PH 201
BEE 573. INTRODUCTION TO FOOD
ENGINEERING PROCESS DESIGN (3).
Fundamental engineering process design principles for food scientists and non-process engineers. Directed at those who need or would like a working knowledge of applied food engineering process design. Lec/rec. PREREQS: (BEE 472 or BEE 572) and consent of instructor.

BEE 585. METABOLIC SYSTEMS
ENGINEERING (3). Quantitative and experimental approaches for describing and engineering biological networks and an introduction to the principles and methodologies of metabolic engineering and synthetic biology. PREREQS Statistics, biology, biochemistry or microbiology.

## BEE 586. PROBLEM SOLVING FOR

 METABOLIC SYSTEMS ENGINEERING (1).Matrix algebra and linear optimization for engineers and life scientists who lack linear algebra, linear optimization, and differential equations. Real-world analysis and optimization problems applied to the design and engineering of biological networks. Lab. PREREQS: Graduate standing. MTH 251 and MTH 252 or equivalent. COREQS: BEE 585
BEE 590. BIOPROCESS CONTROL SYSTEMS (3). Analysis and control of biological and biochemical systems. Stability, observability, controllability, pole-placement methods. Introduction to optimal control and feed back systems. PREREQS: MTH 251 and MTH 306 and BEE 571 or equivalent.
BEE 599. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.
BEE 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
BEE 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

BEE 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

BEE 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

BEE 607. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

BEE 691. MICROBIAL FUEL CELLS (2).
Fundamentals of microbial fuel cells. MFC reactor configuration. Potential applications of MFC. Comparison with other H 2 generation technologies.
BEE 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## SCHOOL OF CHEMICAL, <br> BIOLOGICAL AND <br> ENVIRONMENTAL <br> ENGINEERING

James (Jim) D. Sweeney, Head
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## FACULTY

Professors Chang, Herman, Jovanovic, Koretsky, McGuire ${ }^{1}$, Rorrer, Semprini ${ }^{1}$, Wildenschild, Wood, Yokochi
Associate Professors Bothwell, Dolan, Harper, Higgins, Kelly, Levien ${ }^{1}$, Nason, Rochefort,
Assistant Professors Arnadottir, Baio, Feng, Fu, Montfort, Navab Daneshmand, Radiecki, Schilke, Walker
Professional Practice Engineers Carlisle, Mallette
Linus Pauling Engineer Harding ${ }^{1}$
${ }^{1}$ Licensed professional engineer

## Undergraduate Majors

Bioengineering (BA, BS, CRED, HBA, HBS)
Chemical Engineering (BA, BS,
CRED, HBA, HBS)
Environmental Engineering (BA, BS, CRED, HBA, HBS)

## Minor

Environmental Engineering

## Graduate Majors

Bioengineering (MEng, MS, PhD)

## Graduate Areas of Concentration

 BiomaterialsBiomedical Devices and Instrumentation
Human Performance Engineering
Medical Imaging
Systems and Computation Biology
Chemical Engineering (MEng, MS, PhD)
Graduate Areas of Concentration
Chemical Engineering
Environmental Engineering (MEng, MS, PhD, MAIS)
Graduate Areas of Concentration
Bioremediation
Environmental Fluid Mechanics
Environmental Microbiology
Environmental Modeling
Multiphase Phenomena
Subsurface Flow and Transport
Water and Wastewater Treatment

## Graduate Minors

Chemical Engineering
Environmental Engineering
The School of Chemical, Biological, and

Environmental Engineering (CBEE) offers three undergraduate programs: Chemical Engineering (CHE), Bioengineering (BIOE), and Environmental Engineering (ENVE). The Bachelor of Science degrees in CHE, BIOE, and ENVE are each separately accredited by ABET, the Accreditation Board for Engineering and Technology. The Bachelor of Art degrees in CHE, BIOE, and ENVE are not accredited by ABET.

The goals of the CBEE undergraduate program are consistent with the mission and goals of the College of Engineering, and focus on creating work- and leader-ship-ready graduates who will be successful in professional careers as a chemical engineer, bioengineer, or environmental engineer in the private or public sectors, including industry, government, and consulting, as well as for continued graduate study in the same or closely related fields.

Chemical engineering (CHE) is the engineering discipline that focuses on the science and engineering of processes to convert raw materials into valued chemicals and products on a manufacturing scale.

Bioengineering (BIOE) is an interdisciplinary field that applies scientific and engineering principles to the development of new biologics, materials, devices, and processes in the broad areas of bioprocess, biomedical, and bioenvironmental technology.

Environmental engineering (ENVE) is the engineering discipline that applies scientific and engineering principles to improve the natural environment, to provide healthy water, air, and land, and to remediate polluted sites.

The educational objectives and curriculum are described separately for each CHE, BIOE, and ENVE program. The school has a core undergraduate curriculum where CHE, BIOE, and ENVE students take common courses in first through senior years, including first-year engineering, process material and energy balances, thermodynamics and transport phenomena, and senior year laboratory.

The school also offers graduate programs in bioengineering, chemical engineering, and environmental engineering leading to MEng, MS, and PhD degrees.

## UNDERGRADUATE MAJORS WITH OPTIONS

## BIOENGINEERING (BA, BS, CRED, HBA, HBS)

The School of Chemical, Biological, and Environmental Engineering (CBEE) offers three undergraduate programs: Chemical Engineering (CHE), Bioengineering (BIOE), and Environmental Engineering (ENVE). Each program is separately accredited by the Engineering Accredita-
tion Commission of ABET (http://www. abet.org).

## About Bioengineering

Bioengineering is an interdisciplinary field that applies engineering principles and quantitative methods to the development of new and novel biologicals, materials, devices, and processes. In practice, bioengineers address issues surrounding the broad areas of bioprocess, biomedical, and bioenvironmental technology.

## About the OSU Bioengineering

 Undergraduate Program (BIOE) The Bioengineering Undergraduate Program provides a solid background in biology, chemistry, physics and math, in addition to the engineering sciences. Up-per-level course work in bioengineering includes analysis and design of processes involving suspension and immobilized microbial cultures and the recovery of therapeutic products from bioreactors, as well as selection courses in biomedical materials engineering, metabolic engineering, and cell engineering. All students complete course work in drug and medical device regulation as well as a capstone-design experience.Bioengineering graduates are prepared to contribute to the rapidly growing bioscience-based industries with the ability to formulate and solve problems pertaining to enzyme and microbial process technologies, mammalian cell culture, and downstream processing in biotechnology. They also generate solutions to problems with medical relevance, including the design of devices and systems to replace lost organ function, deliver therapeutic agents, and otherwise improve human health.

Alumni of the Bioengineering program will be work-ready engineers, problem solvers, responsible professionals, and interdisciplinary collaborators. Specifically, within a few years after graduation, they will have:

1. obtained employment in the bioprocess and biotechnology industries and/or entered graduate studies in bioengineering, chemical, environmental, or biomedical engineering and/or gained admission to professional schools including health-professional programs and law programs;
2. created value through solving problems at the interface of engineering and biology, whether in a manufacturing, research, or clinical environment;
3. pursued professional development in order to fulfill their professional and ethical responsibilities, and they will have recognized and responded to evolving contemporary questions at the interface of biosciences, technology, and society; and
4. created value through effectively communicating with a diverse set of professionals, and facilitating meaningful collaboration between bioscientists and other engineers. The Bioengineering undergraduate curriculum is designed to meet these objectives through relevant course content, hands-on laboratory and design experiences at the first year through the senior levels, and structured, collaborative learning experiences. The school has a core curriculum where students from all three programs housed within the school (CHE, BIOE, ENVE) take common courses in the areas of first-year engineering, materials and energy balances, thermodynamics, transport phenomena and senior laboratory.

## Pre-Professional Bioengineering

## First Year

CBEE 101. Chemical, Biological, and Environmental Engineering Orientation (3)

CBEE 102. Engineering Problem Solving and Computations (3) ${ }^{\mathbf{E}}$
CH 231. *General Chemistry (4) ${ }^{\text {E }}$ and CH 261. *Laboratory for Chemistry 231 (1) ${ }^{\text {E }}$
CH 232, CH 233. *General Chemistry $(4,4)$ and CH 262, CH 263. *Laboratory for Chemistry 232, $233(1,1)$
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3) ${ }^{\mathbf{E}}$
MTH 251. *Differential Calculus (4) ${ }^{\mathbf{E}}$
MTH 252. Integral Calculus (4) ${ }^{\text {E }}$
MTH 254. Vector Calculus I (4) ${ }^{\mathbf{E}}$
PH 211. *General Physics with Calculus (4) ${ }^{\text {E }}$
WR 121. *English Composition (3) ${ }^{\text {E }}$
HHS 231. *Lifetime Fitness for Health (2)
HHS 241-HHS 248. *Lifetime Fitness (various activities) (1)
or any PAC course (1-2)
*Perspectives (3)

## Second Year

BI 231, BI 233. Introduction to Human Anatomy and Physiology $(3,3)$
CBEE 211. Material Balances and Stoichiometry (3)
CBEE 212. Energy Balances (3)
CBEE 213. Process Data Analysis (4)
CH 331, CH 332. Organic Chemistry $(4,4)$
ENGR 201. Electrical Fundamentals I (3) ${ }^{\text {E }}$
ENGR 211. Statics (3) ${ }^{\mathrm{E}}$
MTH 256. Applied Differential Equations (4) ${ }^{\mathbf{E}}$

MTH 306. Matrix and Power Series Methods (4) ${ }^{\text {E }}$

PH 212, PH 213. *General Physics with Calculus $(4,4)^{\mathbf{E}}$
*Biology selection (2 or 4) ${ }^{\mathbf{1}}$

## Professional Engineering Program

## Third Year

BB 450, BB 451. General Biochemistry $(4,3)$
BIOE 340. Biomedical Engineering Principles (3)
BIOE 351. Biomaterials and Biointerfaces (3)
BIOE 420. Social Justice, Ethics, and Engineering (3)

CBEE 320. Professionalism and Engineering Ethics (3)
CHE 311. Thermodynamics (3)
CHE 331. Transport Phenomena I (4)
CHE 332. Transport Phenomena II (3)
CHE 333. Transport Phenomena III (3)
WR 327. *Technical Writing (3)
*Difference, Power, and Discrimination (3) ${ }^{4}$
Engineering elective (3) ${ }^{2}$
*Perspectives (6)

## Fourth Year

BB 493. Biochemistry Laboratory Molecular Techniques 1 (3)
BB 494. Biochemistry Laboratory Molecular
Techniques 2 (3)
BIOE 415. Bioengineering Laboratory (3)
BIOE 457. Bioreactors I (3)
BIOE 490. Bioengineering Process Design (4)
BIOE 491. Bioengineering Product Design (4)
BIOE 492. Bioengineering Capstone Design (4)

CBEE 414. ${ }^{\wedge}$ Process Engineering Laboratory (3)

Bioengineering electives (6) ${ }^{3}$
Engineering elective (6) ${ }^{2}$
*Perspectives (3)
*Synthesis (6)

## Total Credits=192

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
${ }^{\text {E }}$ Required for entry into the professional program.
${ }^{1}$ Approved bioscience course from BIOE
program list.
${ }^{2}$ Approved engineering elective from BIOE program list.
${ }^{3}$ Approved bioengineering elective from BIOE program list.
${ }^{4}$ Approved DPD elective from BIOE program list.
Pre-Bioengineering Major Code: 294
Major Code: 298


## CHEMICAL ENGINEERING

(BA, BS, CRED, HBA, HBS)
The School of Chemical, Biological, and Environmental Engineering (CBEE) offers three undergraduate programs: Chemical Engineering (CHE), Bioengineering (BIOE), and Environmental Engineering (ENVE). Each program is separately accredited by the Engineering Accreditation Commission of ABET (http://www. abet.org).

## About the Chemical Engineering Undergraduate Program (CHE):

Chemical engineering is the engineering discipline that focuses on the science and engineering of processes to convert raw materials into valued chemicals and products at a manufacturing scale. These include products found in everyday life such as transportation and heating fuels, plastics, pharmaceuticals, household and paper products (soaps, cosmetics, health care and cleaning products, etc.), as well as more advanced products like solar cells, computer chips, and advanced composites for jet aircraft.

Chemical engineers find employment in traditional chemical industries such as pulp and paper manufacturing and petroleum refining, high-tech industries such as semiconductor device manufacturing, biopharmaceutical production, aerospace, and emerging industries, particularly in sustainable energy.
Alumni of the Chemical Engineering program will be work-ready engineers, problem solvers, responsible professionals, and interdisciplinary collaborators. Specifically, based on the needs of the program's constituencies, within a few years of graduation chemical engineering alumni will have:

1. Obtained professional employment in a company, institute or agency within the chemical or related industries, entered a graduate program in chemical engineering or a related field or gained admission to a professional program such as medicine, law or business.
2. Created value by applying appropriate modern chemical engineering tools to the analysis, design, and control of chemical, physical, and/or biological processes, including the hazards associated with these processes.
3. Continued to develop their skills and knowledge through professional activities including FE/PE certifications, memberships in professional organizations and continuing education courses in order to fulfill their professional and ethical responsibilities though lifelong learning.
4. Demonstrated good communication skills and worked effectively in cross-functional team environments comprised of a diverse set of members with varying organizational backgrounds, positions, and geographic locations.
The chemical engineering undergraduate curriculum is designed to meet these objectives through relevant course content, hands-on laboratory and design experiences at the first year through senior levels, and structured, collaborative learning experiences. The school has a core curriculum where students from all three programs housed within the school (CHE, BIOE, ENVE) take common courses in the areas of first-year engineering, material and energy balances, thermodynamics, transport phenomena, and senior year laboratory.

Chemical engineering students have opportunities to obtain internships offered through the School of CBEE, and through the Multiple Engineering Cooperative Program (MECOP) program. Many scholarships are also available on a competitive basis for chemical engineering undergraduate students.

Pre-Professional Chemical

## Engineering

Pre-Professional Chemical

## Engineering

## First Year

CBEE 101. Chemical, Biological, and
Environmental Engr Orientation (3)
CBEE 102. Engineering Problem Solving and Computations (3) ${ }^{\mathbf{E}}$
CH 231. *General Chemistry (4) ${ }^{\text {E }}$
and CH 261. *Laboratory for Chemistry 231 (1) ${ }^{\mathrm{E}}$
CH 232, CH 233. *General Chemistry $(4,4)$ and CH 262, CH 263. *Laboratory for Chemistry 232, $233(1,1)$
MTH 251. *Differential Calculus (4) ${ }^{\text {E }}$
MTH 252. Integral Calculus (4) ${ }^{\text {E }}$
MTH 254. Vector Calculus I (4) ${ }^{\mathbf{E}}$
PH 211. *General Physics with Calculus (4) ${ }^{\text {E }}$
WR 121. *English Composition (3) ${ }^{\mathbf{E}}$
Biological science baccalaureate core lab course (4)
HHS 231. *Lifetime Fitness for Health (2) ${ }^{\mathbf{1}}$
HHS 241. *Lifetime Fitness (1) 1 or any PAC course (1-2)

## Second Year

CH 331, CH 332. Organic Chemistry $(4,4)$
CBEE 211. Material Balances and
Stoichiometry (3)
CBEE 212. Energy Balances (3)
CBEE 213. Process Data Analysis (4)
COMM 111. *Public Speaking (3) ${ }^{\mathbf{E}}$ or COMM 114. *Argument and Critical Discourse (3) ${ }^{\mathbf{E}}$
ENGR 201. Electrical Fundamentals I (3) ${ }^{\mathbf{E}}$
ENGR 211. Statics (3) ${ }^{\text {E }}$
MTH 256. Applied Differential Equations (4) ${ }^{\text {E }}$

MTH 306. Matrix and Power Series Methods (4) ${ }^{\text {E }}$

PH 212, PH 213. *General Physics with Calculus $(4,4)^{\mathbf{E}}$
WR 327. *Technical Writing (3)

## Professional Chemical Engineering

## Third Year

CH 440, CH 441, CH 442. Physical Chemistry ( $3,3,3$ )
CHE 311. Thermodynamics (3)
CHE 312. Chemical Engineering
Thermodynamics (3)
CHE 320. Safety, Engineering Ethics and Professionalism (3)
CHE 331. Transport Phenomena I (4)
CHE 332. Transport Phenomena II (3)
CHE 333. Transport Phenomena III (3)
CHE 334. Transport Phenomena Laboratory (2)

CHE 361. Chemical Process Dynamics and Simulation (3)
CHE 461. Process Control (3)
Perspectives (6) ${ }^{1}$
Advanced Chemistry (3)
Engineering elective (3)

## Fourth Year

CHE 411. Mass Transfer Operations (4)
CBEE 414. ^Process Engineering Laboratory (3)

CHE 415. Chemical Engineering Laboratory I (3)
CHE 431, CHE 432. Chemical Plant Design I, II (3,3)

CHE 443. Chemical Reaction Engineering (4)
Elective (4)
Advanced Chemistry with lab (4)
Engineering elective (8)
Perspectives (3) ${ }^{1}$
Difference, Power, and Discrimination (3)1
Synthesis (6) ${ }^{1}$
Total=192

## Footnotes:

${ }^{\text {E }}$ Required for entry into the professional
program.
${ }^{1}$ Must be selected to satisfy the requirements of
the baccalaureate core
$\wedge$ Writing Intensive Course (WIC)

* Baccalaureate Core Course (BCC) that satisfies
baccalaureate core requirements


## Sample Four-Year Plan: Chemical <br> Engineering <br> Notes:

- Advanced Chemistry: CH 411, CH 412, CH 418, CH 421, CH 422, CH 424, CH 435, CH 445, CH 450, CH 453, WSE 321, ATS 413, BB 350, BB 450, OEAS 540
- Advanced Chemistry with Lab: OC $450 \&$ OC 499, CH 324, CH 337, CHE 417
- Engineering Electives: CHE 444, CHE 445, CHE 450, CHE 451, CHE 499, CHE 514, CHE 520, CHE 525, CHE 537, BIOE 351, BIOE 440, BIOE 445, BIOE 457, BIOE 459, BIOE 462, ENVE 322, ENVE 421, ENVE 422, ENVE 425, ENVE 431, ENVE 456, ENVE 457, CE 412, ECE 415, ECE 416, ECE 417, ECE 418, ENGR 221, IE 355, IE 356, MATS 321, MATS 322, CBEE 416


## Year 1 ( 47 cr)

Fall Term (15 cr)
CBEE 101. Chemical, Biological and
Environmental Engineering Orientation (3)
CH 231/261. *General Chemistry/
Laboratory (5) ${ }^{\mathrm{E}}$
MTH 251. *Differential Calculus (4) ${ }^{\text {E }}$
WR 121. *English Composition (3) ${ }^{\mathbf{E}}$
Winter Term ( 16 cr)
*Biological Science with Lab (4)
CBEE 102. Engineering Problem Solving and Computations (3) ${ }^{\mathbf{E}}$
CH 232/262. *General Chemistry/
Laboratory (5)
MTH 252. Integral Calculus (4) ${ }^{\text {E }}$

## Spring Term (16 cr)

CH 233/263. *General Chemistry/ Laboratory (5)
COMM 111/114. Public Speaking or
Argument \& Critical Discourse (3) ${ }^{\mathrm{E}}$
MTH 254. Vector Calculus (4) ${ }^{\mathbf{E}}$
PH 211. *General Physics with Calculus (4) ${ }^{\text {E }}$

## Year 2 (49 cr)

Fall Term (15 cr)
CBEE 211. Material Balances and
Stoichiometry (3)
CH 331. Organic Chemistry (4)
MTH 256. Applied Differential Equations (4)

PH 212. *General Physics with Calculus (4) ${ }^{\text {E }}$

Winter Term (18 cr)
CBEE 212. Energy Balances (3)
CH 332. Organic Chemistry (4)
MTH 306. Matrix \& Power Series Methods (4) ${ }^{\text {E }}$

PH 213. *General Physics with Calculus (4) ${ }^{\text {E }}$ Perspective (3) ${ }^{1}$

## Spring Term (16 cr)

CBEE 213. Process Data Analysis (4)
ENGR 201. Electrical Fundamentals I (3) ${ }^{\mathbf{E}}$
ENGR 211. Statics (3) ${ }^{\mathrm{E}}$
HHS 231. *Lifetime Fitness for Health (2) ${ }^{1}$
HHS 241. *Lifetime Fitness (1)
or PAC. *Fitness/Physical Activity (1) ${ }^{1}$
WR 327. *Technical Writing (3)

## Year 3 (48 cr)

Fall Term ( 16 cr)
CH 440. Physical Chemistry (3)
ChE 311. Thermodynamics (3)
ChE 331. Transport Phenomena I (4)
CHE 320. Safety, Engineering Ethics and Professionalism (3)

## Winter Term ( 15 cr )

CH 441. Physical Chemistry (3)
CHE 361. Chemical Process Dynamics and Simulation (3)
CHE 312. Chemical Engineering
Thermodynamics (3)
CHE 332. Transport Phenomena II (3)
Perspective. (3) ${ }^{1}$

## Spring Term (17 cr)

CH 442. Physical Chemistry (3)
CHE 461. Process Control (3)
CHE 333. Transport Phenomena III (3)
CHE 334. Transport Phenomena Laboratory (2)

Perspective (3) ${ }^{\mathbf{1}}$
Advanced Chemistry Elective (3)
Year 4 ( 48 cr)
Fall Term (16 cr)
CBEE 414. ^Process Engineering Laboratory (3)

CHE 443. Chemical Reaction Engineering (4)
CHE 411. Mass Transfer Operations (4)
Advanced Chemistry Laboratory (4)
Perspective (3) ${ }^{1}$

## Winter Term (17 cr)

CHE 415. Chemical Engineering Laboratory I (3)
CHE 431. Chemical Plant Design I (3)
Difference, Power, Discrimination (3) ${ }^{1}$
Engineering Elective (4)
Free Elective (4)
Spring Term (13 cr)
CHE 432. Chemical Plant Design II (3)
Engineering Elective (4)
Synthesis (3) ${ }^{1}$
Synthesis (3) ${ }^{1}$
Total=192
Pre-Chemical Engineering Major

## Code: 333

Major Code: 303

## ENVIRONMENTAL ENGINEERING (BA, BS, CRED, HBA, HBS)

The School of Chemical, Biological, and Environmental Engineering (CBEE) offers three undergraduate programs: Chemical Engineering (CHE), Bioengineering (BIOE), and Environmental Engineering (ENVE). Each program is separately accredited by the Engineering Accreditation Commission of ABET (http://www. abet.org).

The school also offers an undergraduate Environmental Engineering option for civil engineering students and a minor in Environmental Engineering.

## About the Environmental Engineering Undergraduate Program (ENVE)

The ENVE program draws upon a strong foundation in the basic sciences and prepares students for environmental engineering careers in consulting, industry, and state and local governments. It is a rigorous program incorporating course work in civil and chemical engineering, water and wastewater treatment, hazardous substance management, air pollution, and environmental health. The concept of environmental engineering design is introduced during the freshman year, with most of the design skills developed at the junior and senior level. Training culminates in a team approach to the solution of open-ended, realistic problems that incorporate aspects of economics, process operation and maintenance, process stability and reliability, and consideration of constraints. A more detailed explanation of the design experience and design course sequences is contained in the "Undergraduate Advising Guide for the Environmental Engineering Program," which may be obtained from the school or viewed on the school's website at http://cbee.oregon-state.edu/undergraduate-advising.

Alumni of the environmental engineering program will be work-ready engineers prepared with the knowledge and skills necessary to solve contemporary environmental engineering problems. Specifically, within a few years of graduation, they will have:

1. gained employment in the field of environmental engineering and/or matriculated in an environmental engineering or related graduate or professional program;
2. created value by analyzing and designing sustainable solutions to problems involving water, air, and soil pollution abatement and prevention;
3. successfully communicated or defended designs and decisions through reference to fundamental concepts of math, science, and engineering;
4. facilitated collaboration and built
strong professional relationships by working successfully in multidisciplinary teams and effectively communicating with a diverse group of stakeholders;
5. actively participated in professional development activities that demonstrate a commitment to sound professional and ethical practices, and the protection of human health and the environment; and
6. achieved Engineer in Training (EIT) certification by passing the Fundamentals of Engineering exam and gained experience relevant for professional licensure.
The environmental engineering undergraduate curriculum is designed to meet these objectives through relevant course content, hands-on laboratory and design experiences in the first year through senior levels, and structured collaborative learning experiences. The school has a core curriculum where students from all three programs housed within the school (CHE, BIOE, ENVE) take common courses in the areas of first-year engineering, materials and energy balances, thermodynamics, transport phenomena, and senior year unit operations.
Environmental engineering students have opportunities to obtain internships offered through the School of CBEE, and through the College of Engineering Multiple Engineering Cooperative Program (MECOP) program. Many scholarships are also available on a competitive basis for environmental engineering undergraduate students.

## Pre-professional Environmental Engineering

## First Year

CBEE 101. Chemical, Biological, and Environmental Engineering Orientation (3) ${ }^{5}$

CBEE 102. Engineering Problem Solving and Computations (3) ${ }^{\mathbf{E}}$
CH 231E, CH 232, CH 233. *General Chemistry ( $4,4,4)^{5}$
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
(1,1,1)
COMM 111. *Public Speaking (3) ${ }^{\text {E }}$
or COMM 114. *Argument and Critical Discourse (3) ${ }^{\mathbf{E}}$
HHS 231. *Lifetime Fitness for Health (2) ${ }^{\mathbf{1}}$
HHS 241. *Lifetime Fitness (1) ${ }^{1}$ or any PAC course (1-2)
MTH 251. *Differential Calculus (4) ${ }^{\mathbf{E}}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus I (4) ${ }^{\text {E }}$
PH 211. *General Physics with Calculus (4) ${ }^{\text {E }}$
WR 121. *English Composition (3) ${ }^{\mathrm{E}}$

## Second Year

CBEE 211 Material Balances and Stoichiometry (3) ${ }^{5}$
CBEE 212. Energy Balances (3) ${ }^{5}$
CBEE 213. Process Data Analysis (4) ${ }^{5}$
CH 331, CH 332. Organic Chemistry $(4,4)$
ENGR 211. Statics (3) ${ }^{\mathbf{E}}$

ENGR 212. Dynamics (3) ${ }^{\mathbf{E}}$
ENGR 213. Strength of Materials (3) ${ }^{5}$
GEO 221. Environmental Geology (4)
MTH 256. Applied Differential Equations (4) ${ }^{\mathbf{E}}$
MTH 306. Matrix and Power Series Methods (4) ${ }^{\text {E }}$

PH 212, PH 213. *General Physics with Calculus $(4,4)^{\mathbf{E}}$
Perspective (3) ${ }^{\mathbf{1}}$

## Professional Environmental Engineering

Third Year
CBEE 320. Professionalism and Engineering Ethics (3)
CCE 201. Civil and Construction
Engineering Graphics and Design (3) ${ }^{5}$
CE 313. Hydraulic Engineering (4)
or CE 372. Geotechnical Engineering I (4)
CE 412. Hydrology (4)
CHE 311. Thermodynamics (3)
CHE 331. Transport Phenomena I (3)
CHE 332. Transport Phenomena II (3)
CHE 333. Transport Phenomena III (3)
CHE 334. Transport Laboratory (2)
ENVE 322. Fundamentals of Environmental Engineering (4)
MB 230. *Introductory Microbiology (4)
WR 327. *Technical Writing (3) ${ }^{1}$
Perspectives (9) ${ }^{1}$

## Fourth Year

BIOE 457. Bioreactors (3)
CBEE 414. ^Process Engineering Laboratory (3)

ENVE 415. Environmental Engineering Laboratory (3)
ENVE 421. Water and Wastewater
Characterization (4)
ENVE 422. Environmental Engineering
Design (4)
ENVE 425. Air Pollution Control (3)
ENVE 431. Fate and Transport of Chemicals in Environmental Systems (4)
ENVE 456. Sustainable Water Resources Development (3)
ENVE 490. Environmental Engineering
Capstone Design (4)
Perspective (3) ${ }^{\mathbf{1}}$
Synthesis (6) ${ }^{1}$
Technical electives (7)

## Total Credits=192

Footnotes:
${ }^{\mathbf{E}}$ Required for entry into the professional
program.
${ }^{1}$ Must be selected to satisfy the requirements of the baccalaureate core.
${ }^{5}$ Prerequisite for several upper-division courses.
Recommended for completion prior to entry into the professional program or in fall term of junior year.

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Pre-Environmental Engineering

Major Code: 332
Major Code: 311
ENVIRONMENTAL ENGINEERING MINOR

## Minor Core Courses (21)

CH 123. *General Chemistry (5)
or CH 233. *General Chemistry (4) and CH 263. *Laboratory for Chemistry 233
(1)

ENVE 421. Water and Wastewater
Characterization (4)
ENVE 422. Environmental Engineering Design (4)
ENVE 431. Fate and Transport of Chemicals in Environmental Systems (4)

## Additional core courses (6)

ENVE 321. ^Environmental Engineering Fundamentals (4) Approved electives (2)

## Total=27

Contact the School of Chemical, Biological and Environmental Engineering for a list of approved elective courses.

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Minor Code: 310


## GRADUATE MAJORS

## BIOENGINEERING (MEng, MS,

 PhD)Graduate Areas of Concentration
Biomaterials, biomedical devices and instrumentation, human performance engineering, medical imaging, systems and computation biology
Students enrolled in the MEng and MS degree programs will complete at least 45 graduate credits. For students in the MS program, 12 of those credits must be thesis credits (BIOE 503). Students enrolled in the PhD program will complete at least 108 graduate credits. At least 36 of those credits must be non-blanket course work, and at least 36 must be thesis credits (BIOE 603).

Students in all Bioengineering graduate programs (MEng, MS and PhD) will be required to complete the program core curriculum for a total of 15 credits. The remaining credits required for completion of the degree program will be electives, and may include courses in science, mathematics, engineering or other topics (e.g., entrepreneurship). An abundance of courses are currently offered at OSU that could fulfill the elective requirements, including several courses related to bioengineering offered within the College of Engineering. In addition, the College of Veterinary Medicine's graduate program in Comparative Health Sciences includes various course offerings that can serve as electives for Bioengineering graduate students. These include courses in Animal Models (VMB 521) and Molecular Tools (VMB 671), as well as courses in bioinformatics, epidemiology, genomics and immunology.

All students submit a program of study during their first quarter in the program specifying the elective courses they plan to take to complete their degree requirements. Programs of study will be reviewed by a committee of BIOE program faculty to ensure that the program
has sufficient breadth and depth in the context of the student's planned research activities.

## Core (15 credits)

BIOE 507. Bioengineering Seminar (1 credit/ term, 3 credits required)
BIOE 5\#\#. Physiology for Engineers (4)
BIOE 5\#\#. Cellular and Molecular
Bioengineering (3)
BIOE 5\#\#. Bioengineering Analysis (3)
BIOE 5\#\#. Drug and Medical Device
Regulations in Technology Development (2)

## Electives

The number of credits depends on the degree type.
Footnote:
5\#\# are courses under development
Major Code: 3080

## CHEMICAL ENGINEERING (MEng,

 MS, PhD)
## Graduate Areas of Concentration Chemical engineering

The School of Chemical, Biological and Environmental Engineering offers graduate programs leading to the Master of Engineering, Master of Science, and Doctor of Philosophy degrees. All programs are tailored to individual student needs and professional goals. A diversity of faculty interests, broadened and reinforced by cooperation between the school and other engineering departments and schools and research centers on campus, makes tailored individual programs possible. The school originates and encourages programs ranging from those that are classically chemical engineering to those that are distinctly interdisciplinary.

For more information, contact Dr. Gregory Rorrer, School Head, School of Chemical, Biological and Environmental Engineering, Oregon State University, Corvallis, OR 97331-2904, or email cbee@oregonstate.edu.
MEng Degree ( 45 credits)
Chemical Engineering Core (21)
CHE 514. Fluid Flow (4)
CHE 520. Mass Transfer I (4)
CHE 525. Chemical Engineering Analysis (4)
CHE 537. Chemical Engineering
Thermodynamics I (4)
CHE 540. Chemical Reactors I (4)
CHE 507. Seminar (1)
Engineering Electives (9)
Graduate level courses offered through the College of Engineering
Minor Course Work/Electives (15)
Courses approved by graduate program advisor on Graduate Program of Study

## MS Degree ( 45 credits)

Chemical Engineering Core (21)
CHE 514. Fluid Flow (4)
CHE 520. Mass Transfer I (4)
CHE 525. Chemical Engineering Analysis (4)
CHE 537. Chemical Engineering

Thermodynamics I (4)
CHE 540. Chemical Reactors I (4)
CHE 507. Seminar (1)
Minor Course Work/Electives (15)
Courses approved by MS Thesis advisor on
Graduate Program of Study
Thesis (9)
PhD Degree ( 108 credits)

## Chemical Engineering Core (21)

CHE 514. Fluid Flow (4)
CHE 520. Mass Transfer I (4)
CHE 525. Chemical Engineering Analysis (4)
CHE 537. Chemical Engineering
Thermodynamics I (4)
CHE 540. Chemical Reactors I (4)
CHE 507. Seminar (1)

## Minor Course Work/Electives (15+)

Courses approved by student PhD
Committee on Graduate Program of Study

## Thesis (36-72)

## Prerequisite and Corequisite Course Work for Non-engineering Undergraduates

MEng or MS students without undergraduate degrees in chemical engineering or a related engineering discipline, or PhD students without undergraduate degrees or graduate degrees in chemical engineering or a related engineering discipline, must take the following courses in addition to the CHE core:
CBEE 211. Material Balances and
Stoichiometry (3)
CBEE 212. Energy Balances (3)
CHE 312. Chemical Engineering
Thermodynamics (3)
CHE 331. Transport Phenomena I (4)
CHE 332. Transport Phenomena II (3)
CHE 443. Chemical Reaction Engineering (4)

## Major Code: 3030

## ENVIRONMENTAL ENGINEERING (MEng, MS, PhD, MAIS)

## Graduate Areas of Concentration

Bioremediation, environmental fluid mechanics, environmental microbiology, environmental modeling, multiphase phenomena, subsurface flow and transport, water and wastewater treatment
The School of Chemical, Biological and Environmental Engineering offers graduate curricula leading to the Master of Engineering, Master of Science, and Doctor of Philosophy degrees in Environmental Engineering. The ENVE program prepares individuals to apply mathematical and scientific principles to the design, development and operational evaluation of systems for controlling contained living environments and for monitoring and controlling factors in the external natural environment. Specific application areas include pollution control, waste and hazardous material disposal, health and safety protection, conservation, life support, and requirements for protection of special materials and related work
environments, as well as emerging areas including sustainability, detection and treatment of emerging contaminants and their fate in the natural environment, water supply for a growing world population, and mitigation of the effects of climate change, among others. All programs are tailored to individual student needs and professional goals. A diversity of faculty interests, broadened and reinforced by cooperation between the school and other engineering departments and schools and research centers on campus, make tailored individual programs possible.
For more information, contact Dr. Gregory Rorrer, School Head, School of Chemical, Biological and Environmental Engineering, Oregon State University, Corvallis, OR 97331-2904, or email cbee@oregonstate.edu.

## MEng Degree (45 credits)

Environmental Engineering Core (20)
ENVE 532. Aquatic Chemistry: Natural and
Engineered Systems (4)
ENVE 535. Physical and Chemical Processes
for Hazardous Waste Treatment (4)
ENVE 536. Aqueous Environmental
Chemistry Laboratory (1)
ENVE 541. Microbial Processes in
Environmental Systems (4)
CHE 507. Seminar (F, W, S) (3)
CHE 525. Chemical Engineering Analysis (4)
Engineering electives include at
least one of the following (10)
ENVE 525. Air Pollution Control (3)
ENVE 531. Fate and Transport of Chemicals
in Environmental Systems (4)
ENVE 556. Sustainable Water Resources Development (3)

## Minor Course Work/Electives (15)

MS Degree (45 credits)

## Environmental Engineering Core

 Courses (20)ENVE 532. Aquatic Chemistry: Natural and Engineered Systems (4)
ENVE 535. Physical and Chemical Processes for Hazardous Waste Treatment (4)
ENVE 536. Aqueous Environmental Chemistry Laboratory (1)
ENVE 541. Microbial Processes in
Environmental Systems (4)
CHE 507. Seminar (F, W, S) (3)
CHE 525. Chemical Engineering Analysis (4)

## Minor Course Work/Electives

(16-19)
Thesis (6-9)
PhD Degree ( 108 credits)
Environmental Engineering Core (20)
ENVE 532. Aquatic Chemistry: Natural and Engineered Systems (4)
ENVE 535. Physical and Chemical Processes for Hazardous Waste Treatment (4)
ENVE 536. Aqueous Environmental
Chemistry Laboratory (1)
ENVE 541. Microbial Processes in
Environmental Systems (4)
CHE 507. Seminar (F, W, S) (3)
CHE 525. Chemical Engineering Analysis (4)

Minor Course Work/Electives (16+)
(Exact requirement determined by the student's program committee)
Thesis (36-72)
Prerequisite and Corequisite Course Work for Non-engineering Undergraduates
MEng, MS, or PhD students without undergraduate degrees in environmental engineering or a related engineering discipline must take the following courses in addition to the ENVE core:

## Prerequisite Courses:

Completion required before taking
ENVE core courses:
Math through differential equations
One year of general chemistry
One year of physics
CBEE 211. Material Balances and Stoichiometry (3)

## Corequisite Courses:

CE 547. Water Resources Engineering I: Principles of Fluid Mechanics (4)
ENVE 521. Water and Wastewater Characterization (4)
ENVE 522. Environmental Engineering Design (4)
ENVE 531. Fate and Transport of Chemicals in Environmental Systems (4)
Note: ENVE 521 and ENVE 522 will not count towards the credit requirements for the MEng, MS, and PhD degrees.
Major Code: 3310

## GRADUATE MINORS

CHEMICAL ENGINEERING GRADUATE MINOR
For more details, see the school advisor.
Minor Code: 3030

## ENVIRONMENTAL ENGINEERING

 GRADUATE MINORFor more information, contact Dr. Gregory Rorrer, School Head, School of Chemical, Biological and Environmental Engineering, Oregon State University, Corvallis, OR 97331-2904, or email cbee@oregonstate.edu.

## Minor Code: 3310

## ■ BIOLOGICAL ENGINEERING

 COURSESBIOE 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

BIOE 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
BIOE 340. BIOMEDICAL ENGINEERING
PRINCIPLES (3). Application of engineering concepts (mass and energy conservation, thermodynamics, and transport phenomena) to cellular- and system-level human physiology; design considerations for biomedical interventions and devices. PREREQS: (BI 231 [C] or Z 331 [C] ) and (CHE 332 [C] or CHE 332H [C] ) and BI 233* and (CHE 333* or CHE 333H*)
BIOE 351. BIOMATERIALS AND
BIOINTERFACES (3). Material interactions with human tissue, with emphasis on the role of interfacial chemistry and physics in cell adhesion,
infection, blood coagulation and thrombosis
Preparation of functional hydrogels, material coatings, and derivitizations, including immobilized bio-active molecules. Issues surrounding
regulation of implants and device failure.
PREREQS: (BB 451* [C] or BB 451H* [C] ) and (CHE 333* [C] or CHE 333H* [C] )
BIOE 399. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

BIOE 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

BIOE 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
BIOE 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
BIOE 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
BIOE 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
BIOE 415. BIOENGINEERING LABORATORY
(3). Laboratory experimentation with unit operations and processes in bioengineering preparation of technical reports. PREREQS: CBEE 414 [C]
BIOE 420. SOCIAL JUSTICE, ETHICS, AND
ENGINEERING (3). Examination of difference,
power, and discrimination in engineering education and practice. Lec/rec. PREREQS: Upper-division standing in engineering.
BIOE 440. BIOCONJUGATION (3). Survey of theory and practical current methods for chemical modification and conjugation of proteins and other biomolecules. Topics include permanent and cleavable cross-linkers, protein modification reagents, immobilization of enzymes/DNA, enzyme-antibody conjugates, protein-protein interactions, PEGylation and labeling of proteins, and solid-phase peptide synthesis. PREREQS: BB 450 [C] and /or equivalent
BIOE 445. SURFACE ANALYSIS (3). The characterization of molecular, biological, and engineered surfaces by modern surface analytical techniques. Topics include surface sensitive modes of electron spectroscopy, vibrational spectroscopy, and mass spectrometry. Students will interpret surface analytical data and gain access to the surface science literature. PREREQS: BIOE 351 [C]
BIOE 457. BIOREACTORS (3). Design and analysis of bioreactors using suspension and immobilized microbial cultures. PREREQS: (BB 451 [C] or BB 451H [C] ) and (CHE 333 [C] or CHE 333H [C] )
BIOE 459. CELL ENGINEERING (3). Application of engineering methods and principles to the study of mammalian cells. Emphasis on mathematical models of cellular processes (e.g., cellular mass transport, protein-ligand interactions, cellular mechanics) and methods for probing the physical characteristics of biological molecules and cells. PREREQS: BB 451 and CHE 333

BIOE 462. BIOSEPARATIONS (3). Application of basic mass transfer, reaction kinetics and thermodynamic principles to understanding, selection, and development of strategies for the recovery of products from bioreactors. PREREQS: (BB 451 [C] and (CHE 332 [C] or CHE 332H [C] ))
BIOE 470. REGULATION OF DRUGS AND MEDICAL DEVICES (2). Overview of regulations for pharmaceutical products and medical devices. Food and Drug Administration's approval process. Current good manufacturing practices and process validation is emphasized. Quality control and assurance, compliance, and important analytical methods will be introduced. PREREQS: Upper-division standing in engineering.
BIOE 490. BIOENGINEERING PROCESS DESIGN (4). Engineering economic analysis.

Design of bioprocesess: Development of process flow diagrams, equipment sizing, operation, and safety. Quality control and FDA regulations. PREREQS: CHE 333 [C] or CHE 333H [C] COREQS: BIOE 457
BIOE 491. BIOENGINEERING PRODUCT DESIGN (4). Design of biomedical and biotechnology-based products. Applications of a structured design process, meeting customer needs and regulatory considerations to design. PREREQS: BIOE 490 [C]
BIOE 492. BIOENGINEERING CAPSTONE DESIGN (4). Culminating experience in bioengineering design of processes and devices. Includes capstone project prototyping, testing and documentation, and constraints in ethics, intellectual property, standards, regulatory, and manufacturing. PREREQS: BIOE 491 [C]
BIOE 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
BIOE 520. SOCIAL JUSTICE, ETHICS, AND ENGINEERING (3). Examination of difference, power, and discrimination in engineering education and practice. Lec/rec. PREREQS: Upper-division standing in engineering.
BIOE 540. BIOCONJUGATION (3). Survey of theory and practical current methods for chemical modification and conjugation of proteins and other biomolecules. Topics include permanent and cleavable cross-linkers, protein modification reagents, immobilization of enzymes/DNA, enzyme-antibody conjugates, protein-protein interactions, PEGylation and labeling of proteins, and solid-phase peptide synthesis. PREREQS: BB 450 or equivalent
BIOE 545. SURFACE ANALYSIS (3). The characterization of molecular, biological, and engineered surfaces by modern surface analytical techniques. Topics include surface sensitive modes of electron spectroscopy, vibrational spectroscopy, and mass spectrometry. Students will interpret surface analytical data and gain access to the surface science literature PREREQS: BIOE 351
BIOE 557. BIOREACTORS (3). Design and analysis of bioreactors using suspension and immobilized microbial cultures. PREREQS: (BB 451 or BB 451 H ) and (CHE 333 or CHE 333 H )
BIOE 559. CELL ENGINEERING (3). Application of engineering methods and principles to the study of mammalian cells. Emphasis on mathematical models of cellular processes (e.g., cellular mass transport, protein-ligand interactions, cellular mechanics) and methods for probing the physical characteristics of biological molecules and cells. PREREQS: BB 451 and CHE 333

BIOE 562. BIOSEPARATIONS (3). Application of basic mass transfer, reaction kinetics and thermodynamic principles to understanding, selection, and development of strategies for the recovery of products from bioreactors. PREREQS: BB 451 and CHE 332
BIOE 570. REGULATION OF DRUGS AND
MEDICAL DEVICES (2). Overview of regulations for pharmaceutical products and medical devices. Food and Drug Administration’s approval process. Current good manufacturing practices and process validation is emphasized. Quality control and assurance, compliance, and important analytical methods will be introduced. PREREQS: Upper-division standing in engineering.
BIOE 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## - CHEMICAL, BIOLOGICAL AND ENVIRONIMENTAL ENGINEERING COURSES

CBEE 101. CHEMICAL, BIOLOGICAL, AND ENVIRONMENTAL ENGR ORIENTATION (3). Introduction to the engineering profession in general and in particular the CHE, BIOE, and

ENVE programs; development of problem solving strategies and teamwork; analysis and presentation of experimental data, basic process calculations, and design methodologies. Lec/rec/ lab.
CBEE 101H. CHEMICAL, BIOLOGICAL, AND ENVIRONMENTAL ENGR ORIENTATION (3).
Introduction to the engineering profession in general and in particular the CHE, BIOE, and ENVE programs; development of problem solving strategies and teamwork; analysis and presentation of experimental data, basic process calculations, and design methodologies. Lec/ rec/lab. PREREQS: Honors College approval required.
CBEE 102. ENGINEERING PROBLEM SOLVING AND COMPUTATIONS (3). Elementary programming and problem-solving concepts implemented using MATLAB software; emphasis on problem analysis and development of algorithms in engineering including dimensional analysis; application experiences are established through team-based activities including projects using the LEGO-NXT microprocessor for data acquisition. Lec/lab. PREREQS: MTH 112 [C] or MTH 251 [C] or MTH 251H [C]

CBEE 102H. ENGINEERING PROBLEM
SOLVING AND COMPUTATIONS (3). Elementary programming and problem-solving concepts implemented using MATLAB software; emphasis on problem analysis and development of algorithms in engineering including dimensional analysis; application experiences are established through team-based activities including projects using the LEGO-NXT microprocessor for data acquisition. Lec/lab. PREREQS: MTH 112 [C] or MTH 251 [C] or MTH 251H [C]

CBEE 211. MATERIAL BALANCES AND STOICHIOMETRY (3). Material balances, thermophysical, and thermochemical calculations. Lec/rec. PREREQS: MTH 252 [C] or MTH 252H [C] and general chemistry and second-year standing in engineering.

CBEE 211H. MATERIAL BALANCES AND STOICHIOMETRY (3). Material balances, thermophysical, and thermochemical calculations. Lec/rec. PREREQS: MTH 252 [C] or MTH 252H [C] and general chemistry and second-year standing in engineering. Honors College approval required.

CBEE 212. ENERGY BALANCES (3). Energy balances, thermophysical and thermochemical calculations. Lec/rec. PREREQS: (CBEE 211 [C] or CBEE 211H [C] ) and (MTH 256* [C] or MTH $256 \mathrm{H}^{*}[\mathrm{C}]$ ) and one year general chemistry and second-year standing in engineering.
CBEE 212H. ENERGY BALANCES (3). Energy balances, thermophysical and thermochemical calculations. Lec/rec. PREREQS: (CBEE 211 [C] or CBEE 211H [C] ) and (MTH 256* [C] or MTH $256 \mathrm{H}^{*}$ [C] ) and one year general chemistry and second-year standing in engineering. Honors College approval required.
CBEE 213. PROCESS DATA ANALYSIS (4).
Applications of material and energy balances, with an emphasis on data analysis important to chemical engineers, bioengineers, and environmental engineers. Contextual learning is emphasized through the laboratory component and the use of process flow simulation modeling and analysis software. Lec/lab/rec. PREREQS: (CBEE 212 [C] or CBEE 212H [C] )

## CBEE 280. MATERIAL AND ENERGY

BALANCES (6). Material balances,
thermophysical, and thermochemical calculations. Energy balances, thermophysical and thermochemical calculations. PREREQS: (MTH 256* [C] or MTH 256H* [C] )

## CBEE 320. PROFESSIONALISM AND

ENGINEERING ETHICS (3). Introduction to engineering ethics. Topics include ethical theory, professional engineering responsibility, codes of ethics, ethical assessment, conflicts of interest,
risk and safety, loyalty and dissent, as well as overarching professional concerns.

CBEE 414. ^PROCESS ENGINEERING
LABORATORY (3). Unit operations and unit processes; preparation of technical reports. Lec/ lab. (Writing Intensive Course) PREREQS: CBEE $213^{*}$ [C] and CHE 311 [C] and (CHE 333 [C] or CHE 333H [C] )
CBEE 414H. ^PROCESS ENGINEERING
LABORATORY (3). Unit operations and unit processes; preparation of technical reports. Lec/ lab. (Writing Intensive Course) PREREQS: CBEE $213^{*}$ [C] and CHE 311 [C] and (CHE 333 [C] or CHE 333H [C] )
CBEE 416. CBEE LABORATORY II (3).
Integration of overall knowledge of chemical biological, and environmental engineering through group project activities culminating with public demonstration or display of project results. PREREQS: (CHE 415 [C] or CHE 415 H [C] or BIOE 415 [C] or ENVE 415 [C] )
CBEE 507. SEMINAR (1). Graded P/N. This course is repeatable for a maximum of 3 credits.

## - CHEMICAL ENGINEERING COURSES

CHE 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 99 credits.
CHE 199H. SPECIAL TOPICS (1-16). PREREQS: Honors College approval required.

CHE 299. PROFESSIONAL WORKSKILLS (1-16).
This course is repeatable for a maximum of 99 credits.
CHE 311. THERMODYNAMICS (3). Entropy, the second law of thermodynamics, equations of state, and thermodynamic network. PREREQS: (CBEE 212 [C] or CBEE 212H [C] ) and (MTH 256 [C] or MTH 256 H [C] )
CHE 312. CHEMICAL ENGINEERING
THERMODYNAMICS (3). Thermodynamic mixtures, fugacity, phase equilibrium, and chemical reactions equilibrium. PREREQS: CHE 311 [C]
CHE 320. SAFETY, ENGINEERING ETHICS
AND PROFESSIONALISM (3). Introduction to engineering ethics and safety concepts. Topics include professional engineering responsibility, codes of ethics, ethical assessment, conflicts of interest, loyalty and dissent, life-long learning, hazard identification, risk and safety, and process safety management. Lec/rec. PREREQS: Engineering Professional School Standing (+16)

CHE 331. TRANSPORT PHENOMENA I (4). Fundamentals and application of momentum and energy transfer phenomena to fluid flow for the design of industrial chemical engineering equipment PREREQS: (MTH 256 [C] or MTH 256H [C] ) and (CBEE 212* [C] or CBEE 212H* [C] )

CHE 331H. TRANSPORT PHENOMENA I (4). Fundamentals and application of momentum and energy transfer phenomena to fluid flow for the design of industrial chemical engineering equipment. PREREQS: (MTH 256 [C] or MTH $256 \mathrm{H}[\mathrm{C}]$ ) and (CBEE 212* [C] or CBEE 212H* [C] ) and Honors College approval required.

CHE 332. TRANSPORT PHENOMENA II (3).
A unified treatment using control volume and differential analysis of heat transfer, prediction of heat transport properties, and introduction to heat transfer operations. PREREQS: CHE 311 [C] and (CHE 331 [C] or CHE 331H [C] )
CHE 332H. TRANSPORT PHENOMENA II (3).
A unified treatment using control volume and differential analysis of heat transfer, prediction of heat transport properties, and introduction to heat transfer operations. PREREQS: CHE 311 [C] and (CHE 331 [C] or CHE 331H [C] ) and Honors College approval required.

CHE 333. TRANSPORT PHENOMENA III (3).
A unified treatment using control volume and differential analysis of binary mass transfer, prediction of mass transport properties, and introduction to mass transfer operations. Lec/ studio. PREREQS: CHE 331 [C] or CHE 331H [C] or CHE 332 [C] or CHE 332H [C]

CHE 333H. TRANSPORT PHENOMENA III (3). A unified treatment using control volume and differential analysis of binary mass transfer, prediction of mass transport properties, and introduction to mass transfer operations. Lec/ studio. PREREQS: CHE 331 [C] or CHE 331H [C] or CHE 332 [C] or CHE 332H [C] and Honors College approval required.

## CHE 334. TRANSPORT PHENOMENA

LABORATORY (2). Engineering lab practices and the application of the macroscopic balances of mass, energy, and chemical species; fluid flow, heat and mass transfer experiments by teams for demonstrations of principles established in previous transport phenomena courses. PREREQS: CBEE 213* [C] and (CHE 333* [C] or CHE 333H* [C] )
CHE 361. CHEMICAL PROCESS DYNAMICS
AND SIMULATION (3). Fundamental principles for process dynamic modeling used in the control of process variables such as pressure, temperature, flow rate and chemical composition. PREREQS: (MTH 256 [C] or MTH 256H [C] ) and (CHE 331* or CHE $331 \mathrm{H}^{*}$ ) and CBEE 102 recommended.

CHE 399. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

CHE 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

CHE 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

CHE 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
CHE 405H. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

CHE 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

CHE 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

CHE 410. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.

CHE 411. MASS TRANSFER OPERATIONS (4). Mass transfer operations; design of separation processes. Lec/rec. PREREQS: (CHE 312 [C] and (CHE 333 [C] or CHE 333H [C] ))

## CHE 415. CHEMICAL ENGINEERING

LABORATORY I (3). Theoretical and empirical analysis of several unit operations, use of formal work processes, safety, teamwork, oral and written communication, and personal accountability. Lec/ $\mathrm{lab} / \mathrm{rec}$. PREREQS: CBEE 414 [C]

## CHE 417. INSTRUMENTATION IN CHEMICAL,

 BIOLOGICAL, AND ENVIRONMENTALENGINEERING (4). Equips students with a toolbox of instrumental techniques important in chemical, biological, and environmental engineering and the background required to determine the appropriate instrumental technique to address a specific problem. Lec/lab/rec.
PREREQS: (CH 231 or CH 231 H ) and (CH 261 or CH 261 H ) and (CH 232 or CH 232 H ) and (CH 262 or CH 262 H ) and ( CH 233 or CH 233 H ) and (CH 263 or CH 263 H ) and enrollment in chemical, biological or environmental engineering professional programs.
CHE 431. CHEMICAL PLANT DESIGN I (3).
Short-cut techniques and other abbreviated and useful methods for specifying equipment sufficient for the preliminary design of processes and equipment; estimating capital and manufacturing
costs based on equipment specifications PREREQS: (CHE 312 [C] and CHE 411 [C] and CHE 443 [C] )
CHE 432. CHEMICAL PLANT DESIGN II (3).
Transformation of preliminary design to detailed design; introduction to safety, ethical, economical, and environmental considerations in chemical plant design. Lec/rec. PREREQS: CHE 431 [C]

## CHE 443. CHEMICAL REACTION

ENGINEERING (4). Design of chemical reactors for economical processes and waste minimization Contacting patterns, kinetics and transport rate effects in single phase and catalytic systems. PREREQS: (CHE 312 [C] and (CHE 333 [C] or CHE 333H [C] )) and CHE graduate students may not enroll.

CHE 444. THIN FILM MATERIALS PROCESSING
(4). Solid state devices are based on the patterning of thin films. This lecture and lab course is primarily an introduction to the technology associated with processing thin films. Topics include chemical vapor deposition, physical vapor deposition, plasma etching, and thin-film characterization. Lec/lab/rec. PREREQS: CHE 443
CHE 445. POLYMER ENGINEERING AND SCIENCE (4). Polymer engineering and science with an emphasis on practical applications and recent developments. Topics include polymer synthesis, characterization, mechanical properties, rheology, and processing at a level suitable for most engineering and science majors. Lec/lab/rec PREREQS: CH 334 and CH 335 and CH 336 or equivalent and (MTH 256 or MTH 256H) and/or junior standing in engineering or science.

## CHE 450. CONVENTIONAL AND ALTERNATIVE

 ENERGY SYSTEMS (3). Principles of energy conversion from chemical/mechanical energy to electrical energy including an overview of conventional energy systems and of likely renewable energy systems with a focus on the fundamental physico-chemical and thermodynamic concept for each technology. The economics of energy systems will also be discussed.CHE 451. SOLAR ENERGY TECHNOLOGIES
(3). A foundation in the principles of solar energy processes is provided. Topics covered include photovoltaics and solar thermal, and will cover the fundamental solid state physics of semiconductors to applied heat transfer analysis of solar collectors. The course objective is to equip students with an adequate depth of understanding of the operational principles of solar energy systems, and to cover the breadth of the various approaches employed in active solar energy systems. PREREQS: CHE 311 or equivalent.
CHE 461. PROCESS CONTROL (3). Principles of PID feedback control based on models of chemical processes; analysis and implementation of proportional, integral and derivative tuning; cascade, feedforward, ratio and deadtime compensation; multivariable control and control system design issues and methods. PREREQS: (CHE 331 [C] or CHE 331H [C] ) and (CHE 332* [C] or CHE $332 \mathrm{H}^{*}$ [C] ) and CHE 361 [C]
CHE 499. SPECIAL TOPICS (0-4). This course is repeatable for a maximum of 8 credits.
CHE 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
CHE 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
CHE 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
CHE 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

CHE 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.

CHE 514. FLUID FLOW (4). Fundamentals of fluid dynamics for Newtonian and non-Newtonian fluids; flow through porous media; two-phase flow. Lec/rec

## CHE 517. INSTRUMENTATION IN CHEMICAL, BIOLOGICAL, AND ENVIRONMENTAL

ENGINEERING (4). Equips students with a toolbox of instrumental techniques important in chemical, biological, and environmental engineering and the background required to determine the appropriate instrumental technique to address a specific problem. Lec/lab/rec. PREREQS: (CH 231 and CH 261 and CH 232 and CH 262 and CH 233 and CH 263 ) and enrollment in chemical, biological or environmental engineering professional programs.
CHE 520. MASS TRANSFER I (4). Diffusion in gases, liquids, solids, membranes, and between phases. Effects of reactions on mass transfer. Mass transfer rates by convection and dispersion. Rates of dispersion. Rates of combined heat and mass transfer

CHE 525. CHEMICAL ENGINEERING ANALYSIS
(4). Modeling of physical and chemical processes; mathematical analysis of models with appropriate advanced techniques.
CHE 537. CHEMICAL ENGINEERING
THERMODYNAMICS I (4). Applications of the fundamental laws of thermodynamics to complex systems. Properties of solutions of nonelectrolytes. Phase and chemical equilibrium.
CHE 540. CHEMICAL REACTORS I (4).
Catalysis, reactions coupled with transport phenomena. Reactors for high tech applications.
CHE 541. CATALYSIS (3). Introduction to topics related to catalysts and catalytic reactions. Course covers catalytic reaction mechanisms and kinetics, catalyst characterization and testing, and catalyst preparation and manufacturing processes
CHE 544. THIN FILM MATERIALS PROCESSING
(4). Solid state devices are based on the patterning of thin films. This lecture and lab course is primarily an introduction to the technology associated with processing thin films. Topics include chemical vapor deposition, physical vapor deposition, plasma etching, and thin-film characterization. Lec/lab/rec. PREREQS: CHE 443 or CHE 543
CHE 545. POLYMER ENGINEERING AND
SCIENCE (4). Polymer engineering and science with an emphasis on practical applications and recent developments. Topics include polymer synthesis, characterization, mechanical properties, rheology, and processing at a level suitable for most engineering and science majors. Lec/lab/rec PREREQS: CH 334 and CH 335 and CH 336 or equivalent and MTH 256 and/or junior standing in engineering or science.
CHE 550. CONVENTIONAL AND ALTERNATIVE ENERGY SYSTEMS (3). Principles of energy conversion from chemical/mechanical energy to electrical energy including an overview of conventional energy systems and of likely renewable energy systems with a focus on the fundamental physico-chemical and thermodynamic concept for each technology. The economics of energy systems will also be discussed. PREREQS: CHE 311 or ME 311 or ME 311H
CHE 551. SOLAR ENERGY TECHNOLOGIES
(3). A foundation in the principles of solar energy processes is provided. Topics covered include photovoltaics and solar thermal, and will cover the fundamental solid state physics of semiconductors to applied heat transfer analysis of solar collectors. The course objective is to equip students with an adequate depth of understanding of the operational principles of solar energy systems, and to cover the breadth of the various approaches employed in active solar energy systems. PREREQS: CHE 311 or equivalent.

CHE 581. SELECTED TOPICS (3). Non-sequence course designed to acquaint students with recent advances in chemical engineering. Topics vary from term to term and from year to year. May be repeated for credit. This course is repeatable for a maximum of 9 credits.
CHE 599. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

CHE 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

CHE 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

CHE 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

CHE 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

## CHE 611. ELECTRONIC MATERIALS

PROCESSING (3). Technology, theory, and analysis of processing methods used in integration circuit fabrication. Offered alternate years. CROSSLISTED as ECE 611. PREREQS: Graduate standing or instructor approval.

CHE 612. PROCESS INTEGRATION (3).
Process integration, simulation, and statistical quality control issues related to integrated circuit fabrication. Offered alternate years. CROSSLISTED as ECE 612. PREREQS: CHE 611 or ECE 611 or instructor approval

CHE 613. ELECTRONIC MATERIALS AND CHARACTERIZATION (3). Physics and chemistry of electronic materials and methods of materials characterization. Offered alternate years. CROSSLISTED as ECE 613. PREREQS: Graduate standing or instructor approval.

## I ENVIRONMENTAL <br> ENGINEERING COURSES

ENVE 199. SPECIAL TOPICS (1-16). Seminar course that includes invited speakers. Open to all students interested in learning about the Environmental Engineering undergraduate program and potential career opportunities. Graded P/N. This course is repeatable for a maximum of 16 credits.

ENVE 299. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

ENVE 299H. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
ENVE 321. ENVIRONMENTAL ENGINEERING FUNDAMENTALS (4). Application of engineering principles to the analysis of environmental problems. Topics include water, wastewater, solid wastes, and air pollution. PREREQS: (MTH 256 [C] or MTH 256H [C] )
ENVE 322. FUNDAMENTALS OF
ENVIRONMENTAL ENGINEERING (4).
Application of engineering principles to the analysis of environmental problems. Topics include water, wastewater, solid wastes, and air pollution PREREQS: ((CH 222 [C] or CH 232 [C] or CH 232 H [C] or CH 225H [C] ) and (MTH 256 [C] or MTH 256 H [C] )) and environmental engineering majors only.
ENVE 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
ENVE 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ENVE 405. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits.

ENVE 406. SPECIAL PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

ENVE 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

ENVE 407H. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required. ENVE 410. OCCUPATIONAL INTERNSHIP (112). This course is repeatable for a maximum of 12 credits.
ENVE 415. ENVIRONMENTAL ENGINEERING LABORATORY (3). Theoretical and empirical analysis of several unit operations, use of formal work processes, safety, teamwork, oral and written communication, and personal accountability. Lec/ lab/rec. PREREQS: CBEE 414 [C]
ENVE 421. WATER AND WASTEWATER
CHARACTERIZATION (4). Measurement of physical and chemical characteristics of water and wastewater. Engineering principles for the selection and design of treatment processes. PREREQS: (ENVE 321 [C] or ENVE 322 [C] )
ENVE 422. ENVIRONMENTAL ENGINEERING DESIGN (4). Design of water and wastewater treatment facilities including physical, chemical, and biological processes. PREREQS: ENVE 421 [C]
ENVE 425. AIR POLLUTION CONTROL
(3). Study of air pollution sources, transport, and control, including engineering, chemical, meteorological, social, and economic aspects. Lec/rec. PREREQS: (ENVE 321 [C] or ENVE 322 [C] )
ENVE 431. FATE AND TRANSPORT OF
CHEMICALS IN ENVIRONMENTAL SYSTEMS
(4). Fundamentals of organic chemistry and engineering principles applied to the movement and fate of xenobiotic compounds. Lec/lab/rec. PREREQS: ( $(\mathrm{CH} 123$ [C] or CH 223 [C] or CH 226 H [C] or CH 233 [C] ) and (CH 440 [C] or CHE 331 [C] or CHE 331H [C] ) and (ENVE 321 [C] or ENVE 322 [C] ) and ENVE 421 [C] )

## ENVE 456. SUSTAINABLE WATER

RESOURCES DEVELOPMENT (3). Sustainable water resources engineering principles, assessing the impact of engineering practices. Use of engineering analyses and sustainable principles to design projects and minimize their environmental impact.

ENVE 490. ENVIRONMENTAL ENGINEERING DESIGN (4). Open-ended design of environmental processes including development of process flow diagrams, control strategies, process simulators, and financial analysis of processes. PREREQS: (ENVE 421 [C] and ENVE 422 [C] )
ENVE 499. SPECIAL TOPICS IN ENVIRONMENTAL ENGINEERING (1-4). A critical examination of topics selected by the instructor from among topics not covered in other environmental engineering courses. This course is repeatable for a maximum of 4 credits.
ENVE 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.

ENVE 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Graduate standing.
ENVE 505. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits.
ENVE 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
ENVE 507. SEMINAR (1-16). One-credit seminar. Graded P/N. This course is repeatable for a maximum of 16 credits.

ENVE 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.

ENVE 521. WATER AND WASTEWATER CHARACTERIZATION (4). Measurement of physical and chemical characteristics of water and wastewater. Engineering principles for the selection and design of treatment processes. PREREQS: ENVE 321 or ENVE 322

ENVE 522. ENVIRONMENTAL ENGINEERING DESIGN (4). Design of water and wastewater treatment facilities including physical, chemical, and biological processes. PREREQS: ENVE 421
ENVE 525. AIR POLLUTION CONTROL
(3). Study of air pollution sources, transport, and control, including engineering, chemical, meteorological, social, and economic aspects. Lec/rec. PREREQS: ENVE 321 or ENVE 322

ENVE 531. FATE AND TRANSPORT OF CHEMICALS IN ENVIRONMENTAL SYSTEMS (4). Fundamentals of organic chemistry and engineering principles applied to the movement and fate of xenobiotic compounds. Lec/lab/rec. PREREQS: (CH 123 or CH 223 or CH 226 H or CH 233) and (CH 440 or CHE 331 or CHE 331H) and (ENVE 321 or ENVE 322) and ENVE 421
ENVE 532. AQUATIC CHEMISTRY: NATURAL AND ENGINEERED SYSTEMS (4). Low temperature thermodynamic and selective kinetic treatments primarily of the inorganic chemistry groups, but also organic ligands and surface active groups, of natural and engineered waters; thermodynamic principles and computational techniques for prediction of equilibrium speciation; comparison of predictions to observations; computer laboratory. Lec/rec. PREREQS: One year of college-level chemistry ( CH 221 and CH 222 and CH 223 ) or ((CH 231 or CH 231 H$)$ and (CH 232 or CH 232 H ) and ( CH 233 or CH 233 H )) or equivalent, plus a minimum of one year organic or physical chemistry. Recommended corequisites ENVE 536 Aqueous Environmental Laboratory and/or OC 652 Chemical Oceanography Laboratory.
ENVE 535. PHYSICAL AND CHEMICAL
PROCESSES FOR HAZARDOUS WASTE
TREATMENT (4). Principles and design of unit operations and processes for the treatment of hazardous waste and contaminated soils. PREREQS: ENVE 532 [C]
ENVE 536. AQUEOUS ENVIRONMENTAL
CHEMISTRY LABORATORY (1). Laboratory investigation of acid/base equilibria, coordination chemistry, and precipitation/dissolution chemistry. COREQS: ENVE 532

ENVE 541. MICROBIAL PROCESSES
IN ENVIRONMENTAL SYSTEMS (4).
Energetics kinetics and stoichiometry of microbial transformations of organic and inorganic compounds. Mathematical models of biodegradation.

ENVE 542. MICROBIAL PROCESS DESIGN FOR MUNICIPAL AND HAZARDOUS WASTES (4). Principles and design of microbial processes for treatment of municipal and hazardous wastes PREREQS: ENVE 541 [C]
ENVE 554. GROUNDWATER REMEDIATION (4). Theory and practice of groundwater remediation. Environmental site assessments. Physical, chemical, and biological methods for in situ treatment of contaminated aquifers. Modeling of remediation technologies.
ENVE 556. SUSTAINABLE WATER
RESOURCES DEVELOPMENT (3). Sustainable water resources engineering principles, assessing the impact of engineering practices. Use of engineering analyses and sustainable principles to design projects and minimize their environmental impact.
ENVE 599. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.
ENVE 601. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.
ENVE 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: PhD only.

ENVE 699. SELECTED TOPICS IN ENVIRONMENTAL ENGINEERING (1-4). A
critical examination of topics selected by the
instructors from among topics not covered in other environmental engineering courses. This course is repeatable for a maximum of 8 credits. PREREQS: Instructor approval required.

## SCHOOL OF CIVIL <br> AND CONSTRUCTION EncINEARING

W. Jason Weiss, School Head

Shane Brown, Associate Head for Undergraduate Affairs
Merrick Haller, Associate Head for Graduate Affairs
101 Kearney Hall
Oregon State University
Corvallis, OR 97331-3212
541-737-4934
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## FACULTY

Professors Ashford ${ }^{1}$, Belli ${ }^{1}$, Cox,
Gambatese ${ }^{\mathrm{I}}$, Higgins ${ }^{\mathrm{I}}$, Istok $^{\mathrm{I}}$, Liu, OzkanHaller, Schultz1, Trejo ${ }^{1}$, Yeh ${ }^{1}$, Weiss, Yim ${ }^{1}$
Associate Professors Brown ${ }^{1}$, Evans, Haller, Hill, Hunter-Zaworski', Isgor ${ }^{1}$, Lundy ${ }^{\mathrm{I}}$, Miller ${ }^{1}$, Ozkan-Haller, Parrish, Scott, Sillars ${ }^{1}$
Assistant Professors Arocho, BabbarSebens, Barbosa ${ }^{1}$, Coleri, Borello, Gillins, Hernandez, Hurwitz, Ideker, Lee, Leon, Mason, Olsen, Park ${ }^{1}$, Stuedlein ${ }^{1}$, Wang
Adjuncts Gupta, Sinha
Senior Instructors Arras, FradellaI
Instructors Bergerl, Martin
Academic Advisors Nave-Abele, Whitehead
Emeritus Bell¹, Bella¹, Huber ${ }^{\text {¹, }}$ Hudspeth ${ }^{1}$, Klingeman ${ }^{1}$, Layton ${ }^{1}$, Pritchett ${ }^{1}$, Rogge ${ }^{1}$, Schroeder ${ }^{1}$, Sollitt
${ }^{\text {I }}$ Licensed Professional Engineer

## Undergraduate Majors

Civil Engineering (BA, BS, CRED, HBA, HBS)
Option
Environmental Engineering
Construction Engineering Management (BA, BS, CRED, HBA, HBS)

## Graduate Major

Civil Engineering (MAIS, MEng, MS, PhD)
Graduate Areas of Concentration
Civil Engineering
Coastal and Ocean Engineering
Construction Engineering Management
Engineering Education
Geomatics
Geotechnical Engineering
Infrastructure Materials
Structural Engineering
Transportation Engineering
Water Resources Engineering

## Graduate Minor <br> Civil Engineering

The mission of the School of Civil and Construction Engineering is that of the College of Engineering (see college statement on mission and goals), as well as providing a comprehensive, state-of-the-art education to prepare students for professional and responsible engineering and constructor positions with business, industry, consulting firms, or government.
Education in the basic sciences occurs primarily in the freshman and sophomore years. Engineering science is introduced at the sophomore year and continues through to graduation with a combination of required courses and technical electives. Completion of the OSU Baccalaureate Core provides experience in the humanities, social sciences, and other nontechnical areas as additional preparation for a student's profession and life.

The CCE School offers an undergraduate option in environmental engineering that provides education in water pollution, air pollution, solid wastes, and hazardous wastes.
The growing complexity of modern engineering practice requires further specialization in one or more engineering disciplines. This is generally attained through postgraduate study. The CCE School offers MEng, MS, and PhD programs with concentrations in civil engineering, coastal and ocean engineering, construction engineering management, geomatics, geotechnical engineering, infrastructure materials, structural engineering, transportation engineering, and water resources engineering.

Areas of concentration may be combined to form an integrated civil engineering MS program, MEng program, or MEng, MS, and PhD minors.

The school also participates in the Master of Arts in Interdisciplinary Studies program.

## UNDERGRADUATE MAJORS WITH OPTIONS

CIVIL ENGINEERING (BA, BS, CRED, HBA, HBS)
Shane Brown, Associate School Head 101 Kearney Hall
Oregon State University
Corvallis, OR 97331-3212
541-737-1759
Email: cce@engr.orst.edu
Website: http://cce.oregonstate.edu/
The Bachelor of Science degree in Civil Engineering is accredited by the Engineering Commission of ABET, http:// www.abet.org.

Civil engineering is a diverse professional field with discipline specialties in
structures, transportation, water supply and water pollution control, geotechnical engineering, hydrology, hydraulics and water resources, geomatics, ocean engineering, construction, and engineering planning and economics. All CE students receive basic instruction in the various disciplines, with the option for additional elective courses in desired areas. The program is supported by highly qualified faculty and staff that maintain the programs and facilities at the highest level of quality.

The civil engineering curriculum within the School of Civil and Construction Engineering (CCE) includes the basic sciences, social sciences, humanities, communication skills, engineering sciences, and engineering design in order to teach students an integrated approach to practical solutions.

The mission of the civil engineering program is to provide a comprehensive, state-of-the-art education to prepare students for professional and responsible engineering positions with business, industry, consulting firms or government.

## Program Educational Objectives-

 Civil EngineeringNote: The Bachelor of Science degree in Civil Engineering is accredited by the Engineering Accreditation Commission of ABET (http://www.abet.org), which requires stated program educational objectives and student outcomes to support these.
OSU Civil Engineering graduates receive a compelling education, and within 3 to 5 years of graduation will have:

1. Assembled, analyzed and synthesized/evaluated information to solve engineering problems and perform modern civil engineering design by applying mathematics, engineering sciences and fundamentals of civil engineering.
2. Participated in modern professional practice or a graduate program in a specialty area of civil engineering, demonstrating effective communication, collaborative work and leadership in diverse teams, ethical decision-making, successful management of personal and professional career objectives, and continual development through lifelong learning and professional involvement.
3. Recognized the importance of professional licensure and have achieved or prepared to achieve this significant accomplishment. In this endeavor, consideration of the public health, welfare and safety is seen as the paramount priority.
4. Applied an understanding of public policy and contemporary societal issues with sensitivity to the challenge of meeting social,
environmental, and economic constraints within a global community.

## Student Outcomes for Civil Engineering Programs

The OSU Civil Engineering program prepares its graduates to achieve the Program Educational Objectives above several years into their careers. This is achieved by having students able to perform the following on graduation, well preparing them for active immediate and lifelong service in the profession:

1. Ability to apply knowledge of mathematics, science, and engineering to solve engineering problems
2. Ability to design and conduct experiments as well as analyze and interpret data
3. Ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, social, political, ethical, health and safety, manufacturability and sustainability
4. Ability to function on multidisciplinary teams
5. Ability to identify, formulate, and solve engineering problems
6. Understanding of professional and ethical responsibility
7. Ability to communicate effectively
8. Broad education necessary to understand impact of engineering solutions in global, economic, environmental and societal context
9. Recognition of need for and ability to engage in lifelong learning
10. Knowledge of contemporary issues
11. Ability to use techniques, skills, and modern engineering tools necessary for engineering practice
12. Knowledge of basic concepts in leadership
13. Ability to include non-engineering considerations, including business, regulatory and safety issues in problem-solving
14. Ability to incorporate effective negotiation or consensus-gaining in group decision-making
15. Knowledge and application of project planning and management practices and tools
16. Ability to assess imperfect or incomplete data conditions, risks and alternatives into problem-solving decisions
17. Exposure to current industry design practices, construction methods and materials, and overall project delivery considerations
Design is the essence of civil engineering. Junior and senior level courses include extensive design content, culminating in a team approach to the solution of open-ended, realistic problems, including capstone design and
professional practice courses. Courses with design content include those with "design" in their titles. A more detailed explanation of the design experience and design course sequences is contained in the "Civil Engineering Advising Guide," which may be viewed on the school's website at http://cce.oregonstate.edu/ academic-advising.

A student may also earn a concurrent Bachelor of Arts (BA) or Honors Bachelor of Arts (HBA) degree by completing 32 additional credits in residence including language proficiency equivalent to that attained at the end of the second year of a foreign language as certified by the School of Language, Culture, and Society. Neither the BA nor the HBA degree in civil engineering is accredited by the Engineering Commission of ABET.

## Pre-Civil Engineering

## Freshman Year (44)

CCE 101. Civil and Construction Engineering Orientation (2) ${ }^{5}$
CCE 102. Civil and Construction Engineering: Problem-Solving and Technology (3) ${ }^{\mathbf{E}}$
CH 201. Chemistry for Engineering Majors (3) ${ }^{\mathbf{E}}$

CH 202. Chemistry for Engineering Majors (3) ${ }^{5}$

CH 205. Laboratory for Chemistry 202 (1) ${ }^{5}$
COMM 111. *Public Speaking (3) ${ }^{1, \mathrm{E}}$
or COMM 114. *Argument and Critical Discourse (3) ${ }^{1, \mathbf{E}}$
ECON 201. *Introduction to
Microeconomics (4)
HHS 231. *Lifetime Fitness for Health (2) ${ }^{1}$
HHS 241. *Lifetime Fitness ( 1$)^{1}$
or any PAC course (1-2) ${ }^{1}$
MTH 251. *Differential Calculus (4) ${ }^{\mathbf{E}}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus I (4) ${ }^{\mathbf{E}}$
PH 211. *General Physics with Calculus (4) ${ }^{\text {E }}$
WR 121. *English Composition (3) ${ }^{1, \mathbf{E}}$
*Perspectives: Literature and the Arts Course (3) ${ }^{1}$

## Sophomore Year (44)

Approved Biological Science Course (4) ${ }^{5}$
CCE 201. Civil and Construction
Engineering Graphics and Design (3)
CE 202. Civil Engineering: Geospatial
Information and GIS (3)
ENGR 211. Statics (3) ${ }^{\mathbf{E}}$
ENGR 212. Dynamics (3) ${ }^{5}$
ENGR 213. Strength of Materials (3) ${ }^{\text {E }}$
MTH 256. Applied Differential Equations (4) ${ }^{\text {E }}$
MTH 306. Matrix and Power Series Methods (4)

PH 212, PH 213. *General Physics with Calculus $(4,4)^{\text {E }}$
ST 314. Introduction to Statistics for Engineers (3) ${ }^{5}$
WR 327. *Technical Writing (3) ${ }^{\mathbf{1}}$
*Perspectives: Cultural Diversity Course (3) ${ }^{\mathbf{1}}$

## Professional Civil Engineering

## Junior Year (49)

CCE 321. Civil and Construction
Engineering Materials (4)
CE 301. CE Junior Seminar (1)

CE 311. Fluid Mechanics (4)
CE 313. Hydraulic Engineering (4)
CE 361. Surveying Theory (4)
CE 372. Geotechnical Engineering I (4)
CE 373. Geotechnical Engineering II (4)
CE 381, CE 382. Structural Theory I, II $(4,4)$
CE 392. Introduction to Highway
Engineering (4)
CE 412. Hydrology (4)
CE 481. Reinforced Concrete I (4)
ENVE 321. Environmental Engineering Fundamentals (4)

## Senior Year (43)

CE 383. Design of Steel Structures (4)
CE 418. ^Civil Engineering Professional
Practice (3)
CE 419. Civil Infrastructure Design (3)
CE 420. Engineering Planning (4)
CE 491. Transportation Engineering (3)
ENGR 201. Electrical Fundamentals I (3)
*Difference, Power, and Discrimination (3) ${ }^{1}$
${ }^{*}$ Perspectives: Western Culture Course (3) ${ }^{1}$
*Synthesis: Contemporary Global Issues Course (3) ${ }^{1}$
*Synthesis: Science, Technology, and
Society Course (3) ${ }^{1}$
Technical Electives (11)

## Total=180

## Footnotes:

${ }^{\text {E }}$ Required for entry into the professional
program.
${ }^{1}$ Must be selected to satisfy the requirements of the baccalaureate core.
${ }^{5}$ Prerequisite for several upper-division courses.
Recommended for completion prior to entry
into the professional program.

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## CIVIL ENGINEERING-FOREST

## ENGINEERING

A five-year dual-degree program in civil engineering and forest engineering is offered jointly by the School of Civil and Construction Engineering in the College of Engineering and Forest Engineering in the College of Forestry. Advising is done through either academic unit. See Forest Engineering, Resources and Management in the College of Forestry.

## Geomatics (Surveying and Mapping)

Graduates of civil engineering are eligible to take the Fundamentals of Land Surveying Examination in pursuit of the Professional Land Surveying license by selecting courses as follows.
CE 361. Surveying Theory (4)

## Plus 12 credits from the following:

CE 365. Highway Location and Design (3)

CE 461/CE 561. Photogrammetry (3)
CE 463/CE 563. Control Surveying (4)
CE 465/CE 565. Oregon Land Survey Law (3)
CE 469/CE 569. Property Surveys (3)
CE 562. Digital Terrain Modeling (4)
Pre-Civil Engineering Major Code:
336
Major Code: 306

## ENVIRONMENTAL ENGINEERING OPTION

CCE students may elect a transcript-visible Environmental Engineering option. A minimum of 21 credits is required.

## Core Courses (21)

CH 123. *General Chemistry (5)
or CH 223. *General Chemistry (5)
CE 407. Seminar: Water Resource Issues (1)
ENVE 421. Water and Wastewater
Characterization (4)
ENVE 422. Environmental Engineering Design (4)
ENVE 431. Fate and Transport of Chemicals
in Environmental Systems (4)
ENVE 456. Sustainable Water Resources Development (3)

## Total=21

Footnote:

* Baccalaureate Core Course (BCC)

Option Code: 310

## CONSTRUCTION ENGINEERING MANAGEMENT (BA, BS, CRED, HBA, HBS)

Oregon State University
Corvallis, OR 97331-3212
541-737-4934
Email: cce@engr.orst.edu
Website: http://cce.oregonstate.edu/
The School of Civil and Construction Engineering offers BA and BS degrees in Construction Engineering Management (CEM). This unique program blends principles of basic science, engineering, and technology with a strong component of business subjects to prepare graduates for a productive career in the construction industry. The BS in Construction Engineering Management is ACCE accredited.
The CEM program is built on a rigorous four-year curriculum that emphasizes practical applications as well as basic principles. Students are given hands-on experiences in the laboratory and are involved in field trips as a supplement to their classroom activities. A more detailed explanation of the CEM Program is contained in the "Construction Engineering Management Advising Guide," which may be viewed on the school's website at http://cce.oregonstate.edu/ academic-advising.

The mission of the CEM program is to provide a comprehensive, state-of-the-art education to prepare students for professional and responsible constructor positions with business, industry, consulting firms or government. The program's educational objectives are to:

1. Provide a compelling education based in the natural sciences, mathematics, engineering sciences, and business, and in the fundamental paradigms, concepts, understandings, applications, and knowledge of civil and construction engineering and construction management.
2. Develop students' abilities through
their education to analyze, synthesize, and evaluate information, solve engineering problems, and be prepared to effectively perform project engineering and management tasks for effective execution of construction projects.
3. Provide education for modern professional practice including the abilities for effective communication, collaborative work in diverse teams, ethical decision-making, successful management of personal and professional career objectives, and continual development through lifelong learning and professional involvement.
4. Prepare our graduates for either immediate employment or for graduate school opportunities in construction or business.
5. Provide students with knowledge of contemporary societal issues and a sensitivity to the challenge of meeting social, environmental, and economic constraints within a global community.

## CONSTRUCTION ENGINEERING <br> MANAGEMENT (BA, BS, HBA,

## HBS)

Pre-Construction Engineering
Management

## Freshman Year (43)

CCE 101. Civil and Construction
Engineering Orientation (2) ${ }^{5}$
CCE 102. Civil and Construction Engineering: Problem-Solving and Technology (3) ${ }^{\mathbf{E}}$
CH 201. Chemistry for Engineering Majors (3) ${ }^{5}$

COMM 111. *Public Speaking (3) ${ }^{1}$
or COMM 114. *Argument and Critical Discourse (3) ${ }^{1}$
ECON 201. *Introduction to Microeconomics (4) ${ }^{1}$
ECON 202. *Introduction to Macroeconomics (4) ${ }^{1}$
HHS 231. *Lifetime Fitness for Health (2) ${ }^{\mathbf{1}}$
HHS 241. *Lifetime Fitness (1) ${ }^{1}$
or any PAC course (1-2)
MTH 251. *Differential Calculus (4) ${ }^{\mathbf{E}}$
MTH 252. Integral Calculus (4) ${ }^{\text {E }}$
PH 211. *General Physics with Calculus (4) ${ }^{\mathbf{E}}$
WR 121. *English Composition (3) ${ }^{1, \mathrm{E}}$
${ }^{*}$ Perspectives: Cultural Diversity Course (3) ${ }^{\mathbf{1}}$
*Perspectives: Literature and the Arts Course (3) ${ }^{1}$

## Sophomore Year (44)

Approved Biological Science Course (4) ${ }^{5}$
BA 215. Fundamentals of Accounting (4) ${ }^{\mathbf{E}}$ BA 230. Business Law I (4)
CCE 201. Civil and Construction Engineering Graphics and Design (3) ${ }^{1, \mathbf{E}}$ CCE 203. Introduction to Virtual Design and Construction (3)
CEM 263. Plane Surveying (3) ${ }^{5}$
ENGR 211. Statics (3) ${ }^{\mathbf{E}}$
ENGR 213. Strength of Materials (3) ${ }^{\mathbf{E}}$
ENGR 390. Engineering Economy (3) ${ }^{\text {E }}$

PH 212. *General Physics with Calculus (4) ${ }^{\text {E }}$
PHL 205. *Ethics (4) ${ }^{1}$
ST 314. Introduction to Statistics for
Engineers (3) ${ }^{\mathbf{E}}$
WR 327. *Technical Writing (3) ${ }^{\mathbf{1}}$

## Professional Construction

Engineering Management

## Junior Year (46)

CCE 321. Civil and Construction
Engineering Materials (4)
CE 365. Highway Location and Design (3)
CE 424. Contracts and Specifications (4)
CEM 311. Hydraulics (4)
CEM 341. Construction Estimating I (4)
CEM 381. Structures I (4)
CEM 407. Seminar (1)
CEM 441. Heavy Civil Construction Management (4)
CEM 442. Building Construction Management (4)
CEM 471. Electrical Facilities (4)
CEM 472. Mechanical Facilities (3)
FE 315. Soil Engineering (4)
or CE 372. Geotechnical Engineering I (4)
*Difference, Power, and Discrimination Course (3) ${ }^{1}$

## Senior Year (47)

BA 351. Managing Organizations (4)
CE 427. Temporary Construction Structures
(4)

CEM 342. Construction Estimating II (4)
CEM 343. Construction Planning and Scheduling (4)
CEM 383. Structures II (4)
CEM 431. Obtaining Construction Contracts (4) or CEM 432. Construction Project Planning (3)
CEM 443. ${ }^{\wedge}$ Project Management for Construction (4)
H 385. Safety and Health Standards and Laws (3)
MGMT 453. Human Resources Management (4)

Restricted Upper-Division Business Elective (4)

Upper-Division Engineering Elective (3)
${ }^{* S y n t h e s i s ~ C o u r s e ~(6) ~}{ }^{1}$

## Degree total=180

Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
${ }^{\mathrm{E}}$ Required for entry into the professional
program.
${ }^{1}$ Must be selected to satisfy baccalaureate core ${ }_{5}$ requirements.
${ }_{5}$ Prerequisite for several upper-division courses. Recommended for completion prior to entry into the professional program.


## Geomatics (Surveying and Mapping)

Construction engineering management graduates are eligible to take the Fundamentals of Land Surveying Examination by completing:
CE 365. Highway Location and Design (3) CEM 263. Plane Surveying (3)
Plus 10 credits from the following:
CE 461/CE 561. Photogrammetry (3)
CE 463/CE 563. Control Surveying (4)
CE 465/CE 565. Oregon Land Survey Law
(3)

CE 469/CE 569. Property Surveys (3)
CE 562. Digital Terrain Modeling (4)

## Pre-Construction Engineering

Management Major Code: 368
Major Code: 338

## CIVIL ENGINEERING (MEng, MS,

 PhD, MAIS)Graduate Areas of Concentration
Civil engineering, coastal and ocean engineering, construction engineering management, engineering education, geomatics, geotechnical engineering, infrastructure materials, structural engineering, transportation engineering, and water resources engineering
The School of Civil and Construction Engineering offers graduate work leading to the Master of Engineering, Master of Science, and Doctor of Philosophy degrees. The MEng, MS, and PhD degrees offer concentrations in civil engineering, coastal and ocean engineering, construction engineering and management, engineering education, geomatics, geotechnical engineering, infrastructure materials, structural engineering, transportation engineering, water resources engineering, and interdisciplinary areas. Areas of concentration can also be combined to form an integrated civil engineering MS program or MS and PhD minors. The MEng is a course work-only degree requiring a final oral exam. For the MS degree, a thesis or project is required. The PhD degree requires a dissertation.

Degree programs prepare the student for advanced-level entry into professional engineering practice and for careers in research and teaching. Majors within the department constitute approximately two-thirds of the total program. Minor fields may be selected from departmental offerings in different subject areas, from other engineering disciplines, or from other fields of study that support the major. The school also participates in the Master of Arts in Interdisciplinary Studies program.

## Major Code: $\mathbf{3 0 6 0}$

## CIVIL ENGINEERING GRADUATE MINOR

For more details, see the school advisor.

## Minor Code: 3060

■ CIVIL AND CONSTRUCTION ENGINEERING COURSES
CCE 101. CIVIL AND CONSTRUCTION ENGINEERING ORIENTATION (2). Introduction to civil and construction engineering professions; problem solving, communication skills. This course is required by the CE, CEM and FE programs. PREREQS: (MTH 112* or MTH $251^{*}$ ) and MTH 111
CCE 102. CIVIL AND CONSTRUCTION ENGINEERING: PROBLEM-SOLVING AND TECHNOLOGY (3). A skills-based course that focuses on introducing freshman students to the use of technology in solving civil engineering
problems. Topics to be covered include units, homework professionalism, professional presentations, Internet tools, software for numeric methods and programming. Students use laptop computers during class. Some class involvement with professional societies or chapters. Projects from the areas of civil and construction engineering. Lec/lab. PREREQS: (MTH 112* or MTH 251*) and MTH 111

## CCE 201. CIVIL AND CONSTRUCTION

ENGINEERING GRAPHICS AND DESIGN
(3). Introduces the engineering design process and graphic skills that are used by civil and construction engineers. Topics include design process, geometric construction, multiviews, auxiliary views, sections, dimensioning,
tolerances and engineering drawing standards. Students participate in team design projects and presentations. Graphic and design projects from the areas of civil and construction engineering. Lec/lab. PREREQS: (MTH 111 [C] or MTH $112^{*}$ [C] or MTH 241* [C] or MTH 251* [C] )
CCE 203. INTRODUCTION TO VIRTUAL DESIGN
AND CONSTRUCTION (3). Basic principles of
virtual design and construction (VDC) focusing on skills required for generating design and construction information models. Parametric modeling and design constraints are introduced. Students will utilize construction drawings and documentation to create accurate 3D models. Use of design and construction information models for making estimates of quantities and cost, and for determination of constructability problems. Lec/lab. PREREQS: CCE 201 [C] or ENGR 248 [C]
CCE 321. CIVIL AND CONSTRUCTION ENGINEERING MATERIALS (4). Highway materials; aggregate, concrete and asphalt Standard test methods. PREREQS: ((ENGR 213 [C] or ENGR 213 H [C] ) and (ST 314 [C] or BA 276 [C] ))
CCE 321H. CIVIL AND CONSTRUCTION ENGINEERING MATERIALS (4). Highway materials; aggregate, concrete and asphalt. Standard test methods. PREREQS: (ENGR 213 [C] or ENGR 213 H [C] ) and (ST 314 [C] or BA 276 [C] ) and Honors College approval required.

## CCE 421. ADVANCED CONCRETE

## PROPERTIES AND PERFORMANCE (4).

 Cement production, hydration, supplementary cementitious materials, mixture design and proportioning, heat of hydration, volume stability, shrinkage, cracking, expansion, creep, relaxation, admixtures, alternative binders, strength gain, durability. PREREQS: CCE 321 [C] and senior standing.CCE 422. GREEN BUILDING MATERIALS (3). Introduces concepts of construction with green building materials. Specific concepts include evaluation of what truly makes a material "green", long-term performance (e.g., durability) of materials, material production and life cycle cost analysis. Concepts of green building programs, guidelines and specifications will be introduced. PREREQS: (CE 321 [C] or CCE 321 [C] ) and (ECON 201 or ECON 201H or ECON 202 or ECON 202H) and ST 314 or equivalent.
CCE 520. SELECTED TOPICS IN
INFRASTRUCTURE MATERIALS (0-4). A
critical examination of in-depth topics selected by the instructor from among topics not covered in other infrastructure materials courses. This course is repeatable for a maximum of 16 credits. PREREQS: Depending on the selected topic covered there may be prerequisites such as "graduate standing" or "undergraduate materials course such as CCE 321"
CCE 522. GREEN BUILDING MATERIALS (3). Introduces concepts of construction with green building materials. Specific concepts include evaluation of what truly makes a material "green", long-term performance (e.g., durability) of materials, material production and life cycle cost analysis. Concepts of green building programs, guidelines and specifications will be introduced.

PREREQS: (CE 321 or CCE 321) and (ECON 201 or ECON 201 H or ECON 202 or ECON 202H) and ST 314 or equivalent.

CCE 523. CONCRETE DURABILITY (4). Cement production, supplementary cementitious materials, mixture proportioning, concrete durability,
freeze-thaw attack, sulfate attack, corrosion, alkali-silica reaction, long-term performance, durability prediction and modeling, durability of alternative cement, multi-scale assessment dimensional stability. PREREQS: CCE 321, Civil and Construction Engineering Materials or similar introductory materials course or CCE 421, Advanced Concrete Properties and Performance.

CCE 525. CONSTRUCTION SITE SYSTEMS
ENGINEERING (3). Design and planning of construction site field operations and engineered systems. Systems analysis and design as it applies to civil engineering projects. Design of construction systems: blasting; rock crushing and conveying; dewatering; cranes, pile driving, and rigging; and concrete pumping and placement. Construction site design and process design. PREREQS: Graduate standing or consent of instructor.

CCE 526. DESIGN FOR SAFETY (3). Theoretical concepts and industry practices used to model, evaluate, and improve construction worker safety through the design of the project features, construction operations, and site safety program elements. Causes of construction site accidents, hazard recognition and comprehension, safety risk valuation and mitigation, and the true costs of injuries and fatalities. PREREQS: Graduate standing or consent of instructor.
CCE 529. LEAN CONSTRUCTION (3). Introduction to the basics of lean production management, especially about how they are applied to the AEC industry to improve the operation management and product development. Class topics include theory of manufacturing science, principles of the lean production system, application of production management to project management, variability management in design and construction, improving project performance in the AEC industry, data gathering and process evaluation for productivity improvement.
CCE 552. PROJECT RISK MANAGEMENT (4). An introduction to the concept of project risk in producing constructed engineering projects. Course content includes project baselining, risk definition and identification, risk assessment and management techniques, risk control, risk response, and risk management. CROSSLISTED as IE 586. PREREQS: Graduate standing in College of Engineering, or instructor's consent.

CCE 554. PROFESSIONAL RESPONSIBILITY
AND ETHICS (3). An in-depth exploration of professional engineering ethics. Course content includes conceptual theoretical basis of ethics, ethics among professional organizations, ethical consideration of design, critical analysis of ethical situations, ethics in the workplace, and ethical considerations regarding the broader environment CROSSLISTED as IE 589. PREREQS: Graduate standing in College of Engineering, or instructor's consent.

## CIVIL ENGINEERING COURSES

CE 199. SPECIAL TOPICS (1-4).
CE 202. CIVIL ENGINEERING: GEOSPATIAL INFORMATION AND GIS (3). Introductory design principles presented with the use of GIS and geospatial information (remote sensing, GPS, surveying, and aerial photography) for civil engineering problem solving. Introduction to the integration of geospatial data and analysis for decision making and management for site selection, mitigation, change analysis, modeling and assessment. Standard software and custom programming used in course. Students participate in both individual and team projects and presentations. Projects from the area of civil
engineering. Lec/lab. PREREQS: (CE 201 [C] or CCE 201 [C] or ENGR 248 [C] )
CE 299. SPECIAL TOPICS (1-4). Graded P/N.
CE 299H. SPECIAL TOPICS (1-4). Graded P/N.
PREREQS: Honors College approval required.
CE 301. CE JUNIOR SEMINAR (1). Professional practices of civil engineering. PREREQS: Junior standing in civil engineering.
CE 311. FLUID MECHANICS (4). Fluid properties, fluid statics, fluid motion, conservation of mass, momentum and energy for incompressible fluids, dimensional analysis, civil engineering applications.

## CE 313. HYDRAULIC ENGINEERING (4).

Analysis of large civil engineering fluid systems including conduit flow, multiple reservoirs, pipe networks, pumps, turbines, open channel flow, and hydraulic structures. PREREQS: CE 311 [C] or CHE 331 [C] or CHE 331H [C]
CE 361. SURVEYING THEORY (4). Use of surveying equipment, Gaussian error theory applied to measurements, calculations of position on spherical and plane surfaces, state plane coordinate systems, introduction to global positioning systems.
CE 365. HIGHWAY LOCATION AND DESIGN
(3). Curve problems in highway design, including circular, vertical, compound curves and spirals; earth distribution analysis; preliminary office studies; paper location procedures and field layout problems. PREREQS: (CE 361 [C] or CEM 263 [C] or FE 208 [C] )
CE 372. GEOTECHNICAL ENGINEERING I (4). Basic soil mechanics including the identification and classification of soil, principles of compaction and consolidation, flow through porous media, effective stress, and shear strength. Lec/lab. PREREQS: ENGR 213 [C] or ENGR 213H [C] and (CE 311* [C] or CEM 311* [C] or CHE 331* [C] or CHE 331 ${ }^{*}$ [C] )
CE 373. GEOTECHNICAL ENGINEERING II
(4). Application of fundamental soil mechanics principles to analyses of slope stability, retaining structures, and foundation support. Lec/rec. PREREQS: (CE 372 [C] or FE 315 [C] )
CE 381. STRUCTURAL THEORY I (4). Analysis of statically determinate structures (beams, frames, trusses, arches, and cables). Approximate analysis, influence lines, deflections. PREREQS: (ENGR 213 [C] or ENGR 213H [C] )
CE 382. STRUCTURAL THEORY II (4). Analysis of statically indeterminate structures (beams, frames, trusses). Deflections. Energy methods, introduction to matrix methods. PREREQS: CE 381 [C]
CE 383. DESIGN OF STEEL STRUCTURES
(4). Introduction to design of steel members, connections and structural systems. Lec/lab. PREREQS: CE 382 [C]

## CE 392. INTRODUCTION TO HIGHWAY

ENGINEERING (4). Highway engineering standards, geometric design, cross section and roadside design, highway surfaces, pavement design, highways and the environment, highway construction and maintenance. PREREQS:
((ENGR 212 [C] or ENGR 212H [C] ) and CE 361 [C])
CE 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
CE 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS:
Departmental approval required.
CE 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

CE 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

CE 407. SEMINAR (1-3). Understanding
complexity and systems thinking. This course is repeatable for a maximum of 16 credits.

CE 407H. SEMINAR (1-3). Understanding complexity and systems thinking. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
CE 408. WORKSHOP (1-3). This course is repeatable for a maximum of 3 credits.
CE 410. INTERNSHIP (1-12). This course is repeatable for a maximum of 16 credits.
CE 411. OCEAN ENGINEERING (4). Introduction to linear wave theory and wave forces on piles. Guided design of wave gauge facility at Coos Bay, Oregon, that requires synthesizing fluid mechanics, structural design and foundation design. PREREQS: CE 313 [C] or CEM 311 [C]
CE 412. HYDROLOGY (4). Fundamentals of hydrology, the hydrologic cycle, precipitation, streamflow, hydrograph analysis and hydrologic measurements.
CE 413. GIS IN WATER RESOURCES (3).
Course presents Geographic Information System (GIS) technology for developing solutions to water resource problems: water quality, availability, flooding, the natural environment, and management of water resources. Typical GIS data models for hydrologic information are presented. Synthesis of geospatial and temporal water resources to support hydrologic analysis and modeling are covered. PREREQS: Senior or graduate standing in engineering or a previous introductory GIS course.

CE 415. COASTAL INFRASTRUCTURE
(3). Planning and design criteria of coastal infrastructure, including breakwaters, jetties, sea walls, groins, piers, submerged pipelines, harbor design, and tsunami defense. Use of laboratory models, numerical simulations, and field observations for design. PREREQS: CE 313 [C] CE 417. HYDRAULIC ENGINEERING DESIGN
(4). Theory, planning, analysis, and design of hydraulic structures. Application of basic principles detailed analysis and design. Engineering planning and design of water resource systems. PREREQS: CE 313 [C]
CE 418. ^CIVIL ENGINEERING PROFESSIONAL
PRACTICE (3). Engineering career paths; ethics and professionalism, project planning, execution and delivery; team building/management; marketing proposals; engineering overseas; dispute resolution; partnering; effective decision making; uncertainty and risk analysis; and current industry design and construction methods. (Writing Intensive Course) PREREQS: CE 382 [C] and CE 313 [C] and (CE 372 [C] or FE 315 [C] ) and civil and environmental engineering majors within three terms of graduation.

CE 419. ^CIVIL INFRASTRUCTURE DESIGN (3). A capstone design project experience exposing students to problems and issues similar to those encountered in the practice of civil engineering. Students should have completed ALL other required courses in their degree program prior to registering for this course. Lec/rec. PREREQS: CE 418 [C] and civil and environmental engineering majors within three terms of graduation.
CE 420. ENGINEERING PLANNING (4). The application of systems analysis to structuring, analyzing, and planning for civil engineering projects. Concept of the system and its environment; setting goals, objectives, and standards; evaluation criteria; solution generation and analysis; evaluation and optimization. Project management using precedence node diagramming; resource allocation and leveling; time-cost trade-off; and PERT.

CE 424. CONTRACTS AND SPECIFICATIONS
(4). Fundamentals of construction industry contracts, including technical specifications, and issues related to time, money, warranty, insurance, and changed conditions.

CE 427. TEMPORARY CONSTRUCTION
STRUCTURES (4). Design and construction of temporary structures including formwork, shoring, and earth retaining structures. PREREQS: ((CE 321 [C] or CCE 321 [C] ) and (FE 315 [C] or CE 372 [C] ) and (CEM 383 [C] or CE 383 [C] )) CE 428. PROJECT MANAGEMENT FOR CIVIL ENGINEERS (4). Provides the prospective civil engineer with the technical knowledge and familiarity necessary to successfully and confidently manage projects of different sizes and complexity levels. It relies on basic knowledge and techniques developed by the Project Management Institute (PMI) and real-world examples (through lectures, example projects, case studies, and guest speakers) from the public and private sectors.
CE 461. PHOTOGRAMMETRY (3). Geometry of terrestrial and vertical photographs, flightline planning, stereoscopy and parallax, stereoscopic plotting instruments, analytical photogrammetry, orthophotography, introduction to photo interpretation, and aerial cameras. PREREQS: (CE 361 [C] or CEM 263 [C] or FE 208 [C] )
CE 463. CONTROL SURVEYING (4). Global Positioning Systems (GPS) theory, networks, and fieldwork; control specifications, methods and problems in obtaining large area measurements; precise leveling; network adjustments using least square techniques; field instrument adjustments. PREREQS: (CE 361 [C] or CEM 263 [C] or FE 208 [C] )

CE 465. OREGON LAND SURVEY LAW (3). Introduction to U.S. public land survey; Oregon state statutes, common law decisions, and administrative rules dealing with boundary law; case studies; unwritten land transfers; original and resurvey platting laws; guarantees of title; deed descriptions. PREREQS: (CE 361 [C] or CEM 263 [C] or FE 208 [C] )
CE 469. PROPERTY SURVEYS (3). U.S. public land survey: restoration of corners, subdivision of sections; topographic mapping; subdivision and partition plats, resurvey plats, subdivision design; introduction to LIS/GIS; field astronomy. PREREQS: (CE 361 [C] or CEM 263 [C] or FE 208 [C])
CE 471. FOUNDATIONS FOR STRUCTURES
(3). Criteria, theory, design, and construction for foundations of structures; use of in-situ tests for geotechnical engineering; computer applications. PREREQS: CE 373 [C] or FE 316 [C]

CE 479. SLOPE AND EMBANKMENT DESIGN
(3). A comprehensive overview of evaluating stability and performance for natural and engineered slopes. Design aspects include construction of road embankments, slope remediation techniques and application of geosynthetics for slope stabilization, slope and wall construction, and drainage. CROSSLISTED as FE 479/FE 579. PREREQS: CE 373 [C] or FE 316 [C]
CE 481. REINFORCED CONCRETE I (4). Basic principles of reinforced concrete design; strength, stability, and serviceability criteria; design of reinforced concrete members for flexure and shear. Detailing, development length and splices. PREREQS: CE 382 [C] and /or equivalent.
CE 482. MASONRY DESIGN (3). A critical examination in depth of masonry design topics. PREREQS: CE 481 [C] and /or equivalent.
CE 484. WOOD DESIGN (4). Study of basic wood properties and design considerations. Design and behavior of wood connectors, beams, columns and beam columns. Introduction to plywood and glued laminated members. Analysis and design of structural diaphragms and shear walls. Lec/lab. PREREQS: CE 383 [C] or CE 481 [C] and senior or graduate standing.

CE 486. PRESTRESSED CONCRETE (3). Prestressed concrete analysis and design, systems of prestressing, materials, economics.

## PREREQS: CE 481 [C]

CE 491. TRANSPORTATION ENGINEERING
(3). Introduction to transportation engineering systems characteristics, traffic estimation, comprehensive transportation planning, highway economics, driver and vehicle characteristics, highway operations and capacity, signalization and control. Introduction to intelligent transportation.
PREREQS: (CE 392 [C] and ST 314 [C] )
CE 492. PAVEMENT STRUCTURES (3). Design and rehabilitation of pavement structures for streets, highways, and airports. PREREQS: CE 392 [C]
CE 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
CE 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
CE 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

CE 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

CE 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

CE 508. WORKSHOP (1-3). Graded P/N. This course is repeatable for a maximum of 3 credits.

CE 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.

CE 511. OCEAN ENGINEERING (4). Introduction to linear wave theory and wave forces on piles. Guided design of wave gauge facility at Coos Bay, Oregon, that requires synthesizing fluid mechanics, structural design and foundation design. PREREQS: CE 313 or CEM 311

CE 512. HYDROLOGY (4). Fundamentals of hydrology, the hydrologic cycle, precipitation, streamflow, hydrograph analysis and hydrologic measurements.
CE 513. GIS IN WATER RESOURCES (3).
Course presents Geographic Information System (GIS) technology for developing solutions to water resource problems: water quality, availability, flooding, the natural environment, and management of water resources. Typical GIS data models for hydrologic information are presented. Synthesis of geospatial and temporal water resources to support hydrologic analysis and modeling are covered. PREREQS: Senior or graduate standing in engineering or a previous introductory GIS course.

## CE 514. GROUNDWATER HYDRAULICS (4).

Principles of groundwater flow and chemical transport in confined and unconfined aquifers, aquifer testing and well construction. Design of dewatering and contaminant recovery systems. PREREQS: CE 547 [B] and or CE 313 and MTH 252 or equivalent.
CE 515. COASTAL INFRASTRUCTURE
(3). Planning and design criteria of coastal infrastructure, including breakwaters, jetties, sea walls, groins, piers, submerged pipelines, harbor design, and tsunami defense. Use of laboratory models, numerical simulations, and field observations for design. PREREQS: CE 313
CE 517. HYDRAULIC ENGINEERING DESIGN
(4). Theory, planning, analysis, and design of hydraulic structures. Application of basic principles detailed analysis and design. Engineering planning and design of water resource systems. PREREQS: CE 313
CE 518. GROUNDWATER MODELING (4).
Application of numerical methods to the solution of water flow and solute transport through saturated and unsaturated porous media. Analysis of confined and unconfined aquifers. Computer solution of large-scale field problems including groundwater contamination and aquifer yield. PREREQS: CE 514 [C]

CE 520. ENGINEERING PLANNING (4). The application of systems analysis to structuring, analyzing, and planning for civil engineering projects. Concept of the system and its environment; setting goals, objectives, and standards; evaluation criteria; solution generation and analysis; and evaluation and optimization. Project management using precedence node diagramming; resource allocation and leveling; time-cost trade-off; and PERT.
CE 524. CONTRACTS AND SPECIFICATIONS
(4). Fundamentals of construction industry contracts, including technical specifications, and issues related to time, money, warranty, insurance, and changed conditions.
CE 526. ADVANCED CONCRETE MATERIALS
(3). Cement hydration, supplementary cementing materials, micro to macro scale property development, mixture design and proportioning including material selection for sustainable design practices, durability aspects including freeze-thaw attack, corrosion of reinforcing steel, sulfate attack and alkali-silica reaction, recent advances in concrete technology. PREREQS: (CE 321 or CCE 321) or equivalent.

CE 527.TEMPORARY CONSTRUCTION
STRUCTURES (4). Design and construction of temporary structures including formwork, shoring, and earth retaining structures. PREREQS: (CE 321 or CCE 321) and (FE 315 or CE 372) and (CEM 383 or CE 383)
CE 528. PROJECT MANAGEMENT FOR CIVIL
ENGINEERS (4). Provides the prospective civil engineer with the technical knowledge and familiarity necessary to successfully and confidently manage projects of different sizes and complexity levels. It relies on basic knowledge and techniques developed by the Project Management Institute (PMI) and real-world examples (through lectures, example projects, case studies, and guest speakers) from the public and private sectors.
CE 530. SELECTED TOPICS IN STRUCTURAL ANALYSIS AND MECHANICS (3). A critical, in-depth examination of topics selected by the instructor from among topics not covered in other structural analysis and mechanics courses. This course is repeatable for a maximum of 16 credits. PREREQS: CE 585 [C]
CE 531. STRUCTURAL MECHANICS (3).
Theories of failure, multi-axial stress conditions, torsion, shear distortions, energy methods of analysis, beams on elastic foundations. Nonlinear and inelastic behavior. PREREQS: Graduate standing.
CE 532. FINITE ELEMENT ANALYSIS (4). Applications of the finite element method to structural analysis, fluid flow and elasticity problems. Use and development of large finite element computer programs. PREREQS: (CE 585 [C] or ME 520 [C] ) and /or equivalent.
CE 533. STRUCTURAL STABILITY (3). Stability theory and applications, with emphasis on design of steel structures. PREREQS: CE 383 or equivalent.

CE 534. STRUCTURAL DYNAMICS (4).
Analytical and numerical solutions for single, multi-degree of freedom and continuous vibrating systems. Behavior of structures, dynamic forces and support motions. Seismic response spectra analysis. PREREQS: CE 382 or equivalent.

## CE 535. INTRODUCTION TO RANDOM

VIBRATIONS (4). Introduction to probability theory and stochastic processes. Correlation and spectra density functions. Response of linear systems to random excitations. First excursion and fatigue failures. Applications in structural and mechanical system analysis and design. PREREQS: CE 534 [C] or (ME 422 [C] or ME 522 [C] ) and CE 534 or ME 422 or ME 522 or equivalent.

CE 537. NONLINEAR STRUCTURAL ANALYSIS (4). Material and geometric nonlinear analysis of
frame and truss structures. Solution strategies for nonlinear structural analysis. Nonlinear constitutive models of steel and reinforced concrete members. Development and use of computer programs for nonlinear analysis. PREREQS: CE 585 [C]

CE 540. SPECIAL TOPICS IN HYDRAULIC ENGINEERING (3-4). This course is repeatable for a maximum of 16 credits.

CE 543. APPLIED HYDROLOGY (4).
Advanced treatment of hydrology covering major components of the hydrological cycle with special emphasis on surface water; hydrologic analysis and design of water resource systems; runoff prediction; and simulation of surface water systems. Offered alternate years. PREREQS: BEE 512 and CE 412 or equivalent.

CE 544. OPEN CHANNEL FLOW (3). Steady, uniform, and nonuniform flow in natural and artificial open channels; unsteady flow; interaction of flow with river structures; and computational methods. PREREQS: (CE 311 and CE 313) or CE 547 or equivalent.

CE 547. WATER RESOURCES ENGINEERING I: PRINCIPLES OF FLUID MECHANICS (4). Fluid mechanics for water resources engineers, classifications of fluid flows; fluid statics and dynamics, incompressible viscous flows; dimensional analysis; applications to fluid machinery, flow through porous media, fluid motion in rivers, lakes, oceans. PREREQS: Graduate standing.
CE 548. WATER QUALITY DYNAMICS (3). Mass balance, advection and diffusion in streams, lakes and estuaries; thermal pollution, heat balance, oxygen balance, and eutrophication; mathematical models; and numerical solutions.

CE 551. COMPUTER-AIDED SITE AND ROAD
DESIGN (4). Site development and road design principles and application to a comprehensive design project using computer-based digital terrain model software tools. Lec/lab/rec. PREREQS: CE 392*

CE 552. ISOLATED SIGNALIZED
INTERSECTIONS (3). Relationships between signal display, user response, vehicle detection, and signal timing parameters are examined in detail. Traffic simulation is introduced to visualize and design the various elements of isolated signalized intersections. PREREQS: CE 595, Traffic Operations and Design, is recommended but not required.
CE 553. RAILROAD ENGINEERING (3). The principal subject of this course is the railway infra-structure and operational issues related to high speed passenger rail and freight rail (class 1 and regional rail). The course will cover the techniques used to design, construct, monitor and maintain railway track. Class will include field trips. PREREQS: Or permission of instructor. COREQS: CE 392

CE 554. DRIVING SIMULATION (3).
Relationships between the functional elements of driving simulation (simulation computer processing, sensory feedback generation, sensory display devices, and the human operator) are examined in detail. The role of driving simulation in transportation engineering research and practice is also considered in depth. Students will design experiments, analyze and interpret data, and extrapolate simulator results to real-world scenarios. PREREQS: CE 595 is recommended but not required.

CE 560. SELECTED TOPICS IN GEOMATICS
ENGINEERING (0-4). Selected topics on contemporary problems in geomatics engineering; application of ongoing research from resident and visiting faculty. This course is repeatable for a maximum of 16 credits.
CE 561. PHOTOGRAMMETRY (3). Geometry of terrestrial and vertical photographs, flightline planning, stereoscopy and parallax, stereoscopic plotting instruments, analytical photogrammetry,
orthophotography, introduction to photo interpretation, and aerial cameras. PREREQS: CE 361 or CEM 263 or FE 208

CE 562. DIGITAL TERRAIN MODELING (4). Fundamentals of LIDAR and creating digital terrain models. Computational geometry, Delaunay triangulations, spline interpolations, statistical gridding methods, ground filtering, data optimizations, and advanced topics in 3D modeling. PREREQS: CE 361 or CEM 263 or equivalent surveying or GIS course.
CE 563. CONTROL SURVEYING (4). Global Positioning Systems (GPS) theory, networks, and fieldwork; control specifications, methods and problems in obtaining large area measurements; precise leveling; network adjustments using least square techniques; field instrument adjustments PREREQS: CE 361 or CEM 263 or FE 208
CE 565. OREGON LAND SURVEY LAW (3). Introduction to U.S. public land survey; Oregon state statutes, common law decisions, and administrative rules dealing with boundary law; case studies; unwritten land transfers; original and resurvey platting laws; guarantees of title; deed descriptions. PREREQS: CE 361 or CEM 263 or FE 208

CE 566. 3D LASER SCANNING AND IMAGING
(4). Fundamentals of lidar acquisition, registration processing, modeling, analysis, and verification. Use of sensor platforms for 3D acquisition. Effective data management procedures. Introduction to other imaging techniques including structure from motion and structured light. Lec/lab.

CE 568. LEAST SQUARES ADJUSTMENTS
(3). Examines the theory of random error and statistical testing. Discusses the propagation of error in both indirect observations and direct observations from survey. Studies weights of observations and the principles of least squares. Explains how to adjust redundant observations in level nets, horizontal surveys, GNSS networks, and GNSS and terrestrial survey networks by least squares. Estimates the error ellipses of the adjusted observations. Evaluates methods for performing coordinate transformations. PREREQS: CE 361 or CEM 263 or FE 208

CE 569. PROPERTY SURVEYS (3). U.S. public land survey: restoration of corners, subdivision of sections; topographic mapping; subdivision and partition plats, resurvey plats, subdivision design; introduction to LIS/GIS; field astronomy. PREREQS: CE 361 and CEM 263 or FE 208

CE 570. GEOTECHNICAL SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## CE 571. ADVANCED FOUNDATION

ENGINEERING (4). Presents the planning, analysis, and design of shallow and deep foundations from the geotechnical engineering perspective. Topics supporting course objectives include planning and execution of subsurface investigations, interpretation of in-situ tests, analysis and design of deep and shallow foundations, including geotechnical capacity, and immediate settlement. Assessment of deep foundation installation, axial and lateral loading tests, and group effects is presented. Evaluation of foundation performance is conducted under deterministic and probabilistic frameworks. PREREQS: CE 373 and CE 471 or equivalent, or consent of instructor.

## CE 572. ADVANCED GEOTECHNICAL

LABORATORY (4). Examination of soil composition and engineering properties of soils including volume change, pore pressure generation, strength, and deformation behavior of soils in the laboratory. Advanced static and cyclic shear strength testing of soils will also be discussed. Lec/lab. PREREQS: (CE 373 and CE 471) or equivalent, or consent of instructor.

CE 574. ENGINEERING PROPERTIES OF
SOILS (5). Advanced laboratory experimental methods for measurement of soil properties.

Analysis of experimental data, and methods to display data for 2D and 3D experiments. Compositional and environmental factors affecting the stress-strain, volume change, compressibility, shear strength behavior of sand, clay, and compacted soils in 2D and 3D. Stress and strain invariants and modeling of failure criteria. PREREQS: CE 471

CE 575. EARTH RETENTION AND SUPPORT
(4). Presents the theory and practice of design and construction of earth retaining structures. Topics include rigid and flexible retaining structures, ranging from gravity and cantilever systems, cantilever and anchored sheet piling, tied-back shoring elements, soil nailing, and mechanically stabilized earth walls. These topics are developed with a view on compaction stresses and surface loading, and invokes approaches that range from the static equations of equilibrium to empirical rules of thumb. PREREQS: CE 373
CE 576. GROUND IMPROVEMENT (3). Presents the analysis and design of ground improvement techniques. Topics supporting course objectives include design for accelerated settlement (surcharge design) with and without pre-fabricated vertical drains, vibro-compaction, vibroreplacement (stone columns) and aggregate piers, deep soil mixing, jet grouting, EPS geofoam, and other improvement techniques for improving soil strength and stability, and limiting deformations and the effects of liquefaction. PREREQS: CE 572 [C] and CE 577 [C] and /or equivalent, or consent of the instructor.

## CE 577. STATIC AND DYNAMIC SOIL

BEHAVIOR (3). An advanced coverage of volume change and strength behavior of soil. Specific course topics include effective stress, one-dimensional compression of soil, rate of soil consolidation, Mohr circle analysis, shear strength of sands, clays, and silts, and dynamic soil properties, strength, and testing. PREREQS: CE 372 and CE 373 or equivalent or consent of instructor.

## CE 578. GEOTECHNICAL EARTHQUAKE

 ENGINEERING (4). Major course topics include engineering seismology, strong ground motion, seismic hazard analysis, soil dynamics, seismic site response, earthquake motion selection, liquefaction, and seismic slope stability. Attention will be given to earthquakes created by the Cascadia Subduction Zone. Lec/lab. PREREQS: CE 373 and CE 471 or equivalent, or consent of the instructor.CE 579. SLOPE AND EMBANKMENT DESIGN
(3). A comprehensive overview of evaluating stability and performance for natural and engineered slopes. Design aspects include construction of road embankments, slope remediation techniques and application of geosynthetics for slope stabilization, slope and wall construction, and drainage. CROSSLISTED as FE 479/FE 579. PREREQS: CE 373 or FE 316
CE 580. SELECTED TOPICS IN STRUCTURAL
DESIGN (3). A critical examination in depth of topics selected by the instructor from among topics not covered in other structural design courses. This course is repeatable for a maximum of 18 credits.

CE 581. REINFORCED CONCRETE I (4). Basic principles of reinforced concrete design; strength, stability, and serviceability criteria; design of reinforced concrete members for flexure and shear. Detailing, development length and splices. PREREQS: CE 382 or equivalent.

CE 582. MASONRY DESIGN (3). A critical examination in depth of topics selected by the instructor from among topics not covered in other structural design courses. PREREQS: CE 581 or equivalent.
CE 583. BRIDGE DESIGN (3). AASHTO specifications for bridge design; load models; design for moving loads; design and analysis of bridge decks and simple and continuous bridge
spans. PREREQS: CE 381 and CE 382 and (CE 481 or CE 581). It's recommended that students take CE 383 concurrently with CE 583.
CE 584. WOOD DESIGN (4). Study of basic wood properties and design considerations. Design and behavior of wood connectors, beams, columns and beam columns. Introduction to plywood and glued laminated members. Analysis and design of structural diaphragms and shear walls. Lec/lab. CROSSLISTED as WSE 558. PREREQS: CE 383 or CE 481 with a minimum grade of C, senior or graduate standing.
CE 585. MATRIX STRUCTURAL ANALYSIS
(4). Development of matrix methods for linear structural analysis. Force and displacement methods of analysis. Virtual work principles. Use of computer programs to analyze structures. Introduction to finite-element method. PREREQS: CE 382 or equivalent.
CE 586. PRESTRESSED CONCRETE (3).
Prestressed concrete analysis and design, systems of prestressing, materials, economics. PREREQS: CE 581

CE 588. PROBABILITY-BASED ANALYSIS AND DESIGN (4). Application of probability and statistics in the analysis and design of civil and mechanical engineering systems. Probabilistic modeling of loading and resistance. Probabilitybased design criteria including load and resistance factor design. PREREQS: ST 314 or equivalent.
CE 589. SEISMIC DESIGN (4). Design of structures to resist the effects of earthquakes. Introduction to structural dynamics, dynamic analysis, seismic design philosophy, code requirements, and detailing for steel and reinforced concrete. PREREQS: CE 383 or CE 481 or equivalent.

CE 590. SELECTED TOPICS IN
TRANSPORTATION ENGINEERING (1-3). Selected topics on contemporary problems in transportation engineering; application of ongoing research from resident and visiting faculty. This course is repeatable for a maximum of 9 credits.
CE 591. TRANSPORTATION SYSTEMS
ANALYSIS, PLANNING, AND POLICY (3).
The systems approach and its applications to transportation engineering and planning. The making of transportation plans and policies. Development of transportation models. Transportation system performance. Decision analysis. Evaluation of transportation projects. Environmental and social impacts of transportation.

CE 592. PAVEMENT STRUCTURES (3). Design and rehabilitation of pavement structures for streets, highways, and airports. PREREQS: CE 392
CE 593. TRAFFIC FLOW ANALYSIS AND
CONTROL (4). Traffic operations and control systems; traffic flow theory and stream characteristics; capacity analysis; traffic models and simulation; accident and safety improvement. Offered alternate years.
CE 594. TRANSPORT FACILITY DESIGN (4). Location and design of highways, and other surface transportation terminals; design for safety, energy efficiency, and environmental quality. Offered alternate years. Lec/rec. PREREQS: CE 392

CE 595. TRAFFIC OPERATIONS AND DESIGN
(3). Traffic operations and engineering; human and vehicular characteristics; traffic stream characteristics; highway capacity analysis; intersection operation, control and design.
PREREQS: CE 491*
CE 596. PAVEMENT EVALUATION AND
MANAGEMENT (3). Advanced topics in pavement evaluation techniques and pavement management procedures. PREREQS: CE 492

CE 597. PUBLIC TRANSPORTATION (3).
Characteristics and nature of public transportation systems, including bus, light and heavy rail; financing policy considerations; planning transit service; managing and operating transit systems for small and large urban areas. Offered alternate years.

CE 598. AIRPORT PLANNING AND DESIGN
(3). Characteristics and nature of the air transport system. Airport financing, air traffic control. Analysis and design of airports and the airport planning processes. Airport appurtenances. Airport pavement design, environmental facilities and drainage. Offered alternate years.

CE 599. INTELLIGENT TRANSPORTATION
SYSTEMS (3). Introduction to intelligent transportation systems, including enabling surveillance, navigation, communication and computer technologies. Application of technologies for monitoring, analysis evaluation and prediction of transportation system performance. Intervention strategies, costs and benefits, safety, human factors, institutional issues and case studies. Offered alternate years. PREREQS: CE 491 is a corequisite for new graduate students.

CE 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

CE 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

CE 605. READING AND CONFERENCE (1-16) This course is repeatable for a maximum of 16 credits.
CE 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
CE 607. OCEAN ENGINEERING SEMINAR (1). Presentations from on-campus and off-campus speakers discussing state of technology topics in ocean engineering research, development, and construction. Graded P/N. This course is repeatable for a maximum of 16 credits.

CE 630. OCEAN WAVE MECHANICS I (3). Linear wave boundary value problem formulation and solution, water particle kinematics, shoaling, refraction, diffraction, and reflection. Linear long wave theory with applications to tides, seiching, and storm surge. CROSSLISTED as OC 630. Lec/ lab.

## CE 631. OCEAN WAVE MECHANICS II

(3). Second in the sequence of ocean wave engineering mechanics, covers the following topics: introduction to long wave theory, wave superposition, wave height distribution, and the wind-wave spectrum, introduction to wave forces, and basic nonlinear properties of water waves. May include additional selected topic in wave mechanics. CROSSLISTED as OC 631. PREREQS: (CE 630 [C] or OC 630 [C] )
CE 634. LONG WAVE MECHANICS (3). Theory of long waves. Depth-integrated Euler's equation and its jump conditions. Evolution equations and their solutions. Nonlinear shallow-water waves, the Korteweg-deVries equation and Boussinesq equation. Boundary-layer effects. Shallow-water waves on beaches. Applications of the fundamentals to problems of tsunamis. CROSSLISTED as OC 634. PREREQS: (CE 630 [C] and CE 631 [C] ) and OC 670 or equivalent.
CE 635. APPLIED MODELING OF NEARSHORE PROCESSES (4). An introduction to numerical modeling of the nearshore ocean, providing hands-on experience with state-of-the-art numerical models for wave propagation, nearshore circulation, planform shoreline evolution and bathymetric profile evolution. The focus is on review of model requirements, detailed study of several specific models for several domains of interest, application to coastal phenomena, and the interpretation of model results. Offered alternate years. CROSSLISTED as OC 635.
CE 639. DYNAMICS OF OCEAN STRUCTURES (3). Dynamic response of fixed and compliant structures to wind, wave and current loading;

Morison equation and diffraction theory for wave and current load modeling, time and frequency domain solution methods; application of spectral and time series analyses; system parameter identification; and stochastic analysis of fatigue and response to extreme loads. Offered alternate years.

CE 640. SELECTED TOPICS IN OCEAN AND COASTAL ENGINEERING (1-3). Selected topics on contemporary problems in ocean and coastal engineering; application of ongoing research from resident and visiting faculty. Offered alternate years. This course is repeatable for a maximum of 9 credits. PREREQS: CE 630

CE 642. RANDOM WAVE MECHANICS (3). Random wave theories, probability and statistics of random waves and wave forces, time series analyses of stochastic processes, ocean wave spectra. Offered alternate years. PREREQS: CE 630 [C]

CE 643. COASTAL ENGINEERING (3). Coastal sediment transport including nearshore currents, longshore onshore-offshore transport, and shoreline configuration; equilibrium beach profile concept with application to shore protection; shoreline modeling; tidal inlet hydrodynamics and inlet stabilization; design criteria for soft structures Offered alternate years. PREREQS: CE 630 [C]

## CE 645. WAVE FORCES ON STRUCTURES

(3). Wave forces on small and large members, dimensional analyses and scaling of equations, identification and selection of force coefficients for Morison equation; compatibility of wave kinematics and force coefficients in Morison equation, diffraction and radiation of surface gravity waves by large floating bodies, wavemaker problem, and reciprocity relations. PREREQS: CE 630 [C]
CE 647. OCEAN AND COASTAL ENGINEERING
MEASUREMENTS (3). Hands-on experience in the conduct of field and laboratory observations, including waves, currents, wind, tides, tsunami, sediments, bathymetry, shore profiles, wave forces on structures, and structural response. Online data archival and retrieval systems. PREREQS: CE 630 [C]

CE 808. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

## - CONSTRUCTION ENGINEERING MANAGEMENT COURSES

CEM 263. PLANE SURVEYING (3). Use of field surveying equipment; error analysis; plane surveying methods applied to construction; plane coordinate computations; topographic mapping; and introduction to GPS. Lec/lab. PREREQS: (ENGR 211 [C] or ENGR 211H [C] ) and sophomore standing in engineering.
CEM 311. HYDRAULICS (4). Pressure and energy concepts of fluids, fluid measurements, flow in pipes and open channels. PREREQS: (ENGR 211 [C] or ENGR 211H [C] )
CEM 341. CONSTRUCTION ESTIMATING I (4). Fundamentals of estimating and bidding construction projects; plan reading, specification interpretation; quantity take-off; types of estimates; estimating and methods of construction for sitework, concrete, and carpentry; estimating subcontracts, estimating job overhead and home office overhead; estimating profit, and computeraided estimating. PREREQS: CE 102 and CE 201. CEM 341 and CEM 342 must be taken in order.
CEM 342. CONSTRUCTION ESTIMATING II (4). Fundamentals of estimating and bidding construction projects; plan reading, specification interpretation; quantity take-off; types of estimates; estimating and methods of construction for sitework, concrete, and carpentry; estimating subcontracts, estimating job overhead and home office overhead; estimating profit, and computeraided estimating. PREREQS: CEM 341 [C]
CEM 343. CONSTRUCTION PLANNING AND SCHEDULING (4). Principles of construction
planning, scheduling, and resource optimization; scheduling techniques and calculations; methods for integrating project resources (materials, equipment, personnel, and money) into the schedule. PREREQS: CEM 342* [C]
CEM 381. STRUCTURES I (4). Introduction to statically determinate analysis and design of steel structures. Lec/rec. PREREQS: (ENGR 213 [C] or ENGR 213H [C] )
CEM 383. STRUCTURES II (4). Analysis and design of building elements of concrete and timber; detailing and fabrication. Lec/rec. PREREQS: (CCE 321* [C] and CEM 381 [C])
CEM 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CEM 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

CEM 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

CEM 407. SEMINAR (1). Professional practices of construction engineering management.

CEM 431. OBTAINING CONSTRUCTION
CONTRACTS (4). Preparing and effectively presenting detailed and complete proposals for the execution of construction projects. PREREQS: CEM 341 [C]

## CEM 432. CONSTRUCTION PROJECT

PLANNING (3). Planning and preparing cost estimates, schedules, site logistics plans for executing construction projects; presenting written and oral construction proposals. PREREQS: CEM 341 [C]
CEM 441. HEAVY CIVIL CONSTRUCTION
MANAGEMENT (4). Heavy civil construction management methods. Construction equipment types, capabilities, costs, productivity, and the selection and planning of equipment needed for a project. Soil characteristics, quantity analysis, and movement on construction sites. PREREQS: (FE 315 [C] or CE 372 [C] )
CEM 442. BUILDING CONSTRUCTION MANAGEMENT (4). Building construction management and methods.

## CEM 443. ^PROJECT MANAGEMENT FOR

CONSTRUCTION (4). Project management concepts for construction; concepts, roles and responsibilities, labor relations and supervision, administrative systems, documentation, quality management, and process improvement. (Writing Intensive Course)

CEM 471. ELECTRICAL FACILITIES (4).
Principles and applications of electrical
components of constructed facilities; basic electrical circuit theory, power, motors, controls, codes, and building distribution systems. Lec/lab.
CEM 472. MECHANICAL FACILITIES (3).
Principles and applications of mechanical components of constructed facilities; heating, ventilating, air conditioning, plumbing, fire protection, and other mechanical construction.
CEM 541. HEAVY CIVIL CONSTRUCTION
MANAGEMENT (4). Heavy civil construction management methods. Construction equipment types, capabilities, costs, productivity, and the selection and planning of equipment needed for a project. Soil characteristics, quantity analysis, and movement on construction sites. PREREQS: FE 315 or CE 372
CEM 543. PROJECT MANAGEMENT FOR CONSTRUCTION (4). Project management concepts for construction; concepts, roles and responsibilities, labor relations and supervision, administrative systems, documentation, quality management, and process improvement.
CEM 550. CONTEMPORARY TOPICS
IN CONSTRUCTION ENGINEERING
MANAGEMENT (4). Contemporary topics
of emerging technologies and processes, construction engineering and management, how industry environmental change causes development of new technologies, and the applications of the technologies in the field. PREREQS: CEM or CE degree or 3 years professional construction experience or instructor approval required.

CEM 551. PROJECT CONTROLS (4). Advanced methods of project controls including advanced technologies and methodologies for quality, time, and cost management; project management organization models, and intra-organizational relationships. PREREQS: Graduate standing and CEM or CE degree or 3 years professional construction experience, or instructor approval.

## CEM 552. RISK MANAGEMENT IN

CONSTRUCTION (4). An introduction to the concept of risk in construction projects and construction firms, including risk definition, identification, assessment and management techniques; contractual risk control, sharing and shedding; and contingency management. PREREQS: Graduate standing and CEM or CE degree or 3 years of professional construction experience or instructor approval required.

## CEM 553. CONSTRUCTION BUSINESS

MANAGEMENT (4). Introduction to concepts of business structures associated with the construction industry; enterprise-level management techniques; extra-organizational risk management; and operational management structuring. PREREQS: Graduate standing and CEM or CE degree or three years professional construction experience or instructor approval.

## SCHOOL OF ELECTRICAL ENGINEARING AND COMPUTER SCIENCE

V. John Mathews, School Head 1148 Kelley Engineering Center Oregon State University
Corvallis, OR 97331-5501
541-737-3617
Website: http://eecs.oregonstate.edu/

## FACULTY

Distinguished Professor Dietterich Professors Bailey, Bose, Burnett, Conley, Cull (Emeritus), Erwig, A. Fern, Fiez, Lee, Liu, Mayaram, Moon, Pancake (Emeritus), Tadepalli, Temes, von Jouanne, Wager, Weisshaar

## Associate Professors

Borradaile, Brekken, Budd
(Emeritus), Chiang, Dhagat, X. Fern, Groce, Hamdaoui, Hanumolu, Jander, Jensen, Magaña, Minoura (Emeritus), Nguyen, Plant, Raich, Scaffidi, Todorovic, Wong, E. Zhang
Assistant Professors T. Anand, Bobba, L. Chen, Cheng, CotillaSanchez, Dig, Hendrix, L. Huang, Hutchinson, Johnston, Kim, F. Li, Natarajan, Nayyeri, Ramsey, Rosulek, Sarma, Termehchy, Walkingshaw, Wang, Yavuz, J. Zhang
Senior Instructor Traylor
Instructors Alcon, Brewster, Ehsan,
McGrath, O'Hara, Parham-Mocello, Redfield, Rooker, Schutfort, Shuman, Sweet, Van Londen, Wolford
Faculty Research Assistant 1 Irvine

Faculty Research Assistant Heer, Presley
Assistant Professor Senior
Research Y. Zhang

## Undergraduate Majors

Computer Science (BA, BS, CRED, HBA, HBS)
Options
Applied Computer Science
Computer Science Double Degree
Computer Systems
Electrical and Computer Engineering (BS, CRED, HBS)

Undergraduate Minor
Computer Science
Graduate Majors
Computer Science (MA, MAIS, MEng, MS, PhD)
Graduate Areas of Concentration Algorithms and Cryptography Artificial Intelligence, Machine Learning and Data Science
Computer Graphics, Visualization, and Vision
Computer Systems and Networking Human-Computer Interaction
Programming Languages Software Engineering
Electrical and Computer Engineering (MEng, MS, PhD)
Graduate Areas of Concentration Analog and Mixed Signal
Artificial Intelligence and Machine Learning
Communications and Signal Processing Computer Systems
Energy Systems
Materials and Devices
RF/Microwaves/optoelectronics

## Graduate Minors <br> Computer Science <br> Electrical and Computer Engineering

Consistent with the mission of the university and college, the mission of the School of Electrical Engineering and Computer Science at Oregon State University is to provide a comprehensive, state-of-the-art education that prepares our students to be successful in engineering and computing practice and advanced studies.

The school has traditionally strong undergraduate programs and one of the largest graduate programs within the university, with internationally recognized research programs in the areas of mixed signal integration, artificial intelligence and machine learning, computer graphics and vision, energy systems, multimedia and networking, materials and devices, end-user software, humancomputer interaction, and signal processing and communications systems.

## ELECTRICAL AND COMPUTER ENGINEERING

The School of EECS offers programs leading to the BS, MS, MEng, and PhD degrees in Electrical and Computer Engineering (ECE).
Electrical and computer engineers engage in the design, construction and programming, and applications of electronic and integrated circuits, digital computers and embedded systems, power generation and utilization, communication and computer networks, electronic materials and devices, electromagnetic, microwave and optical circuits and systems, control systems, and signal processing and conditioning.

Course work leading to the BS degree consists of courses in many of these topics, as well as courses in the supporting disciplines of mathematics, physical sciences, and computer science. Students select further study beyond the required courses for either more depth in a subdiscipline or further breadth across engineering. Students fulfill humanities and social science requirements as specified by the university's baccalaureate core program. The BS program is supported by well-equipped laboratories providing hands-on experience with electronic circuits, digital logic, electronic and photonic materials, electric machines, IC design, optoelectronics, RF techniques, instrumentation, and microprocessors.

The program incorporates engineering design principles throughout the undergraduate curriculum. This includes the integration of societal, economic, legal, regulatory, ethical, environmental, and other factors into the technical aspects of engineering design. Design activities begin in the freshman orientation sequence, which incorporates openended design problems, and continues throughout the curriculum. The design experience culminates with a yearlong senior design project. Within the senior design experience, students working in teams complete all phases of a design project under the supervision of a faculty member.
Graduates of this program are prepared to either seek industrial employment or pursue advanced graduate degrees.
The BS degree in Electrical and Computer Engineering (ECE) is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone 410-347-7700.

The Electrical and Computer Engineering graduate program provides opportunities for both MS and PhD thesis programs and a MEng course work-based program in the following areas: analog and mixed signals, communications and signal processing, computer systems and networking, energy systems, materi-
als and devices, and RF/microwave optoelectronics. Graduate work is supported by the school's well-equipped laboratory facilities. Opportunities exist for graduate students to participate in many research projects sponsored by private industry and government agencies.

The School of Electrical and Computer Science faculty, advising procedures, undergraduate programs' educational objectives, graduate program application procedures, research areas, and many other aspects may be found at the school's website: http://eecs.oregonstate. edu/.

The Multiple Engineering Cooperative Program (MECOP) offers industrial internships to selected students in the discipline areas of computer science, electrical engineering, and computer engineering.

## COMPUTER SCIENCE

The School of EECS offers programs leading to BA, BS, MA, MAIS, MEng, MS, and PhD degrees in Computer Science (CS).

Computer science is the heart of cut-ting-edge computing software. Computer scientists invent software that enables computers to do new things. They design programming languages, compilers, operating systems, games, databases, computer networks, and user interfaces. They solve complex challenging problems in a wide range of fields that can make a positive difference in the world.

Computer science majors learn skills to create realistic graphics, design new problem-solving tools that anyone can use, and create new solutions for business, medical diagnoses, games and entertainment. Their programming skills enable computers to "learn" as they process data, as well as assist in social communication and technologies for the disadvantaged.

Computer science offers a foundation that permits graduates to learn how to make software work well, how to make it fast, how to make it correct, how to find where innovation is needed, and how to understand the people who will be using it, so as to make it genuinely useful and compelling to people. Much of computer science course work is carried out in teams, and students gain experience in teamwork, in professionalism in writing, in working with clients, and in making presentations of their teams' efforts.

Course work leading to the BS degree consists of required courses in many of these topics, as well as courses in supporting disciplines such as mathematics. The BS program is supported by well-equipped computer laboratories. Students select further study beyond the required core courses, opting for either more depth in computer science, for breadth in business and entrepreneurship, or for grounding in an applications
area for their computing skills. The BS program culminates with a yearlong senior capstone project. Within the senior capstone experience, students working in teams complete all phases of a software project under the supervision of a faculty member.

Graduates of this program are prepared either to pursue advanced graduate degrees or to seek employment in business, industry or government.

The BS degree in Computer Science (CS) with Computer Systems option is accredited by Computing Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012, telephone 410-347-7700. The BA degree is not ABET accredited.

The computer science graduate program provides opportunities for MS and PhD thesis, MS non-thesis, and MEng course work-based programs in the following areas: artificial intelligence and machine learning, computer systems and networking, graphics and visualization, human-computer interaction, programming languages, software engineering, algorithms. Graduate work is supported by the school's well-equipped laboratory facilities. Opportunities exist for graduate students to participate in many research projects sponsored by private industry and government agencies.
The School of Electrical and Computer Science faculty, advising procedures, undergraduate programs' educational objectives, graduate program application procedures, research areas, and many other aspects may be found at the school's website: http://eecs.oregonstate. edu/.
The Multiple Engineering Cooperative Program (MECOP) offers internships to selected students in the discipline areas of computer science, electrical engineering, and computer engineering.

## UNDERGRADUATE MAJORS WITH OPTIONS

COMPUTER SCIENCE (BA, BS, CRED, HBA, HBS)

## Also available at OSU-Cascades campus and via Ecampus.

The computer science undergraduate curriculum has the following objectives:

1. Graduates of the program will have successful careers.
2. Graduates of the program will continue to learn and adapt to a changing world.
Entering undergraduate students must choose and complete options 1 or 2 to earn a degree in Computer Science. Entering post-baccalaureate students may select options 1 and 2 that are offered on campus or the online Computer Science Double Degree option offered by Ecampus.
3. Applied Computer Science (BA, BS, HBA, HBS)
4. Computer Systems (BA, BS, HBA, HBS)
5. Computer Science Double Degree (BS, HBS)
For students entering the undergraduate program, the recommended high school preparation is four years of mathematics, science, and English. High school programming or computer applications courses should not be taken in place of other college preparatory courses.

Each option has its own requirements. Please select a specific option for details.
Pre-Computer Science Major Code: 335
Major Code: 307

## OPTIONS

## APPLIED COMPUTER SCIENCE OPTION

## Also offered at OSU-Cascades

 campus.The Applied Computer Science option is for students who want to combine the study of computer science with an indepth examination of a field in which computer science plays an important role. This option requires an approved program of study for each student. Students build their own program of study to include their choice of CS electives plus an Applied CS program. The Computer Science Undergraduate Curriculum Committee reviews these programs of study for approval. Existing OSU minors may be proposed for use both as an Applied CS program and as a minor.

## Program for Applied Computer

 Systems OptionPre-Professional Program: Computer Science

## Required for Pro-School

## Admittance:

COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical
Discourse (3)
CS 160. Computer Science Orientation (3)
CS 161. Introduction to Computer Science I (4)
CS 162. Introduction to Computer Science II (4)
or CS 165. Accelerated Introduction to
Computer Science (8) Ecampus only.
CS 261. Data Structures (4)
CS 271. Computer Architecture and
Assembly Language (4)
CS 290. Web Development (4)
MTH 231. Elements of Discrete Mathematics (4)
or CS 225. Discrete Structures in Computer Science (4) Ecampus only.
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
WR 121. *English Composition (3)
WR 214. *Writing in Business (3)
or WR 222. *English Composition (3)

## Other:

ST 314. Introduction to Statistics for Engineers (3)
WR 327. *Technical Writing (3)

## Professional Computer Science

CS 325. Analysis of Algorithms (4)
CS 340. Introduction to Databases (4)
CS 344. Operating Systems I (4)
CS 352. Introduction to Usability Engineering (4)
CS 361. ^Software Engineering I (4)
CS 362. Software Engineering II (4)
CS/ECE 372. Introduction to Computer Networks (4)
CS 381. Programming Language
Fundamentals (4)
CS 391. *Social and Ethical Issues in
Computer Science (3)
CS 444. Operating Systems II (4)
CS 461. Senior Software Engineering Project I (3)
CS 462. Senior Software Engineering Project II (3)
CS 463. Senior Software Engineering Project (2)

Computer Science Restricted Elective (3-4)
Computer Science Restricted Elective (3-4)

## Applied Program (minimum 32

## credits)

Applied Course (1-4)
Applied Course (1-4)

## Baccalaureate Core

HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC course (1)
Biological Science Course (4)
Perspective (Physical Science) (4)
Perspective (Second Biology plus Lab or
Physical Science) (4)
Perspectives Course (Western Culture) (3-4)
Perspectives Course (Cultural Diversity) (3-4)
Perspectives Course (Literature \& Arts) (3-4)
Perspectives Course (Social Processes and Institutions) (3-4)
Synthesis Course (Contemporary Global
Issues) (3)
Difference, Power, and Discrimination Course (3)
Unrestricted Electives (4-12)

## Total=180

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
${ }^{\mathbf{E}}$ Required for entry into the professional program.
${ }^{\mathbf{1}}$ Must be selected to satisfy the requirements of the baccalaureate core.


## Option Code: 354

## COMPUTER SCIENCE DOUBLE

 DEGREE OPTION
## Also available via Ecampus.

The Computer Science Double Degree option is for students who want to combine a bachelor's degree in computer science with a bachelor's degree in another field. Since computer science is relevant in so many diverse disciplines, students
can obtain a computer science degree in combination with virtually any other degree. Those who already hold a bachelor's degree-a BA or BS-from an accredited institution can add to their existing skill set and enhance their job prospects by earning a computer science degree online from OSU. The program of study includes the core courses in computer science, and also includes courses at the leading edge of computing technologies, software design, web development, and mobile/cloud computing.

All of the courses in the Double Degree option are offered through Ecampus, and most of the courses are also offered oncampus. This degree requires students to be enrolled as online students selecting DSC-Distance Degree Corvallis as their campus.

## Second Bachelor's Degree in <br> Another Discipline

Students who choose the Computer Science Double Degree option may pursue a degree in computer science concurrently while earning a second bachelor's degree, or may pursue the computer science
degree as a post-baccalaureate degree.

## Required Computer Science

## Courses

CS 161. Introduction to Computer Science I (4)
or CS 165 Accelerated Introduction to Computer Science (8)
CS 162. Introduction to Computer Science II (4)
or CS 165 Accelerated Introduction to Computer Science (8)
CS 225. Discrete Structures in Computer Science (4)
CS 261. Data Structures (4)
CS 271. Computer Architecture and Assembly Language (4)
CS 290. Web Development (4)
CS 325. Analysis of Algorithms (4)
CS 340. Introduction to Databases (4)
CS 344. Operating Systems I (4)
CS 361. Software Engineering I (4)
CS 362. Software Engineering II (4)
CS/ECE 372. Introduction to Computer Networks (4)
CS 419. Selected Topics in Computer
Science: Software Projects (4)
CS 496. Mobile and Cloud Software Development (4)

## CS Restricted Electives (12)

Select three upper-division (300- or 400-level) electives (12):
CS 352. Introduction to Usability Engineering (4)
CS 373. Defense Against the Dark Arts (4)
CS 464. Open Source Software Development (4)

CS 475. Introduction to Parallel Programming (4)
CS 496. Mobile and Cloud Software Development (4)

## Total=60 credits

Pre-Computer Science Major

## Option Code: 297

## COMPUTER SYSTEMS OPTION

The Computer Systems option is for students who want to take up computer science as a career and seek an in-depth understanding of computer science as an academic discipline. This option provides excellent preparation for those who plan to work for companies developing systems software or embedded systems. It also provides excellent preparation for those who plan to pursue an MS or PhD in computer science.

## Program for Computer Systems <br> Option

Pre-Professional Program Required

## for Pro-School Admittance:

COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical
Discourse (3)
CS 160. Computer Science Orientation (3)
CS 161. Introduction to Computer Science I (4)
CS 162. Introduction to Computer Science II (4)
or CS 165. Accelerated Introduction to
Computer Science (8) [Ecampus only]
CS 261. Data Structures (4)
CS 290. Web Development (4)
ECE 271. Digital Logic Design (3)
ECE 272. Digital Logic Design Laboratory (1)

MTH 231. Elements of Discrete
Mathematics (4)
or CS 225. Discrete Structures in
Computer Science (4) [Ecampus only]
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 254. Vector Calculus I (4)
MTH 306. Matrix and Power Series Methods (4)

PH 211. *General Physics with Calculus (4)
PH 221. Recitation for PH 211 (1) ${ }^{1}$
WR 121. *English Composition (3)
Additional Major Requirements:
PH 212, PH 213. *General Physics with Calculus $(4,4)$
PH 222, PH 223. Recitation for PH 212, PH $213(1,1)^{1}$
ST 314. Introduction to Statistics for Engineers (3)
WR 214. *Writing in Business (3)
or WR 222. *English Composition (3)
WR 327. *Technical Writing (3)
Computer Science, College of Science, Engineering, or Liberal Arts Electives (6)

## Professional Program

CS 321. Introduction to Theory of Computation (3)
CS 325. Analysis of Algorithms (4)
CS 340. Introduction to Databases (4)
CS 344. Operating Systems I (4)
CS 361. Software Engineering I (4)
CS 362. Software Engineering II (4)
CS 372. Introduction to Computer
Networks (4)
CS 381. Programming Language Fundamentals (4)
CS 391. *Social and Ethical Issues in Computer Science (3)

CS 444. Operating Systems II (4)
CS 461. Senior Software Engineering Project I (3)
CS 462. Senior Software Engineering Project II (3)
CS 463. Senior Software Engineering Project (2)

CS 480. Translators (4)
CS/ECE 472. Computer Architecture (4)
ECE 375. Computer Organization and Assembly Language Programming (4)
Computer Science Restricted Electives (12)
Three to Four of the following electives:

- CS 300-400 level courses, excluding courses required for Professional Program and CS 410, Occupational Internship
- CS 401-406 limited to 6 credits total
- ECE 300-400 level courses, excluding courses required for Professional Program
- MTH 351, MTH 440, MTH 451, MTH 452, and MTH 453
- Others may apply with prior department approval


## Baccalaureate Core

Biological Science Course (4)
Difference, Power, and Discrimination
Course (3-4)
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1)
or any PAC course (1)
Perspectives Course (Cultural Diversity) (3-4)
Perspectives Course (Literature \& Arts) (3-4)
Perspectives Course (Social Processes \&
Institutions) (3-4)
Perspectives Course (Western Culture) (3-4)
Synthesis Course (Contemporary Global
Issues) (3-4)
Unrestricted Electives (0-6)

## Total=180

Footnotes:
${ }^{1} 3$ credits of PH 221, PH 222, and PH 223 can be substituted with a physical science course (3 cr. or higher)

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Option Code: 334


## ELECTRICAL AND COMPUTER

 ENGINEERING (BS, CRED, HBS)The curriculum in Electrical and Computer Engineering provides a wide range of opportunities in undergraduate study in the electrical engineering areas of communications, signal processing and controls, electronics and integrated circuits, power electronics and energy systems, materials and devices, electromagnetism, microwaves and optics, and the computer engineering areas of computer architecture, digital hardware design, and computer networks.

The Electrical and Computer Engineering undergraduate program has the following objectives:

1. Graduates of the program will have successful careers.
2. Graduates of the program will
continue to learn and adapt to a changing world.
The Electrical and Computer Engineering undergraduate degree program includes a common set of core courses that provides a solid foundation, plus 29 -credits of restricted electives. The restricted electives allow students to prepare for industry, graduate study, or other career paths, specializing or broadening further their knowledge and skills. Elective course work is available focusing on sustainability and renewable energy, computers and networks, energy systems, integrated circuits, systems signals and communications, materials and devices, RF/microwaves and optoelectronics, and robotics and control. The sustainability and renewable energy focus addresses global technological challenges balancing societal needs with environmental and economic tradeoffs. Further details on restricted electives can be found on the EECS website: http://eecs.oregonstate.edu/.

Except as approved by the ECE curriculum committee, the 29 credits of restricted electives must include either CS 344 or ECE 390, plus four ECE 400-level electives and one additional 400-level elective from the approved list.

The ECE curriculum has been designed to meet the following minimum requirements, which still must be met if specific courses are waived:

- Mathematics and basic sciences: 45 credits
- Engineering science and design: 67.5 credits
- Upper-division courses: 60 credits

Non-MECOP Sample Program for ECE Majors
Pre-Professional Electrical and Computer Engineering Curriculum

## Freshman Year

CH 201. Chemistry for Engineering Majors (3) ${ }^{\mathbf{E}}$
or CH 231. *General Chemistry (4) ${ }^{\mathbf{E}}$
COMM 111. *Public Speaking (3) ${ }^{\mathbf{E}}$
or COMM 114. *Argument and Critical
Discourse (3) ${ }^{\mathbf{E}}$
CS 161. Introduction to Computer Science I (4) ${ }^{5}$
CS 162. Introduction to Computer Science II $(4)^{5}$
ECE 111. Introduction to ECE: Tools (3)
ECE 112. Introduction to ECE: Concepts (3) ${ }^{\mathbf{E}}$

HHS 231. *Lifetime Fitness for Health (2) ${ }^{\mathbf{1}}$
HHS 241. *Lifetime Fitness (1)1 or any PAC course (1-2)
MTH 231. Elements of Discrete Mathematics (4) ${ }^{\mathbf{5}}$
MTH 251. *Differential Calculus (4) ${ }^{\text {E }}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus I (4) ${ }^{\mathbf{E}}$
WR 121. *English Composition (3) ${ }^{\text {E }}$
Perspectives course (9) ${ }^{\mathbf{1}}$

## Sophomore Year

Biological Science course with lab (4) ${ }^{\mathbf{1}}$
CS 261. Data Structures (4) ${ }^{5}$
ECE 271. Digital Logic Design (3) ${ }^{5}$
ECE 272. Digital Logic Design Laboratory (1) ${ }^{5}$
ENGR 201. Electrical Fundamentals I (3) ${ }^{\mathbf{E}}$
ENGR 202. Electrical Fundamentals II (3) ${ }^{\mathbf{E}}$
ENGR 203. Electrical Fundamentals III (3)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4) ${ }^{\mathbf{E}}$

MTH 306. Matrix and Power Series Methods (4) ${ }^{\mathbf{E}}$

PH 211. *General Physics with Calculus (4) ${ }^{\mathbf{E}}$
PH 212. *General Physics with Calculus (4) ${ }^{\mathbf{E}}$
PH 213. *General Physics with Calculus (4) ${ }^{\mathbf{E}}$

## Professional Electrical and

## Computer Engineering Curriculum

## Junior Year

ECE 322. Electronics I (3)
ECE 323. Electronics II (3)
ECE 341. Junior Design I (3)
ECE 342. Junior Design II (3)
ECE 351. Signals and Systems I (3)
ECE 352. Signals and Systems II (3)
ECE 353. Introduction to Probability and Random Signals (3)
ECE/CS 372. Introduction to Computer Networks (4) ${ }^{6}$
ECE 375. Computer Organization and
Assembly Language Programming (4)
ECE 391. Transmission Lines (3) ${ }^{6}$
Difference, Power and Discrimination course (3) ${ }^{\mathbf{1}}$

## Restricted Electives:

ECE 390. Electric and Magnetic Fields (4) or CS 344. Operating Systems I (4)
Contemporary Global Issues course (3) ${ }^{\mathbf{1}}$
WR 327. *Technical Writing (3)

## Senior Year

CS 391. *Social and Ethical Issues in Computer Science (3)
ECE 441, ECE 442, ECE 443. ${ }^{\wedge}$ Engineering Design Project $(3,3,2)$
Perspectives course (3) ${ }^{\mathbf{1}}$
Restricted Electives: four 400-level ECE courses (12-16) ${ }^{6}$
Restricted Electives: one 400-level course $(3-4)^{6}$

## Restricted Electives (5-10) ${ }^{6}$

## Current List of Restricted Electives:

CH 411. Inorganic Chemistry (3)
CHE 444. Thin Film Materials Processing (4)
CHE 499. Special Topics [Conventional
Alternative Energy Systems] (3)
CS 325. Analysis of Algorithms (4)
CS 331. Introduction to Artificial Intelligence (4)
CS 344. Operating Systems I (4)
CS 434. Machine Learning and Data Mining (4)

CS 444. Operating Systems II (4)
CS 450. Introduction to Computer Graphics (4)

ECE 331. Electromechanical Energy Conversion (4)
ECE 390. Electric and Magnetic Fields (4)
ECE 406. Projects (1-6)
ECE 411. Engineering Magnetics (3)
ECE 413. Sensors (3)
ECE 415. Material Science of

Nanotechnology (3)
ECE 416. Electronic Materials and Devices (4)

ECE 417. Basic Semiconductor Devices (4)
ECE 418. Semiconductor Processing (4)
ECE 422. CMOS Integrated Circuits I (4)
ECE 423. CMOS Integrated Circuits II (4)
ECE 428. Data Converters (4)
ECE 431. Power Electronics (4)
ECE 432. Dynamics of Electromechanical Energy Conversion (4)
ECE 433. Power System Analysis (4)
ECE 437. Smart Grid (3)
ECE 438. Electric and Hybrid Vehicles (4)
ECE 451/ME 430. Systems Dynamics and Control (4)
ECE 461. Introduction to Analog and Digital Communications (4)
ECE 462. Digital Communications and Channel Coding (4)
ECE 463. Wireless Communications Network (4)
ECE 464. Digital Signal Processing (4)
ECE 468. Digital Image Processing (3)
ECE 471. Energy-Efficient VLSI Design (4)
ECE/CS 472. Computer Architecture (4)
ECE 473. Microcontroller System Design (4)
ECE 474. VLSI System Design (4)
ECE/CS 476. Advanced Computer
Networking (4)
ECE 477. Multimedia Systems (4)
ECE 478. Network Security (4)
ECE/PH 482. Optical Electronic Systems (4)
ECE/PH 483. Guided Wave Optics (4)
ECE 484. Antennas and Propagation (4)
ECE 485. Microwave Design Techniques (4)
ECE 499. Special Topics (3-4)
ECE 520. Analog CMOS Integrated Circuits (4)

ECE 530. Contemporary Energy Applications (4)
ECE 534. Advanced Electrical Machines (3)
ECE 536. Power System Protection (3)
ECE 550. Linear Systems (4)
ME/NSE 311. Introduction to Thermal-Fluid Sciences (4)
ME 317. Intermediate Dynamics (4)
MTH 341. Linear Algebra I (3)
MTH 342. Linear Algebra II (4)
MTH 351. Introduction to Numerical Analysis (3)
PH 315. Physics of Contemporary
Challenges (3)
PH 481. Physical Optics (4)
ROB 421. Applied Robotics (4)
ROB 456. Intelligent Robots (4)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Core Course (WIC)
${ }^{\text {E }}$ Required for entry into the professional program.
${ }^{\mathbf{1}}$ Must be selected to satisfy the requirements of the baccalaureate core.
${ }^{5}$ Prerequisite for required upper-division courses. Recommended for completion prior to entry into the professional engineering program.
${ }^{6}$ Must be selected from approved restricted elective list.
Pre-Electrical and Computer Engineering Major Code: 030
Major Code: 039


## COMPUTER SCIENCE MINOR

## Also available at OSU-Cascades

Computing has become pervasive, touching nearly every aspect of our lives. A minor in Computer Science can open up opportunities for employment in the software development industry, but also in many areas including healthcare, business, science, medicine, graphics, utilities and education. Courses will teach theory, problem-solving skills, and programming.

## Computer Science Minor

## Requirements ( $\mathbf{3 6}$ credits total)

To earn the minor upon graduation, students must meet all of the following:

1. Earn a C in each of their minor courses (all courses must be taken A-F grading)
2. Have a minimum 2.25 GPA in all required minor course work (36 credits)
Lower-Division Computer Science
Minor Requirements ( $\mathbf{2 0}$ credits)
CS 161. Introduction to Computer Science I (4)
CS 162. Introduction to Computer Science II (4)
CS 261. Data Structures (4)
CS 271. Computer Architecture and Assembly Language (4) ${ }^{\mathbf{1}}$
MTH 231. Elements of Discrete Mathematics (4)
or CS 225. Discrete Structures in
Computer Science (4)
Students may declare the Computer Science minor after completing the required lower-division courses with a GPA of 2.25 or higher and after becoming eligible to take 300-level courses in their major. Please speak with an EECS advisor to declare the minor.

## Upper-Division Computer Science

Minor Requirements ( 16 credits) ${ }^{2,3}$
CS 362. Software Engineering II (4)

## Recommended elective courses

might include (but not limited to) ( 12 credits):
CS 344. Operating Systems (4)
CS 352. Introduction to Usability
Engineering (4)
CS 361. ^ ^Software Engineering I (4)
CS 440. Database Management Systems (4)
CS 475. Introduction to Parallel
Programming (4)
CS 496. Mobile and Cloud Software Development (4)
Other upper-division courses are acceptable; please speak with an advisor about which courses might create the best path for your goals.
Courses that cannot be used for minor requirements:
CS 391. *Social and Ethical Issues in Computer Science (3)
CS 395. Website Multimedia (4)
CS 401. Research (1-16)
CS 405. Reading and Conference (1-16)
CS 407. Seminar (1-16)
CS 410. Occupational Internship (1-16)
CS 461. ${ }^{\wedge}$ Senior Software Engineering

Project I (3)
CS 462. ^ Senior Software Engineering
Project II (3)
CS 463. Senior Software Engineering Project (2)

CS 494. Web Development (4)
CS 495. Interactive Multimedia Projects (4)

## Footnotes:

${ }^{1}$ Electrical and Computer Engineering (ECE) students who wish to minor in Computer Science must take ECE 271 (3) and ECE 272 (1), instead of CS 271.
${ }^{2}$ Electrical and Computer Engineering
(ECE) students will take ECE 375. Computer Organization and Assembly Language Programming (4) and CS/ECE 372. Introduction to Computer Networks (4) plus 4 credits of upper-division computer science courses.
${ }^{3}$ Electrical and Computer Engineering (ECE) students can take the following courses that will count both as an ECE restrictive elective for the ECE major and as well as towards the CS minor: CS 344, CS 325, CS 331, CS 444, CS 434,
CS 450, CS/ECE 472, CS/ECE 476

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Minor Code: 249

## GRADUATE MAJORS

COMPUTER SCIENCE (MA, MEng, MS, PhD, MAIS)

Graduate Areas of Concentration
Algorithms and cryptography; artificial
intelligence, machine learning and data
science; computer graphics, visualization, and vision; computer systems and networking; human-computer
interaction; programming languages; software engineering
See EECS website for complete information: http://eecs.oregonstate.edu/ research.

The master's program provides advanced instruction beyond the undergraduate degree. It prepares students for careers in which a higher level of experience is required. The PhD program prepares students for work in government or industry research laboratories or industry research laboratories or for careers at universities.

Additional areas of concentration may be arranged with other departments, for example, numerical analysis or computer algebra with the Department of Mathematics.

For additional information, contact Nicole Thompson, Graduate Coordinator, School of EECS, OSU, Corvallis, OR 97331-5501, 541-737-7234, email: eecs. gradinfo@oregonstate.edu. Additional information concerning courses, advising, procedures, faculty and many other aspects of the program may be found on the school's website at http://eecs.or-egonstate.edu/future-students/graduate/ research-interest-areas.
Major Code: 3070

## ELECTRICAL AND COMPUTER ENGINEERING (MEng, MS, PhD)

Graduate Areas of Concentration
Analog and mixed signal; artificial intelligence and machine learning, communications and signal processing, computer systems; energy systems; materials and devices; RF/microwaves/ optoelectronics
See EECS website for complete information: http://eecs.oregonstate.edu/ research.

The School of Electrical and Computer Engineering offers graduate programs leading to MEng, MS, and PhD degrees focusing on the major areas listed below. The MS and MEng programs provide advanced instruction beyond the undergraduate degree. They prepare students for careers in which a higher level of experience is required. The MEng degree is a course work-only degree with no required thesis or project report. The PhD program prepares students for work in government or industry research laboratories or careers at universities. Students are encouraged to develop programs of study in close cooperation with the faculty members in their areas of interest.

Graduate work is supported by the school's well-equipped laboratory facilities. Opportunities exist for graduate students to participate in many research projects sponsored by private industry and government agencies.

For more information, contact Nicole Thompson, Graduate Coordinator, School of Electrical Engineering and Computer Science, OSU, Corvallis, OR 97331-5501; 541-737-7234; email: eecs. gradinfo@oregonstate.edu.

Additional information concerning courses, advising procedures, faculty, and many other aspects of the school may be found on the school's website at http:// eecs.oregonstate.edu/.

## Major Code: 3110

## GRADUATE MINORS

## COMPUTER SCIENCE GRADUATE

 MINORFor more details, see the school advisor.
Minor Code: 3070

## ELECTRICAL AND COMPUTER ENGINEERING GRADUATE MINOR

For more details, see the school advisor.

## Minor Code: 3110

## - COMPUTER SCIENCE COURSES

CS 101. COMPUTERS: APPLICATIONS AND IMPLICATIONS (4). The varieties of computer hardware and software. The effects, positive and negative, of computers on human lives. Ethical implications of information technology. Hands-on experience with a variety of computer applications Lec/lab.
CS 151. INTRODUCTION TO PROGRAMMING I WITH EMBEDDED CONTROL LAB (4).

Thorough treatment of the basic elements of C , bitwise operations, flow of control, input/output, functions, arrays, strings, and structures. Lec/lab. CROSSLISTED as ECE 151. PREREQS: (MTH 111 [C] or MTH 112 [C] or (MTH 251 [C] or MTH 251H [C] )) or Placement Test MPT(23)
CS 160. COMPUTER SCIENCE ORIENTATION (3). Introduction to the computer science field and profession. Team problem solving. Introduction to writing computer programs. Lec/lab. PREREQS: Wireless laptop required
CS 160H. COMPUTER SCIENCE ORIENTATION (3). Introduction to the computer science field and profession. Team problem solving. Introduction to writing computer programs. Lec/lab. PREREQS: Wireless laptop required. Honors College approval required.
CS 161. INTRODUCTION TO COMPUTER
SCIENCE I (4). Overview of fundamental concepts of computer science. Introduction to problem solving, software engineering, and object-oriented programming. Includes algorithm design and program development. Lec/lab/rec. PREREQS: MTH 112* [C] or Placement Test MPT(33) or Placement Test MPAL(061) and for CS Double Degree students: BA/BS and (MTH 111 or MPT>=24 or MPAL>=061)

CS 162. INTRODUCTION TO COMPUTER SCIENCE II (4). Basic data structures. Computer programming techniques and application of software engineering principles. Introduction to analysis of programs. Lec/lab/rec. PREREQS: CS 161 [C] or EECS 161 [C]
CS 165. ACCELERATED INTRODUCTION TO COMPUTER SCIENCE (8). Overview of the fundamental concepts of computer science. Introduction to problem solving, algorithm development, data types, and basic data structures. Introduction to analysis of algorithms and principles of software engineering. System development and computer programming using procedural/object-oriented paradigms. Offered via Ecampus only. PREREQS: MTH 111 [C] or Placement Test MPAL(060) and CS Double Degree students must have a BA/BS degree.
CS 175. *COMMUNICATIONS SECURITY AND SOCIAL MOVEMENTS (3). Equipping students with the theory and practice of communications security, this course explores how social movements can remain effective in the context of mass surveillance and state repression. Lec/rec. (Bacc Core Course) PREREQS: Wireless laptop required.

CS 195. WEBSITE DESIGN (4). How to design and publish a static website using an existing publishing platform: Techniques and tools for designing and publishing on the World Wide Web; hypertext and HTMTL; site and page design; media integration; issues raised by Internet publishing.
CS 199. ST/COMPUTER SCIENCE (1-16). This course is repeatable for a maximum of 16 credits. CS 201. COMPUTER PROGRAMMING FOR NON-CS MAJORS (3). Covers a variety of fundamental topics in computer programming relevant to anyone who wants to write or work with computer code in their work or studies. Teaches basic computational thinking and programming skills which will allow students to solve a variety of real-world problems. In addition, students will learn more advanced topics such as how some basic algorithms work and can be written in computer code. PREREQS: This course may not be used to count towards the CS major or minor.
CS 225. DISCRETE STRUCTURES IN
COMPUTER SCIENCE (4). An introduction to the discrete mathematics of computer science, including logic, set and set operations, methods of proof, recursive definitions, combinatorics, and graph theory. (Note: Students may take either MTH 231 or CS 225, but cannot receive credit for both.) PREREQS: MTH 111 [C] or Placement Test MPT(24) or Placement Test MPAL(061) or MTH
$112^{*}$ [C] and for CS Double Degree students: BA/ BS and (MTH 111 or MPT>=24 or MPAL>=61)

CS 261. DATA STRUCTURES (4). Abstract data types, dynamic arrays, linked lists, trees and graphs, binary search trees, hash tables, storage management, complexity analysis of data structures. Lec/rec. PREREQS: (CS 162 [C] or CS 165 [C] ) and (CS 225 [C] or MTH 231 [C] )
CS 262. PROGRAMMING PROJECTS IN C++ 4). Learning a second computer programming language. Elements of C++. Object-oriented programming. Experience team work on a large programming project. PREREQS: CS 261 [C]
CS 271. COMPUTER ARCHITECTURE AND ASSEMBLY LANGUAGE (4). Introduction to functional organization and operation of digital computers. Coverage of assembly language; addressing, stacks, argument passing, arithmetic operations, decisions, macros, modularization, linkers and debuggers. PREREQS: (CS 151 [C] or CS 161 [C] or CS 165 [C] or ECE 151 [C] )
CS 290. WEB DEVELOPMENT (4). How to design and implement a multi-tier application using web technologies: Creation of extensive custom clientand server-side code, consistent with achieving a high-quality software architecture. PREREQS: CS 162 [C] or CS 165 [C]
CS 295. WEBSITE MANAGEMENT (4). How to create and promote a dynamic website using existing frameworks/libraries: Designing, developing, publishing, maintaining, and marketing dynamic websites; web security and privacy issues; emerging web technologies; running a website marketing campaign. PREREQS: CS 195 [C] and /or equivalent (i.e., basic HTML and CSS)
CS 312. LINUX SYSTEM ADMINISTRATION
(4). Introduction to LINUX system administration. Network administration and routing. Internet services. Security issues. PREREQS: CS 344 [C] or CS 311 [C] and /or instructor approval.
CS 321. INTRODUCTION TO THEORY OF COMPUTATION (3). Survey of models of computation including finite automata, formal grammars, and Turing machines. PREREQS: CS 261 [C] and (CS 225 [C] or MTH 231 [C] ) CS 321H. INTRODUCTION TO THEORY OF COMPUTATION (3). Survey of models of computation including finite automata, formal grammars, and Turing machines. PREREQS: CS 261 [C] and (CS 225 [C] or MTH 231 [C] ) and Honors College approval required.

CS 325. ANALYSIS OF ALGORITHMS (4).
Recurrence relations, combinatorics, recursive algorithms, proofs of correctness. PREREQS: CS 261 [C] and (CS 225 [C] or MTH 231 [C] )
CS 325H. ANALYSIS OF ALGORITHMS (4). Recurrence relations, combinatorics, recursive algorithms, proofs of correctness. PREREQS: CS 261 [C] and (CS 225 [C] or MTH 231 [C] ) and Honors College approval required.

CS 331. INTRODUCTION TO ARTIFICIAL NTELLIGENCE (4). Fundamental concepts in artificial intelligence using the unifying theme of an intelligent agent. Topics include agent architectures, search, games, logic and reasoning and Bayesian networks. PREREQS: (CS 325 [C] or CS 325H [C] )
CS 340. INTRODUCTION TO DATABASES (4). Design and implementation of relational databases, including data modeling with ER or UML, diagrams, relational schema, SQL queries, relational algebra, user interfaces, and administration. PREREQS: CS 290 [C]

CS 344. OPERATING SYSTEMS I (4). Introduction to operating systems using UNIX as the case study. System calls and utilities, undamentals of processes and interprocess communication. PREREQS: CS 261 [C] and (CS 271 [C] or ECE 271 [C]) and experience programming in the $C$ language.

CS 352. INTRODUCTION TO USABILITY
ENGINEERING (4). Basic principles of usability engineering methods for the design and evaluation of software systems. Includes the study of humanmachine interactions, user interface characteristics and design strategies, software evaluation methods, and related guidelines and standards. PREREQS: (CS 151 [C] or CS 161 [C] or CS 165 [C] or CS 295 [C] or ECE 151 [C] )
CS 361. SOFTWARE ENGINEERING I (4). Introduction to the "front end" of the software engineering lifecycle; requirements analysis and specification; design techniques; project management. PREREQS: CS 261 [C]
CS 362. SOFTWARE ENGINEERING II (4). Introduction to the "back end" of the software engineering lifecycle implementation; verification and validation; debugging; maintenance.
PREREQS: CS 261 [C] and Experience with object-oriented programming and data structures (e.g., CS 161, CS 162, CS 261). CS 361 is recommended but not required.
CS 370. INTRODUCTION TO SECURITY (4). Introductory course on computer security with the objective to introduce concepts and principles of computer systems security. Notions of security, basic crytographic primitives and their application, basics of authentication and access control, basics of key-management, basics of malware and software security. PREREQS: CS 344* [C]

## CS 372. INTRODUCTION TO COMPUTER

 NETWORKS (4). Computer network principles, fundamental networking concepts, packetswitching and circuit switching, TCP/IP protocol layers, reliable data transfer, congestion control, flow control, packet forwarding and routing, MAC addressing, multiple access techniques. Lec. CROSSLISTED as ECE 372. PREREQS: CS 261 [C] and (ECE 271 [C] or CS 271 [C] ) and C programming and Unix familiarity.CS 373. DEFENSE AGAINST THE DARK ARTS
(4). Introduction to the current state of the art in anti-malware, computer forensics, and networking messaging, and web security. Broad introduction to the field of computer security. PREREQS: CS 344 [C] and CS 340 [C] and CS 372 [C]

## CS 381. PROGRAMMING LANGUAGE

FUNDAMENTALS (4). An introduction to the concepts found in a variety of programming languages. Programming languages as tools for problem solving. A brief introduction to languages from a number of different paradigms. PREREQS: CS 261 [C] and (CS 225 [C] or MTH 231 [C] )

## CS 391. *SOCIAL AND ETHICAL ISSUES IN

 COMPUTER SCIENCE (3). In-depth exploration of the social, psychological, political, and ethical issues surrounding the computer industry and the evolving information society. (Bacc Core Course) PREREQS: CS 101 or computer literacy.CS 395. WEBSITE MULTIMEDIA (4). How to create and deploy interactive digital multimedia through static websites: Technological, aesthetic, and pedagogical issues of communication using interactive multimedia and hypermedia; techniques for authoring interactive multimedia projects using a variety of digital media roots. PREREQS: CS 195 [C] or (ART 120 [C] and (CS 162 [C] or CS 165 [C] ))
CS 401. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CS 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CS 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approva required.
CS 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

CS 407. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

CS 407H. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
CS 410. OCCUPATIONAL INTERNSHIP (1-16).
Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CS 419. SELECTED TOPICS IN COMPUTER
SCIENCE (0-5). Topics of special and current interest not covered in other courses. This course is repeatable for a maximum of 99 credits. PREREQS: Varies by class offering, senior standing in computer science.
CS 419H. SELECTED TOPICS IN COMPUTER
SCIENCE (1-5). Topics of special and current interest not covered in other courses. This course is repeatable for a maximum of 99 credits. PREREQS: Varies by class offering, senior standing in computer science. Honors College approval required.
CS 420. GRAPH THEORY WITH APPLICATIONS TO COMPUTER SCIENCE (3). Directed and undirected graphs; paths, circuits, trees, coloring, planar graphs, partitioning; computer representation of graphs and graph algorithms; applications in software complexity metrics, program testing, and compiling. PREREQS: (CS 325 [C] or CS 325H [C] )
CS 427. CRYPTOGRAPHY (4). Introduction to the theory and practice of modern cryptography. Fundamental primitives including pseudorandom generators, block ciphers, hash functions. Symmetric-key cryptography for privacy and authenticity. Public-key cryptography based on number-theoretic problems. PREREQS: CS 261 [C] or MTH 355 [C]
CS 434. MACHINE LEARNING AND DATA
MINING (4). Introduction to machine learning and data mining algorithms (supervised learning, unsupervised learning, and reinforcement learning) tools that are widely employed in industrial and research settings. PREREQS: (CS 325 [C] or CS 325H [C] )
CS 440. DATABASE MANAGEMENT SYSTEMS
(4). Relational database design, normalization, file structures, disk storage, query processing and optimization, team development of database applications. PREREQS: CS 261 [C] and (CS 275 [C] or CS 340 [C] )
CS 444. OPERATING SYSTEMS II (4). Principles of computer operating systems: concurrent processes, memory management, job scheduling, multiprocessing, file systems, performance evaluation, and networking. Lec/rec. PREREQS: (CS 311 [C] or CS 344 [C] ) and (CS 271 [C] or ECE 375 [C] )
CS 446. NETWORKS IN COMPUTATIONAL
BIOLOGY (3). An introduction to biological networks and computational methods for their analysis, inference, and functional modeling. Various network centralities, topological measures, clustering algorithms, and probabilistic annotation models are introduced in the context of protein interaction, gene regulatory, and metabolic networks. The course also surveys bioinformatics methods for data-driven inference of network structure. PREREQS: CS 261 [C] and CS 325* (recommended) or by instructor permission
CS 447. WIRELESS EMBEDDED SYSTEMS (4). A hands-on introduction to programming wireless embedded systems (aka the "Internet of Things"). Topics include sensors, actuators, state machines, scheduling, wireless communications, time synchronization, localization, fault tolerance, and security related to cyber-physical systems. PREREQS: CS 344 [C]
CS 450. INTRODUCTION TO COMPUTER GRAPHICS (4). 2-D and 3-D graphics APIs.
Modeling transformations. Viewing specification and transformations. Projections. Shading. Texture
mapping. Traditional animation concepts. 3-D production pipeline. Keyframing and kinematics. Procedural animation. PREREQS: (CS 261 [C] and (MTH 306 [C] or MTH 306H [C] or MTH 341 [C]))
CS 453. SCIENTIFIC VISUALIZATION (4).
Applies 3D computer graphics methods to visually understand scientific and engineering data. Methods include hyperbolic projections; mapping scalar values to color spaces; data visualization using range sliders; scalar visualization (point clouds, cutting planes, contour plots, isosurfaces); vector visualization (arrow clouds, particle advection, streamlines); terrain visualization; Delauney triangulation; and volume visualization. PREREQS: Prior experience with Unix or Windows, programming experience.
CS 457. COMPUTER GRAPHICS SHADERS (4).
Theoretical and practical treatment of computer graphics shaders, including both RenderMan and GPU shaders. Programming in both RenderMan and OpenGL shading languages. PREREQS: Previous graphics pipeline programming experience.
CS 458. INTRODUCTION TO INFORMATION VISUALIZATION (4). Tools and techniques for designing, developing, and deploying interactive visualizations of abstract data sources. Discusses techniques based on principles from design, cognitive science, and perceptual psychology. Topics include 1D, 2D, 3D, multivariate representations, time-series, graphs and trees, text and documents, and interaction techniques. PREREQS: CS 361 [C] and junior standing or above.

## CS 461. ^SENIOR SOFTWARE ENGINEERING

PROJECT I (3). Utilize software engineering methodology in a team environment to develop a real-world application. Teams will be responsible for all phases of software development, including project planning, requirements analysis, design, coding, testing, configuration management, quality assurance, documentation, and delivery. Threeterm sequence required. This course fulfills the WIC requirement for computer science majors. (Writing Intensive Courses). PREREQS: CS 361 [C] and senior standing
CS 462. ^SENIOR SOFTWARE ENGINEERING PROJECT II (3). Utilize software engineering methodology in a team environment to develop a real-world application. Teams will be responsible for all phases of software development, including project planning, requirements analysis, design, coding, testing, configuration management, quality assurance, documentation, and delivery. Three-term sequence required. (Writing Intensive Courses) PREREQS: (CS 362 [C] and CS 461 [C]) and senior standing

## CS 463. SENIOR SOFTWARE ENGINEERING

 PROJECT (2). Utilize software engineering methodology in a team environment to develop a real-world application. Teams will be responsible for all phases of software development, including project planning, requirements analysis, design, coding, testing, configuration management, quality assurance, documentation, and delivery. Threeterm sequence required. PREREQS: CS 462 [C]CS 464. OPEN SOURCE SOFTWARE (4).
Provides a theoretical foundation of the history, key concepts, technologies, and practices associated with modern Free and Open Source Software (FOSS) projects, and gives students an opportunity to explore and make contributions to FOSS projects with some mentoring and guidance. PREREQS: CS 261 [C] or CS 361 [C]
CS 466. WEB-BASED START-UP PROJECT (4). Real-world, hands-on learning in a high-tech web/ mobile-based company environment. Research in the development of product ideas, hypotheses, and business models to create customer experiments. Prototyping and statistical analysis to develop, optimize, and evaluate solutions. Rapid iteration/refactoring based on customer input, web analytics, and user engagement metrics. Offered at OSU-Cascades only. COREQS: CS 461

CS 467. ONLINE CAPSTONE PROJECT (4).
Real-world team-based experience with the software engineering design and delivery cycle, including requirements analysis and specification, design techniques, and requirements and final project written documentation. For students in the online CS double-degree program only. PREREQS: CS 361 [C] and for students in the online CS double-degree program only.
CS 468. INCLUSIVE DESIGN (HCI) (4). Inclusive design is designing software that works for a wide variety of differently abled customers. Teaches the skills needed to design inclusively without having to have a separate design for each differently abled customer. PREREQS: CS 352 [C] and /or CS 565 [C]
CS 472. COMPUTER ARCHITECTURE (4). Computer architecture using processors, memories, and I/O devices as building blocks. Issues involved in the design of instruction set architecture, processor, pipelining and memory organization. Design philosophies and trade-offs involved in Reduced Instruction Set Computer (RISC) architectures. Lec/lab. CROSSLISTED as ECE 472/ECE 572. PREREQS: ECE 375 [C]

CS 475. INTRODUCTION TO PARALLEL
PROGRAMMING (4). Theoretical and practical survey of parallel programming, including a discussion of parallel architectures, parallel programming paradigms, and parallel algorithms. Programming one or more parallel computers in a higher-level parallel language. PREREQS: (CS 325 [C] or CS 325H [C] )

## CS 476. ADVANCED COMPUTER

NETWORKING (4). Advanced networking concepts: source/channel coding, queuing theory, router design, network architectures (Intserv, DiffServ, MPLS), multimedia protocols (TFRC, RTP), overlay networks, and wireless standards (Bluetooth 802.11b, 3/4G). CROSSLISTED as ECE 476/ECE 576. PREREQS: (CS 372 [C] or ECE 372 [C] ) and (ECE 353 [C] or ST 314 [C] or ST 314H [C] )

CS 478. NETWORK SECURITY (4). Basic concepts and techniques in network security, risks and vulnerabilities, applied cryptography and various network security protocols. Coverage of high-level concepts such as authentication, confidentiality, integrity, and availability applied to networking systems. Fundamental techniques including authentication protocols, group key establishment and management, trusted intermediaries, public key infrastructures, SSL/ TLS, IPSec, firewalls and intrusion detection CROSSLISTED as ECE 478. PREREQS: (CS 372 [C] or ECE 372 [C] ) and recommended prerequisite: CS 370, Introduction to Security
CS 480. TRANSLATORS (4). An introduction to compilers; attribute grammars, syntax-directed translation, lex, yacc, LR(1) parsers, symbol tables, semantic analysis, and peep-hole optimization. PREREQS: (CS 344 [C] or CS 311 [C] ) and CS 321 [C]

## CS 491. COMPUTER SCIENCE SKILLS FOR

 SIMULATION AND GAME PROGRAMMING (4). Game and simulation development is very much a data and math-intensive activity. A certain number of actions must be produced, and producing them by hand is hard. This is a middleware CS course that fills in many of the missing pieces for those wanting to enter the simulation and game development worlds in a software tool-building capacity. PREREQS: CS 261 [C] and (CS 225 [C] or MTH 231 [C] ) and MTH 252 [C]
## CS 495. INTERACTIVE MULTIMEDIA

PROJECTS (4). Students apply principles and procedures of digital art, design, communication, and software authoring while working on large integrated media projects. PREREQS: CS 395

## CS 496. MOBILE AND CLOUD SOFTWARE

DEVELOPMENT (4). Introduction to the concepts and techniques for developing mobile and cloud applications. PREREQS: CS 344 [C] or CS 311
[C] and students need a working knowledge of at least one operating system in order to be successful in developing mobile and cloud software.
CS 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
CS 501. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 99 credits. PREREQS: Departmental approval required.
CS 503. CS MS THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Instructor's consent required.

CS 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 20 credits. PREREQS: Departmental approval required.
CS 506. PROJECTS (1-16). Graded P/N. This course is repeatable for a maximum of 99 credits. PREREQS: Departmental approval required.
CS 507. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Graduate standing.

CS 515. ALGORITHMS AND DATA
STRUCTURES (4). Greedy algorithms, divide and conquer, dynamic programming, network flow, data structures. PREREQS: Graduate standing in computer science and an undergraduate course in algorithms.

CS 516. THEORY OF COMPUTATION AND FORMAL LANGUAGES (4). Models of computation. Universal machines. Unsolvable problems. Nondeterministic computation. Chomsky hierarchy: regular, context-free, context-sensitive and unrestrictive grammars; characterization, closure properties, algorithms, and limitations. PREREQS: Graduate standing in computer science.

CS 517. THEORY OF COMPUTATION (4).
Turing machines, decidability, NP-completeness, complexity classes, randomized computation, relativization, circuit complexity, interactive proof systems, lower bounds, cryptography. PREREQS: Graduate standing in computer science.

CS 519. SELECTED TOPICS IN COMPUTER
SCIENCE (0-5). Topics of special and current interest not covered in other courses. May not be offered every year. This course is repeatable for a maximum of 99 credits. PREREQS: Varies by class offering.

CS 520. GRAPH THEORY WITH APPLICATIONS TO COMPUTER SCIENCE (3). Directed and undirected graphs; paths, circuits, trees, coloring, planar graphs, partitioning; computer representation of graphs and graph algorithms applications in software complexity metrics, program testing, and compiling. PREREQS: CS 325 and MTH 232

## CS 521. COMPUTABILITY (4). Recursive

functions. Turing machines. Undecidability. Relativized computation. Complexity classes PREREQS: CS 516

CS 523. ADVANCED ALGORITHMS (4).
Approximation algorithms, randomized and probabilistic algorithms, online algorithms. PREREQS: CS 515

CS 524. NP-COMPLETE AND HARDER
PROBLEMS (4). Complexity classes and reducibilities. NP-Complete problems, proof techniques, and heuristics, approximation algorithms. Provably hard problems. Hierarchies. PREREQS: CS 523

CS 527. ERROR-CORRECTING CODES (4). Hamming codes, linear codes, cyclic codes, BCH and Reed-Solomon codes. Introduction to Galois fields. Encoding and decoding algorithms. Burst error correcting codes, asymmetric and unidirectional codes. Applications of codes for computer systems. PREREQS: Discrete math and probability

CS 529. SELECTED TOPICS IN THEORETICAL COMPUTER SCIENCE (1-5). Topics of interest in algorithms and theory of computation. Topics include approximation algorithms, planar graph algorithms, distributed algorithms, combinatorial optimization, computational geometry. This course is repeatable for a maximum of 99 credits. PREREQS: CS 515

CS 531. ARTIFICIAL INTELLIGENCE (4). Intelligent agents. Problem-solving as heuristic search. Adversarial search. Constraint satisfaction methods; Arc-consistency. Knowledge representation and reasoning. Propositional logic. Reasoning with propositional logic: algorithms for satisfiability. First-order logic. Proof theory, model theory, resolution refutation, forward and backward chaining, representing events and actions. Lec/ lab. PREREQS: Graduate standing in computer science.

CS 532. ADVANCED ARTIFICIAL
INTELLIGENCE (4). Knowledge representation, reasoning, and learning with relational and firstorder representations. First-order logic: proof theory, model theory, resolution refutation, Prologstyle resolution. Inductive logic programming. Complex belief networks: Hidden Markov models, Viterbi algorithm, Forward-backward algorithm. Learning HMMs with EM. Probabilistic relational models: exact and stochastic inference algorithms. Learning methods for probabilistic relational models. PREREQS: CS 531

CS 533. INTELLIGENT AGENTS AND DECISION
MAKING (4). Representations of agents, execution architectures. Planning: non-linear planning, graphplan, SATplan. Scheduling and resource management. Probabilistic agents. Dynamic belief networks. Dynamic programming (value iteration and policy iteration). Reinforcement learning: Prioritized sweeping, Q learning, value function approximation and SARSA (lamda), policy gradient methods. PREREQS: CS 531
CS 534. MACHINE LEARNING (4). Continuous representations. Bias-variance tradeoff. Computational learning theory. Gaussian probabilistic models. Linear discriminants. Support vector machines. Neural networks. Ensemble methods. Feature extraction and dimensionality reduction methods. Factor analysis. Principle component analysis. Independent component analysis. Cost-sensitive learning. PREREQS: Graduate standing.
CS 535. DEEP LEARNING (4). An introduction to the concepts and algorithms in deep learning; basic feedforward neural networks, convolutional neural networks, recurrent neural networks including long short-term memory models, deep belief nets, autoencoders and deep networks applications in computer vision, natural language processing and reinforcement learning PREREQS: CS 534 [B] and /or equivalent.

CS 536. PROBABILISTIC GRAPHICAL MODELS
(4). Representation of probabilistic graphical models, both directed (Bayesian networks) and undirected (Markov networks). Exact and approximate inference techniques. Parameter and structure learning from data. PREREQS: Graduate standing with strong programming skills.

CS 539. SELECTED TOPICS IN ARTIFICIAL
INTELLIGENCE (1-5). Advanced topics in artificial intelligence. Typical topics include machine learning for sequential and spatial data, knowledge representation and inference, probabilistic modeling of complex systems, data mining and information extraction. This course is repeatable for a maximum of 12 credits. PREREQS: Instructor's approval required.
CS 540. DATABASE MANAGEMENT SYSTEMS
(4). Purpose of database systems, levels of data representation. Entity-relationship model. Relational systems: data definition, data manipulation, query language (SQL), relational calculus and algebra, data dependencies and normal forms. DBTG network model. Query
optimization, recovery, concurrency control. PREREQS: CS 261 or graduate standing in computer science.

CS 544. OPERATING SYSTEMS II (4). Principles of computer operating systems: concurrent processes, memory management, job scheduling, multiprocessing, file systems, performance evaluation, and networking. Lec/rec. PREREQS: (CS 311 or CS 344) and (CS 271 or ECE 375)

CS 546. NETWORKS IN COMPUTATIONAL BIOLOGY (3). An introduction to biological networks and computational methods for their analysis, inference, and functional modeling. Various network centralities, topological measures, clustering algorithms, and probabilistic annotation models are introduced in the context of protein interaction, gene regulatory, and metabolic networks. The course also surveys bioinformatics methods for data-driven inference of network structure. PREREQS: CS 325* (recommended) or by instructor permission.

## CS 549. SELECTED TOPICS IN INFORMATION-

 BASED SYSTEMS (1-5). Current topics in information-based systems, e.g. information management for CAD, geographical information systems, distributed information systems, data models for complex applications. This course is repeatable for a maximum of 99 credits. PREREQS: CS 540
## CS 550. INTRODUCTION TO COMPUTER

GRAPHICS (4). 2-D and 3-D graphics APIs.
Modeling transformations. Viewing specification and transformations. Projections. Shading. Texture mapping. Traditional animation concepts. 3-D production pipeline. Keyframing and kinematics. Procedural animation. PREREQS: CS 261 and (MTH 306 or MTH 306H or MTH 341)
CS 551. COMPUTER GRAPHICS (4). 3-D graphics hardware: Line and polygon scan conversion, modeling transformations, viewing transformations, matrix stacks, hierarchical models, perspective and orthographic projections, visible surface determination, illumination models, shading models, texture mapping, ray tracing. PREREQS: CS 450 or CS 550
CS 552. COMPUTER ANIMATION (4). Traditional animation concepts: production pipeline, keyframing implementation, interpolation, pointmass dynamics, spring-mass systems, rigid body dynamics, forward and inverse kinematics, human motion control, motion capture. PREREQS: CS 551
CS 553. SCIENTIFIC VISUALIZATION (4).
Applies 3D computer graphics methods to visually understand scientific and engineering data. Methods include hyperbolic projections; mapping scalar values to color spaces; data visualization using range sliders; scalar visualization (point clouds, cutting planes, contour plots, isosurfaces); vector visualization (arrow clouds, particle advection, streamlines); terrain visualization; Delauney triangulation; and volume visualization. PREREQS: Prior experience with Unix or Windows, programming experience.

## CS 554. GEOMETRIC MODELING IN

 COMPUTER GRAPHICS (4). Advanced topics in computer graphics focusing on representation and processing of polygonal models and their application. Surface fundamentals; discrete differential geometry and topology; data structures for representing 3-D surfaces; surface subdivision and smoothing; mesh simplification and multiresolution representation of 3-D surfaces; geometry compression; surface parameterization; geometry remeshing; topological simplification; implicit surfaces. PREREQS: CS 450CS 555. SIGNAL AND IMAGE PROCESSING
(4). Fundamental aspects of signal and image processing including image acquisition and display, histograms, level-set and geometric operations, convolutions, Fourier transform, image filtering, sampling theory, image transforms, human vision, color, morphological operations,
and image compression. PREREQS: Graduate standing and knowledge of C/C++

CS 556. COMPUTER VISION (4). Algorithm development for automatic interpretation of the three-dimensional world that is captured in a set of images; cameras and image formation; color; keypoint and edge detection; perceptual grouping; segmentation; shape representation; texture; object recognition; optical flow; motion estimation and tracking; and 3-D scene reconstruction from motion and stereo. PREREQS: Basic statistics, probability, calculus, linear algebra, good programming skills,machine learning or Al (recommended).

CS 557. COMPUTER GRAPHICS SHADERS (4). Theoretical and practical treatment of computer graphics shaders, including both RenderMan and GPU shaders. Programming in both RenderMan and OpenGL shading languages. PREREQS: Previous graphics pipeline programming experience.

CS 559. SELECTED TOPICS IN COMPUTER GRAPHICS AND VISION (1-5). Advanced topics in graphics, animation, and vision. Topics include distribution ray tracing, globalillumination, radiosity, image-based modeling and rendering, vision-assisted image and video editing, 3-D vision, 3-D virtual environments, 3-D interaction, control for physical simulation, motion graphs, computational geometry, etc. This course is repeatable for a maximum of 12 credits. PREREQS: Instructor approval and graduate standing.

## CS 560. DATA-DRIVEN SOFTWARE

ENGINEERING (4). An overview of data-driven empirical research methods that can be used to understand the different aspects of software engineering. PREREQS: CS 561 [C] and graduate standing in CS or instructor consent.

CS 561. SOFTWARE ENGINEERING (4). Utilize software engineering methodology in a team environment to develop a real-world application. Teams will be responsible for all phases of software development, including project planning, requirements analysis, design, coding, testing, configuration management, quality assurance, documentation, and delivery. Two-term sequence required. PREREQS: CS 362
CS 562. APPLIED SOFTWARE ENGINEERING
(4). Application of software engineering methodology to the development of a complete software system. PREREQS: CS 561

CS 564. FIELD STUDIES IN SE AND HCI (4). Deals with the type of empirical study known as the "case" study. These are studies that collect data from natural software development situations as they really occur in the field, in which the researcher does not manipulate or "control" anything. The course is an end-to-end coverage of the process. Mainly focuses on case studies involving human software developers in the field. The student will conduct a field study as part of this course. PREREQS: Graduate standing in CS or permission of instructor.

## CS 565. HUMAN-COMPUTER INTERACTION

(4). Basic principles of Human-Computer Interaction $(\mathrm{HCl})$ for the design and evaluation of software systems. Includes research methods for studying human-machine interactions and user interfaces, design strategies, software evaluation methods, and related guidelines and standards. PREREQS: Graduate standing in CS or instructor consent.
CS 567. LABORATORY STUDIES IN SE
AND HCl (4). Empirical lab studies of software development. Covers how to go about designing, preparing for, running, analyzing, and writing-for-publication lab experiments of programming situations involving human subjects. This is an end-to-end coverage of the entire process, and will put students in a position to conduct lab studies of their own with human subjects. PREREQS: Graduate standing in CS or instructor consent.

CS 568. INCLUSIVE DESIGN (HCL) (4). Inclusive design is designing software that works for a wide variety of differently abled customers. Teaches the skills needed to design inclusively without having to have a separate design for each differently abled customer. PREREQS: CS 352 [C] or CS 565 [C]
CS 569. SELECTED TOPICS IN SOFTWARE
ENGINEERING (1-5). Topics include new programming methodologies, productivity, software development, software complexity metrics. This course is repeatable for a maximum of 99 credits. PREREQS: CS 561
CS 570. HIGH PERFORMANCE COMPUTER
ARCHITECTURE (4). Advanced concepts in computer architecture. Performance improvement employing advanced pipelining and multiple instruction scheduling techniques. Issues in memory hierarchy and management. CROSSLISTED as ECE 570. PREREQS: ECE 472 or ECE 572

CS 572. COMPUTER ARCHITECTURE (4). Computer architecture using processors, memories, and I/O devices as building blocks. Issues involved in the design of instruction set architecture, processor, pipelining and memory organization. Design philosophies and trade-offs involved in Reduced Instruction Set Computer (RISC) architectures. Lec/lab. CROSSLISTED as ECE 472/ECE 572. PREREQS: ECE 375
CS 575. INTRODUCTION TO PARALLEL
PROGRAMMING (4). Theoretical and practical
survey of parallel programming, including a discussion of parallel architecture, parallel programming paradigms, and parallel algorithms. Programming one or more parallel computers in a higher-level parallel language.

## CS 576. ADVANCED COMPUTER

NETWORKING (4). Advanced networking
concepts: source/channel coding, queuing theory, router design, network architectures (Intserv, DiffServ, MPLS), multimedia protocols (TFRC, RTP), overlay networks, and wireless standards (Bluetooth 802.11b, 3/4G). CROSSLISTED as ECE 476/ECE 576. PREREQS: (CS 372 or ECE 372) and (ECE 353 or ST 314 or ST 314H)

CS 578. CYBER-SECURITY (4). A broad overview of the field of computer and network security. Essential cryptographic mechanisms such as symmetric and public-key cryptography (e.g., encryption, signatures), network security and authentication protocols (e.g., Kerberos, TLS, IPSec), system security (e.g., access control, firewalls), advanced topics (e.g., searchable encryption, cloud security, secure computation). CROSSLISTED as ECE 578. PREREQS: Graduate standing

CS 579. TOPICS IN COMPUTER
ARCHITECTURE AND PARALLEL
PROCESSING (1-5). Current topics in advanced computer architecture and parallel processing. This course is repeatable for a maximum of 99 credits. PREREQS: CS 575 or CS 572 or ECE 572

CS 581. PROGRAMMING LANGUAGES I (4).
Graduate-level introduction to functional programming and programming language theory. Strongly typed functional programming in Haskell, abstract syntax and grammars, interpreters, denotional semantics, domain theory, and lambda calculus. PREREQS: Graduate standing in Computer Science
CS 582. PROGRAMMING LANGUAGES II (4).
Essentials of programming language theory for understanding and conducting programming language research. Dependently typed programming in Agda, Coq, or Idris; operational semantics; type systems; unification and type inference. PREREQS: CS 581 [C] and graduate standing in Computer Science
CS 583. ADVANCED FUNCTIONAL
PROGRAMMING (4). Advanced functional programming concepts and strategies, with a
focus on techniques useful for the design and implementation of programming languages Includes higher-order abstract syntax, functors and monads, generalized algebraic data types, functional data structures, and graph reduction. PREREQS: CS 581 [C] and graduate standing in Computer Science

CS 584. HUMAN FACTORS PROGRAMMING
LANGUAGES (4). Principles and evaluation methods for designing and evaluating programming languages to emphasize human productivity. Overall goals are (a) to enable students to understand and apply these principles and methods, and (b) to introduce at least four programming languages that aim specifically at supporting human problem solving. PREREQS: Graduate standing in computer science or instructor approval required.
CS 585. DOMAIN-SPECIFIC LANGUAGES (4).
Graduate-level introduction to the design and implementation of domain-specific languages (DSLs). Domain analysis; review and revision of language designs; binding constructs to support abstraction; definition of syntax and semantics of DSLs; prototype implementation of embedded DSL. PREREQS: CS 581 [C] and graduate standing in Computer Science
CS 589. SELECTED TOPICS IN PROGRAMMING LANGUAGES (1-5). An in-depth examination of a specific topic of interest in programming language design and implementation. Example topics include object-oriented programming, parallel programming, compiler optimization, programming language semantics. This course is repeatable for a maximum of 99 credits.
CS 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
CS 601. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 99 credits. PREREQS: Departmental approval required.

CS 603. CS PhD THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Instructor's consent required.

CS 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CS 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
CS 637. COMPUTER VISION II (4). An introduction to recent advances in visual recognition, including object detection, semantic segmentation, multimodal parsing of images and text, image captioning, face recognition, and human activity recognition. The course covers common formulations of these problems, including energy minimization on graphical models, and supervised machine learning approaches to lowand high-level recognition tasks. PREREQS: CS 556 [B] and CS 519, Selected Topics/Computer Sci/Deep Learning or equivalent.

## ELECTRICAL AND COMPUTER ENGINEERING COURSES

ECE 111. INTRODUCTION TO ECE: TOOLS (3). Introduction to the electrical and computer engineering professional practice. Covers the foundations of engineering problem solving and other skills necessary for success. Students will be taught engineering practice through handson approaches. Recommended for electrical and computer engineering majors, and for those interested in engineering as a profession. Lec/lab. Has extra fees. PREREQS: MTH 111 recommended (concurrent OK if needed)
ECE 112. INTRODUCTION TO ECE: CONCEPTS (3). Basic electrical and computer engineering concepts, problem solving and hands-on laboratory project. Topics include electronic circuit and device models, digital logic, circuit analysis, and simulation tools. Lec/lab. Has extra fees. PREREQS: (MTH 111 [C] or MTH 112 [C] or MTH

251 [C] or MTH 251H [C] ) or Placement Test MPT(23)

ECE 151. INTRODUCTION TO PROGRAMMING I with EMBEDDED CONTROL LAB (4).
Thorough treatment of the basic elements of C bitwise operations, flow of control, input/output, functions, arrays, strings, and structures. Lec/lab. CROSSLISTED as CS 151. PREREQS: (MTH 111 [C] or MTH 112 [C] or MTH 251 [C] or MTH 251H [C] ) or Placement Test MPT(23)
ECE 152. INTRODUCTION TO PROGRAMMING II WITH EMBEDDED CONTROL LAB (4). Control using microcontrollers with the $C$ language. Interfacing to PCs using on Object Oriented Programming language. Lec/lab. PREREQS: ((ECE 151 [C] or CS 151 [C] ) and MTH 231* [C] )
ECE 199. SPECIAL STUDIES (0-16). One-credit section. Graded P/N. This course is repeatable for a maximum of 16 credits.
ECE 271. DIGITAL LOGIC DESIGN (3). A first course in digital logic design. Data types and representations, Boolean algebra, state machines, simplification of switching expressions, and introductory computer arithmetic. Lec/rec. PREREQS: (MTH 251* [C] or MTH 251H* [C] or MTH 231* [C] )
ECE 272. DIGITAL LOGIC DESIGN
LABORATORY (1). This laboratory course accompanies ECE 271, Digital Logic Design.
This also illustrates topics covered in the lectures of ECE 271 using computer-aided design, verification tools, and prototyping hardware. PREREQS: Corequisite or prerequisite of ECE 271 is strongly recommended.
ECE 322. ELECTRONICS I (3). Fundamental device characteristics including diodes, MOSFETs and bipolar transistors; small- and large-signal characteristics and design of linear circuits. PREREQS: ENGR 203 [C]
ECE 322H. ELECTRONICS I (3). Fundamental device characteristics including diodes, MOSFETs and bipolar transistors; small- and large-signal characteristics and design of linear circuits. PREREQS: ENGR 203 [C-] and Honors College approval required.

ECE 323. ELECTRONICS II (3). Transient operation of MOSFETs and bipolar transistors; multistage amplifiers; frequency response; feedback and stability. PREREQS: ECE 322 [C]
ECE 331. ELECTROMECHANICAL ENERGY CONVERSION (4). Energy conversion principles for electric motors. Steady-state characteristics and analysis of induction, synchronous and direct machines. Lec/lab. PREREQS: ENGR 202 [C] or ENGR 202H [C]
ECE 341. JUNIOR DESIGN I (3). Introduction to system design and group projects. Design and fabrication of an electrical engineering project in a small group. PREREQS: CS 261* [C] and ENGR 203 [C]
ECE 342. JUNIOR DESIGN II (3). Introduction to system design and group projects. Design and fabrication of an electrical engineering project in a small group. PREREQS: ECE 341 [C]
ECE 351. SIGNALS AND SYSTEMS I (3).
Analytical techniques for continuous-time and discrete-time signal, system, and circuit analysis Lec. PREREQS: (ENGR 203 [C] and (MTH 256 [C] or MTH 256H [C] ))
ECE 352. SIGNALS AND SYSTEMS II (3). Analytical techniques for continuous-time and discrete-time signal, system, and circuit analysis PREREQS: (ECE 351 [C] and (MTH 306 [C] or MTH 306H [C] )
ECE 353. INTRODUCTION TO PROBABILITY
AND RANDOM SIGNALS (3). Introductory discrete and continuous probability concepts, single and multiple random variable distributions, expectation, introductory stochastic processes, correlation and power spectral density properties
of random signals, random signals through linear filters. Lec. PREREQS: ((MTH 254 [C] or MTH 254H [C] ) and ECE 351 [C] )
ECE 372. INTRODUCTION TO COMPUTER
NETWORKS (4). Computer network principles, fundamental networking concepts, packetswitching and circuit-switching, TCP/IP protocol layers, reliable data transfer, congestion control, flow control, packet forwarding and routing, MAC addressing, multiple access techniques. Lec CROSSLISTED as CS 372. PREREQS: CS 261 [C] and (ECE 271 [C] or CS 271 [C] ) and C programming and Unix familiarity.
ECE 375. COMPUTER ORGANIZATION AND
ASSEMBLY LANGUAGE PROGRAMMING
(4). Introduction to computer organization, how major components in a computer system function together in executing a program, and assembly language programming. Lec/lab. PREREQS: ECE 271 [C] and C/C++ programming (e.g., CS 261).

ECE 390. ELECTRIC AND MAGNETIC FIELDS (4). Static and quasi-static electric and magnetic fields. PREREQS: ((MTH 255 [C] or MTH 255H [C] ) and ENGR $203^{*}$ [C] )
ECE 391. TRANSMISSION LINES (3). Transient and steady-state analysis of transmission line circuits with application to engineering problems. PREREQS: (ENGR 203 [C] and (MTH 254 [C] or MTH 254H [C] ) and (MTH 256 [C] or MTH 256H [C] ) and ECE 322* [C] )
ECE 399. SPECIAL TOPICS (1-16). Course work to meet students' needs in advanced or specialized areas and to introduce new, important topics in electrical and computer engineering at the undergraduate (junior/senior) level. This course is repeatable for a maximum of 16 credits.

ECE 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ECE 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
ECE 405. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ECE 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECE 410. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECE 411. ENGINEERING MAGNETICS (3). Application of magnetic materials in the design of magnetic devices. Properties of magnetic materials; engineering design of actuators, sensors and data storage devices. Introduction to spintronics. PREREQS: ECE 390 [C]
ECE 413. SENSORS (3). Overview of sensor technologies including materials, physics of operation, applications and system integration. PREREQS: (ECE 322 [C] and ECE 323 [C] )
ECE 415. MATERIAL SCIENCE OF
NANOTECHNOLOGY (3). Introductory physical chemistry of solid surfaces, thermodynamics, and kinetics applied to synthesis of nanomaterials such as nanoparticles, nanowires, thin films, carbon nanotubes, fullerenes, graphene, etc. Characterization of nanomaterials, applications of nanomaterials, nano-synthesis techniques, integration of nanotechnology, and emerging nanotechnology topics. PREREQS: (ECE 416 [C] or ENGR 321 [C] or ENGR 321H [C] )
ECE 416. ELECTRONIC MATERIALS AND DEVICES (4). Semiconductor fundamentals and physical principles of pn junctions and Schottky barrier diodes. PREREQS: ENGR 201 [C]

ECE 417. BASIC SEMICONDUCTOR DEVICES
(4). Theory and physical principles of bipolar junction and field-effect transistors. Lec/rec.

## PREREQS: ECE 416 [C]

ECE 418. SEMICONDUCTOR PROCESSING
(4). Theory and practice of basic semiconductor processing techniques. Introduction to process simulation. Lec/lab/rec. PREREQS: ECE 416 [C] and /or equivalent.
ECE 422. CMOS INTEGRATED CIRCUITS I (4). Analysis and design of analog integrated circuits in CMOS technology; current mirrors, gain stages, single-ended operational amplifier, frequency response, and compensation. PREREQS: (ECE 322 [C] and ECE 323* [C] )
ECE 423. CMOS INTEGRATED CIRCUITS II
(4). Analysis and design of analog integrated circuits in CMOS technology; cascaded current mirrors, cascaded gain stages, single-ended and fully differential operational amplifier, commonmode feedback, noise, and distortion. Lec/lab. PREREQS: ECE 422 [C]
ECE 428. DATA CONVERTERS (4). The functions, characterization, algorithms, architectures and implementation of A/D and D/A data converters. Lec/lab. PREREQS: (ECE 323 [C] and ECE 352 [C] )
ECE 431. POWER ELECTRONICS (4). Fundamentals and applications of devices, circuits and controllers used in systems for electronic power processing. Lec/lab. PREREQS: (ECE 322 [C] and ECE 323* [C] and ECE 351 [C] )

## ECE 432. DYNAMICS OF

ELECTROMECHANICAL ENERGY
CONVERSION (4). Generalized machine theory. Techniques for dynamic analysis of electromechanical machines including arbitrary reference frame theory. Lec/lab. PREREQS: ECE 331 [C] COREQS: ECE 431

## ECE 433. POWER SYSTEM ANALYSIS (4).

Fundamentals and control of real and reactive power, steady-state load flow studies, unbalance, stability and transient system analysis. PREREQS: (ECE 323 [C] and ECE 352 [C] ) and three-phase power
ECE 437. SMART GRID (3). Fundamentals of smart power grids. Technology advances in transmission and distribution systems, policy drivers, assets and demand management, and smart grid security. PREREQS: ECE 433 [C] and Background in power systems analysis equivalent to ECE 433
ECE 438. ELECTRIC AND HYBRID ELECTRIC VEHICLES (4). Transportation electrification history, hybrid electric vehicle architecture, powertrain components and their modeling and control, vehicle system dynamics and controls. PREREQS: ECE 331 [C] and ECE 431 [C]
ECE 441. ^ENGINEERING DESIGN PROJECT (3). First term of an extended, 3-term team design project to expose students to problem situations and issues in engineering design similar to those encountered in industry. (Writing Intensive Courses) PREREQS: (ECE 322 [C] and ECE 351 [C] ) and senior standing in ECE.
ECE 442. ^ENGINEERING DESIGN PROJECT
(3). Second term of an extended, 3-term team design project to expose students to problem situations and issues in engineering design similar to those encountered in industry. (Writing Intensive Courses) PREREQS: ECE 441 [C]
ECE 443. ^ENGINEERING DESIGN PROJECT
(2). An extended team design project to expose students to problem situations and issues in engineering design similar to those encountered in industry. (Writing Intensive Courses) PREREQS: ECE 442 [C] and senior standing in electrical or computer engineering.
ECE 451. SYSTEMS DYNAMICS AND
CONTROL (4). Modeling and analysis of linear continuous systems in time and frequency domains. Fundamentals of single-input-singleoutput control system design. CROSSLISTED as ME 430. PREREQS: (ME 317 [C] or (ECE 351 [C]
and ECE 352 [C] and (ENGR 212 [C] or ENGR 212H [C] )))
ECE 461. INTRODUCTION TO ANALOG AND DIGITAL COMMUNICATIONS (4). Fundamental concepts of analog and digital telecommunication systems: modeling, analysis, and design of analog amplitude and angle modulation systems; probabilistic performance assessment of modulated signals over noisy channels; introduction to baseband digital modulation techniques such as binary pulse amplitude modulation and pulse position modulation and their demodulation in the presence of random noise. Lec. PREREQS: (ECE 351 [C] and ECE 352 [C] and ECE 353 [C] )
ECE 462. DIGITAL COMMUNICATIONS
AND CHANNEL CODING (4). Modeling, analysis, design of baseband and passband digital communications systems: geometric representation of signals; correlator receivers for M-ary digital communications systems; decision theory and its application to digital communication systems in additive white Gaussian noise environment; generation, transmission, and reception of passband digital modulated signals (BPSK, QPSK, FSK PAM); basics of information theory and channel encoding. Lec. PREREQS: (ECE 461 [C] and ECE 351 [C] and ECE 352 [C] and ECE 353 [C] )
ECE 463. WIRELESS COMMUNICATIONS NETWORK (4). Wireless networks: personal area (IEEE 802.15.4a), local area (IEEE 802.11), metropolitan area (IEEE 802.16), and mobile cellular networks (e.g., CDMA); physical-layer techniques for data modulation and multiple access; RF system engineering aspects of mobile cellular networks (e.g., system capability for voice and packet data traffics, RF coverage for a certain propagation environment.) Lec. PREREQS: (ECE 351 [C] and ECE 352 [C] ) and probability background. Recommended: ECE 461.
ECE 464. DIGITAL SIGNAL PROCESSING (4). Analysis and design of discrete-time linear-time invariant systems for processing discrete-time signals: DT-LTI system properties, DT signal analysis using Discrete-Time Fourier Transform, Discrete Fourier Transform and z-Transform, frequency response and transfer function. Signal sampling and reconstruction, digital processing of continuous-time signals, FIR and IIR digital filter design, and filter structures. PREREQS: (ECE 351 [C] and ECE 352 [C] )
ECE 468. DIGITAL IMAGE PROCESSING (3). Introduction to digital image processing including fundamental concepts of visual perception, image sampling and quantization, image enhancement in spatial and frequency domains (through 2D Fourier transform), image restoration, and color image processing. Implementation of algorithms using Matlab Image Processing Toolbox
PREREQS: (ECE 351 [C] and ECE 352 [C] )
ECE 471. ENERGY-EFFICIENT VLSI DESIGN
(4). Combinational and sequential logic design using CMOS transistors; analysis of power consumption and logic delay of digital logic; clock design including skew, jitter, and dynamic clock energy consumption; supply voltage and power supply noise sources; dynamic voltage frequency scaling (DVFS); sub-threshold logic design and effect on energy/robustness; custom digital integrated circuit design including transistor layouts and CAD entry; CMOS scaling and the effect on process variability and power consumption. Lec/lab. PREREQS: (ECE 271 [C] and ECE 322 [C] and ECE 323* [C] )

## ECE 472. COMPUTER ARCHITECTURE

(4). Computer architecture using processors, memories, and I/O devices as building blocks. Issues involved in the design of instruction set architecture, processor, pipelining, and memory organization. Design philosophies and trade-offs involved in Reduced Instruction Set Computer (RISC) architectures. Lec/lab. CROSSLISTED as CS 472/CS 572. PREREQS: ECE 375 [C]

ECE 473. MICROCONTROLLER SYSTEM
DESIGN (4). Implementation of embedded computer systems focusing on the development of hardware and software for an embedded microcontroller system. Topics include internal microcontroller architecture, interfacing peripheral devices, mixed analog and digital systems, and hardware and software implementation of several systems using a microcontroller and peripherals. Lec/lab. PREREQS: ECE 322 [C] and ECE 375 [C] and CS 261 [C]
ECE 474. VLSI SYSTEM DESIGN (4). Introduction to custom and semi-custom digital integrated circuit design as used in VLSI systems. The use of CAD/CAE tools, design management, and design methodology are introduced. PREREQS: (ECE 322 [C] and ECE 375 [C] )
ECE 476. ADVANCED COMPUTER
NETWORKING (4). Advanced networking concepts: source/channel coding, queuing theory, router design, network architectures (Intserv, DiffServ, MPLS), multimedia protocols (TFRC, RTP), overlay networks, and wireless standards (Bluetooth 802.11b, 3/4G). CROSSLISTED as CS 476/CS 576. PREREQS: (CS 372 [C] or ECE 372 [C] ) and (ECE 353 [C] or ST 314 [C] or ST 314H [C] )
ECE 477. MULTIMEDIA SYSTEMS (4). Design of multimedia systems used in information technology covering the hardware, software, applications, and networks. Components covered include multimedia representation, coding and compression techniques, wireless networks, networking for multimedia, and embedded system for multimedia. Lec. PREREQS: ECE 375
ECE 478. NETWORK SECURITY (4). Basic concepts and techniques in network security, risks and vulnerabilities, applied cryptography and various network security protocols. Coverage of high-level concepts such as authentication, confidentiality, integrity, and availability applied to networking systems. Fundamental techniques including authentication protocols, group key establishment and management, trusted intermediaries, public key infrastructures, SSL/ TLS, IPSec, firewalls and intrusion detection. CROSSLISTED as CS 478. PREREQS: (CS 372 [C] or ECE 372 [C] ) and recommended prerequisite: CS 370, Introduction to Security

ECE 482. OPTICAL ELECTRONIC SYSTEMS
(4). Photodetectors, laser theory, and laser systems. Lec/lab. CROSSLISTED as PH 482/PH 582. PREREQS: ECE 391 or (PH 481 or PH 581) or equivalent.
ECE 483. GUIDED WAVE OPTICS (4). Optical fibers, fiber mode structure and polarization effects, fiber interferometry, fiber sensors, optical communication systems. Lec/lab. CROSSLISTED as PH 483/PH 583. PREREQS: (ECE 391* [C] or PH 481* [C] )
ECE 484. ANTENNAS AND PROPAGATION
(4). Introduction to antennas and radiowave propagation. Offered alternate years. PREREQS: (ECE 390 [C] and ECE 391 [C] ) and /or equivalent.

ECE 485. MICROWAVE DESIGN TECHNIQUES
(4). Introduction to basic design techniques required for the design of high-frequency circuits and systems. Lec/Lab. PREREQS: (ECE 390 [C] and ECE 391 [C] ) and /or equivalent.
ECE 499. SPECIAL TOPICS (0-16). Course work to meet students' needs in advanced or specialized areas and to introduce new important topics in electrical and computer engineering at the undergraduate level. This course is repeatable for a maximum of 16 credits.
ECE 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ECE 503. ECE MS THESIS (1-16). This course is repeatable for a maximum of 999 credits.

ECE 505. READING AND CONFERENCE (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECE 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECE 507. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Graduate standing.

ECE 511. ELECTRONIC MATERIALS
PROCESSING (3). Technology, theory, and analysis of processing methods used in integration circuit fabrication. Offered alternate years.
PREREQS: Graduate standing or instructor approval required.
ECE 516. ELECTRONIC MATERIALS AND
DEVICES (4). Semiconductor fundamentals and physical principles of pn junctions and Schottky barrier diodes. PREREQS: ENGR 201

## ECE 517. BASIC SEMICONDUCTOR DEVICES

(4). Theory and physical principles of bipolar junction and field-effect transistors. Lec/rec. PREREQS: ECE 416
ECE 518. SEMICONDUCTOR PROCESSING
(4). Theory and practice of basic semiconductor processing techniques. Introduction to process simulation. Lec/lab/rec. PREREQS: ECE 416 or equivalent.

## ECE 520. ANALOG CMOS INTEGRATED

CIRCUITS (4). Principles and techniques of design of electronic circuits with focus on a design methodology for analog integrated circuits. Practical aspects of using CAD tools in analyzing and laying out circuits will be discussed.

## ECE 521. ANALOG CIRCUIT SIMULATION (4).

Formulation/solution of circuit equations; sparse matrix techniques; DC, transient, sensitivity, noise and Fourier analyses; RF circuit simulation. PREREQS: ECE 423 or ECE 520

ECE 522. CMOS INTEGRATED CIRCUITS I (4).
Analysis and design of analog integrated circuits in CMOS technology; current mirrors, gain stages, single-ended operational amplifier, frequency response, and compensation. PREREQS: ECE 322 and ECE 323*
ECE 523. CMOS INTEGRATED CIRCUITS II
(4). Analysis and design of analog integrated circuits in CMOS technology; cascaded current mirrors, cascaded gain stages, single-ended and fully differential operational amplifier, commonmode feedback, noise, and distortion. Lec/lab.
PREREQS: ECE 422 or ECE 522
ECE 528. DATA CONVERTERS (4). The
functions, characterization, algorithms, architectures and implementation of $A / D$ and $D / A$ data converters. Lec/lab. PREREQS: ECE 323 and ECE 352

## ECE 530. CONTEMPORARY ENERGY

APPLICATIONS (4). Contemporary energy issues and applications; fundamental physics of renewable energy sources (e.g. wind, wave, and solar), devices used to harvest energy from these sources, state-of-the-art renewable energy technology, power transmission, transformers, and energy storage. PREREQS: Graduate standing in engineering; Matlab, basic circuit analysis with RLC components and diodes.

ECE 531. POWER ELECTRONICS (4).
Fundamentals and applications of devices, circuits and controllers used in systems for electronic power processing. Lec/lab. PREREQS: ECE 322 and ECE 323* and ECE 351

## ECE 532. DYNAMICS OF

ELECTROMECHANICAL ENERGY
CONVERSION (4). Generalized machine theory. Techniques for dynamic analysis of electromechanical machines including arbitrary reference frame theory. Lec/lab. PREREQS: ECE 331 COREQS: ECE 531

ECE 533. POWER SYSTEM ANALYSIS (4).
Fundamentals and control of real and reactive power, steady-state load flow studies, unbalance, stability and transient system analysis. PREREQS: ECE 323 and ECE 352 and three-phase power
ECE 534. ADVANCED ELECTRICAL MACHINES (3). Development of models for the dynamic performance of all classes of electrical machines; synchronous, induction, permanent magnet and reluctance motors. Dynamic motor simulations. PREREQS: ECE 530
ECE 535. ADJUSTABLE SPEED DRIVES AND MOTION CONTROL (3). Adjustable speed drives, associated power electronic converters, simulation and control. Lec. PREREQS: ECE 530

ECE 536. POWER SYSTEM PROTECTION (3). Fundamentals of protective relaying. Relay input sources. Generation, transmission, and distribution systems protection. Stability and load shedding. PREREQS: ECE 433 or ECE 533 or equivalent.
ECE 537. SMART GRID (3). Fundamentals of smart power grids. Technology advances in transmission and distribution systems, policy drivers, assets and demand management, and smart grid security. PREREQS: Background in power systems analysis equivalent to ECE 433
ECE 538. ELECTRIC AND HYBRID ELECTRIC VEHICLES (4). Transportation electrification history, hybrid electric vehicle architecture, powertrain components and their modeling and control, vehicle system dynamics and controls. PREREQS: ECE 331 and ECE 431

ECE 550. LINEAR SYSTEMS (4). Linear dynamic systems theory and modeling. PREREQS: ECE 351 and ECE 352 or equivalent

## ECE 560. STOCHASTIC SIGNALS AND

SYSTEMS (4). Stochastic processes, correlation functions, spectral analysis applicable to communication and control systems. PREREQS: ECE 461 or ECE 561

ECE 561. INTRODUCTION TO ANALOG AND
DIGITAL COMMUNICATIONS (4). Fundamental concepts of analog and digital telecommunication systems: modeling, analysis, and design of analog amplitude and angle modulation systems; probabilistic performance assessment of modulated signals over noisy channels; introduction to baseband digital modulation techniques such as binary pulse amplitude modulation and pulse position modulation and their demodulation in the presence of random noise. Lec. PREREQS: ECE 351 and ECE 352 and ECE 353
ECE 562. DIGITAL COMMUNICATIONS AND CHANNEL CODING (4). Modeling, analysis, design of baseband and passband digital communications systems: geometric representation of signals; correlator receivers for M-ary digital communications systems; decision theory and its application to digital communication systems in additive white Gaussian noise environment; generation, transmission, and reception of passband digital modulated signals (BPSK, QPSK, FSK PAM); basics of information theory and channel encoding. Lec. PREREQS: ECE 461 and ECE 351 and ECE 352 and ECE 353

ECE 563. WIRELESS COMMUNICATIONS NETWORK (4). Wireless networks: personal area (IEEE 802.15.4a), local area (IEEE 802.11), metropolitan area (IEEE 802.16), and mobile cellular networks (e.g., CDMA); physical-layer techniques for data modulation and multiple access; RF system engineering aspects of mobile cellular networks (e.g., system capability for voice and packet data traffics, RF coverage for a certain propagation environment.) Lec. PREREQS: Probability background. Recommended: ECE 461
ECE 564. DIGITAL SIGNAL PROCESSING (4).
Analysis and design of discrete-time linear-time invariant systems for processing discrete-time signals: DT-LTI system properties, DT signal
analysis using Discrete-Time Fourier Transform, Discrete Fourier Transform and z-Transform, frequency response and transfer function. Signal sampling and reconstruction, digital processing of continuous-time signals, FIR and IIR digital filter design, and filter structures. PREREQS: ECE 351 and ECE 352

ECE 565. ESTIMATION, FILTERING, AND
DETECTION (4). Principles of estimation, linear filtering, and detection. PREREQS: ECE 353 or equivalent.
ECE 566. INFORMATION THEORY (4).
Introduction to information theory: entropy, differential entropy, entropy rates, mutual information, data compression, channel capacity, source coding, channel coding, network information theory. PREREQS: ECE 353 or equivalent; strong mathematical background.
ECE 567. DIGITAL SIGNAL PROCESSING (3). Advanced methods in signal processing, optimum filter design, decimation and interpolation methods, quantization error effects, spectral estimation. PREREQS: ECE 464 or ECE 564 or instructor approval required
ECE 568. ADVANCED DIGITAL IMAGE
PROCESSING (3). Advanced topics in digital image processing including wavelet and multiresolution image processing, image compression, image segmentation, image representation and description, and object recognition. Implementation of digital image processing algorithms using Matlab Image Processing Toolbox. PREREQS: ECE 468 or CS 555
ECE 570. HIGH PERFORMANCE COMPUTER
ARCHITECTURE (4). Advanced concepts in computer architecture. Performance improvement employing advanced pipelining and multiple instruction scheduling techniques. ssues in memory hierarchy and management. CROSSLISTED as CS 570. PREREQS: ECE 472 or ECE 572

ECE 571. ENERGY-EFFICIENT VLSI DESIGN
(4). Combinational and sequential logic design using CMOS transistors; analysis of power consumption and logic delay of digital logic; clock design including skew, jitter, and dynamic clock energy consumption; supply voltage and power supply noise sources; dynamic voltage frequency and scaling (DVFS); sub-threshold logic design and effect on energy/robustness; custom digital integrated circuit design including transistor layouts and CAD entry; CMOS scaling and the effect on process variability and power consumption. Lec/lab. PREREQS: ECE 271 and ECE 322 and ECE 323* with a minimum grade of C.

ECE 572. COMPUTER ARCHITECTURE (4).
Computer architecture using processors, memories, and I/O devices as building blocks. Issues involved in the design of instruction set architecture, processor, pipelining, and memory organization. Design philosophies and trade-offs involved in Reduced Instruction Set Computer (RISC) architectures. Lec/lab. CROSSLISTED as CS 472/CS 572. PREREQS: ECE 375

ECE 573. MICROCONTROLLER SYSTEM DESIGN (4). Implementation of embedded computer systems focusing on the development of hardware and software for an embedded microcontroller system. Topics include internal microcontroller architecture, interfacing peripheral devices, mixed analog and digital systems, and hardware and software implementation of several systems using a microcontroller and peripherals. ec/lab. PREREQS: ECE 322 and ECE 375 and CS 261

ECE 574. VLSI SYSTEM DESIGN (4).
introduction to custom and semi-custom digital integrated circuit design as used in VLSI systems. The use of CAD/CAE tools, design management, and design methodology are introduced. PREREQS: ECE 322 or ECE 375

ECE 575. DATA SECURITY AND
CRYPTOGRAPHY (3). Secret-key and publickey cryptography, authentication and digital signatures, protocols, implementation issues, privacy enhanced mail, data and communication security standards. PREREQS: Graduate standing.

ECE 576. ADVANCED COMPUTER
NETWORKING (4). Advanced networking concepts: source/channel coding, queuing theory, router design, network architectures (Intserv, DiffServ, MPLS), multimedia protocols (TFRC, RTP), overlay networks, and wireless standards (Bluetooth 802.11b, 3/4G). CROSSLISTED as CS 476/CS 576. PREREQS: (CS 372 or ECE 372) and (ECE 353 or ST 314 or ST 314H)
ECE 577. MULTIMEDIA SYSTEMS (4).
Design of multimedia systems for information technology covering the hardware, software, applications, and networks. Components covered include multimedia representation, coding and compression techniques, wireless networks, networking for multimedia, and embedded system for multimedia. Lec. PREREQS: ECE 375
ECE 578. CYBER-SECURITY (4). A broad overview of the field of computer and network security. Essential cryptographic mechanisms such as symmetric and public-key cryptography (e.g., encryption, signatures), network security and authentication protocols (e.g., Kerberos, TLS, IPSec), system security (e.g., access control, firewalls), advanced topics (e.g., searchable encryption, cloud security, secure computation). CROSSLISTED as CS 578. PREREQS: Graduate standing
ECE 580. NETWORK THEORY (4). Linear graphs, multiport networks, and other topics in advanced network theory. PREREQS: Graduate standing in ECE.

ECE 582. OPTICAL ELECTRONIC SYSTEMS
(4). Photodetectors, laser theory, and laser systems. Lec/lab. CROSSLISTED as PH 482/ PH 582. PREREQS: (PH 481 or PH 581) or equivalent
ECE 583. GUIDED WAVE OPTICS (4). Optical fibers, fiber mode structure and polarization effects, fiber interferometry, fiber sensors, optical communication systems. Lec/lab. CROSSLISTED as PH 483/PH 583. PREREQS: (ECE 391* or PH 481* or PH 581*)
ECE 584. ANTENNAS AND PROPAGATION (4). Introduction to antennas and radiowave propagation. Offered alternate years.
ECE 585. MICROWAVE DESIGN TECHNIQUES
(4). Introduction to basic design techniques required for the design of high-frequency circuits and systems. Lec/Lab.
ECE 590. ANALYTICAL TECHNIQUES IN ELECTROMAGNETIC FIELDS (4). Basic analytical techniques required to solve meaningful field problems in engineering. PREREQS: Graduate standing in ECE.
ECE 591. ADVANCED ELECTROMAGNETICS
(3). Advanced techniques for analyzing problems in electromagnetics, primarily numerical. Offered alternate years. PREREQS: ECE 590
ECE 592. ADVANCED OPTOELECTRONICS (3).
Principles of quantum exchange devices, fieldmaterial interaction and theory, and applications of optical circuits and devices. Offered alternate years. PREREQS: (ECE 482 or ECE 582) and ECE 590

ECE 593. RF MICROWAVE CIRCUIT DESIGN (3). Active/passive RF and microwave circuit design with emphasis to wireless systems. PREREQS: ECE 390 and ECE 391 or equivalent
ECE 599. SPECIAL TOPICS (0-16). Course work to meet students' needs in advanced or specialized areas and to introduce new important topics in electrical and computer engineering at the graduate level. This course is repeatable for a
maximum of 99 credits.
ECE 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ECE 603. ECE PhD THESIS (1-16). This course is repeatable for a maximum of 999 credits.

ECE 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECE 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECE 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
ECE 611. ELECTRONIC MATERIALS
PROCESSING (3). Technology, theory, and analysis of processing methods used in integration circuit fabrication. Offered alternate years. CROSSLISTED as CHE 611. PREREQS: Graduate standing or instructor approval.
ECE 612. PROCESS INTEGRATION (3).
Process integration, simulation, and statistical quality control issues related to integrated circuit fabrication. Offered alternate years. CROSSLISTED as CHE 612. PREREQS: ECE 611 or CHE 611 or instructor approval.
ECE 613. ELECTRONIC MATERIALS AND CHARACTERIZATION (3). Physics and chemistry of electronic materials and methods of materials characterization. Offered alternate years. CROSSLISTED as CHE 613. PREREQS: Graduate standing or instructor approval.
ECE 614. SEMICONDUCTORS (3). Essential aspects of semiconductor physics relevant for an advanced understanding of semiconductor materials and devices. Offered alternate years. PREREQS: Exposure to quantum mechanics and solid state physics.
ECE 615. SEMICONDUCTOR DEVICES I (3). Advanced treatment of two-terminal semiconductor electronic devices. Offered alternate years. PREREQS: Graduate standing or instructor approval; ECE 614 recommended.
ECE 616. SEMICONDUCTOR DEVICES II (3).
Advanced treatment of three-terminal semiconductor electronic devices. Offered alternate years. PREREQS: ECE 615 or instructor approval.
ECE 619. SELECTED TOPICS IN SOLID STATE
(3). Special courses taught on various topics in solid state as interests and demands vary. This course is repeatable for a maximum of 99 credits.

ECE 621. RADIO FREQUENCY IC DESIGN (3). Radio frequency (RF) circuits. Principles, analysis, and design of bipolar and MOS RF IC building blocks: low noise amplifiers, mixers, oscillators, frequency synthesizers. PREREQS: (ECE 422 or ECE 522) and (ECE 423 or ECE 523) or ECE 520
ECE 626. ANALOG CMOS CIRCUIT DESIGN (3). Switched-capacitor circuit design, on-chip filters, data converters. Practical aspects of analog CMOS IC design.
ECE 627. OVERSAMPLED DELTA-SIGMA
DATA CONVERTERS (3). Noise-shaping theory in first, second, and higher-order modulators. Design, simulation, and realization in hardware of converters using this popular architecture.

ECE 659. SELECTED TOPICS IN SYSTEMS AND CONTROL (3). Course work to meet students, needs in advanced or specialized areas and to introduce the newest important results in systems and control. This course is repeatable for a maximum of 18 credits. PREREQS: Graduate standing in ECE.

ECE 662. COMMUNICATION SYSTEMS-CODING AND INFORMATION THEORY (3). Various aspects of information theory, with particular emphasis on the coding process; data
compression problems, and the development of rate distortion theory. PREREQS: (ECE 462 or ECE 562) and ECE 560

ECE 669. SELECTED TOPICS IN

## COMMUNICATIONS AND SIGNAL

PROCESSING (3). Course work to meet students' needs in advanced or specialized areas and to introduce the newest important results in signal processing. This course is repeatable for a maximum of 18 credits. PREREQS: Graduate standing in ECE.
ECE 679. SELECTED TOPICS IN COMPUTER ENGINEERING (1-16). Topics to be presented at various times include information storage and retrieval, computer architecture, fault-tolerant computing, asynchronous sequential circuits, automata, data transmission, coding theory. This course is repeatable for a maximum of 99 credits. PREREQS: Graduate standing in ECE.
ECE 699. SPECIAL TOPICS (3). Advanced studies in field and wave theories and special devices. Topic examples are microwave and acoustic devices, advanced lasers and masers, electron beam interactions with traveling waves, MHD device dynamics. This course is repeatable for a maximum of 99 credits. PREREQS: Graduate standing in ECE.

## - HUMANITARIAN ENGINEERING SCIENCE AND TECHNOLOGY COURSES

HEST 299. SPECIAL TOPICS (1-6). This course is repeatable for a maximum of 9 credits.
HEST 310. *INTRO TO COMMUNITY
ENGAGEMENT AND COMMUNITY-BASED
DESIGN (3). Includes study of civic problems and issues, design-thinking concepts and application to co-design of engineering, science and technology-based solutions with social impact, and development of dispositions for effective community engagement through field study and service-learning. Recommended course for student wanting to complete a HEST internship. (Bacc Core Course)
HEST 320. *ENGINEERING FOR GLOBAL
HEALTH SOLUTIONS (3). An introduction to the critical processes and drivers involved in the development of engineering solutions to address global health problems. Topics include world health challenges, accessing and interpreting health and economic data, basic healthcare systems around the world, the importance of ethical guidelines in ensuring the protection of human subjects, the process of cost effectiveness assessment of a technology, and the timescale and hurdles to adoption of a technology. (Bacc Core Course)
HEST 399. SPECIAL TOPICS (1-6). This course is repeatable for a maximum of 9 credits.
HEST 411. ENGINEERING DESIGN
FOR EMERGENCY \& LOW-RESOURCE
ENVIRONMENTS (3). Introduces the challenges of engineering in emergency and low-resource environments, concepts of appropriate technologies and response, and engineering design of discrete services and technologies such as water systems, environmental health systems and infrastructure. PREREQS: Completion of an undergraduate engineering fluid mechanics course or equivalent.
HEST 412. *MULTIDISCIPLINARY CASE STUDIES IN HUMANITARIAN ENGINEERING, SCIENCE AND TECHNOLOGY (3). Introduces students to multidisciplinary methods and perspectives applied to case studies in humanitarian engineering, science and technology. Applications to real world issues with global implications at the interface of humanity and nature are addressed from a systems perspective using a case study approach.
HEST 499. SPECIAL TOPICS (1-6). This course is repeatable for a maximum of 9 credits.

HEST 511. ENGINEERING DESIGN FOR EMERGENCY \& LOW-RESOURCE ENVIRONMENTS (3). Introduces the challenges of engineering in emergency and low-resource environments, concepts of appropriate technologies and response, and engineering design of discrete services and technologies such as water systems, environmental health systems and infrastructure. PREREQS: Completion of an undergraduate engineering fluid mechanics course or equivalent.
HEST 512. MULTIDISCIPLINARY CASE STUDIES IN HUMANITARIAN ENGINEERING, SCIENCE AND TECHNOLOGY (3). Introduces students to multidisciplinary methods and perspectives applied to case studies in humanitarian engineering, science and technology. Applications to real world issues with global implications at the interface of humanity and nature are addressed from a systems perspective using a case study approach.
HEST 599. SPECIAL TOPICS (1-6). This course is repeatable for a maximum of 9 credits.

## SCHOOL OF MECHANICAL, INDUSTRIAL, AND <br> MANUFAGTURING ENGINEERING

## EAC/ABET Accredited

Robert B. Stone, Head
David P. Cann, Associate Head for
Graduate Programs
Brady J. Gibbons, Associate Head for
Undergraduate Programs
204 Rogers Hall
Oregon State University
Corvallis, OR 97331-6001
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Website: http://mime.oregonstate.edu/

## FACULTY

Professors Batten, Campbell, Cann, Doolen, Kim, Kruzic, Liburdy, Logendran, Narayanan, Paasch, B. Paul, Pence, Sharp, Stone, I. Tumer, K. Tumer
Associate Professors Albertani, Apte, Atre, Bay, Funk, Gibbons, Grimm, Hurst, Porter, Smart, Warnes

## Assistant Professors

Balasubramanian, Blunck, Calvo, DuPont, Eseonu, Feuerbacher, Fronk, Greaney, Haapala, Hagen, Hatton, Hollinger, Hoyle, Malhotra, Menguc, Ng, Niemeyer, Parmigiani, Sencer, Tucker, Vergara, Wang
Instructors Ettringer, Feldman, Natarajan, Shea, Squires

## PROFESSIONAL FACULTY

Barber, Borntrager, DeAdder, Finn, Helvie, Jensen, Marx, G. Newcomb, L. Paul, Randall, J. Robinson, T.A. Robinson

## Undergraduate Majors

Energy Systems Engineering (BS, HBS)
[OSU-Cascades/COCC only]
Industrial Engineering (BS, CRED, HBS)

## Option

Business Engineering
Manufacturing Engineering (BS, CRED, HBS)
Mechanical Engineering (BS, CRED, HBS)
Undergraduate Minor
Aerospace Engineering
Graduate Majors
Industrial Engineering (MAIS, MEng, MS, PhD)
Graduate Options
Advanced Manufacturing
Engineering Management
Human Systems Engineering
Information Systems Engineering
Manufacturing Systems Engineering
Materials Science (MS, PhD)
Graduate Areas of Concentration
Chemistry
Chemical Engineering
Civil Engineering
Electrical and Computer Engineering
Forest Products
Mathematics
Mechanical Engineering
Nuclear Engineering
Physics
Mechanical Engineering (MEng, MS, PhD)
Graduate Options
Advanced Manufacturing
Design
Materials Mechanics
Renewable Energy
Robotics
Thermal Fluids
Robotics (MEng, MS, PhD)
Graduate Areas of Concentration
Assistive Robots
Autonomous Robots
Human-Robot Interaction
Legged Locomotion
Manipulation
Mobile Robots
Multi-robot Coordination

## Graduate Minors

Industrial Engineering
Mechanical Engineering
Robotics

The School of Mechanical, Industrial, and Manufacturing Engineering (MIME) at OSU offers three ABET-accredited undergraduate degrees: Mechanical Engineering, Industrial Engineering, and Manufacturing Engineering and one undergraduate degree that is currently undergoing ABET accreditation: Energy Systems Engineering (offered at OSUCascades campus).
The mission of the School of MIME is two-fold:

- To prepare our students as
entrepreneurial, team-oriented, work-
ready graduates and lifelong learners in mechanical, industrial and manufacturing engineering, and
- To engage in collaborative, cuttingedge research whose applications lead to greater prosperity and a sustainable future for Oregon and the world.


## MIME PROGRAM OBJECTIVES

ABET requires that each program establishes educational objectives defined as "broad statements that describe the career and professional accomplishments that the program is preparing graduates to achieve." While each program has specific objectives, all MIME programs' program objectives may be summarized by the following statements in three broad areas of student participation and graduate achievement:

1. Our graduates will be systems thinkers. MIME graduates will be able to analyze, evaluate, improve, and design engineered systems and processes using modern engineering tools (hardware and software) and approaches. They will demonstrate in-depth knowledge of mechanical, industrial and/or manufacturing systems.
2. Our graduates will be global collaborators. MIME graduates will be able to communicate effectively across disciplines and cultures. They will provide management and leadership skills within their organizations and work effectively in diverse environments.
3. Our graduates will be innovative designers and problem solvers. MIME graduates will use both structured and unstructured methodologies to innovate systems and processes. They will apply technical knowledge and creativity in solving real-world problems. They will demonstrate a sound understanding of engineering and project management fundamentals and breadth of experience with engineering design and problem-solving processes.

## MECHANICAL ENGINEERING

Mechanical engineers design and develop small devices, large equipment, and processes for society. They play major roles in the design, testing and operation of mechanisms, machines, and systems, including processes for energy conversion and equipment used in households, businesses, transportation, and manufacturing.

In addition to the university baccalaureate core, the mechanical engineering curriculum has its base in mathematics, science, engineering science, and design. Mathematics and science courses occur primarily in the first two years. Engineer-
ing science is a major component, which is treated from the sophomore year to graduation in a combination of required and technical elective sources.

OSU's Mechanical Engineering Program has all the attributes needed for the best learning environment: ABET accredited curriculum, excellent faculty, modern facilities, quality students, and strong industrial interaction.

Engineering design is an integral element of the program. The philosophy is to "plant the seed" for design at the freshman level and grow it throughout the program. Most of the skills are developed at the junior and senior levels when students have achieved proficiency in the basic technical requirements. At the junior level, the design process is extensively developed in three courses. At the senior year, design experiences occur in several areas, culminating in the twoterm senior project in which students in small teams carry out the design of some product or process under the supervision of a faculty advisor. Attention to handson activity adds a very desirable "feel" for many aspects of the design process.

A good choice of senior electives enables students to achieve a degree of specialization and depth to match their interests. The areas include applied stress analysis; design, dynamics, and analysis of mechanical and thermal/fluid systems; concurrent engineering; control system design; mechatronics; heat transfer; and metallurgy and materials.

The faculty encourages a vibrant extracurricular program for professional and leadership experiences. Students are encouraged to obtain at least three months of work experience through an industrial or research internship or to participate in a foreign exchange program. The school's goal is to have more than 95 percent of its students graduate with such experience. In addition to students having general internships, many of the professional-level students participate in the industry-driven Multiple Engineering Cooperative Program (MECOP). This program provides two paid six-month internships at over 60 Pacific Northwest companies where interns work with a company mentor and improve their capabilities for the work environment.

Mechanical engineers can be found in a wide variety of industries including aerospace, electronics, biomedical, transportation, manufacturing, energy, automotive, and government labs. Because of the increasing complexity of mechanical engineering, graduate study for the MS and PhD degrees is advisable for students who wish to specialize in depth in any of the above areas. The undergraduate curriculum provides an excellent foundation for graduate study.

## INDUSTRIAL ENGINEERING

Industrial engineers (IEs) apply science, mathematics, and engineering methods to complex system integration and operation. Because the systems with which they work are often large and complex, IEs utilize knowledge and skills in a wide variety of disciplines, have the ability to work well with people, and take a broad, systems perspective. The Industrial Engineering degree is a very flexible degree that allows students to tailor their program of study to meet their individual career goals. A large number of restricted elective credits allows students to pursue the Business Engineering option or to customize their program to a field of interest.

IEs are key players in the integration and operation of systems in all sectors of industry and government including the following (with examples):

- aerospace (NASA space shuttle prelaunch processing systems)
- automotive (automobile final assembly plants)
- communications (telephone services)
- computers (factory information systems)
- electronics/semiconductors (silicon wafer fabrication facilities)
- food (canneries and fast food restaurant chains)
- government (department of motor vehicles service centers)
- health care (hospital central stores and operating rooms)
- manufacturing (circuit board fabrication facilities)
- retail (product distribution centers)
- transportation (airlines, overnight delivery services)
In their role as system integrators, IEs analyze and design systems. For example: - facilities layout,
- material handling systems,
- manufacturing and other production systems,
- information systems,
- individual and group workplaces.

In the operations realm, IEs analyze, design and manage processes. For example:

- manufacturing processes-service processes,
- production system planning and control,
- resource allocation and scheduling,
- personnel assignment and scheduling,
- quality assurance,
- inventory control,
- system and personnel safety.


## ENERGY SYSTEMS ENGINEERING

Energy systems engineers oversee complex energy conversion and distribution systems, work to improve energy storage systems, and manage the efficient use of energy in building, manufacturing, and
processing systems. ESE professionals also study the secondary effects of energy usage from a local environmental impact, regional and national economic impact, and global climate change perspective.

Energy systems engineers pursue a variety of jobs and occupations. For example, they might be hired to do any of the following:

- Manage operations of a wind turbine farm
- Analyze efficiency of hydroelectric power systems
- Oversee production of innovative fuel-cell technologies
- Evaluate the economic viability of new solar power installations
- Assess the environmental impact of alternative energy systems


## MANUFACTURING ENGINEERING

The Manufacturing Engineering degree is a more specialized degree, focusing on both high-tech manufacturing and traditional manufacturing. In particular, it is a specialization of industrial engineering that focuses on the making of physical products. The Manufacturing Engineering degree offers a hands-on education, and manufacturing engineering students are encouraged to participate in the college's MECOP program, a nationally recognized industrial cooperative education program.

Students who complete the requirements for the Manufacturing Engineering degree plus 32 additional credits (at least 16 of these credits must be from the list of industrial engineering restricted electives) can earn two separate degrees, one in manufacturing engineering and the other in industrial engineering. The additional 32 credits typically take two additional quarters to complete.

## UNDERGRADUATE MAJORS WITH OPTIONS

ENERGY SYSTEMS ENGINEERING (BS, CRED, HBS)

## Offered at OSU-Cascades only.

## ABET Accredited

For more information, please contact program advisor Apolo Aguirre, 541-3222054, apolo.aguirre@oregonstate.edu.

Note: The Pre-Energy Systems Engineering undergraduate major (major code 257) is available on the Corvallis campus, but the pro-school courses for the Energy Systems Engineering major (major code 293) are only offered on the OSU-Cascades campus. To earn the HBS degree, students must take Honors courses on the Corvallis campus; Honors courses are not available at OSU-Cascades.

## Baccalaureate Core (35 at OSU or 37 at COCC)

## Communications

WR 121. English Composition (4) (COCC) or WR 121. *English Composition (3) (OSU) ${ }^{\mathbf{E}}$
WR 122. English Composition (4) (COCC) or WR 227. Technical Writing (4) (COCC) or WR 327. *Technical Writing (3) (OSU)
SP 111. *Fundamentals of Public Speaking (3) (COCC)
or COMM 111. *Public Speaking (3) (OSU)
or COMM 114. *Argument and Critical Discourse (3) (OSU) ${ }^{\mathbf{E}}$

## Skills

HHP 295. Health and Fitness (3) (COCC) or HHS 231. *Lifetime Fitness for Health (2) (OSU)
and HHS 241. *Lifetime Fitness (1) or any PAC course (1-2) (OSU)

## Perspectives

Western Culture (3)
Cultural Diversity (3)
Literature and the Arts (3)
Social Processes and Institutions:
ECON 201. *Microeconomics (4) (COCC) or ECON 201. *Introduction to
Microeconomics (4) (OSU)
Difference, Power and Discrimination (3)

## Synthesis

Contemporary Global Issues: SUS 350.
*Sustainable Communities (4) (OSU)
Science, Technology, and Society (3)
Math and Science (46 at OSU or 52

## at COCC)

CH 221. General Chemistry I (5) (COCC) or CH 201. Chemistry for Engineering Majors (3) (OSU) ${ }^{\mathbf{E}}$
CH 222. General Chemistry II (5) (COCC) or CH 202. Chemistry for Engineering Majors (3) (OSU) ${ }^{\mathbf{5}}$
and CH 205. Laboratory for CH 202 (1) (OSU)
MTH 251. *Calculus I (4) (COCC)
or MTH 251. *Differential Calculus (4) (OSU) ${ }^{\mathbf{E}}$
MTH 252. Calculus II (4) (COCC) or MTH 252. Integral Calculus (4) (OSU) ${ }^{\mathbf{E}}$
MTH 253. Calculus III (4) (COCC)
or MTH 306. Matrix and Power Series Methods (4) (OSU) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus I (4) (COCC)
or MTH 254. Vector Calculus I (4) (OSU) ${ }^{\mathbf{E}}$
MTH 256. Applied Differential Equations (4) (COCC)
or MTH 256. Applied Differential
Equations (4) (OSU) ${ }^{\mathbf{E}}$
PH 211. General Physics I (5) (COCC)
or PH 211. *General Physics with Calculus (4) (OSU) ${ }^{\mathbf{E}}$

PH 212. General Physics II (5) (COCC)
or PH 213. *General Physics with Calculus (4) $(\mathrm{OSU})^{\mathbf{E}}$

PH 213. General Physics III (5) (COCC)
or PH 212. *General Physics with Calculus (4) (OSU) ${ }^{\mathbf{E}}$

ST 314. Introduction to Statistics for Engineers (3) ${ }^{5}$
Biological Science Elective (4)

## Business Management Courses (19

at OSU or 19 at COCC)
BA 217. Accounting Fundamentals (3) (COCC)
or BA 215. Fundamentals of Accounting
(4) (OSU or Ecampus)

BA 352. Managing Individual and Team Performance (4)
or BA 351. Managing Organizations (4)
(OSU or Ecampus, not OSU-Cascades)
BA 357. Operations Management (4)
BA 360. Introduction to Financial
Management (4)
or ENGR 390. Engineering Economy (3)
(OSU or Ecampus)
MGMT 364. Project Management (4)
Engineering (80 at OSU or 84 at

## COCC)

CIS 122. Introduction to Programming (4) (COCC)
or IE 212. Computational Methods for
Industrial Engineering (4) (OSU)
ESE 355. Energy Regulation (4)
ESE 360. Energy Consumption Analysis (4)
ESE 450. Energy Generation Systems (4)
ESE 470. Energy Distribution Systems (4)
ESE 471. Energy Storage Systems (4)
ESE 497. ${ }^{\wedge}$ MIME Capstone Design (4)
ESE 498. ${ }^{\wedge}$ MIME Capstone Design (4)
ENGR 201. Electrical Fundamentals (4)
(COCC)
or ENGR 201. Electrical Fundamentals I (3) (OSU) ${ }^{\mathbf{E}}$

ENGR 202. Electrical Fundamentals II (4)
(COCC)
or ENGR 202. Electrical Fundamentals II (3) (OSU) ${ }^{\mathbf{5}}$

ENGR 211. Statics (4) (COCC)
or ENGR 211. Statics (3) (OSU)
ENGR 212. Dynamics (4) (COCC)
or ENGR 212. Dynamics (3) (OSU) ${ }^{\mathbf{E}}$
GE 101. Engineering Orientation (3)
(COCC)
or MIME 101. Introduction to MIME (3) (OSU)
GE 102. Engineering Problem Solving and Technology (3) (COCC)
or ENGR 112. Introduction to Engineering
Computing (3) (OSU) ${ }^{\mathbf{E}}$
IE 415. Simulation and Decision Support Systems (4)
IE 425. Industrial Systems Optimization (4)
ME 311/NE 311. Introduction to Thermal-
Fluid Sciences (4)
ME 312/NE 312. Thermodynamics (4)
ME 331. Introductory to Fluid Mechanics (4)
ME 332. Heat Transfer (4)
Restricted Technical Electives (6)[No more
than 3 credits from 200-level courses.]

## Total=180 at OSU (192 at COCC)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
${ }^{\text {E }}$ Required for entry into the professional program.
${ }_{5}^{5}$ Prerequisite for upper-division courses.
Recommended for completion prior to entry
into the professional program.
COCC Course Catalog Online: http://www.
cocc.edu/Admissions/Catalog/
COCC/OSU Course Equivalencies Table:
http://oregonstate.edu/admissions/course-
equivalencies-central-oregon-community-
college
Pre-Energy Systems Engineering
Major Code: 257
Major Code: 293


## INDUSTRIAL ENGINEERING <br> (BS, CRED, HBS)

## ABET Accredited

For more information, please contact
program advisor Tyler DeAdder, 541-737-

## 4718, tyler.deadder@oregonstate.edu.

## Pre-Industrial Engineering

## Freshman Year (46)

CH 201. Chemistry for Engineering Majors (3) ${ }^{\mathbf{E}}$

CH 202. Chemistry for Engineering Majors (3) ${ }^{5}$

COMM 111. *Public Speaking (3) ${ }^{\mathbf{E}}$
or COMM 114. *Argument and Critical Discourse (3) ${ }^{\mathbf{E}}$
ENGR 112. Introduction to Engineering Computing (3) ${ }^{\mathbf{E}}$
ENGR 248. Engineering Graphics and 3-D
Modeling (3) ${ }^{5}$
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1)
or any PAC course (1-2)
MIME 101. Introduction to MIME (3)
MTH 251. *Differential Calculus (4) ${ }^{\mathbf{E}}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus I (4) ${ }^{\mathbf{E}}$
PH 211. *General Physics with Calculus (4) ${ }^{\mathbf{E}}$
WR 121. *English Composition (3) ${ }^{\mathbf{E}}$
*Perspectives (6) ${ }^{\mathbf{1}}$

## Sophomore Year (45)

ENGR 211. Statics (3) ${ }^{\mathbf{E}}$
ENGR 212. Dynamics (3)
ENGR 213. Strength of Materials (3) ${ }^{\text {E }}$
ENGR 390. Engineering Economy (3) ${ }^{\boldsymbol{5}}$
IE 212. Computational Methods for Industrial Engineering (4) ${ }^{5}$
IE/MFGE 285. Introduction to Industrial and Manufacturing Engineering (3)
ME 250. Introduction to Manufacturing Processes (1)
MTH 256. Applied Differential Equations (4) ${ }^{\text {E }}$
MTH 306. Matrix and Power Series Methods (4) ${ }^{\mathbf{E}}$

PH 212, PH 213. *General Physics with Calculus $(4,4)^{\mathbf{E}}$
ST 314. Introduction to Statistics for
Engineers (3) ${ }^{5}$
WR 327. *Technical Writing (3)
Engineering Elective (3)
*Difference, Power, and Discrimination (3) ${ }^{\mathbf{1}}$

## Professional Industrial Engineering

## Junior Year (45)

ENGR 201. Electrical Fundamentals I (3)
ENGR/MATS 321. Introduction to Materials Science (4)
MFGE 336. Production Engineering (4)
IE 355. Statistical Quality Control (4)
IE 356. Experimental Design for Industrial Processes (4)
IE 366. Work Systems Engineering (4)
IE 367. Production Planning and Control (4)
IE 368. Facility Design and Operations
Management (4)
Restricted IME Electives (8)
${ }^{*}$ Perspectives (6) ${ }^{1}$

## Senior Year (44)

IE 412. Information Systems Engineering (4)
IE 415. Simulation and Decision Support Systems (4)
IE 425. Industrial Systems Optimization (4)

IE 426. Stochastic Models of Industrial Systems (4)
IE/ESE/ME 497. ${ }^{\wedge}$ MIME Capstone Design (4) IE/ESE/ME 498. ${ }^{\wedge}$ MIME Capstone Design (4)
Biological Science Elective (4) ${ }^{1}$
Restricted IME Electives (10)
*Synthesis Courses (6) ${ }^{1}$

## Total=180

## SAMPLE FOUR-YEAR PLAN:

## INDUSTRIAL ENGINEERING

## Year 1

Fall
CH 201. Chemistry for Engineering Majors (3) ${ }^{\mathrm{E}}$

MIME 101. Introduction to MIME (3)+
MTH 251. *Differential Calculus (4) ${ }^{\mathbf{E}}$
WR 121. *English Composition (3) ${ }^{\text {E }}$
Perspective Course *(Western Culture) (3) ${ }^{1}$

## Winter

CH 202. Chemistry for Engineering Majors (3) ${ }^{5}$

ENGR 248. Engineering Graphics and 3D Modeling (3) ${ }^{5}$
HHS 231. *Lifetime Fitness for Health (2) ${ }^{\mathbf{1}}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$
Perspective Course *(Cultural Diversity) (3) ${ }^{\mathbf{1}}$
${ }^{*}$ Physical Activity Course (1) ${ }^{1}$

## Spring

COMM 111. *Public Speaking (3) ${ }^{\text {E }}$ or COMM 114. *Argument and Critical Discourse (3) ${ }^{\mathrm{E}}$
ENGR 112. Introduction
Engineering Computing (3) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus (4) ${ }^{\mathbf{E}}$
PH 211. *General Physics With Calculus (4) ${ }^{\text {E }}$
*Difference, Power and Discrimination (3) ${ }^{1}$

## Year 2

Fall
ENGR 211. Statics (3) ${ }^{\text {E }}$
IE 285. Introduction to Industrial and Manufacturing Engineering (3)+
MTH 256. Applied Differential Equations (4) ${ }^{\mathbf{E}}$
PH 212. *General Physics With Calculus (4) ${ }^{\text {E }}$

## Winter

ENGR 213. Strength of Materials (3) ${ }^{\mathbf{E}}$
IE 212. Computational Methods for Industrial Engineering (4) ${ }^{5}$
MTH 306. Matrix and Power Series Methods (4) ${ }^{\mathbf{E}}$

PH 213. *General Physics With Calculus (4) ${ }^{\mathbf{E}}$

## Spring

ENGR 212. Dynamics (3)
ENGR 390. Engineering Economy (3)
ME 250. Introduction to Manufacturing Processes (1)
ST 314. Introduction to Statistics for Engineers (3) ${ }^{5}$
WR 327. *Technical Writing (3)
Perspective Course *(Social Processes and Institutions) (3) ${ }^{1}$

## Year 3

Fall
IE 355. Statistical Quality Control (4)
IE 367. Production Planning and Control (4)
MATS 321. Introduction to Materials
Science (4)
Restricted Elective (4)

## Winter

IE 356. Experimental Design for Industrial Processes (4)
IE 366. Work Systems Engineering (4)
IE 368. Facility Design and Operations
Management (4)
MFGE 336. Production Engineering (4)

## Spring

ENGR 201. Electrical Fundamentals I (3)
Perspective Course *(Biology + Lab) (4) ${ }^{1}$
Perspective Course *(Literature and Arts) (3) ${ }^{1}$

Restricted Elective (4)

## Year 4

Fall
IE 412. Information Systems Engineering (4)
IE 425. Industrial Systems Optimization (4)
IE 497. ${ }^{\wedge}$ MIME Capstone Design (4)
Restricted Elective (3)

## Winter

IE 415. Simulation and Decision Support Systems (4)
IE 426. Stochastic Models of Industrial Systems (4)
IE 498. ^MIME Capstone Design (4)
Restricted Elective (3)

## Spring

Restricted Elective (4)
Synthesis Course *(Contemporary Global Issues) (3) ${ }^{1}$
Synthesis Course *(Science Technology and Society) (3) ${ }^{1}$

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
${ }^{\mathrm{E}}$ Required for entry into the professional program.
${ }^{1}$ Must be selected to satisfy baccalaureate core requirements.
${ }^{5}$ Prerequisite for several upper-division courses.
Recommended for completion prior to entry into the professional program.


## Pre-Industrial Engineering Major

Code: 360
Major Code: 323

## OPTIONS

## BUSINESS ENGINEERING OPTION

Students who complete the Business En-
gineering option will be well prepared to integrate industrial engineering solutions in business settings.

## Required Courses

BA 211. Financial Accounting (4)
BA 230. Business Law I (4)
BA 390. Marketing (4)
FIN 342. Advanced Financial Management (4)

IE 470. Management Systems Engineering (4)

IE 471. Project Management in Engineering (3)

IE 475. Advanced Manufacturing Costing Techniques (3)
Option Code: 355

MANUFACTURING ENGINEERING
(BS, CRED, HBS)

## ABET Accredited

For more information, please contact program advisor Tyler DeAdder, 541-7374718, tyler.deadder@oregonstate.edu.

## Pre-Manufacturing Engineering

Freshman Year (46)
CH 201. Chemistry for Engineering Majors (3) ${ }^{\mathrm{E}}$

CH 202. Chemistry for Engineering Majors (3) ${ }^{5}$

COMM 111. *Public Speaking (3) ${ }^{\text {E }}$
or COMM 114. *Argument and Critical
Discourse (3) ${ }^{\mathbf{E}}$
ENGR 112. Introduction to Engineering
Computing (3) ${ }^{\mathbf{E}}$
ENGR 248. Engineering Graphics and 3-D
Modeling (3) ${ }^{5}$
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC
course (1-2)
MIME 101. Introduction to MIME (3)
MTH 251. *Differential Calculus (4) ${ }^{\mathbf{E}}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus I (4) ${ }^{\mathbf{E}}$
PH 211. *General Physics with Calculus (4) ${ }^{\text {E }}$
WR 121. *English Composition (3) ${ }^{\text {E }}$
${ }^{*}$ Perspectives (6) ${ }^{1}$

## Sophomore Year (45)

ENGR 211. Statics (3)
ENGR 212. Dynamics (3)
ENGR 213. Strength of Materials (3) ${ }^{\text {E }}$
ENGR 390. Engineering Economy (3) ${ }^{5}$
IE 212. Computational Methods for Industrial Engineering (4) ${ }^{5}$
ME 250. Introduction to Manufacturing Processes (1)
MFGE/IE 285. Introduction to Industrial and Manufacturing Engineering (3)
MTH 256. Applied Differential Equations (4) ${ }^{\text {E }}$
MTH 306. Matrix and Power Series Methods (4) ${ }^{\mathbf{E}}$

PH 212, PH 213. *General Physics with Calculus $(4,4)^{\mathbf{E}}$
ST 314. Introduction to Statistics for Engineers (3) ${ }^{5}$
WR 327. *Technical Writing (3)
*Difference, Power, and Discrimination (3) ${ }^{1}$

## Professional Manufacturing

Engineering

## Junior Year (44)

ENGR 201. Electrical Fundamentals I (3)
ENGR/MATS 321. Introduction to Materials Science (4)
IE 355. Statistical Quality Control (4)
IE 356. Experimental Design for Industrial Processes (4)
IE 366. Work Systems Engineering (4)
IE 367. Production Planning and Control (4)
IE 368. Facility Design and Operations
Management (4)
ME 311. Introduction to Thermal-Fluid Sciences (4)
MFGE 336. Production Engineering (4)
Manufacturing Process Elective (3)
${ }^{*}$ Perspectives (6) ${ }^{1}$

## Senior Year (45)

IE 412. Information Systems Engineering (4)
IE 415. Simulation and Decision Support Systems (4)

IE 497, IE 498. ${ }^{\wedge}$ MIME Capstone Design $(4,4)$ ME 382. Introduction to Design (4)
MFGE 437. Computer Control of
Manufacturing Processes (4)
MFGE 337. Materials and Manufacturing Processes (4)
MFGE 436. Lean Manufacturing Systems Engineering (4)
*Biological Science Elective (4) ${ }^{\mathbf{1}}$
Manufacturing Systems Elective (3)
*Synthesis Courses (6) ${ }^{1}$

## Total=180

Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
${ }^{\mathbf{E}}$ Required for entry into the professional
program.
${ }^{1}$ Must be selected to satisfy the requirements of the baccalaureate core.
${ }^{5}$ Prerequisite for several upper-division courses. Recommended for completion prior to entry into the professional program.


## Pre-Manufacturing Engineering

Major Code: 363
Major Code: 317

## MECHANICAL ENGINEERING (BS, CRED, HBS)

## ABET Accredited

For more information, please contact program advisor Carrie Randall, carrie. randall@oregonstate.edu, 541-737-0702.

## Pre-Mechanical Engineering

Freshman Year (47)
CH 201. Chemistry for Engineering Majors (3) ${ }^{\text {E }}$

CH 202. Chemistry for Engineering Majors (3) ${ }^{5}$

CH 205. Laboratory for CH 202 (1)
COMM 111. *Public Speaking (3) ${ }^{1, \mathrm{E}}$
or COMM 114. *Argument and Critical Discourse (3)
HHS 231. *Lifetime Fitness for Health (2) ${ }^{\mathbf{1}}$
HHS 241. *Lifetime Fitness (1) ${ }^{1}$ or any PAC course (1-2)
ENGR 248. Engineering Graphics and 3-D Modeling (3) ${ }^{5}$
MIME 101. Introduction to Mechanical Engineering (3)
MTH 251. *Differential Calculus (4) ${ }^{\mathbf{E}}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus I (4) ${ }^{\text {E }}$
PH 211. *General Physics with Calculus (4) ${ }^{\mathbf{E}}$
WR 121. *English Composition (3) ${ }^{\mathbf{E}}$
*Perspectives Courses (9) ${ }^{\mathbf{1}}$

## Sophomore Year (48)

ENGR 112. Introduction to Engineering Computing (3) ${ }^{\mathbf{E}}$
ENGR 201. Electrical Fundamentals I (3) ${ }^{5}$
ENGR 202. Electrical Fundamentals II (3)
ENGR 211. Statics (3) ${ }^{\mathbf{E}}$
ENGR 212. Dynamics (3) ${ }^{\text {E }}$
ENGR 213. Strength of Materials (3) ${ }^{5}$
ENGR 391. Engineering Economics and Project Management (3)
MTH 256. Applied Differential Equations (4) ${ }^{\text {E }}$

MTH 306. Matrix and Power Series Methods (4) ${ }^{\mathrm{E}}$

PH 212, PH 213. *General Physics with Calculus $(4,4)^{\mathbf{E}}$

ST 314. Introduction to Statistics for Engineers (3) ${ }^{5}$
WR 327. *Technical Writing (3)
Biological Science Course (4) ${ }^{1}$
*Difference, Power, and Discrimination Elective (3) ${ }^{1}$

Professional Mechanical
Engineering
Junior Year (44)
ENGR 321. Materials Science (4)
ENGR 322. Mechanical Properties of Materials (3)
ME 250. Introduction to Manufacturing Processes (1)
ME 311. Introduction to Thermal-Fluid Sciences (4)
ME 312. Thermodynamics (4)
ME 316. Mechanics of Materials (3)
ME 317. Intermediate Dynamics (4)
ME 331. Introductory Fluid Mechanics (4)
ME 332. Heat Transfer (4)
ME 373. Mechanical Engineering Methods (3)

ME 382. Introduction to Design (4)
ME 383. Mechanical Component Design (4)

## Senior Year (41)

ME 497, ME 498. ${ }^{\wedge}$ MIME Capstone Design $(4,4)$
ME 430. Systems Dynamics and Control (4)
ME 451. Introduction to Instrumentation and Measurement Systems (4)
Restricted ME Technical Electives (11)
Restricted ME Laboratory Elective (4)
Perspectives (4) ${ }^{1}$
*Synthesis Courses (6) ${ }^{1}$

## Total=180

Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
${ }^{\text {e }}$ Required for entry into the professional program.
${ }^{1}$ Must be selected to satisfy baccalaureate core requirements.
${ }^{5}$ Prerequisite for upper-division courses. Recommended for completion prior to entry into the professional program.
Pre-Mechanical Engineering Major Code: 351
Major Code: 321


## AEROSPACE ENGINEERING

 MINOR
## Required (15 credits)

AAE 210. Introduction to Aerospace Engineering (3)
ME 411. Aerospace Applications in
Mechanical Engineering (4)
ME 497. ${ }^{\wedge}$ MIME Capstone Design (4)
ME 498. ${ }^{\wedge}$ MIME Capstone Design (4)
Choose from below (12 credits):
ME 445. Introduction to Combustion (4)
ME 461. Gas Dynamics (4)
ME 499. Special Topics [Space Systems Engineering] (4)
ME 499. Special Topics [UAV Engineering] (4)
ME 499. Special Topics [Aerospace Vehicle Design Laboratory] (4)
Total = $\mathbf{2 7}$
Footnote:
$\wedge$ Writing Intensive Course (WIC)

## Minor Code: 905

## GRADUATE MAJORS

INDUSTRIAL ENGINEERING (MEng, MS, PhD, MAIS)
Also available via Ecampus.
Industrial engineering is the application of science, mathematics, and engineering methods to complex system integration and operation. Because the systems with which they work are so large and complex, industrial engineers (IEs) must develop expertise in a wide variety of disciplines, the ability to work well with people, and a broad, systems perspective. All IE graduate students learn advanced methods of system integration and operation. As practitioners, MEng and MS graduates analyze and design facilities, material handling systems, manufacturing processes, information systems, and workstations. They also develop, apply, and oversee policies, procedures, and algorithms for production planning, inventory control, resource allocation and scheduling, quality assurance, and supply chain management. As researchers, MS and PhD graduates advance the field of industrial and manufacturing engineering by their work in industrial corporations and government agencies. As educators, PhD graduates teach and perform research in industrial and manufacturing engineering in universities around the world.
Major Code: 3190

## OPTIONS

## ADVANCED MANUFACTURING OPTION

The Advanced Manufacturing graduate option is offered under both the Industrial Engineering and Mechanical Engineering majors. Advanced Manufacturing (AM) focuses on the integration of nanomaterial synthesis and microfabrication techniques and conventional macroscale manufacturing technologies to produce nano- and microscale systems in an economically, environmentally, and socially sustainable manner.

A minimum of 12 credits from the following set of specific courses will be required of students wishing to declare the IE Advanced Manufacturing (AM) graduate option:

## One materials science course:

ME/MATS 570. Structure-Property Relations in Materials (4)
One or more manufacturing systems course(s):
IE 552. Design of Industrial Experiments (3)
MFGE 535. Industrial Sustainability
Analysis (3)
MFGE 536. Lean Manufacturing Systems Engineering (4)
One or more manufacturing
processes course(s):

MFGE 531. Meso-Scale Manufacturing (3)
MFGE 534. Ceramics Processing (3)
MFGE 538. Composites Manufacturing (4)
Option Code: 3191

## ENGINEERING MANAGEMENT OPTION

## Also available via Ecampus.

The graduate option in Engineering Management at Oregon State University is designed for engineers who are conversant in the language and methods of engineering and technology who are motivated to become managers and leaders. The curriculum will equip engineers with the knowledge and skills necessary to effectively manage technical resources to accomplish complex technical tasks.

## Required

IE 571. Project Management in Engineering (3)

IE 581. Operations Management (4)
IE 582. Introduction to Management for
Engineers and Scientists (4)
IE 583. Advanced Engineering Economics Analysis (4)
Option Code: 3195

## HUMAN SYSTEMS ENGINEERING OPTION

This graduate option within the Industrial Engineering major distinguishes an area of specialization, human systems engineering, within the broader discipline of industrial engineering. Human Systems Engineering (HSE) uses engineering methods and knowledge from the physical, biological, information, social, and management sciences to develop, implement, operate, evaluate, and improve human-machine, human-human, and human-organization systems. Topical areas include management systems engineering and human factors and ergonomics.

The following set of specific courses will be required of students wishing to declare the IE Human Systems Engineering (HSE) graduate option:
IE 545. Human Factors Engineering (4) or IE 570. Management Systems Engineering (4)
IE 546. Human-Machine Systems Engineering (3)
or MFGE 536. Lean Manufacturing Systems Engineering (4)
IE 548. Cognitive Engineering (3) or IE 571. Project Management in Engineering (3)
One course from the list below:
H 594. Applied Ergonomics (3)
IE 515. Simulation and Decision Support Systems (4)
ME 515. Risk and Reliability Analysis in Engineering Design (4)
MFGE 535. Industrial Sustainability Analysis (3)
PSY 537. Motivation (4)
PSY 540. Cognition Research (4)
PSY 544. Learning and Memory (4)

PSY 596 Industrial and Organizational
Psychology (4)
SOC 518. Qualitative Research Methods (4)
ST 531. Sampling Methods (3)
ST 539. Survey Methods (3)
ST 559. Bayesian Statistics (3)
Option Code: 3192

## INFORMATION SYSTEMS ENGINEERING OPTION

This graduate option within the Industrial Engineering major distinguishes an area of specialization, information systems engineering, within the broader discipline of industrial engineering. Information Systems Engineering (ISE) uses information systems to integrate organizational mechanisms, people, and processes for purposes of improving organizational performance. Typical ISE technologies include database management systems, networks, wireless communications, Web-enabled technologies, and automatic identification and data collection using bar codes, RFID, EDI, and other such devices.

The following set of specific courses will be required of students wishing to declare the IE Information Systems Engineering (ISE) graduate option:
IE 511. Visual Programming for Industrial Applications (4)
IE 512. Information Systems Engineering (4)

IE 518. Telecommunication Concepts (3)
IE 519. Wireless Networks (3)

## Total=14

Option Code: 3193

## MANUFACTURING SYSTEMS ENGINEERING OPTION

This graduate option within the Industrial Engineering major distinguishes an area of specialization within the broader discipline of industrial engineering. Manufacturing Systems Engineering (MSE) focuses on the development of reliable, economically competitive, and environmentally benign manufacturing processes and systems. Topical areas include operations research, computer integrated manufacturing, environmentally responsible manufacturing, simulation, and statistical quality engineering.

## Required Courses (6):

IE 521. Industrial Systems Optimization I (3) or IE 522. Industrial Systems Optimization II (3)
IE 563. Advanced Production Planning and Control (3)

## Plus six (6) or more credits of

 course work from the following alternatives:IE 512. Information Systems Engineering (4)
IE 515. Simulation and Decision Support Systems (4)
IE 545. Human Factors Engineering (4) IE 564. Design and Scheduling of Cellular Manufacturing Systems (3)

ME 515. Risk and Reliability Analysis in Engineering Design (4)
ME 516. Modeling and Analysis of Complex Systems (4)
ME 517. Optimization in Design (4)
MFGE 536. Lean Manufacturing Systems Engineering (4)

## Total=12

Option Code: 3196

## MATERIALS SCIENCE (MS, PhD)

## Graduate Areas of Concentration

Chemistry, chemical engineering, civil engineering, electrical and computer engineering, forest products, mathematics, mechanical engineering, nuclear engineering, physics
The discipline of materials science is inherently interdisciplinary, involving fundamental aspects of chemistry, physics, biology, geoscience, agricultural science, mathematics, and engineering.

Reflecting this characteristic, the Materials Science Program at Oregon State University, initiated in the 1980s, is distributed over nine departments spanning three OSU colleges. This allows students to earn MS and PhD degrees in Materials Science in many different areas of concentration, including all classes of materials, and in a wide range of materials behavior. The course work requirements are extremely flexible to allow students to tailor their program of study to directly support their research activities.
Applications and other inquiries should be forwarded to Prof. Bill Warnes, Materials Science Program Director, 204 Rogers Hall, Oregon State University, Corvallis, OR, 97331, USA. Email: william.warnes@oregonstate.edu.
For more information, visit the website at http://matsci.oregonstate.edu/

## Major Code: 3200

## MECHANICAL ENGINEERING

 (MEng, MS, PhD)The School of Mechanical, Industrial, and Manufacturing Engineering offers graduate programs leading to the Master of Engineering, Master of Science, and Doctor of Philosophy degrees. Master's degree candidates may pursue thesis or nonthesis options; students in the nonthesis option must complete additional course work where an individual project may be included.
The mechanical engineering field is diverse, therefore, research activities in the school encompass a broad range of technical endeavors. Areas of research include applied mechanics, solid mechanics, biomechanics, dynamics, stress analysis, design, systems and control, energy, applied thermodynamics, heat transfer, fluid mechanics, metallurgy, and materials science.
In addition, research activities have been directed toward areas of current
interest and need, including wind energy, microscale energy conversion, combustion, composite materials, superconductors, advanced materials, impact dynamics, mechatronics, microscale fluid mechanics, diagnostics in design, design for manufacture and computer-aided design and manufacturing, design and control of complex systems.
Major Code: $\mathbf{3 2 1 0}$

## OPTIONS

## ADVANCED MANUFACTURING OPTION

The Advanced Manufacturing graduate option is offered under both the Industrial Engineering and Mechanical Engineering majors. Advanced Manufacturing (AM) focuses on the integration of nanomaterial synthesis and microfabrication techniques and conventional macroscale manufacturing technologies to produce nano- and microscale systems in an economically, environmentally, and socially sustainable manner.

A minimum of 12 credits from the following set of specific courses will be required of students wishing to declare the IE Advanced Manufacturing (AM) graduate option:
One materials science course:
ME/MATS 570. Structure-Property Relations in Materials (4)
One or more manufacturing systems course(s):
IE 552. Design of Industrial Experiments (3)
MFGE 535. Industrial Sustainability Analysis (3)
MFGE 536. Lean Manufacturing Systems Engineering (4)
One or more manufacturing
processes course(s):
MFGE 531. Meso-Scale Manufacturing (3)
MFGE 534. Ceramics Processing (3)
MFGE 538. Composites Manufacturing (4)

## Option Code: 3191

## DESIGN OPTION

## Required

ME 507. Seminar: Design and Mechanics (1)
Choose 15 credits from the following courses:
ME 511. CAD/CAM III (3)
ME 512. Design of Mechanisms (4)
ME 515. Risk and Reliability Analysis in Engineering Design (4)
ME 516. Modeling and Analysis of Complex Systems (4)
ME 517. Optimization in Design (4)
ME 611. Modern Product Design (4)
MFGE 536. Lean Manufacturing Systems
Engineering (4)

## Total=16

Option Code: 3215

## ENGINEERING

MANAGEMENT OPTION

## Also available via Ecampus.

The graduate option in Engineering Management at Oregon State University is designed for engineers who are conversant in the language and methods of engineering and technology who are motivated to become managers and leaders. The curriculum will equip engineers with the knowledge and skills necessary to effectively manage technical resources to accomplish complex technical tasks.

## Required

IE 571. Project Management in Engineering (3)

IE 581. Operations Management (4)
IE 582. Introduction to Management for
Engineers and Scientists (4)
IE 583. Advanced Engineering Economics Analysis (4)
Option Code: 3195

## MATERIALS MECHANICS OPTION

Required
ME 507. Seminar: Materials Science (1)
ME 520. Applied Stress Analysis (4)
ME 570. Structure-Property Relations in Materials (4)
Choose one course from the following (mechanical behavior):
ME 583. Composite Materials (3)
ME 584. Advanced Fracture of Materials (4)
ME 585. Fatigue of Materials (4)
ME 587. Dislocations, Deformation, and Creep (4)
Choose one course from the following (mechanics):
ME 523. Advanced Stress Analysis (4)
ME 524. Finite Element Modeling of
Mechanical Engineering Systems (4)
ME 553 Structure and Mechanics
Laboratory (4)
Total=16-17
Option Code: 3220

## RENEWABLE ENERGY OPTION

This graduate option within the Mechanical Engineering graduate major distinguishes an area of interdisciplinary specialization, Renewable Energy (RE).

Renewable Energy is inherently interdisciplinary and thus is being proposed as an interdisciplinary option within ME which requires students to select 16 credits of ME courses from across all four ME primary graduate options and then choose from a set of courses which equip students to understand the underlying physical phenomena governing renewable energy technologies and be able to understand overarching themes in US energy policy pertaining to renewables.
Students wishing to declare the ME Renewable Energy (RE) graduate option must first fulfill core mechanical engineering requirements in one of two ways:

1. Declare an interdisciplinary option in mechanical engineering, or
2. Fulfill the requirements of one of the four ME Primary Options.

## Required:

Select and complete 8 credits of
technical electives from:
CE 630. Ocean Wave Mechanics I (3)
CE 639. Dynamics of Ocean Structures (3)
CE 647. Ocean and Coastal Engineering
Measurements (3)
CHE 550. Conventional and Alternative Energy Systems (3)
CHE 551. Solar Energy Technologies (3)
ECE 530. Contemporary Energy
Applications (4)
ECE 532. Dynamics of Electromechanical
Energy Conversion (4)
ECE 533. Power Systems Analysis (4)
ME 507. Seminar/ Marine Forum (1)
ME 543. Renewable Energy: Thermal Fluid Systems (4)
Select and complete 4 credits of technical electives from:
PS 573. US Energy Policy (4)
PS 578. Renewable Energy Policy (4)

## Total=16 minimum

Option Code: 3222

## ROBOTICS OPTION

## Required:

ME 507. Seminar: Robotics and Control (1)
Choose 16 credits from the following:
ME 531. Linear Multivariable Control Systems I (4)
ME 532. Linear Multivariable Control Systems II (4)
ME 533. Nonlinear Dynamic Analysis (4)
ROB 521. Applied Robotics (4)
ROB 536. Actuator Dynamics (4)
[Terminated summer 2016]
ROB 537. Learning-Based Control (4)
ROB 538. Autonomous Agents and MultiAgent Systems (4)
Total=17
Option Code: 3225

## THERMAL FLUID <br> SCIENCES OPTION

## Required:

ME 507. Seminar: Thermal Fluid Science Seminar (1)
ME 526. Numerical Methods for
Engineering Analysis (4)
ME 550. Applied Heat Transfer (4)
ME 552. Measurements in Fluid Mechanics and Heat Transfer (4)
ME 560. Intermediate Fluid Mechanics (4)

## Total=17

Option Code: 3230

## ROBOTICS (MEng, MS, PhD)

Graduate Areas of Concentration
Assistive robots, autonomous robots, human-robot interaction, legged locomotion, manipulation, mobile robots, multi-robot coordination
The interdisciplinary robotics program offers Master of Engineering, Master of Science, and Doctor of Philosophy degrees in Robotics.

Master's degree candidates may pursue thesis or nonthesis options. The PhD program prepares students for careers in industry, research laboratories or universities. Students are encouraged to develop programs of study in close cooperation with the faculty members in their areas of interest.
The program includes core areas of robotics, including actuation, locomotion, manipulation, dynamics, control, sensing, artificial intelligence, and human/ robot interactions.

Additional information concerning courses, advising procedures, faculty, and many other aspects of the program may be found in the programs' website at http://robotics.oregonstate.edu/

Course work for all degrees in Robotics (including minors) will consist of at least 15 credits of core courses, selected from the following list:
CS 515. Algorithms and Data Structures (4)
CS 531. Artificial Intelligence (4)
CS 532. Advanced Artificial Intelligence (4)
CS 533. Intelligent Agents and Decision Making (4)
CS 534. Machine Learning (4)
CS 536. Probabilistic Graphical Models (4)
CS 556. Computer Vision (4)
ECE 550. Linear Systems (4)
ME 531. Linear Multivariable Control Systems I (4)
ME 532. Linear Multivariable Control Systems II (4)
ME 533. Nonlinear Dynamic Analysis (4)
ROB 521. Applied Robotics (4)
ROB 537. Learning-Based Control (4)
ROB 538. Autonomous Agents and Multiagent Systems (4)
ROB 551. Biomechanisms (4) [Pending submission and approval of curriculum proposal.]
ROB 554. Geometric Mechanics (4)
[Pending submission and approval of curriculum proposal.]
ROB 557. Programming Mobile Robots (4)
[Pending submission and approval of curriculum proposal.]
ROB 558. Intelligent Mobile Robotics (4) [Pending submission and approval of curriculum proposal.]
Totals: MS/MEng = 45 (minimum);
PhD = 108 (minimum)
Major Code: 3250

## GRADUATE MINORS

INDUSTRIAL ENGINEERING
GRADUATE MINOR
For more details, see the school advisor.
Minor Code: 3190
MATERIALS SCIENCE
GRADUATE MINOR
For more details, see the school advisor.
Minor Code: 3200

## MECHANICAL ENGINEERING GRADUATE MINOR

For more details, see the school advisor.
Minor Code: 3210

## ROBOTICS GRADUATE MINOR

For additional information about the Robotics graduate minor, please visit the program website at http://robotics. oregonstate.edu/.

## Minor Code: 3255

## - AERONAUTICAL AND ASTRONAUTICAL ENGINEERING COURSES

AAE 210. INTRODUCTION TO AEROSPACE
ENGINEERING (3). Topics will include the engineering fundamentals of aeronautics and astronautics, including an introduction to aerodynamics, propulsion, structures, orbital mechanics and mission planning. Current industry practices in aerospace vehicle specifications, manufacturing, flight testing and certification will be presented. PREREQS: ENGR 211 [C] and /or equivalent
AAE 412. SPACE SYSTEMS ENGINEERING (4).
Topics will include the fundamentals of astronautics, orbital mechanics and trajectory design, flight dynamics, guidance and navigation, stability and control of spacecraft. Rocket propulsion concepts, including chemical rockets (liquid, gas and solid propellants), hybrid rocket engines and modern advances in satellite power systems will be discussed. Current design practices in space systems engineering will be emphasized. PREREQS: ME 317 [C] and ME 373 [C] and /or equivalent. This partially satisfies the requirements for the minor in Aerospace Engineering and Senior Restricted Electives in Mechanical Engineering.

## - ENERGY SYSTEMS ENGINEERING COURSES

ESE 355. ENERGY REGULATION (4). Introductory course to the policies and laws governing energy generation and transmission in the United States with a focus on electricity. History of regulations give context to understand current regulation and potential future policies. Laws regulating the use of alternative energy resources covered in a practical setting. Offered at OSU-Cascades only. PREREQS: BA 360* [C] or ENGR 390* [C] and junior standing in ESE pro school.
ESE 360. ENERGY CONSUMPTION ANALYSIS
(4). Analysis of energy use in transportation, residential and industrial sectors to understand how new technologies improve energy efficiency. Tradeoff techniques applied to decide between less efficient, less expensive systems versus more efficient, more expensive systems. International energy consumption compared, and energy losses evaluated for heating, cooling and electronic systems. Offered at OSU-Cascades only. PREREQS: (BA 360* [C] or ENGR 390* [C] ) and ME 311 [C] and junior standing in ESE pro school.
ESE 450. ENERGY GENERATION SYSTEMS (4). Survey of technical fundamentals and operational principles of conventional and renewable energy conversion systems to understand the environmental and sustainable issues for energy systems currently in use or may be used in the future to power our industrial society. Offered at OSU-Cascades only. PREREQS: ME 312 [C]
ESE 470. ENERGY DISTRIBUTION SYSTEMS
(4). Detailed coverage of the electrical energy distribution system, its operation, control and design. Design considerations and impacts to meet emerging and evolving customer needs. Broader understanding of natural gas and oil pipeline distribution for these infrastructure
commodities. Offered at OSU-Cascades only. PREREQS: ENGR 202 [C] and ME 311 [C]
ESE 471. ENERGY STORAGE SYSTEMS (4).
Coverage of energy storage techniques involving electrochemical, mechanical and emerging options. Integration of the energy storage media, its effects on the bulk power system, and design tradeoffs to understand environmental impacts, cost, reliabilities, and efficiencies for commercialization of bulk energy storage. Offered at OSU-Cascades only. PREREQS: ENGR 202 [C] and ME 312 [C]
ESE 497. ^MIME CAPSTONE DESIGN (4). Product design; selection and replacement of major tools, processes, and equipment; paperwork controls; subsystem revision; system or plant revision; selection and training of personnel; long-run policies and strategy. CROSSLISTED as IE 497 and ME 497. (Writing Intensive Course) PREREQS: ((IE 355 [C] and IE 356 [C] and IE 366 [C] and IE 367 [C] and IE 368 [C] and WR 327 [C] )) or ((ENGR 322 [C] or MATS 322 [C] ) and (ENGR 391 [C] or ENGR 391H [C]) and ME 250 [C] and (ME 312 [C] or ME 312H [C] ) and (ME 317 [C] or ME 317H [C] ) and ME 383 [C] and WR 327 [C] and (ST 314 [C] or ST 314H [C] )) or ((ENGR 390 [C] or BA 360 [C] ) and IE 425 [C] and (ME 312 [C] or ME 312H [C]) and (ME 331* [C] or ME $331 \mathrm{H}^{*}$ [C] ) and ESE 355 [C] and ESE 360 [C] and WR 327 [C] and (ST 314 [C] or ST 314H [C] ))
ESE 498. ^MIME CAPSTONE DESIGN (4). Product design; selection and replacement of major tools, processes, and equipment; paperwork controls; subsystem revision; system or plant revision; selection and training of personnel; long-run policies and strategy. CROSSLISTED as IE 498 and ME 498. (Writing Intensive Course) PREREQS: ESE 497 [C] or IE 497 [C] or ME 497 [C]
ESE 499. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits. PREREQS: Permission by the instructor.

## INDUSTRIAL AND MANUFACTURING ENGINEERING COURSES

IE 199. SPECIAL TOPICS (1-16). Special topics in industrial engineering. This course is repeatable for a maximum of 16 credits.
IE 212. COMPUTATIONAL METHODS FOR INDUSTRIAL ENGINEERING (4). Engineering problem solving using computational methods. Data structures. Modular programming. Sorting and search algorithms. Algorithms for inventory models, production scheduling, production line analysis, and optimization. PREREQS: ENGR 112 [C] and algebra, calculus, differentiation and integration.
IE 255. INTRODUCTORY QUANTITATIVE
ANALYSIS OF INDUSTRIAL AND
MANUFACTURING SYSTEMS (3). An
introduction to basic analysis concepts that will be utilized in subsequent industrial and manufacturing engineering courses. Emphasis will be placed on fundamental concepts such as data collection, commonly applied quantitative analysis methods, and how these are utilized to support decisions in different industrial and manufacturing system applications. Examples include resource utilization calculations, equipment fraction equations, queuing models, basic statistical inference procedures, and probability models used in discrete event simulation. PREREQS: MTH 252 [C]
IE 285. INTRODUCTION TO INDUSTRIAL AND MANUFACTURING ENGINEERING (3). Introduction to selected topics in industrial and manufacturing engineering, including history and philosophy, product design and manufacturing cycle, integrate role of engineering and business, and multi-objective nature of organizations. Surveys of selected design problems in resource
allocation, operations and quality management, and production engineering. CROSSLISTED as MFGE 285.

IE 299. SPECIAL TOPICS (1-16). Special topics in industrial engineering. This course is repeatable for a maximum of 16 credits.
IE 355. STATISTICAL QUALITY CONTROL (4). Control of quality through the use of statistical analysis; typical control techniques and underlying theory. Development of reliability models and procedures for product assurance. Lec/lab. PREREQS: IE 255 [C] or ST 314 [C]
IE 356. EXPERIMENTAL DESIGN FOR INDUSTRIAL PROCESSES (4). Systematic analysis of processes through the use of statistical analysis, methods, and procedures. Application of statistical techniques including use of classic process analysis techniques, regression and design of experiments. Lec/rec. PREREQS: IE 255 [C] or ST 314 [C]
IE 366. WORK SYSTEMS ENGINEERING (4). Principles and techniques of work measurement, methods engineering, workplace design, work sampling, and predetermined time systems. Basic human factors engineering and ergonomics principles applied to workplace design. The work systems engineering process. Lec/lab/rec. PREREQS: IE 255 [C] or ST 314 [C]
IE 367. PRODUCTION PLANNING AND CONTROL (4). Forecasting techniques, inventory analysis, master production scheduling, material and capacity requirements, planning and scheduling methods. PREREQS: IE 255 [C] or ST 314 [C]
IE 368. FACILITY DESIGN AND OPERATIONS
MANAGEMENT (4). Design and analysis of industrial facilities including just-in-time systems, queuing, material handling systems, material flow analysis, line balancing, systematic layout planning, design of warehouse facilities, and facilities location. PREREQS: IE 255 [C] or ST 314 [C]
IE 380. *THE RESPONSIBLE ENGINEER (3).
The idea of responsibility and the ethical responsibilities of the engineer. Introduction to value, ethics, and ethical systems. Engineering as value creation and the ethical ramifications of engineering. Codes of engineering ethics. Recognizing and addressing ethical dilemmas in engineering. Examination of the individual, social, and environmental effects of engineering and technology. (Baccalaureate Core Course)
IE 399. SPECIAL TOPICS (1-16). Special topics in industrial engineering. This course is repeatable for a maximum of 16 credits.

E 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required

IE 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
IE 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
IE 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

IE 410. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.
IE 411. VISUAL PROGRAMMING FOR INDUSTRIAL APPLICATIONS (4). Objectoriented modeling, Unified Modeling Language, software development concepts, file and database connectivity, and visual programming skills (Microsoft Visual Basic) for use in developing industrial applications, such as process monitoring and supply chain management. PREREQS: IE 212 [C]
IE 412. INFORMATION SYSTEMS
ENGINEERING (4). Framework for enterprise
information systems. Engineering and scientific systems. Requirements definition, enhanced entity relationship modeling, logical modeling, structured query language, relational model, referential integrity. Lec/lab.
IE 415. SIMULATION AND DECISION SUPPORT SYSTEMS (4). Analysis of operations and production systems through the application of computer simulation modeling techniques. Fundamentals of computer simulation including random number generation, input/output data analysis, model validation and verification. Lec/lab. PREREQS: IE 255 [C] or ST 314 [C]

IE 418. TELECOMMUNICATION CONCEPTS (3).
Telecommunication concepts for industrial applications. OSI reference model, local area networks, wide area networks, internet architecture. Taught fall in even years. PREREQS: IE 212 [D-] and previous programming experience.
IE 419. WIRELESS NETWORKS (3). RF fundamentals, ISO 802.11 standards, spread spectrum technology, narrow band technology, direct sequence and frequency hopping transmission schemes, electromagnetic interference, design of indoor wireless networks. PREREQS: IE 418 [C]
IE 425. INDUSTRIAL SYSTEMS OPTIMIZATION
(4). A first course in operations research. Topics include mathematical programming formulations and solutions, the simplex method, network optimization, introduction to metaheuristics, and linear programming under uncertainty. PREREQS: (IE 255 [C] or ST 314 [C] ) and (MTH 306 [C] or MTH 341 [C] ) and /or equivalent

E 426. STOCHASTIC MODELS OF INDUSTRIAL SYSTEMS (4). The application of probabilistic and stochastic modeling methodologies to analyze the performance of production and service systems. Major topics include probability models for space planning, Poisson arrival processes, discrete and continuous time Markov chain models of machine cycle times, and queuing models applied to various industrial systems. Other applications of these tools to model inventories, process behavior, and equipment reliability is illustrated. PREREQS: (IE 255 [C] or ST 314 [C] ) and IE 425 [C]

## IE 470. MANAGEMENT SYSTEMS

ENGINEERING (4). Improvement of organizational performance through the design and implementation of systems that integrate personnel, technological, environmental, and organizational variables. Topics include performance assessment and measurement as well as improvement methodologies. PREREQS: Senior standing.

## IE 471. PROJECT MANAGEMENT IN

ENGINEERING (3). Critical issues in the
management of engineering and high-technology projects are discussed. Time, cost, and performance parameters are analyzed from the organizational, people, and resource perspectives. Network optimization and simulation concepts are introduced. Resource-constrained project scheduling case discussions and a term project are included. PREREQS: Junior standing in engineering.

## IE 475. ADVANCED MANUFACTURING

COSTING TECHNIQUES (3). Costing techniques applicable in advanced manufacturing enterprises: activity-based costing, economic value added, Japanese cost management techniques, life cycle costing, throughput accounting, cost of quality, and financial versus operational performance measures. Emphasis on linkages to such advanced manufacturing systems as cellular manufacturing, flexible manufacturing, JIT, Lean, and ERP. PREREQS: ENGR 390 [C]
IE 497. ^MIME CAPSTONE DESIGN (4). Product design; selection and replacement of major tools, processes, and equipment; paperwork controls; subsystem revision; system or plant revision; selection and training of personnel; long-run policies and strategy. CROSSLISTED as ESE

497 and ME 497. (Writing Intensive Course) PREREQS: ( $($ IE 355 [C] and IE 356 [C] and IE 366 [C] and IE 367 [C] and IE 368 [C] and WR 327 [C] )) or ((ENGR 322 [C] or MATS 322 [C] ) and (ENGR 391 [C] or ENGR 391H [C] ) and ME 250 [C] and (ME 312 [C] or ME 312H [C]) and (ME 317 [C] or ME 317H [C] ) and (ME 383 [C] or ME 383H [C] ) and WR 327 [C] and (ST 314 [C] or ST 314 H [C] )) or ((ENGR 390 [C] or BA 360 [C] ) and IE 425 [C] and (ME 312 [C] or ME 312H [C]) and (ME 331 [C] or ME 331H [C] ) and ESE 355 [C] and ESE 360 [C] and WR 327 [C] and (ST 314 [C] or ST 314H [C] ))
E 498. ^MIME CAPSTONE DESIGN (4). Product design; selection and replacement of major tools, processes, and equipment; paperwork controls; subsystem revision; system or plant revision; selection and training of personnel; long-run policies and strategy. CROSSLISTED as ESE 498 and ME 498. (Writing Intensive Course) PREREQS: ESE 497 [C] or IE 497 [C] or ME 497 [C]
IE 499. SPECIAL TOPICS (1-5). This course is repeatable for a maximum of 99 credits.
IE 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.

IE 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
IE 506. PROJECTS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
IE 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
IE 511. VISUAL PROGRAMMING FOR INDUSTRIAL APPLICATIONS (4). Objectoriented modeling, Unified Modeling Language, software development concepts, file and database connectivity, and visual programming skills (Microsoft Visual Basic) for use in developing industrial applications, such as process monitoring and supply chain management. PREREQS: IE 212

## IE 512. INFORMATION SYSTEMS

ENGINEERING (4). Framework for enterprise information systems. Engineering and scientific systems. Requirements definition, enhanced entity relationship modeling, logical modeling, structured query language, relational model, referential integrity. Lec/lab.

IE 515. SIMULATION AND DECISION SUPPORT
SYSTEMS (4). Analysis of operations and production systems through the application of computer simulation modeling techniques Fundamentals of computer simulation including random number generation, input/output data analysis, model validation and verification. Lec/lab PREREQS: ST 314

IE 518. TELECOMMUNICATION CONCEPTS
(3). Telecommunication concepts for industrial
applications. OSI reference model, local
area networks, wide area networks, internet architecture. Taught fall in even years. PREREQS:
IE 212 and previous programming experience.
IE 519. WIRELESS NETWORKS (3). RF fundamentals, ISO 802.11 standards, spread spectrum technology, narrow band technology, direct sequence and frequency hopping transmission schemes, electromagnetic interference, design of indoor wireless networks. PREREQS: IE 518 [C]
IE 521. INDUSTRIAL SYSTEMS OPTIMIZATION
I (3). Techniques for analysis and solution of problems in industrial and management systems. Emphasis on application of linear and integer programming and extensions. PREREQS: MTH 341

IE 522. INDUSTRIAL SYSTEMS OPTIMIZATION
I (3). Techniques for analysis and solution
of problems in industrial and management
systems. Emphasis on applications of dynamic programming. Markovian processes, and questions as applied to industrial problems. PREREQS: ST 314
IE 545. HUMAN FACTORS ENGINEERING (4). Analysis and design of work systems considering human characteristics, capabilities and limitations. Analysis and design of displays, controls, tools, and workstations. Human performance analysis. Human factors research methods. PREREQS: Graduate standing.
IE 546. HUMAN-MACHINE SYSTEMS
ENGINEERING (3). Development of safe, high performance human-machine systems. System/ function/task analysis, function allocation, design, mockups and rapid prototyping, human factors test and evaluation. Critical examination of the humanfactors and domain-specific literature to identify human factors problems, and knowledge and methods to address those problems. PREREQS: IE 545

IE 548. COGNITIVE ENGINEERING (3). Theories and models of human sensory, cognitive, and motor performance pertaining to the operation of complex systems. Applications to humanmachine systems engineering. Research topics and methods related to cognitive engineering. PREREQS: Graduate standing in science or engineering and IE 545

## IE 552. DESIGN OF INDUSTRIAL

EXPERIMENTS (3). A first course in design of experiments with an emphasis on applications and fundamental data analysis methods. Basic statistical inference, analysis of variance, blocking general factorial designs, and two-level factorial designs are covered. PREREQS: ST 314

## IE 553. DESIGN OF INDUSTRIAL

EXPERIMENTS II (3). This second course in design of experiments is a continuation of IE 552. The same textbook is used. Topics covered include two-level fractional factorial designs, regression models, response surface methods, rules for expected sum of squares and expected mean squares, a summary of the "no-name" approach to DOE, and analysis of experiments with unbalanced data (time permitting).
PREREQS: IE 552 [C]
IE 563. ADVANCED PRODUCTION PLANNING AND CONTROL (3). Application of quantitative and heuristic methods to problems of production, material, and capacity planning. Mathematical models for inventory systems, sequencing, and scheduling. Assembly line balancing methods. Just-in-time manufacturing. PREREQS: IE 521 and ST 314

## IE 564. DESIGN AND SCHEDULING OF

CELLULAR MANUFACTURING SYSTEMS (3).
Designing manufacturing cells. Impact of alternate process plan on cell design. Part-machine assignment to cells. Disaggregated manufacturing cells. Group scheduling. PREREQS: Graduate standing, computer experience.

## IE 570. MANAGEMENT SYSTEMS

ENGINEERING (4). Improvement of
organizational performance through the design and implementation of systems that integrate personnel, technological, environmental and organizational variables. Topics include performance assessment and measurement as well as improvement methodologies. PREREQS: Graduate standing.

## IE 571. PROJECT MANAGEMENT IN

ENGINEERING (3). Critical issues in the
management of engineering and high-technology projects are discussed. Time, cost, and performance parameters are analyzed from the organizational, people, and resource perspectives Network optimization and simulation concepts are introduced. Resource-constrained project scheduling case discussions and a term project are included. PREREQS: Junior standing in engineering.

IE 575. SYSTEMS THINKING THEORY AND
PRACTICE (4). An introduction to systems science theory and practice. Systems science theory is explored through the fundamentals of systems thinking theory, and theory of knowledge. Systems science practice is explored through system dynamics modeling techniques for simulating socio-technical systems, structures, and processes. PREREQS: IE or similar engineering BS degree or with instructor approval.
IE 581. OPERATIONS MANAGEMENT (4). Critical and current issues on the implementation of operations management strategies for the engineering manager. Includes aspects of operations in an engineering management environment such as work systems design, forecasting, strategy, facilities location and design, management of quality and resources planning and management. PREREQS: IE 571

## IE 582. INTRODUCTION TO MANAGEMENT

 FOR ENGINEERS AND SCIENTISTS (4). An introduction to concepts, tools, and practices necessary for a broad understanding of the roles of engineering and technical managers. A mix of research results, case studies, and experiential learning is used to bolster theories of management, with focus on technical organizations.
## IE 583. ADVANCED ENGINEERING

ECONOMICS ANALYSIS (4). Examines
the economics dimension of engineering management, from costing techniques to financial analysis. Topics include industrial cost analysis and estimation, economic planning, forecasting, and budgeting, and financial analysis for engineering and engineering management. PREREQS: Basic courses in engineering economic analysis (ENGR 390) or instructor's consent.
IE 584. SYSTEMS ENGINEERING (4). An overview of systems engineering within engineering management practice. Principles of systems engineering are explored through traditional and contemporary hard and soft systems of engineering techniques and practices, and through current future developments in the field. PREREQS: IE 582 [B-] and IE 581 and IE 583 and IE 586 and IE 587

IE 585. LEGAL ASPECT OF ENGINEERING MANAGEMENT (3). A survey of legal topics relevant to engineers, including basic of legal system, labor law, intellectual property, torts, and contracts. This is an introductory course, emphasizes on legal principles that can provide engineers with the ability to recognize legal issues that are likely to arise in the engineering profession and engineering management. Note: This is an introductory class and will in no way make a student a lawyer. Students are advised to seek legal representation if he/she encounters a legal issue. PREREQS: IE 582 [B] and IE 581 and IE 583 and (IE 586 or CCE 552) and graduate standing.
IE 586. PROJECT RISK MANAGEMENT (4). An introduction to the concept of project risk in producing constructed engineering projects. Course content includes project baselining, risk definition and identification, risk assessment and management techniques, risk control, risk response, and risk management. CROSSLISTED as CCE 552. PREREQS: Graduate standing in College of Engineering, or instructor's consent.

## E 587. MANAGEMENT OF INFORMATION

SYSTEMS (4). An introduction to the management of information systems and their strategic importance in business. Topics covered include global e-business and collaboration, databases and information management, basics of telecommunications and wireless technology, security vulnerabilities of information systems, basics of business intelligence and business analytics, knowledge management and enhanced decision making. PREREQS: IE 582 [B]

IE 589. PROFESSIONAL RESPONSIBILITY
AND ETHICS (3). An in-depth exploration of professional engineering ethics. Course content includes conceptual theoretical basis of ethics, ethics among professional organizations, ethical consideration of design, critical analysis of ethical situations, ethics in the workplace, and ethical considerations regarding the broader environment. CROSSLISTED as CCE 554.

## IE 594. RESEARCH METHODS IN

ENGINEERING (3). Introduction to research methodologies including surveys, interviews, quasi-experimentation, and case studies. Methods for research design, and collection and analysis of data. PREREQS: Graduate standing or instructor approval.
IE 599. SPECIAL TOPICS (1-5). This course is repeatable for a maximum of 99 credits. PREREQS: Graduate standing only.
IE 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.

IE 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
IE 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
IE 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

- MATERIALS SCIENCE COURSES MATS 221. THE SCIENCE, ENGINEERING AND SOCIAL IMPACT OF NANOTECHNOLOGY (3). Nanotechnology is an emerging engineering field that manipulates atoms and molecules to fabricate new materials and tiny devices. Properties of nanostructured materials, manufacturing methods, characterization methods, and impact on health and safety. Benefits and concerns about nanotechnology will be assessed. Lec/rec. CROSSLISTED as ENGR 221. PREREQS: One year of college science.
MATS 321. INTRODUCTION TO MATERIALS SCIENCE (4). Crystal structure, microstructure, and physical properties of metals, ceramics, polymers, composites, and amorphous materials. Also includes elementary mechanical behavior and phase equilibria. Lec. CROSSLISTED as ENGR 321. PREREQS: (CH 202 [C] or CH 222 [C] or CH 232 [C] or CH 232 H [C] or CH 224H [C] )


## MATS 322. MECHANICAL PROPERTIES

OF MATERIALS (3). Mechanical behavior of materials, relating laboratory test results to material structure, and elements of mechanical analysis. Lec/lab. CROSSLISTED as ENGR 322. PREREQS: (ENGR 213 [C] or ENGR 213H [C] ) and (ENGR 321 [C] or ENGR 321 H [C] or MATS 321 [C])
MATS 455. EXPERIMENTAL TECHNIQUES IN MATERIAL SCIENCE (4). Materials processing, characterization, computational and data analysis techniques in materials science. Focus on processing-structure-property relationships. Lec/ lab. This course is repeatable for a maximum of 8 credits. PREREQS: (ENGR 321 [C] or ENGR 321 H [C] ) and ME 570 or equivalent.

## MATS 478. THIN FILM MATERIALS

 CHARACTERIZATION AND PROPERTIES (4). Processing of thin films and characterization of the microstructure; diffusion and solid state reactions; mechanical, magnetic and electronic properties of thin films. PREREQS: (ME 311 [C] or ME 311H [C] ) and (ENGR 321 [C] or ENGR 321H [C] or MATS 321 [C] ) and (ENGR 322 [C] or MATS 322 [C])MATS 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
MATS 509. MATERIALS SCIENCE SEMINAR (1). Student participation seminar experience for one
credit; students will listen to seminars concerning ongoing research activities within materials science. Students will also have the opportunity to present their own research results periodically. Graded P/N. CROSSLISTED as ME 509.
MATS 555. EXPERIMENTAL TECHNIQUES IN MATERIAL SCIENCE (4). Materials processing, characterization, computational and data analysis techniques in materials science. Focus on processing-structure-property relationships. Lec/ lab. This course is repeatable for a maximum of 8 credits. PREREQS: ME 570 [C] and (ENGR 321 or ENGR 321H)

## MATS 570. STRUCTURE-PROPERTY

RELATIONS IN MATERIALS (4). Fundamentals of the interactions between the structure and properties of materials. Atomic bonding and atom interactions. Geometric and algebraic representations of symmetry. Introduction to phase equilibria. Phenomenological background of elasticity and plasticity in materials. Anisotropic materials and tensor representations. Influence of structure on thermal, electrical, and optical properties of materials. CROSSLISTED as ME 570.

## MATS 571. ELECTRONIC PROPERTIES OF

 MATERIALS (4). Development of a quantitative description of the electronic structure of solids starting with the quantum mechanical model of the atom, atomic bonding, and band theory of solids. Quantitative description of the electronic properties of metals, semiconductors, and insulators. CROSSLISTED as ME 571 PREREQS: CH 545 or ME 570 or equivalent.
## MATS 578. THIN FILM MATERIALS

CHARACTERIZATION AND PROPERTIES (4). Processing of thin films and characterization of the microstructure; diffusion and solid state reactions; mechanical, magnetic and electronic properties of thin films. PREREQS: Instructor permission for ME/MATS 578.

MATS 581. THERMODYNAMICS OF SOLIDS
(4). Thermodynamics of solutions and phase equilibrium. Phase diagrams and invariant reactions. Order and disorder in solutions. Applications to advanced materials development. Lec/lab. CROSSLISTED as ME 581.

## MATS 582. RATE PROCESSES IN MATERIALS

(4). Diffusion in solids, including vacancy and interstitial and short-circuit diffusion. Phase transformations including classic nucleation and growth theory. Applications to materials development. Laboratory will emphasize microstructural evaluation and quantitative metallography. Lec/lab. CROSSLISTED as ME 582.

MATS 584. ADVANCED FRACTURE OF
MATERIALS (4). Fracture mechanics will be used as a basis for predicting failure of materials, understanding failure mechanisms, and identifying causes of failure. Course will include discussion of recent journal articles, experimental demonstrations, and analysis of real fracture data. CROSSLISTED as ME 584. PREREQS: ENGR 322 or equivalent is recommended.

MATS 587. DISLOCATIONS, DEFORMATION, AND CREEP (4). The effects of point, line, and planar defects on plastic deformation and creep behavior in solids will be discussed with emphasis on the role of dislocations and vacancies. CROSSLISTED as ME 587. PREREQS: ENGR 322 or equivalent.

MATS 588. COMPUTATIONAL METHODS IN MATERIALS SCIENCE (4). A broad introduction to important materials science simulation methods. These include molecular dynamics, density functional theory, and Monte Carlo methods. Learning is through a mixture of lecture and hands-on lab projects in which students use computational methods to explore and reinforce fundamental concepts in materials science. Lec/ lab. CROSSLISTED as ME 588. PREREQS: Experience with Matlab or Mathematica or an equivalent numerical and programming
environment.
MATS 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

MATS 671. ELECTRONIC PROPERTIES OF
OXIDES (4). Band theory of solids applied to metal oxide materials. Includes metallic oxides, non-stoichiometric semiconductors and associated defect chemistry, high temperature superconductors, electrostatics, linear dielectrics, non-linear dielectrics, piezoelectrics, and the optical properties of oxides. CROSSLISTED as ME 671. PREREQS: ME 571 or MATS 571 or PH 575

## 1 MECHANICAL ENGINEERING COURSES

ME 101. INTRODUCTION TO MECHANICAL
ENGINEERING (3). Orientation to mechanical engineering: methods used in solving engineering problems; experience with typical mechanical engineering projects and problems; ethics, curricula and engineering careers. Lec/rec. PREREQS: Trigonometry.
ME 206. PROJECTS (1-16). PREREQS: Sophomore standing.
ME 250. INTRODUCTION TO MANUFACTURING
PROCESSES (1). Use of measuring and layout tools, interpretation of blueprints and drawings, identification of engineering materials. Operation of machine tools, including calculation of machining parameters. Operation of gas and MIG welding equipment. Lec/lab. Graded P/N. PREREQS: ENGR 248 [C] and ME or IE professional school admission.
ME 299. SPECIAL TOPICS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
ME 299H. SPECIAL STUDIES (1-16). Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

ME 306. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing.
ME 311. INTRODUCTION TO THERMALFLUID SCIENCES (4). Basic concepts of fluid mechanics, thermodynamics and heat transfer are introduced. Conservation of mass, energy, moment and the second law of thermodynamics are included. CROSSLISTED as NSE 311. PREREQS: ((ENGR 212 [C] or ENGR 212H [C] ) and (MTH 256 [C] or MTH 256H [C] ))
ME 311H. INTRODUCTION TO THERMALFLUID SCIENCES (4). Basic concepts of fluid mechanics, thermodynamics and heat transfer are introduced. Conservation of mass, energy, moment and the second law of thermodynamics are included. CROSSLISTED as NSE 311H. PREREQS: ((ENGR 212 [C] or ENGR 212H [C] ) and (MTH 256 [C] or MTH 256H [C] )) and Honors College approval required

ME 312. THERMODYNAMICS (4). Exergy destruction, machine and cycle processes, law of corresponding states, non-reactive gas mixtures, reactive mixtures, thermodynamics of compressible fluid flow. CROSSLISTED as NSE 312. PREREQS: (MTH 256 [C] or MTH 256H [C]) and (ME 311 [C] or ME 311H [C] or NSE 311 [C] or NSE 311H [C] or NE 311 [C] or NE 311H [C])
ME 312H. THERMODYNAMICS (4). Energy destruction, machine and cycle processes, law of corresponding states, non-reactive gas mixtures, reactive mixtures, thermodynamics of compressible fluid flow. CROSSLISTED as NSE 312H. PREREQS: (MTH 256 [C] or MTH 256H [C] ) and (ME 311 [C] or ME 311H [C] or NSE 311 [C] or NSE 311H [C] or NE 311 [C] or NE 311H [C] ) and Honors College approval required.
ME 316. MECHANICS OF MATERIALS (3).
Determination of stresses, deflections, and stability of deformable bodies with an introduction
to finite element analysis. PREREQS: (ENGR 213 [C] or ENGR 213H [C] ) and (MTH 256 [C] or MTH 256H [C] )
ME 317. INTERMEDIATE DYNAMICS (4).
Continuation of the study of kinematics and kinetics of particles and rigid bodies, with applications to mechanical systems of current interest to engineers. PREREQS: ((ENGR 212 [C] or ENGR 212H [C] ) and (MTH 256 [C] or MTH 256H [C] ))
ME 317H. INTERMEDIATE DYNAMICS (4).
Continuation of the study of kinematics and kinetics of particles and rigid bodies, with applications to mechanical systems of current interest to engineers. PREREQS: ((ENGR 212 [C] or ENGR 212H [C] ) and (MTH 256 [C] or MTH 256 H [C] )) and Honors College approval required.
ME 331. INTRODUCTORY FLUID MECHANICS
(4). Introduces the concepts and applications of fluid mechanics and dimensional analysis with an emphasis on fluid behavior, internal and external flows, analysis of engineering applications of incompressible pipe systems, and external aerodynamics. CROSSLISTED as NSE 331 PREREQS: ((MTH 254 [C] or MTH 254H [C] ) and (MTH 256 [C] or MTH 256H [C] ) and (ENGR 212 [C] or ENGR 212H [C] ) and (ENGR 311 [C] or ME 311 [C] or ME 311H [C] or NSE 311 [C] or NSE 311 H [C] or NE 311 [C] or NE 311H [C] ))
ME 331H. INTRODUCTORY FLUID MECHANICS
(4). Introduces the concepts and applications of fluid mechanics and dimensional analysis with an emphasis on fluid behavior, internal and external flows, analysis of engineering applications of incompressible pipe systems, and external aerodynamics. CROSSLISTED as NSE 331H. PREREQS: ((MTH 254 [C] or MTH 254H [C] ) and (MTH 256 [C] or MTH 256H [C] ) and (ENGR 212 [C] or ENGR 212H [C] ) and (ENGR 311 [C] or ME 311 [C] or ME 311H [C] or NSE 311 [C] or NSE 311 H [C] or NE 311 [C] or NE 311H [C] )) and Honors College approval required.
ME 332. HEAT TRANSFER (4). A treatment of conductive, convective and radiative energy transfer using control volume and differential analysis and prediction of transport properties. CROSSLISTED as NSE 332. PREREQS: ((MTH 256 [C] or MTH 256H [C] ) and (ENGR 212 [C] or ENGR 212H [C] ) and (ME 311 [C] or ME 311H [C] or NE 311 [C] or NE 311H [C] ) and (ME 331 [C] or ME 331H [C] or NSE 331 [C] or NSE 331H [C] or NE 331 [C] or NE 331H [C] ))

ME 332H. HEAT TRANSFER (4). A treatment of conductive, convective and radiative energy transfer using control volume and differential analysis and prediction of transport properties. CROSSLISTED as NSE 332H. PREREQS: ((MTH 256 [C] or MTH 256H [C] ) and (ENGR 212 [C] or ENGR 212H [C] ) and (ME 311 [C] or ME 311H [C] or NE 311 [C] or NE 311H [C] ) and (ME 331 C] or ME 331H [C] or NSE 331 [C] or NSE 331H C] or NE 331 [C] or NE 331H [C] )) and Honors College approval required.

ME 348. ADVANCED SOLID MODELING (1). Practical application of graphical communication theory using advanced solid modeling software to capture design intent and generate engineering drawings. Lec/lab. Graded P/N. PREREQS: ENGR 248 [C]

ME 373. MECHANICAL ENGINEERING
METHODS (3). Analytical and numerical methods for solving representative mechanical engineering problems. Lec/rec. PREREQS: (ENGR 112 [C] or ENGR 112H [C] ) and (MTH 256 [C] or MTH 256H [C] ) and /or equivalent.

ME 373H. MECHANICAL ENGINEERING
METHODS (3). Analytical and numerical methods for solving representative mechanical engineering problems. Lec/rec. PREREQS: (ENGR 112 [C] or ENGR 112H [C] ) and (MTH 256 [C] or MTH 256 H [C] ) and /or equivalent. Honors College approval required.

ME 382. INTRODUCTION TO DESIGN (4).
Organization, planning, economics, and the use of creativity and optimization in solving mechanical design problems. Case studies and/or industrial design problems. Lec/lab. PREREQS: ENGR 248 [C] and ME 250* [C]

## ME 382H. INTRODUCTION TO DESIGN (4).

Organization, planning, economics, and the use of creativity and optimization in solving mechanical design problems. Case studies and/or industrial design problems. Lec/lab. PREREQS: ENGR 248 [C] and ME 250* [C] and Honors College approval required.
ME 383. MECHANICAL COMPONENT DESIGN
(4). Failure analysis and design of machine components. Lec/lab. PREREQS: ME 316 [C] and ME 250* [C]
ME 383H. MECHANICAL COMPONENT DESIGN (4). Failure analysis and design of machine components. Lec/lab. PREREQS: (ME 316 [C] and (ME 382 [C] or ME 382H [C] )) and Honors College approval required.

ME 401. RESEARCH (1-16). This course is repeatable for a maximum of 9 credits.

ME 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS:
Departmental approval required.
ME 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 9 credits.
ME 405H. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 9 credits. PREREQS: Honors College approval required.

ME 406. PROJECTS (1-16). This course is repeatable for a maximum of 15 credits.

ME 407. SEMINAR (1-16). This course is repeatable for a maximum of 2 credits.

ME 410. INTERNSHIP (1-16). Credits may not apply toward BS degree in Mechanical Engineering. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

## ME 411. AEROSPACE APPLICATIONS IN

 MECHANICAL ENGINEERING (4). Provides students with the fundamentals of mechanical engineering applications to aerospace. Topics covered include an overview of modern aircraft and spacecraft analysis, with an emphasis on performance, stability, structures, materials, FAA and FAR standards and current professional practices in the conceptual design of aerospace vehicles. Student projects will integrate course topics. PREREQS: (ME 316 [C] and ME 317 [C] and ME 331 [C] and ME 373 [C] )ME 412. DESIGN OF MECHANISMS (4). Analysis and study of the function, classification, position, velocity, and acceleration of multi-element mechanical linkages and mechanisms. Synthesis of mechanisms for specified multiple point paths, quick return, dwell, and straight-line motion. The lecture will instruct students in the kinematic analysis and synthesis of mechanisms through the use of theory and software packages. The laboratory will familiarize students with a modern mechanism design and animation software package. Lec/lab. PREREQS: (ME 317 [C] or ME 317 H [C] ) and ME 383 [C]

## ME 413. COMPUTER-AIDED DESIGN AND

 MANUFACTURING (4). Introduces students to the use of computers in several extended areas of product design and manufacturing. These areas include product data management in a sustaining engineering environment; computer-aided manufacturing (CAM) and computer numerical control (CNC) operations and technology; the use of programmable logic controllers (PLCs) for industrial control systems; and the use of simulation software for virtual prototyping for Design/Manufacturing/Validation. Lec/lab. PREREQS: (ME 382 [C] or ME 382H [C] or IE 366 [C] )ME 420. APPLIED STRESS ANALYSIS (4). Elasticity theory, failure theories, energy methods, finite element analysis. PREREQS: ME 316 [C]
ME 422. MECHANICAL VIBRATIONS (4). Dynamic response of single and multiple degree-of-freedom systems. PREREQS: (ME 317 [C] or ME 317H [C] )
ME 422H. MECHANICAL VIBRATIONS (4). Dynamic response of single and multiple degree-of-freedom systems. PREREQS: ME 317 [C] or ME 317H [C] and Honors College approval required.

## ME 424. FINITE ELEMENT MODELING OF

MECHANICAL ENGINEERING SYSTEMS (3).
Application of modern finite element code in the analysis of complex mechanical engineering systems. Extensive use of engineering workstations. Lec/lab. PREREQS: (ME 420 [C] or ME 520 [C] )
ME 430. SYSTEMS DYNAMICS AND CONTROL
(4). Modeling and analysis of linear continuous systems in time and frequency domains.
Fundamentals of single-input-single-output control system design. CROSSLISTED as ECE 451. PREREQS: (ME 317 [C] or ME 317H [C] or (ECE 351 [C] and ECE 352 [C] and (ENGR 212 [C] or ENGR 212H [C] )))
ME 430H. SYSTEMS DYNAMICS AND
CONTROL (4). Modeling and analysis of linear continuous systems in time and frequency domains. Fundamentals of single-input-singleoutput control system design. CROSSLISTED as ECE 451. PREREQS: (ME 317 [C] or ME 317H [C] or (ECE 351 [C] and ECE 352 [C] and (ENGR 212 [C] or ENGR 212H [C] ))) and Honors College approval required.
ME 443. RENEWABLE ENERGY: THERMAL FLUID SYSTEMS (4). Evaluates several thermal/ fluid power conversion strategies that deal with both thermal and fluid energy sources in terms of basic conversion technology, resource potential and developmental challenges. There are four modules, each targeting a particular renewable energy system in thermal and fluid sciences. PREREQS: (ME 311 [C] or ME 311H [C] or NE 311 [C] or NE 311H [C] ) and (ME 331 [C] or ME 331 H [C] or NE 331 [C] or NE 331H [C] ) and (ME 332 [C] or ME 332H [C] or NE 332 [C] or NE 332H [C] )

## ME 444. ADVANCED POWER GENERATION

SYSTEMS (4). Thermal mechanical evaluation of modern power generation technologies, including fossil and nuclear Rankine cycle power plants, gas turbines, cogeneration power plants, distributed power generation and fuel cells. Lec/ rec. PREREQS: (ME 312 [C] or ME 312H [C] ) and (ME 332 [C] or ME 332H [C] )
ME 445. INTRODUCTION TO COMBUSTION
(4). Study of combustion science based on the background of chemistry, thermodynamics, fluid mechanics, heat and mass transfer. Stoichiometry, energetics of chemical reactions, flame temperature, equilibrium product analyses, chemical kinetics, and chain reactions. PREREQS: (ME 312 [C] or ME 312H [C] and (ME 332 [C] or ME 332H [C] ))
ME 450. APPLIED HEAT TRANSFER (4). An intermediate heat transfer course seeking to lay a foundation for determining the heating and cooling characteristics with a variety of modern and classical processes. Included is design of multi-component heat transfer systems. Lecture, 110 minutes twice per week. PREREQS: (ME 332 [C] or ME 332H [C] )

## ME 451. INTRODUCTION TO

INSTRUMENTATION AND MEASUREMENT
SYSTEMS (4). Function, operation, and application of common mechanical engineering instruments, measurement principles, and statistical analysis. Major elements of measurement systems, including transduction, signal conditioning, and data recording. Function and operation of digital data acquisition systems.

Lec/lab. PREREQS: ((ENGR 202 [C] or ENGR 202 H [C] ) and (ME 311 [C] or ME 311H [C] ) and ME 316 [C] and (ME 317 [C] or ME 317H [C] ) and (ME 373 [C] or ME 373H [C] ) and (ST 314 [C] or ST 314H [C] ))
ME 452. THERMAL AND FLUIDS SCIENCES
LABORATORY (4). Course emphasis is on experiments related to thermodynamics, heat transfer, and fluid mechanics. Proper experimental methods, data and uncertainty analysis related to thermal and fluids measurements are discussed.
PREREQS: (ME 311 [C] or ME 311H [C] ) and
(ME 331 [C] or ME 331H [C] ) and (ME 332 [C] or ME 332H [C] )
ME 452H. THERMAL AND FLUIDS SCIENCES
LABORATORY (4). Course emphasis is on experiments related to thermodynamics, heat transfer, and fluid mechanics. Proper experimental methods, data and uncertainty analysis related to thermal and fluids measurements are discussed. PREREQS: (ME 311 [C] or ME 311H [C] ) and (ME 331 [C] or ME 331H [C] ) and (ME 332 [C] or ME 332 H [C] ) and Honors College approval required.
ME 453. STRUCTURE AND MECHANICS
LABORATORY (4). Techniques for measurement of structural response and material properties. Proper use of rosette strain gauges, load cells, and displacement transducers. Full-field strain measurement using photoelasticity and digital image correlation. Proper implementation of material testing standards. Characterization of anisotropic composite materials. PREREQS: ME 451 [C]
ME 460. INTERMEDIATE FLUID MECHANICS
(4). Ideal fluid flow including potential flow theory. Introduction to compressible flow. Viscous flow and boundary layer theory. Introduction to turbulence. PREREQS: (ME 331 [C] or ME 331H [C] )
ME 461. GAS DYNAMICS (4). Studies onedimensional isentropic flow, nozzles, diffusers, normal and oblique shocks, compressible flow with friction and heating, and an introduction to propulsion systems. PREREQS: (ME 312 [C] or ME 312H [C] ) and (ME 331 [C] or ME 331H [C] )
ME 480. MATERIALS SELECTION (3). Selecting materials for engineering applications. The major families of materials, their properties, and how their properties are controlled; case studies and design projects emphasizing materials selection. PREREQS: MATS 322 [C] or ENGR 322 [C]
ME 483. COMPOSITE MATERIALS (3). Fibers and matrices, mechanics of composites, reinforcement and failure mechanisms, properties and applications. Lec/lab. PREREQS: MATS 322 [C] or ENGR 322 [C]
ME 484. FRACTURE OF MATERIALS (3).
Fracture mechanics and fatigue mechanisms: mechanisms of ductile and brittle fracture. Environmentally induced fracture and fatigue. Considerations in design of engineering materials and structures will be discussed. PREREQS: MATS 322 [C] or ENGR 322 [C]
ME 497. ^MIME CAPSTONE DESIGN (4). Product design; selection and replacement of major tools, processes, and equipment; paperwork controls; subsystem revision; system or plant revision; selection and training of personnel; long-run policies and strategy. CROSSLISTED as ESE 497 and IE 497. (Writing Intensive Course) PREREQS: ((IE 355 [C] and IE 356 [C] and IE 366 [C] and IE 367 [C] and IE 368 [C] and WR 327 [C] )) or ((ENGR 322 [C] or MATS 322 [C] ) and (ENGR 391 [C] or ENGR 391H [C] ) and ME 250 [C] and (ME 312 [C] or ME 312H [C] ) and (ME 317 [C] or ME 317H [C] ) and (ME 383 [C] or ME 383H [C] ) and WR 327 [C] and (ST 314 [C] or ST 314H [C] )) or ((ENGR 390 [C] or BA 360 [C] ) and IE 425 [C] and (ME 312 [C] or ME 312H [C] ) and (ME 331 [C] or ME 331H [C] ) and ESE 355 [C] and ESE 360 [C] and WR 327 [C] and (ST 314 [C] or ST 314H [C] ))

ME 498. ^MIME CAPSTONE DESIGN (4).
Product design; selection and replacement of major tools, processes, and equipment; paperwork controls; subsystem revision; system or plant revision; selection and training of personnel; long-run policies and strategy. CROSSLISTED as ESE 498 and IE 498. (Writing Intensive Course) PREREQS: ESE 497 [C] or IE 497 [C] or ME 497 [C]
ME 499. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.
ME 499H. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
ME 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
ME 502. INDEPENDENT STUDIES (1-16). This course is repeatable for a maximum of 16 credits. ME 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

ME 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

ME 506. PROJECTS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

ME 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

ME 508. THERMAL FLUID SCIENCE SEMINAR
(1). Student participation seminar experience for 1 course credit. Students will present and listen to seminars concerning ongoing research within the thermal fluid sciences

ME 509. MATERIALS SCIENCE SEMINAR (1).
Student participation seminar experience for one credit; students will listen to seminars concerning ongoing research activities within materials science. Students will also have the opportunity to present their own research results periodically. Graded P/N. CROSSLISTED as MATS 509.

ME 511. PRECISION MACHINE DESIGN (3).
Tolerance analysis and application in design/ manufacturing practice, principles of machine design and computational analysis of errors in machine design, sensor mounting and sensor calibration, machine level error budget with geometric and thermal errors, structural design of joints and supports, deterministic damping, exact constraint design for flexures and couplings, bearing systems design, motion and power system design for machine tools. CROSSLISTED as MFGE 511. PREREQS: An understanding of mechanical component design and solid mechanics.

ME 512. DESIGN OF MECHANISMS (4). Analysis and study of the function, classification, position, velocity, and acceleration of multi-element mechanical linkages and mechanisms. Synthesis of mechanisms for specified multiple point paths, quick return, dwell, and straight-line motion. The lecture will instruct students in the kinematic analysis and synthesis of mechanisms through the use of theory and software packages. The laboratory will familiarize students with a modern mechanism design and animation software package. Lec/lab. PREREQS: (ME 317 or ME 317 H ) and ME 383
ME 513. BIO-INSPIRED DESIGN (4). Intersection of design and biology that seeks to systematically mine biological knowledge to solve design problems. Investigates inspiration from nature from three different types: visual, conceptual, and computational. Includes design rules, heuristics, principles or patterns to solve engineering problems. Algorithmic bio-inspiration emulates natural algorithms for control or optimization problems. PREREQS: Graduate standing.
ME 515. RISK AND RELIABILITY ANALYSIS IN ENGINEERING DESIGN (4). Fundamentals of risk, uncertainty, and reliability. Methods to analyze and quantify the risk of failures, and the
reliability of complex systems, including fault tree analysis, reliability block diagrams, probabilistic risk assessment. Introduction to research methods for risk and reliability analysis during the early design stages.
ME 516. MODELING AND ANALYSIS OF
COMPLEX SYSTEMS (4). Introduction to challenges and considerations when designing complex systems. Fundamentals of systems engineering and methods used in practice. Models and tools used to enable the use of models for trade studies during the design of complex systems. Model-based design environments and methodologies. Introduction to decision support tools in design.
ME 517. OPTIMIZATION IN DESIGN (4).
Optimization methods as applied to engineering design, theory and application of nonlinear optimization techniques for multivariate unconstrained and constrained problems. Model boundedness and sensitivity. PREREQS: Graduate standing.
ME 519. SELECTED TOPICS IN DESIGN (3-4). Topics in mechanical design selected from the following: design processes, quality engineering, design for assembly, statistical machine design, the Tagucchi method, and parametric design. This course is repeatable for a maximum of 32 credits.

ME 520. APPLIED STRESS ANALYSIS (4). Elasticity theory, failure theories, energy methods, finite element analysis. PREREQS: ME 316
ME 521. LINEAR ELASTICITY (4). A general introduction to the theory of elasticity. The solution of 2-D problems using the Airy stress function in rectangular and polar coordinates. The solution of 3-D problems using the Galerkin vector, the Papkovich-Neuber solution, and complex variable methods. Applications to asymptotic fields at discontinuities, contact and crack problems, and thermoelasticity. PREREQS: ME 520 [C] and ME 316 or equivalent and graduate standing in mechanical engineering, civil engineering, or material science, or instructor approval.
ME 522. MECHANICAL VIBRATIONS (4).
Dynamic response of single and multiple degree-of-freedom systems. PREREQS: ME 317
ME 523. ADVANCED STRESS ANALYSIS (4).
An introduction to the mechanics of nonlinear elastic, plastic, and viscoelastic material behavior including large deformations. PREREQS: ME 316 or equivalent and graduate standing in mechanical engineering, civil engineering, or material science, or instructor approval.

## ME 524. FINITE ELEMENT MODELING OF

 MECHANICAL ENGINEERING SYSTEMS (3). Application of modern finite element code in the analysis of complex mechanical engineering systems. Extensive use of engineering workstations. Lec/lab. PREREQS: ME 520 [C]
## ME 526. NUMERICAL METHODS FOR

ENGINEERING ANALYSIS (3). Numerical
solutions of linear equations, difference equations, ordinary and partial differential equations. CROSSLISTED as NSE 526. PREREQS: Programming experience and previous exposure to numerical methods, or instructor approval.

## ME 529. SELECTED TOPICS IN SOLID

MECHANICS (3-4). Advanced topics in solid mechanics emphasizing research applications of current interest. This course is repeatable for a maximum of 32 credits.
ME 531. LINEAR MULTIVARIABLE CONTROL SYSTEMS I (4). Theoretical design of control systems for systems modeled by linear multivariable differential equations. Topics covered include controllability, observability, state feedback control, pole placement, output feedback, estimator design, and control designs that include both estimators and regulators.
ME 532. LINEAR MULTIVARIABLE CONTROL SYSTEMS II (4). Focuses on designing control systems where the device to be controlled is an
uncertain system, yet can be described by a set of linear differential equations. Lec. PREREQS: ME 531 [C] and /or equivalent.
ME 533. NONLINEAR DYNAMIC ANALYSIS (4).
Course focuses on understanding the behavior of nonlinear dynamic systems of interest to mechanical engineers. Lec. PREREQS: ME 317 or equivalent.
ME 534. NONLINEAR MULTIVARIABLE
CONTROL SYSTEMS (4). Focuses on designing control systems when the device to be controlled is mathematically described by a nonlinear set of differential equations. Lec. PREREQS: ME 533 [C] and /or equivalent.
ME 539. SELECTED TOPICS IN DYNAMICS
(1-16). Advanced topics in dynamics emphasizing research applications of current interest. This course is repeatable for a maximum of 30 credits.

## ME 540. INTERMEDIATE THERMODYNAMICS

(4). Students are expected to master classical thermodynamics by way of solving extended problems using software tools. Statistical thermodynamics concepts are also introduced and exercised. PREREQS: ME 312

ME 541. LIQUID-VAPOR PHASE CHANGE AND HEAT TRANSFER (4). Advanced treatment of underlying physics and engineering modeling approaches for heat transfer associated with vapor/liquid phase change processes. Topics include thermodynamics and mechanical aspects of phase change processes, pool boiling, filmwise and dropwise condensation, internal convective boiling and condensation, and other emerging areas in phase change heat transfer. PREREQS: Graduate standing

ME 543. RENEWABLE ENERGY: THERMAL FLUID SYSTEMS (4). Evaluates several thermal/ fluid power conversion strategies that deal with both thermal and fluid energy sources in terms of basic conversion technology, resource potential and developmental challenges. There are four modules, each targeting a particular renewable energy system in thermal and fluid sciences. PREREQS: (ME 311 or ME 311 H or NE 311 or NE 311H) and (ME 331 or ME 331H or NE 331 or NE 331H) and (ME 332 or ME 332H or NE 332 or NE 332H)

ME 544. ADVANCED POWER GENERATION SYSTEMS (4). Thermal mechanical evaluation of modern power generation technologies, including fossil and nuclear Rankine cycle power plants, gas turbines, cogeneration power plants, distributed power generation and fuel cells. Lec/rec. PREREQS: ME 312 and (ME 332 or ME 332H)

ME 545. INTRODUCTION TO COMBUSTION (4). Study of combustion science based on the background of chemistry, thermodynamics, fluid mechanics, heat and mass transfer. Stoichiometry, energetics of chemical reactions, flame temperature, equilibrium product analyses, chemical kinetics, and chain reactions PREREQS: ME 312 and (ME 332 or ME 332H)
ME 546. CONVECTION HEAT TRANSFER (3). An advanced treatment of forced and natural convection heat transfer processes emphasizing underlying physical phenomena. Current topical literature will be considered; analytical and numerical problem solving is included. PREREQS (ME 332 or ME 332 H ) and ME 373
ME 547. CONDUCTIVE HEAT TRANSFER (3). Analytical and numerical solutions to steady state and transient conduction problems. PREREQS: (ME 332 or ME 332H) and ME 373

## ME 548. RADIATION HEAT TRANSFER (3).

Analytical and numerical methods of solution of thermal radiation problems. PREREQS: (ME 332 or ME 332H) and ME 373

ME 549. SELECTED TOPICS IN HEAT
TRANSFER (3). Topics in heat transfer including advanced problems in conduction, radiation, and convection. Additional examination of heat transfer in multiphase systems, inverse problems,
combined modes, equipment design, solution techniques and other topics of current interest considered, including extensive use of current literature. Not all topics covered each year. This course is repeatable for a maximum of 9 credits.
ME 550. APPLIED HEAT TRANSFER (4). An intermediate heat transfer course seeking to lay a foundation for determining the heating and cooling characteristics with a variety of modern and classical processes. Included is design of multi-component heat transfer systems. Lecture, 110 minutes twice per week. PREREQS: ME 332 or ME 332H

ME 552. MEASUREMENTS IN FLUID
MECHANICS AND HEAT TRANSFER (4). Course emphasis is on measurement techniques and data analysis methods related to fluid mechanics and heat transfer. Proper experimental methods, data and uncertainty analyses related to thermal and fluids measurements are discussed. Local and spatial mapping of fluid and thermal fields are highlighted. PREREQS: (ME 331 or ME 331H) and (ME 332 or ME 332 H ) and ME 451.
ME 553. STRUCTURE AND MECHANICS LABORATORY (4). Techniques for measurement of structural response and material properties. Proper use of rosette strain gauges, load cells, and displacement transducers. Full-field strain measurement using photoelasticity and digital image correlation. Proper implementation of material testing standards. Characterization of anisotropic composite materials. PREREQS: ME 451

ME 560. INTERMEDIATE FLUID MECHANICS
(4). Ideal fluid flow including potential flow theory. Introduction to compressible flow. Viscous flow and boundary layer theory. Introduction to turbulence. PREREQS: ME 331 or equivalent

ME 561. GAS DYNAMICS (4). Studies onedimensional isentropic flow, nozzles, diffusers, normal and oblique shocks, compressible flow with friction and heating, and an introduction to propulsion systems. PREREQS: ME 312 and (ME 331 or ME 331H)
ME 564. TURBULENCE MODELING (3).
An introductory course on theory of different turbulence modeling techniques such as Reynolds Averaged Navier Stokes (RANS), Large Eddy Simulation (LES), and Direct Numerical Simulation (DNS) applied to a range of turbulent flows including free shear flows, boundary layers, and internal flows. PREREQS: ME 560 [C] and (ME 565 [C] or ME 566 [C] ) and /or instructor's consent.

## ME 565. INCOMPRESSIBLE FLUID

MECHANICS (3). Generalized fluid mechanics; kinematics; methods of description, geometry of the vector field, dynamics of nonviscous fluids, potential motion, two-dimensional potential flow with vorticity.
ME 566. VISCOUS FLOW (3). Boundary layer, stability, transition prediction methods, computational methods in fluid mechanics, recent developments.
ME 567. ENGINEERING APPLICATIONS OF COMPUTATIONAL FLUID DYNAMICS (4). Basic concepts of computational fluid dynamics, a technique used for solving fully three-dimensional fluid flow problems with no exact solution, will be discussed and applied to general engineering applications using commercially available software. Lec. PREREQS: ME 312 and (ME 331 or ME 331H)

ME 568. TURBULENT FLOW DYNAMICS (4).
An introductory course of the basic physics of turbulent flows, coverage will include statistical methods and physical interpretation of a range of flows including boundary layer flows, internal flows, and environmental flows. PREREQS: ME 560 [C] and A first course in fluid mechanics such as ME 331, Introduction to Fluid Mechanics.

ME 569. SELECTED TOPICS IN FLUID MECHANICS (2-4). Topics in fluid mechanics emphasizing research applications of current interest. This course is repeatable for a maximum of 32 credits.
ME 570. STRUCTURE-PROPERTY RELATIONS
IN MATERIALS (4). Fundamentals of the interactions between the structure and properties of materials. Atomic bonding and atom interactions. Geometric and algebraic representations of symmetry. Introduction to phase equilibria. Phenomenological background of elasticity and plasticity in materials. Anisotropic materials and tensor representations. Influence of structure on thermal, electrical, and optical properties of materials. CROSSLISTED as MATS 570.

## ME 571. ELECTRONIC PROPERTIES OF

 MATERIALS (4). Development of a quantitative description of the electronic structure of solids starting with the quantum mechanical model of the atom, atomic bonding, and band theory of solids. Quantitative description of the electronic properties of metals, semiconductors, and insulators. CROSSLISTED as MATS 571. PREREQS: CH 545 or ME 570 or equivalent.ME 580. MATERIALS SELECTION (3). Selecting materials for engineering applications. The major families of materials, their properties, and how their properties are controlled; case studies and design projects emphasizing materials selection. Lec/lab. PREREQS: MATS 322 or ENGR 322

ME 581.THERMODYNAMICS OF SOLIDS (4). Thermodynamics of solutions and phase equilibrium. Phase diagrams and invariant reactions. Order and disorder in solutions. Applications to advanced materials development. Lec/lab. CROSSLISTED as MATS 581.
ME 582. RATE PROCESSES IN MATERIALS (4).
Diffusion in solids, including vacancy and interstitial and short-circuit diffusion. Phase transformations including classic nucleation and growth theory. Applications to materials development. Laboratory will emphasize microstructural evaluation and quantitative metallography. Lec/lab. CROSSLISTED as MATS 582.

ME 583. COMPOSITE MATERIALS (3). Fibers and matrices, mechanics of composites, reinforcement and failure mechanisms, properties and applications. Lec/lab. PREREQS: MATS 322 or ENGR 322

ME 584. ADVANCED FRACTURE OF
MATERIALS (4). Fracture mechanics will be used as a basis for predicting failure of materials, understanding failure mechanisms, and identifying causes of failure. Course will include discussion of recent journal articles, experimental demonstrations, and analysis of real fracture data. CROSSLISTED as MATS 584. PREREQS: MATS 322 or ENGR 322 or equivalent is recommended.
ME 585. FATIGUE OF MATERIALS (4). Analyzes the failure of materials by fatigue including how fatigue behavior is characterized, how fatigue failure is predicted, the physical mechanisms responsible for fatigue failure of various materials, and how such behavior is related to the atomic structure and microstructure of the material. PREREQS: (ME 570 [C] or MATS 570 [C] )

## ME 587. DISLOCATIONS, DEFORMATION,

AND CREEP (4). The effects of point, line, and planar defects on plastic deformation and creep behavior in solids will be discussed with emphasis on the role of dislocations and vacancies. CROSSLISTED as MATS 587. PREREQS: MATS 322 or ENGR 322 or equivalent.
ME 588. COMPUTATIONAL METHODS IN
MATERIALS SCIENCE (4). A broad introduction to important materials science simulation methods. These include molecular dynamics, density functional theory, and Monte Carlo methods. Learning is through a mixture of lecture and hands-on lab projects in which students use
computational methods to explore and reinforce fundamental concepts in materials science. Lec/ lab. CROSSLISTED as MATS 588. PREREQS: Experience with Matlab or Mathematica or an equivalent numerical and programming environment.
ME 589. SELECTED TOPICS IN MATERIALS (3).
Topics in materials science to correspond to areas of graduate research. Topics will be chosen from the following list: optical materials, dielectrics, oxidation and corrosion, ceramics, thermophysical properties, polymers and viscoelasticity, coatings and thin films. Lec/rec. This course is repeatable for a maximum of 32 credits.

## ME 596. SELECTED TOPICS IN

THERMODYNAMICS (3). Topics in
thermodynamics including advanced problems in classical thermodynamics and statistical thermodynamics of current interest. Topics will likely be considered, including extensive use of literature. Not all topics covered each year. This course is repeatable for a maximum of 32 credits.
ME 597. PRECISION MOTION GENERATION (4). Introduces fundamental knowledge in mechatronic systems used in manufacturing equipment such as CNC machine tools, and their computer numerical controls. Students will be exposed to sensors and actuators utilized in machine tools, industrial robots and for process automation. Fundamental knowledge to model and identify dynamics of motion delivery systems, design and analysis of accurate position control algorithms for precision motion generation will be covered. Digital motion control design will be introduced. Motion planning and real-time path interpolation algorithms will be covered. Students will be able to design NC systems for 2D motion platforms. PREREQS: ME 430 or equivalent, and graduate standing in Mechanical Engineering, Manufacturing Engineering, Robotics, or instructor approval.
ME 599. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 32 credits.
ME 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
ME 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: PhD students only.

ME 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: PhD students only.

ME 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: PhD students only.
ME 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: PhD students only.
ME 611. MODERN PRODUCT DESIGN (4).
Modern product development, design and prototyping are covered. Product development and prototyping is examined from a research standpoint in this course. Customer outcomes gathering, functional modeling, product architecture, modern techniques for concept generation and selection are explored. Also covered are recently developed theories and techniques for prototyping. The topics, place in the overall design process is shown through a product development and prototyping project.
ME 615. DESIGN UNDER UNCERTAINTY (4).
Tackles the problem of decision making in engineering design. The fundamental challenge faced in making decisions in engineering designs is that they are almost exclusively decisions made under uncertainty. Sources of uncertainty could result from engineering models, experiments conducted, or lack of knowledge of future events. The course will cover three basic topics 1) how do we quantify uncertainty, 2) how do we account for the uncertainty in decision making, and 3) how do we make design selection decisions about products or systems we design. PREREQS: ME 517 [C] and graduate standing

ME 617. DESIGN AUTOMATION (4). Design automation is the field of study whereby advanced numerical methods are used to automate difficult or tedious design decisions. Typically, such methods are based on numerical optimization and artificial intelligence. They work in tandem with other engineering digital tools like computer-aided design, computer-aided manufacturing, and finite-element analysis. This course builds upon a fundamental understanding of optimization to introduce students to a range of different techniques that may be used to support engineering decision-making. This includes heuristic methods, Al tree-search, discrete and stochastic algorithms. The course concludes with discussion of recent innovations in multi-objective, multi-disciplinary and robust optimization.
PREREQS: ME 517 [C]
ME 667. COMPUTATIONAL FLUID DYNAMICS (3). Application of modern computational techniques to solve a wide variety of fluid dynamics problems including both potential and viscous flow with requirements for computer code development. PREREQS: (ME 560 [C] or ME 565 [C] or ME 566 [C] ) and (ME 526 [C] or ME 575 [C] ) and /or equivalent.
ME 671. ELECTRONIC PROPERTIES OF OXIDES (4). Band theory of solids applied to metal oxide materials. Includes metallic oxides, non-stoichiometric semiconductors and associated defect chemistry, high temperature superconductors, electrostatics, linear dielectrics, non-linear dielectrics, piezoelectrics, and the optical properties of oxides. CROSSLISTED as MATS 671. PREREQS: ME 571 or MATS 571 or PH 575

## ■ MANUFACTURING ENGINEERING COURSES

MFGE 285. INTRODUCTION TO INDUSTRIAL AND MANUFACTURING ENGINEERING (3). Introduction to selected topics in industrial and manufacturing engineering, including history and philosophy, product design and manufacturing cycle, integrated role of engineering and business, and multi-objective nature of organizations. Surveys of selected design problems in resource allocation, operations and quality management, and production engineering. CROSSLISTED as IE 285.
MFGE 336. PRODUCTION ENGINEERING (4). Provides a general understanding of the production engineering function within industry and the means by which to achieve tight tolerances through machining. Geometric dimensioning and tolerancing, fixture and gage design, and fundamentals of metal cutting mechanics are introduced, and their interactions are explored. Lec/lab. PREREQS: (ENGR 213 [C] or ENGR 213H [C] ) and ENGR 248 [C] and (ENGR 321 [C] or ENGR 321H [C] or MATS 321 [C] or MATS 321 H [C] ) and ME 250 [C]

## MFGE 337. MATERIALS AND

MANUFACTURING PROCESSES (4). Introduces mechanical manufacturing methods by which materials are economically shaped into valuable products. The overall goal is to develop an understanding of how the functionality, shape, materials, cost and sustainability of a product influence manufacturing process selection and design. Lec/lab. PREREQS: ((ENGR 321 [C] or ENGR 321 H [C] or MATS 321 [C] or MATS 321H [C] ) and ME 250 [C] and MFGE 336 [C] )
MFGE 436. LEAN MANUFACTURING SYSTEMS ENGINEERING (4). The planning, evaluation, deployment, and integration of lean manufacturing theory and methods. Examines manufacturing processes/equipment and systems, e.g., planning/ control, product design, supply chain resource management. Lec/lab.
MFGE 437. COMPUTER CONTROL OF
MANUFACTURING PROCESSES (4). Introduces fundamental knowledge in the automation of manufacturing systems and processes. Automated
manufacturing system design and operations-computer numerical control (CNC) technology; NC part programming; sensors and actuators, their modeling and dynamic simulation; feedback motion delivery systems design and tuning; programmable logic controls (PLC) for industrial control systems, and path planning for numerical controlled (NC) machinery. Lec/lab. PREREQS: (ME 317 [C] or ME 317H [C] or MFGE 336 [C] ) and (ENGR 212 [C] or ENGR 212H [C] )
MFGE 438. COMPOSITES MANUFACTURING
(4). Introduction to fiber-reinforced composite materials and their applications. Topics include matrices and reinforcement; open and closed molding processes; filament winding, quality, testing, damage assessment; basics of factory operations and sustainability of composites. Students will complete laboratory projects using fiber-reinforced laminates. Lec/lab. PREREQS: (ENGR 213 [C] or ENGR 213H [C] )
MFGE 499. SPECIAL TOPICS (0-5). This course is repeatable for a maximum of 99 credits.
MFGE 507. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
MFGE 511. PRECISION MACHINE DESIGN (3). Tolerance analysis and application in design/ manufacturing practice, principles of machine design and computational analysis of errors in machine design, sensor mounting and sensor calibration, machine level error budget with geometric and thermal errors, structural design of joints and supports, deterministic damping, exact constraint design for flexures and couplings, bearing systems design, motion and power system design for machine tools. CROSSLISTED as ME 511. PREREQS: An understanding of mechanical component design and solid mechanics.
MFGE 531. MESO-SCALE MANUFACTURING
(3). Meso-scale processing techniques for fabricating microfluidic devices, especially microtechnology-based energy, chemical and biological systems. Introduction to microlamination and techniques for lamina patterning, registration and bonding. Lec/lab. PREREQS: Graduate standing in science or engineering.
MFGE 534. CERAMICS PROCESSING (3). Introduction to materials, manufacturing methods, properties and applications of ceramics. The emphasis of the course is on understanding and exploring the inter-relationships between material characteristics, processing variables and component geometry in the context of ceramics. PREREQS: Graduate standing in engineering or science, or senior standing in manufacturing engineering.
MFGE 535. INDUSTRIAL SUSTAINABILITY
ANALYSIS (3). Students are exposed to the role of business and engineering in the design and implementation of sustainable industrial systems. Drivers, metrics, and analysis concepts, methods, and tools are introduced. Students incorporate business and engineering considerations in making product, manufacturing process, and supply chain design considerations. PREREQS: Graduate standing or instructor approval.
MFGE 536. LEAN MANUFACTURING SYSTEMS ENGINEERING (4). The planning, evaluation, deployment, and integration of lean manufacturing theory and methods. Examines manufacturing processes/equipment and systems, e.g., planning/ control, product design, supply chair resource management. Lec/lab.
MFGE 538. COMPOSITES MANUFACTURING
(4). Introduction to fiber-reinforced composite materials and their applications. Topics include matrices and reinforcement; open and closed molding processes; filament winding, quality, testing, damage assessment; basics of factory operations and sustainability of composites. Students will complete laboratory projects using fiber-reinforced laminates. Lec/lab. PREREQS: (ENGR 213 or ENGR 213H)

MFGE 599. SPECIAL TOPICS (0-5). This course is repeatable for a maximum of 99 credits. PREREQS: Graduate standing only.

## ■ MECHANICAL/INDUSTRIAL/ MANUFACTURING ENGINEERING COURSES

MIME 101. INTRODUCTION TO MIME (3).
Provides students with an overview of mechanical, industrial, manufacturing, and energy systems engineering careers and an introduction to technical areas of study. Skills necessary for success in both the academic curriculum and in the engineering profession will also be emphasized, including communication and ethics. Lec/rec.
MIME 101H. INTRODUCTION TO MIME (3).
Provides students with an overview of mechanical, industrial, manufacturing, and energy systems engineering careers and an introduction to technical areas of study. Skills necessary for success in both the academic curriculum and in the engineering profession will also be emphasized, including communication and ethics. Lec/rec. PREREQS: Honors College approval required.
MIME 199. SPECIAL TOPICS (0-4).
MIME 299. SPECIAL TOPICS (0-4). This course is repeatable for a maximum of 4 credits.
MIME 399. SPECIAL TOPICS (0-4). Special topics in mechanical, industrial, and manufacturing engineering. This course is repeatable for a maximum of 16 credits.

## MIME 504. WRITING AND CONFERENCE/

EXPLORATION (1-9). Students will be allowed to register for a variable number of MIME 504 credits to bring their registration up to full-time status (9 credits). Graded P/N. This course is repeatable for a maximum of 15 credits.
MIME 507. SEMINAR/NEW STUDENT
ORIENTATION (1).

## ■ ROBOTICS COURSES

ROB 421. APPLIED ROBOTICS (4).
Multidisciplinary teams of students design, build, and demonstrate a robotic system, including all sensing, computation, and actuation. The specific task, such as checkers-playing robots, changes each year, and is designed to be challenging for ambitious students. Robots will compete in a friendly competition at the end of the term. Lec/ lab. PREREQS: College of Engineering students (pro-school or graduate students) or approval of instructor.
ROB 456. INTELLIGENT ROBOTS (4).
Foundations of probabilistic reasoning for robotics. Topics include state estimation, robot motion, perception, localization and decision making under uncertainty. PREREQS: ME 373 or ME 373H or ECE 353 or CS 331
ROB 501. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 99 credits.
ROB 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
ROB 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
ROB 506. PROJECTS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
ROB 507. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

## ROB 514. INTRODUCTION TO ROBOTICS (4).

 A broad introduction to the field of robotics, and to the graduate Robotics program. The goal of the class is to take students with different backgrounds (mechanical engineering, computer science, electrical engineering, physics, etc.) and give them a common base in the fundamentals of robotics. A secondary goal is to introduce studentsto the Robotics program, and to give them some of the skills that will make them successful, both in the program and as a professional roboticist. PREREQS: Student must be enrolled in graduate Robotics Program.
ROB 521. APPLIED ROBOTICS (4).
Multidisciplinary teams of students design, build, and demonstrate a robotic system, including all sensing, computation, and actuation. The specific task, such as checkers-playing robots, changes each year, and is designed to be challenging for ambitious students. Robots will compete in a friendly competition at the end of the term. Lec/ lab. PREREQS: College of Engineering students (pro-school or graduate students) or approval of instructor.
ROB 534. SEQUENTIAL DECISION MAKING IN ROBOTICS (4). Examines sequential decision making in robotics with a focus on motion planning and related optimization problems applied to fielded systems in marine, aerial, and ground domains. Discussions regarding both fundamental background material as well as cutting edge research in the following areas: discrete planning, sampling-based planning, planning under uncertainty, multi-robot systems, optimization, and performance guarantees.
ROB 537. LEARNING-BASED CONTROL (4).
Provides an introduction to learning systems and their application to the control of nonlinear systems. Covered topics include neural networks, reinforcement learning, and evolutionary algorithms. Includes project component in which students write a technical paper and give a conference style presentation based on their project.
ROB 538. AUTONOMOUS AGENTS AND MULTI-
AGENT SYSTEMS (4). Provides an introduction to autonomous agents and multi-agent systems. In particular, it focuses on how to use agents as building blocks for different autonomous systems. Covered topics include reinforcement learning, game theory, swarms, auctions, and collectives. Because this course covers a constantly evolving field, there will be a significant paper reading component in addition to the regular lectures. Students are expected to spend at least three hours a week reading, discussing and critiquing assigned papers.
ROB 541. GEOMETRIC MECHANICS (4). An introduction to geometric methods in the analysis of dynamic systems. Using the kinematics of simple robotic systems as a motivating example, we explore topics such as manifolds and Lie groups, representations of velocity, holonomic and nonholonomic constraints, constraint curvature and response to cyclic inputs, distance metrics. PREREQS: Graduate standing, along with prior exposure to linear algebra and differential equations.
ROB 542. ACTUATOR DYNAMICS (4). Focuses on how inertia, spring compliance, and other passive dynamics affect highly dynamic, softwarecontrolled systems. Examples include robotic manipulation tasks, robot-human interaction, CNC machines, or legged locomotion. Lec/lab. PREREQS: Graduate standing and prior courses on dynamics and control (at the discretion of the instructor) such as ME 531, ME 533, ME 535.

## ROB 562. HUMAN CONTROL SYSTEMS (4)

Covers mechanisms of human motor systems and control of the neuromusculoskeletal anatomy followed by functional analysis of these system components. Then all the components are integrated to study feedback control dynamics Covers classic to modern theories of motor control, adaptation, cognitive involvement, and rehabilitation techniques. PREREQS: Basic feedback control systems, linear algebra, differential equations, or instructor permission.

ROB 564. SOFT ROBOTICS (4). Soft robotics researchers propose building intelligent machines purely out of stretchable compressible soft materials. The course is centered on term-long projects that will result in real soft robots with the
goal of presenting to the international community. The topics covered include rapid digital manufacturing, soft actuators, soft sensors, soft logic, soft energy, applications of soft robotics, and modeling soft mechanics. PREREQS: Graduate standing. Seniors must contact instructor.
ROB 567. HUMAN ROBOT INTERACTION (4).
The field of human-robot interaction brings together research and application of methodology from robotics, human factors, human-computer interaction, interaction design, cognitive psychology, education and other fields to enable robots to have more natural and more rewarding interactions with humans throughout their spheres of functioning. PREREQS: Recommended background in one of human factors, usability/hci, programming experience, design.
ROB 599. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 32 credits.
ROB 601. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 99 credits.
ROB 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
ROB 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

## SCHOOL OF NUCLEAR <br> SCIENCE AND ENGINEERING

## EAC/ABET/CAMPEP Accredited

Kathryn A. Higley, School
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## FACULTY

Professors Hamby, Higley ${ }^{9}$, Klein ${ }^{\mathbf{I} \text {, }}$
T. Palmer, Reyes ${ }^{1}$, Woods, Wu

Associate Professors Farsoni, Paulenova
Assistant Professors Marcum, Tack², Yang
Instructors Crilly, Keller, Kishore, Laub, Merz, C. Palmer, Pillai,
Reese ${ }^{9}$, Schickler, Tanyi, Zhang
Emeriti Binney ${ }^{1,9}$, Johnson, Ringle, Robinson ${ }^{1}$
${ }^{\text {I }}$ Licensed Professional Engineer
${ }^{2}$ DABR (Diplomat, American Board of
Radiology)
${ }^{9}$ Certified Health Physicist

## Undergraduate Majors

Nuclear Engineering (BS, CRED, HBS)
Radiation Health Physics (BS, CRED, HBS)
Option
Radiation Health Physics-Pre Med

## Minors

Nuclear Engineering
Radiation Health Physics

## Graduate Majors

Medical Physics (MMP, MS, PhD)

## Graduate Areas of Concentration

Medical Health Physics
Therapeutic Radiologic Physics
Nuclear Engineering (MEng, MS, PhD)
Graduate Areas of Concentration
Application of Nuclear Techniques
Arms Control Technology
Nuclear Instrumentation and Applications
Nuclear Medicine
Nuclear Power Generation
Nuclear Reactor Engineering
Nuclear Systems Design and Modeling
Nuclear Waste Management
Numerical Methods For Reactor Analysis
Radiation Shielding
Radioisotope Production
Space Nuclear Power
Thermal Hydraulics
Radiation Health Physics (MHP, MS, PhD)
Graduate Areas of Concentration
Application of Nuclear Techniques
Boron Neutron Capture Therapy
Emergency Response Planning
Environmental Monitoring
Environmental Pathways Assessment Nuclear Medicine
Radiation Detection and Instrumentation Radiation Dosimetry
Radiation Shielding
Radioactive Material Transport
Radioactive Waste Management
Research Reactor Health Physics
Risk Assessment

## Graduate Minors

Nuclear Engineering
Radiation Health Physics
The School of Nuclear Science and
Engineering at Oregon State University offers BS, MEng, MS, and PhD degrees in Nuclear Engineering. In addition, it offers a BS, MS, MHP (Master of Health Physics) degrees in Radiation Health Physics and an MMP (Master of Medical Physics), MS, and PhD in Medical Physics. The BS in Radiation Health Physics degree may also be taken as a premedical track.

Excellent facilities are available for the instructional and research programs at the Radiation Center, including a TRIGA Mark II nuclear reactor and the AP-600 $1 / 4$ scale test facility. Instruction is integrated with an extensive research program, with opportunities to participate at both the undergraduate and graduate levels.

The mission of the School of Nuclear Science and Engineering is to educate students to become nuclear engineers and health physicists with the ability to achieve the highest standards of the profession and to support the needs of industry, government, and the nation.

The nuclear engineering undergradu-
ate program objectives are:

1. To produce graduates with a high level of competency in the nuclear engineering core curriculum.
2. To produce graduates with a high level of competency in engineering and science.
3. To produce graduates that can work effectively in both individual and team environments.
4. To produce graduates with effective communication skills.
5. To produce graduates with a high regard for their profession and their responsibility to lifelong learning.
The objectives of the nuclear engineering and radiation health physics undergraduate curricula are to prepare students for careers related to the many beneficial uses of nuclear technology and energy. Nuclear engineers apply scientific principles to the research, design, and operation of a wide variety of nuclear technology applications including power generation, medicine, and radioactive waste management. Radiation health physicists study methods used to protect people and their environment from radiation hazards while enabling the beneficial uses of radiation and radioactive materials. In addition, an emphasis is provided in nuclear instrumentation, nuclear systems and materials, radiation protection, reactor analysis and nuclear power economics and, particularly, safety and regulation in nuclear operations.

The School of Nuclear Science and Engineering aims to educate students majoring in radiation health physics to become radiation health physicists with the ability to achieve the highest standards of the profession and to support the needs of industry, government, and the nation.

The radiation health physics undergraduate program objectives are:

1. To produce graduates with a high level of competency in the radiation health physics core curriculum.
2. To produce graduates with a high level of competency in the biological and physical sciences.
3. To produce graduates who can work effectively in both individual and team environments.
4. To produce graduates with effective communication skills.
5. To produce graduates with a high regard for their profession and their responsibility to lifelong learning. Radiation health physics is a specialized program in the School of Nuclear Science and Engineering for students with a professional interest in the field of radiation protection, also known as health physics. It involves an integrated study of the physical aspects of ionizing and nonionizing radiation, their biological effects, and the methods used to pro-
tect people and their environment from radiation hazards while still enabling the beneficial uses of radiation and radioactive material.

## PRE-MED OPTION

Students in radiation health physics can also pursue a pre-med option in which they fulfill the requirements for the BS in Radiation Health Physics degree, as well as the course work expected for entrance into most medical schools.

## CERTIFIED HEALTH PHYSICIST

Students completing the Radiation Health Physics degree will be eligible to take Part I of the Certified Health Physics (CHP) Examination of the American Board of Health Physics after one year of applied health physics practice. After six years of responsible professional experience in health physics, graduates will be eligible to take Part II of the CHP examination.

## UNDERGRADUATE MAJORS WITH OPTIONS

## NUCLEAR ENGINEERING

(BS, CRED, HBS)
The objectives of the nuclear engineering and radiation health physics undergraduate curricula are to prepare students for careers related to the many beneficial uses of nuclear technology and energy. Nuclear engineers apply scientific principles to the research, design, and operation of a wide variety of nuclear technology applications including power generation, medicine, and radioactive waste management. Radiation health physicists study methods used to protect people and their environment from radiation hazards while enabling the beneficial uses of radiation and radioactive materials. In addition, an emphasis is provided in nuclear instrumentation, nuclear systems and materials, radiation protection, reactor analysis and nuclear power economics and, particularly, safety and regulation in nuclear operations.

## Pre-Nuclear Engineering

## Freshman Year (44)

CH 201. Chemistry for Engineering Majors (3) ${ }^{\mathrm{E}}$

CH 202. Chemistry for Engineering Majors (3)

COMM 111. *Public Speaking (3) ${ }^{\text {E }}$
or COMM 114. *Argument and Critical
Discourse (3) ${ }^{\mathbf{E}}$
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC course (1-2)
MTH 251. *Differential Calculus (4) ${ }^{\text {E }}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus I (4) ${ }^{\mathbf{E}}$
NSE 114. Intro to Nuclear Engineering and Radiation Health Physics I (3)
NSE 115. Intro to Nuclear Engineering and Radiation Health Physics II (3) ${ }^{\mathbf{E}}$

PH 211. *General Physics with Calculus (4) ${ }^{\text {E }}$ PHL 205. *Ethics (4)
WR 121. *English Composition (3) ${ }^{\text {E }}$
${ }^{*}$ Perspectives Courses (3) ${ }^{\mathbf{1}}$

## Sophomore Year (44)

ENGR 201. Electrical Fundamentals I (3)
ENGR 211. Statics (3) ${ }^{\mathbf{E}}$
ENGR 212. Dynamics (3) ${ }^{\mathbf{E}}$
ENGR 213. Strength of Materials (3)
MTH 256. Applied Differential Equations (4) ${ }^{\mathbf{E}}$
MTH 306. Matrix and Power Series Methods (4) ${ }^{\mathbf{E}}$

NSE 234. Nuclear and Radiation Physics I (3)
NSE 235. Nuclear and Radiation Physics II (3)

NSE 236. Nuclear Radiation Detection and Instrumentation (4)
NSE 333. Mathematical Method for Nuclear Engineering and Radiation (3)
PH 212, PH 213. *General Physics with Calculus $(4,4)^{\mathbf{E}}$
${ }^{*}$ Perspectives Courses (3) ${ }^{1}$

## Professional Nuclear Engineering

## Junior Year (48)

Biological Science Elective (4) ${ }^{\mathbf{1}}$
ENGR 248. Engineering Graphics and 3-D Modeling (3)
ENGR/MATS 321. Introduction to Material Science (4)
ENGR 390. Engineering Economy (3)
NSE/ME 311. Introduction to Thermal-Fluid Science (4)
NSE/ME 312. Thermodynamics (4)
NSE/ME 331. Introductory Fluid Mechanics (4)

NSE/ME 332. Heat Transfer (4)
NSE 451, NSE 452. Neutronic Analysis I, II $(3,3)$
WR 327. *Technical Writing (3) ${ }^{1}$
${ }^{*}$ Perspectives Course (6) ${ }^{1}$
*Synthesis Course (3)

## Senior Year (44)

NSE 407. Seminar in Nuclear Engineering (3 terms) $(1,1,1)$
NSE 415. Nuclear Rules and Regulations (2)
NSE 435. Radiation Shielding and External Dosimetry (4)
NSE 457. Nuclear Reactor Laboratory (2)
NSE 467. Nuclear Reactor Thermal
Hydraulics (4)
NSE 473. Nuclear Reactor Systems Analysis (3)

NSE 474. ${ }^{\wedge}$ Nuclear Systems Design I (4)
NSE 475. ${ }^{\wedge}$ Nuclear Systems Design II (4)
NSE 481. Radiation Protection (4)
Restricted Elective (8) ${ }^{2}$
${ }^{*}$ Synthesis Course (3) ${ }^{\mathbf{1}}$
Free Elective (3) ${ }^{1}$
Total =180
Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
${ }^{\mathrm{E}}$ Required for entry into the professional
program.
${ }_{1}^{1}$ Must be selected to satisfy baccalaureate core requirements.
${ }^{2}$ Approved technical electives from departmental list.
Pre-Nuclear Engineering Major Code: 357


## Major Code: 327

## RADIATION HEALTH PHYSICS

## (BS, CRED, HBS)

Radiation health physics is a specialized program in the School of Nuclear Science and Engineering for students with a professional interest in the field of radiation protection, also known as health physics. It involves an integrated study of the physical aspects of ionizing and nonionizing radiation, their biological effects, and the methods used to protect people and their environment from radiation hazards while still enabling the beneficial uses of radiation and radioactive material.

## Pre-Radiation Health Physics

## Freshman Year (46)

CH 121. General Chemistry (5)
and CH 122, CH 123. *General Chemistry $(5,5)^{\text {E }}$
or CH 231, CH 232, CH 233 . *General
Chemistry $(4,4,4)^{\mathbf{E}}$
and CH 261, CH 262 , CH 263.
${ }^{*}$ Laboratory for Chemistry 231, 232, 233
$(1,1,1)^{\mathbf{E}}$
COMM 111. *Public Speaking (3) ${ }^{1, \mathrm{E}}$
or COMM 114. *Argument and Critical Discourse (3) ${ }^{1, \mathrm{E}}$
CS 101. Computers: Applications and Implications (4)
or CS 151. Introduction to Programming I
with Embedded Control Lab (4)
MTH 251. *Differential Calculus (4) ${ }^{\mathbf{E}}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus I (4)
NSE 114. Intro to Nuclear Engineering and Radiation Health Physics I (3)
NSE 115. Intro to Nuclear Engineering and Radiation Health Physics II (3) ${ }^{\mathbf{E}}$
PHL 205. *Ethics (4)
WR 121. *English Composition (3) ${ }^{1, \mathrm{E}}$
*Perspectives Course (3) ${ }^{1}$

## Sophomore Year (45)

BI 211, BI 212. *Principles of Biology (4,4) ${ }^{\text {E }}$
BI 213. *Principles of Biology (4)
HHS 231. *Lifetime Fitness for Health (2) ${ }^{\mathbf{1}}$
HHS 241. *Lifetime Fitness (1) ${ }^{1}$ or any PAC course (1-2)
PH 201, PH 202, PH 203. *General Physics $(5,5,5)^{\mathbf{E}}$
or PH 211, PH 212, PH 213. *General
Physics with Calculus $(4,4,4)^{\mathbf{E}}$
plus free elective (3)
NSE 234, NSE 235. Nuclear and Radiation Physics I, II $(3,3)$
NSE 236. Nuclear Radiation Detection and Instrumentation (4)
${ }^{*}$ Perspectives Course (3) ${ }^{1}$

## Professional Radiation Health Physics

## Junior Year (44)

BI 231. Introduction to Human Anatomy and Physiology (3)
NSE 319. *Societal Aspects of Nuclear Technology (3)
NSE 481. Radiation Protection (4)
ST 201, ST 202. Principles of Statistics $(4,4)$ or ST 314. Introduction to Statistics for Engineers (3)
plus free elective (3)
WR 327. *Technical Writing (3)
Electives (restricted in Health) (3)
Free Electives (3)
*Perspectives Courses (9) ${ }^{\mathbf{1}}$
Restricted Electives (10) ${ }^{3}$

## Senior Year (45)

H 425. Foundations of Epidemiology (3)
H 445. Occupational Health (3)
NSE 407. Seminar in Radiation Health Physics (3 terms) (1,1,1)
NSE 415. Nuclear Rules and Regulations (2)
NSE 435. Radiation Shielding and External Dosimetry (4)
NSE 474. ^Nuclear Systems Design I (4)
NSE 475. ^Nuclear Systems Design II (4)
NSE 483. Radiation Biology (3)
NSE 488. Radioecology (3)
Electives (restricted in Health) (9)
Free Electives (8)
Restricted Elective (3) ${ }^{2}$
${ }^{*}$ Synthesis Course (3) ${ }^{1}$

## Total=180

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
${ }^{\text {E }}$ Required for entry into the professional program.
${ }^{1}$ Must be selected to satisfy the requirements of the baccalaureate core.
${ }^{2}$ Approved technical electives from
departmental list.
Pre-Radiation Health Physics Major Code: 356
Major Code: 326


## OPTIONS

## RADIATION HEALTH PHYSICS -

## PRE MED OPTION

Students in Radiation Health Physics can also pursue the Radiation Health PhysicsPre Med option in which they fulfill the requirements for the BS degree in Radiation Health Physics, as well as the course work expected for entrance into most medical schools.

## Freshman Year (44)

BI 109. Health Professions: Medical (1)
CH 231, CH 232, CH 233. *General

## Chemistry $(4,4,4)^{\mathbf{E}}$

and CH 261, CH 262, CH 263. *Laboratory
for Chemistry 231, 232, $233(1,1,1)^{\mathbf{E}}$
COMM 111. *Public Speaking (3) ${ }^{\mathbf{E}}$
or COMM 114. *Argument and Critical Discourse (3) ${ }^{\mathbf{E}}$
CS 101. Computers: Applications and Implications (4)
or CS 161. Introduction to Computer
Science I (4)
MTH 251. *Differential Calculus (4) ${ }^{\mathbf{E}}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus I (4)
NSE 114. Intro to Nuclear Engineering and Radiation Health Physics I (3)
NSE 115. Intro to Nuclear Engineering and Radiation Health Physics II (3) ${ }^{\mathbf{E}}$
WR 121. *English Composition (3) ${ }^{\mathbf{E}}$

## Sophomore Year (47)

BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)^{\mathbf{E}}$

HHS 231. *Lifetime Fitness for Health (2) ${ }^{\mathbf{1}}$
HHS 241. *Lifetime Fitness (1) ${ }^{1}$
or any PAC course (1-2)
NSE 234, NSE 235. Nuclear and Radiation Physics I, II (3,3)
NSE 236. Nuclear Radiation Detection and Instrumentation (4)
PH 211, PH 212, PH 213. *General Physics with Calculus $(4,4,4)^{\mathbf{E}}$
PHL 205. *Ethics (4)
PSY 201. *General Psychology (3)
Perspectives Course (3) ${ }^{\mathbf{1}}$

## Professional Radiation Health <br> Physics-Pre Med Option

## Junior Year (45)

BB 314. Cell and Molecular Biology (4)
BI 231. Introduction to Human Anatomy and Physiology (3)
BI 241. Introduction Human Anatomy and Physiology Laboratory (2)
BI 311. Genetics (4)
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
H 425. Foundations of Epidemiology (3)
NSE 481. Radiation Protection (4)
PSY 202. *General Psychology (3)
ST 351. Introduction to Statistical Methods (4)

WR 327. *Technical Writing (3)
Perspectives Course (3) ${ }^{1}$

## Senior Year (45)

BB 450, BB 451. General Biochemistry $(4,3)$
H 445. *Occupational Health (3)
NSE 319. *Societal Aspects of Nuclear Technology (3) ${ }^{1}$
NSE 407. Seminar [Radiation Health Physics (3 terms)] (1,1,1)
NSE 415. Nuclear Rules and Regulations (2)
NSE 435. Radiation Shielding and External Dosimetry (4)
NSE 474. ^Nuclear Systems Design I (4)
NSE 475. ^Nuclear Systems Design II (4)
NSE 483. Radiation Biology (3)
NSE 488. Radioecology (3)
SOC 204. *Introduction to Sociology (3)
Perspectives Course (3) ${ }^{\mathbf{1}}$
Synthesis Course (3) ${ }^{1}$
Total=181

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
${ }^{\mathrm{E}}$ Required for entry into the professional
program.
${ }^{1}$ Must be selected to satisfy the requirements of the baccalaureate core.
${ }^{2}$ Approved technical electives from departmental list.
Option Code: 602


## UNDERGRADUATE MINORS

## NUCLEAR ENGINEERING MINOR

Students not majoring in nuclear engineering or radiation health physics may earn a Nuclear Engineering minor, which consists of the following courses:

NSE 234, NE 235. Nuclear and Radiation Physics I, II $(4,4)$
NSE 451. Neutronic Analysis and Lab I (4)
NSE 481. Radiation Protection (4)
Other NSE courses (200-level or higher) (12)

## Total=28

## Minor Code: 327

## RADIATION HEALTH PHYSICS

MINOR
Students not majoring in radiation
health physics or nuclear engineering may earn the Radiation Health Physics minor, which consists of the following courses:
NSE 234, NSE 235. Nuclear and Radiation Physics I, II $(4,4)$
NSE 236. Nuclear Radiation Detection and Instrumentation (4)
NSE 415. Nuclear Rules and Regulations (2)
NSE 435. Radiation Shielding and External Dosimetry (4)
NSE 475. ^Nuclear Systems Design II (4)
NSE 481. Radiation Protection (4)
NSE 483. Radiation Biology (3)

## Total=29

Footnote:
$\wedge$ Writing Intensive Course (WIC)
Minor Code: 326
GRADUATE MAJORS

## MEDICAL PHYSICS (MMP, MS, PhD)

## Graduate Areas of Concentration

Medical health physics, therapeutic radiologic physics
Medical physics examines and applies numerous aspects of nuclear science to medicine. Graduates can move to clinical residencies or research jobs which apply physics to medicine in imaging and radiation therapy.

The programs consist of a minimum of 45 credits, 39 of which must be didactic. The following courses are required and the remaining credits can be compiled of any 500 - or 600 -level course taught in the department or from outside the department if approved by an advisor. A comprehensive oral exam must be passed to complete the degree. MS students, in addition to the exam, must present their work to a committee of graduate faculty.

For more information, please contact:
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## Major Code: 3770

## NUCLEAR ENGINEERING (MEng, MS, PhD)

Graduate Areas of Concentration
Application of nuclear techniques, arms control technology, nuclear instrumentation and applications, nuclear medicine, nuclear power generation, nuclear reactor engineering, nuclear systems design and modeling, nuclear waste management, numerical methods for reactor analysis, radiation shielding, radioisotope production, space nuclear power, thermal hydraulics
The School of Nuclear Science and Engineering offers graduate work leading toward the Master of Engineering, Master of Science, and Doctor of Philosophy degrees in Nuclear Engineering, Master of Science, Master of Health Physics, and Doctor of Philosophy degrees in Radiation Health Physics, and Master of Medical Physics, Master of Science, and Doctor of Philosophy in Medical Physics.
The nuclear engineering and radiation health physics graduate degree programs are designed to prepare students for careers involved with the many beneficial applications of nuclear energy, radiation, and radioactive materials. The nuclear engineering and radiation health physics professions are essential to society's well-being since they enable significant public benefits through energy security, national defense, medical health, and industrial competitiveness.

In nuclear engineering particular attention is directed toward the application of scientific principles to the safe design and operation of nuclear installations. In addition, an emphasis is provided in system safety and thermal hydraulic testing, high-performance computational methods development, nuclear instrumentation, nuclear systems and materials, radiation protection, reactor analysis, nuclear power economics, and the regulation of nuclear operations.

Competitive fellowships and research and teaching assistantships are available to incoming graduate students. The U.S. Department of Energy and National Academy for Nuclear Training support a number of fellowship programs each year. Oregon State University is one of eight participating universities in the U.S. where students may attend graduate school on the Nuclear Engineering, Health Physics, and Applied Health Physics fellowships sponsored by the U.S. Department of Energy. Each year the National Academy for Nuclear Training also supports fellowships for students entering nuclear engineering and radiation health physics at OSU. Research and teaching assistant opportunities are also available for students to support the educational and research programs conducted by the department.

World-class facilities are available for the instructional and research programs
of the department. These are housed in the OSU Radiation Center and include a TRIGA Mark II nuclear reactor, the Advanced Thermal Hydraulic Research Laboratory, the APEX nuclear safety scaled testing facility, and laboratories specially designed to accommodate radiation and the use of radioactive materials.

For more information, visit the department's website at http://ne.oregonstate. edu/.
Major Code: 3270

## RADIATION HEALTH PHYSICS (MA, MHP, MS, PhD)

## Graduate Areas of Concentration

Application of nuclear techniques, boron neutron capture therapy, emergency response planning, environmental monitoring, environmental pathways assessment, nuclear medicine, radiation detection and instrumentation, radiation dosimetry, radiation shielding, radioactive material transport, radioactive waste management, research reactor health physics, risk assessment

## Also available via Ecampus.

The Master of Arts degree will be terminated pending approval of proposal 94447.

The School of Nuclear Science and Engineering offers graduate work leading toward the Master of Engineering, Master of Science, and Doctor of Philosophy degrees in Nuclear Engineering and Master of Health Physics (MHP), Master of Science, and Doctor of Philosophy degrees in Radiation Health Physics.

The nuclear engineering and radiation health physics graduate degree programs are designed to prepare students for careers involved with the many beneficial applications of nuclear energy, radiation, and radioactive materials. The nuclear engineering and radiation health physics professions are essential to society's well-being since they enable significant public benefits through energy security, national defense, medical health, and industrial competitiveness.

The radiation health physics graduate curricula and research programs are designed for students with professional interests in the field of radiation protection. This specialized field involves an integrated study of the physical aspects of ionizing and nonionizing radiation, their biological effects, and the methods used to protect people and their environment from radiation hazards while still enabling the beneficial uses of radiation and radioactive materials.
Competitive fellowships and research and teaching assistantships are available to incoming graduate students. The U.S. Department of Energy and National Academy for Nuclear Training support a number of fellowship programs each year. Oregon State University is one of eight participating universities in the
U.S. where students may attend graduate school on the Nuclear Engineering, Health Physics, and Applied Health Physics fellowships sponsored by the U.S. Department of Energy. Each year the National Academy for Nuclear Training also supports fellowships for students entering nuclear engineering and radiation health physics at OSU. Research and teaching assistant opportunities are also available for students to support the educational and research programs conducted by the department.
World-class facilities are available for the instructional and research programs of the department. These are housed in the OSU Radiation Center and include a TRIGA Mark II nuclear reactor, the Advanced Thermal Hydraulic Research Laboratory, the APEX nuclear safety scaled testing facility, and laboratories specially designed to accommodate radiation and the use of radioactive materials.

For more information, visit the department's website at http://ne.oregonstate. edu/.

## Major Code: 3750

## GRADUATE MINORS

## NUCLEAR ENGINEERING

## GRADUATE MINOR

For more details, see the departmental advisor.
Minor Code: 3270

## RADIATION HEALTH PHYSICS GRADUATE MIINOR

For more details, see the departmental advisor.

## Minor Code: 3750 <br> ■ NUCLEAR SCIENCE AND ENGINEERING COURSES

NSE 114. INTRO TO NUCLEAR ENGINEERING AND RADIATION HEALTH PHYSICS I (3). Introduction to the nuclear engineering and radiation health physics fields; problem-solving techniques; careers in the nuclear industry; nuclear history; elementary nuclear and reactor physics; basic nuclear fission and fusion theory; reactor types; nuclear safety; nuclear fuel cycle; and radiation protection.
NSE 115. INTRO TO NUCLEAR ENGINEERING AND RADIATION HEALTH PHYSICS II (3). introduction to the nuclear engineering and radiation health physics fields; problem-solving techniques; careers in the nuclear industry; nuclear history; elementary nuclear and reactor physics; basic nuclear fission and fusion theory; reactor types; nuclear safety; nuclear fuel cycle; and radiation protection.
NSE 233. MATHEMATICAL METHODS FOR NSE
(3). Development and application of analytical and numerical methods with applications to problems in the NE/RHP field. Major topics will include solution of ODEs and systems of ODEs, root finding techniques and numerical integration and differentiation. Major applications will include solution of the Bateman Equations and solution of the diffusion equation. PREREQS: MTH 254* [C] or MTH $254 \mathrm{H}^{*}$ [C]
NSE 234. NUCLEAR AND RADIATION PHYSICS I (3). Relativistic dynamics; basic nuclear
physics; basic quantum mechanics; radioactivity; electromagnetic waves; interaction of ionizing radiation with matter; cross sections; basic atomic structure. PREREQS: MTH 251 [C] or MTH 251H [C]
NSE 235. NUCLEAR AND RADIATION PHYSICS II (3). Radioactivity; radioactive decay modes; decay kinetics, interaction of neutrons with matter; nuclear reactions; fission and fusion basics; cross sections. PREREQS: (NSE 234 [C] or NE 234 [C] or RHP 234 [C] ) and (MTH 252 [C] or MTH 252 H [C])
NSE 236. NUCLEAR RADIATION DETECTION AND INSTRUMENTATION (4). Principles and mechanisms underlying nuclear radiation detection and measurements; operation of nuclear electronic laboratory instrumentation; application of gas-filled, scintillation and semiconductor laboratory detectors for measurement of alpha, beta, gamma, and neutron radiation; experimental investigation of interactions of radiation with matter. Lec/lab. PREREQS: NSE 235 [C] or NE 235 [C] or RHP 235 [C]
NSE 311. INTRODUCTION TO THERMALFLUID SCIENCES (4). Basic concepts of fluid mechanics, thermodynamics and heat transfer are introduced. Conservation of mass, energy, moment and the second law of thermodynamics are included. CROSSLISTED as ME 311. PREREQS: (ENGR 212 [C] or ENGR 212H [C] ) and (MTH 256 [C] or MTH 256 [C] )
NSE 311H. INTRODUCTION TO THERMALFLUID SCIENCES (4). Basic concepts of fluid mechanics, thermodynamics and heat transfer are introduced. Conservation of mass, energy, moment and the second law of thermodynamics are included. CROSSLISTED as ME 311H. PREREQS: (ENGR 212 [C] or ENGR 212H [C] ) and (MTH 256 [C] or MTH 256H [C] ) and Honors College approval required.
NSE 312. THERMODYNAMICS (4). Energy destruction, machine and cycle processes, law of corresponding states, non-reactive gas mixtures, reactive mixtures, thermodynamics of compressible fluid flow. CROSSLISTED as ME 312. PREREQS: (NSE 311 [C] or NSE 311H [C] or NE 311 [C] or NE 311 [C] or ME 311 [C] or ME 311 H [C] ) and (MTH 256 [C] or MTH 256H [C] )
NSE 312H. THERMODYNAMICS (4). Energy destruction, machine and cycle processes, law of corresponding states, non-reactive gas mixtures, reactive mixtures, thermodynamics of compressible fluid flow. CROSSLISTED as ME 312H. PREREQS: (NSE 311 [C] or NSE 311H [C] or NE 311 [C] or NE 311H [C] or ME 311 [C] or ME 311H [C] ) and (MTH 256 [C] or MTH 256H [C] ) and Honors College approval required.

NSE 319. *SOCIETAL ASPECTS OF NUCLEAR TECHNOLOGY (3). Description and discussion of nuclear-related issues as they impact society. (Bacc Core Course)
NSE 331. INTRODUCTORY FLUID MECHANICS
(4). Introduces the concepts and applications of fluid mechanics and dimensional analysis with an emphasis on fluid behavior, internal and external flows, analysis of engineering applications of incompressible pipe systems, and external aerodynamics. CROSSLISTED as ME 331
PREREQS: (MTH 254 [C] or MTH 254H [C] ) and (MTH 256 [C] or MTH 256H [C] ) and (ENGR 212 [C] or ENGR 212 H [C] ) and (ENGR 311 [C] or ENGR 311H [C] or ME 311 [C] or ME 311H [C] or NSE 311 [C] or NSE 311H [C] or NE 311 [C] or NE 311H [C] )

## NSE 331H. INTRODUCTORY FLUID

MECHANICS (4). Introduces the concepts and applications of fluid mechanics and dimensional analysis with an emphasis on fluid behavior, internal and external flows, analysis of engineering applications of incompressible pipe systems, and external aerodynamics. CROSSLISTED as ME 331H. PREREQS: (MTH 254 [C] or MTH 254H [C] ) and (MTH 256 [C] or MTH 256H [C] ) and

ENGR 212 [C] or ENGR 212 H [C]) and (ENGR 311 [C] or ENGR 311H [C] or ME 311 [C] or ME 311 H [C] or NSE 311 [C] or NSE 311H [C] or NE 311 [C] or NE 311H [C] ) and Honors College approval required.
NSE 332. HEAT TRANSFER (4). A treatment of conductive, convective and radiative energy transfer using control volume and differential analysis and prediction of transport properties. CROSSLISTED as ME 332. PREREQS: (MTH 256 [C] or MTH 256 H [C]) and (ENGR 212 [C] or ENGR 212H [C] ) and (NSE 311 [C] or NSE 311H [C] or NE 311 [C] or NE 311H [C] or ME 311 [C] or ME 311H [C] ) and (ME 331 [C] or ME 331H [C] or NSE 331 [C] or NSE 331H [C] or NE 331 [C] or NE 331H [C] )
NSE 332H. HEAT TRANSFER (4). A treatment of conductive, convective and radiative energy transfer using control volume and differential analysis and prediction of transport properties. CROSSLISTED as ME 332H. PREREQS: (MTH 256 [C] or MTH 256 H [C] ) and (ENGR 212 [C] or ENGR 212H [C] ) and (NSE 311 [C] or NSE 311H C] or NE 311 [C] or NE 311H [C] or ME 311 [C] or ME 311H [C] ) and (ME 331 [C] or ME 331H [C] or NSE 331 [C] or NSE 331H [C] or NE 331 [C] or NE 331 H [C] ) and Honors College approval required.
NSE 401. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 99 credits.
NSE 403. THESIS/DISSERTATION (1-16). This course is repeatable for a maximum of 16 credits.
NSE 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
NSE 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

NSE 407. SEMINAR (1). Graded P/N. This course is repeatable for a maximum of 16 credits.

NSE 410. INTERNSHIP (1-12). Supervised technical work experience at approved organizations. Graded P/N. This course is repeatable for a maximum of 12 credits.
PREREQS: Upper-division standing.
NSE 415. NUCLEAR RULES AND
REGULATIONS (2). An introduction to the
key nuclear regulatory agencies; major nuclear legislation; current radiation protection standards and organizations responsible for their implementation. Offered alternate years. PREREQS: NSE 481 or NE 481 or RHP 481
NSE 429. SELECTED TOPICS IN NUCLEAR ENGINEERING (1-3). Topics associated with nuclear engineering not covered in other undergraduate courses; topics may vary from year to year. This course is repeatable for a maximum of 45 credits. PREREQS: Instructor approval required.
NSE 435. RADIATION SHIELDING AND EXTERNAL DOSIMETRY (4). Theoretical principles of shielding for neutron and gamma radiation; external dosimetry fundamentals for neutrons, photons, and charged particles; applications to problems of practical interest; analytical, numerical, and computer solutions emphasized. PREREQS: (NSE 234 [C] or NE 234 [C] or RHP 234 [C] ) and (NSE 235 [C] or NE 235 [C] or RHP 235 [C] ) and (NSE 481 [C] or NE 481 [C] or RHP 481 [C] ) and /or instructor approval.
NSE 440. NUCLEAR FUEL CYCLE AND WASTE MANAGEMENT (4). Mining, milling, conversion, enrichment, fuel fabrication, reprocessing, and waste management of nuclear fuel, including disposal of low- and high-level radioactive waste. PREREQS: NSE 235 [C] or NE 235 [C] or RHP 235 [C]
NSE 450. PRINCIPLES OF NUCLEAR
MEDICINE (3). Basic principles of nuclear medicine; detectors; radiopharmaceutical; dosimetry; imaging procedures.

NSE 451. NEUTRONIC ANALYSIS I (3). Physical models of neutronic systems; nuclear physics; steady state and transient neutronic system behavior; introductory neutron transport theory, one speed diffusion theory; numerical methods; fast and thermal spectrum calculations; multigroup methods; transmutation and burnup; reactor fuel management; reactivity control; perturbation theory; neutronic laboratory sessions. PREREQS: (MTH 256 [C] or MTH 256H [C] ) and (NSE 235 C] or NE 235 [C] or RHP 235 [C] ) and (NSE 333 C] or NE 333 [C] or RHP 333 [C] ) and NSE 451 and NSE 452 must be taken in order.

NSE 452. NEUTRONIC ANALYSIS II (3). Physical models of neutronic systems; nuclear physics; steady state and transient neutronic system behavior; introductory neutron transport theory, one speed diffusion theory; numerical methods; fast and thermal spectrum calculations; multigroup methods; transmutation and burnup; reactor fuel management; reactivity control; perturbation theory; neutronic laboratory sessions. Lec/lab. PREREQS: NSE 451 [C] or NE 451 [C] and NSE 451 and NSE 452 must be taken in order

NSE 455. REACTOR OPERATOR TRAINING I (3). The Oregon State University TRIGA reactor Operator Training I class is one of a two-course series. Students interested in participating in this course are expected to enroll in both the NSE 455/NSE 555 and NSE 456/NSE 556 classes taught during spring and summer terms. Students successfully completing the NSE 455/NSE 555 and NSE 456/NSE 556 series will culminate their course work with the opportunity to take a certification test proctored by the Nuclear Regulatory Commission. PREREQS: (NSE 236 [C] or NE 236 [C] or RHP 236 [C] ) and (MTH 256 [C] or MTH 256H [C] )
NSE 456. REACTOR OPERATOR TRAINING II
(4). The Oregon State University TRIGA reactor Operator Training II class is one of a two-course series. Students interested in participating in this course must have already taken and successfully passed NSE 455/NSE 555. Students successfully completing NSE 455/NSE 555 will culminate their course work with the opportunity to take a certification test proctored by the Nuclear Regulatory Commission. PREREQS: NSE 455 [C] or NE 455 [C] and instructor approval required.
NSE 457. NUCLEAR REACTOR LABORATORY (2). Experimental investigation of the principles of nuclear reactor operation. Use of the OSU TRIGA Reactor and other laboratory facilities. Preparation and presentation of laboratory reports. Lec/lab. PREREQS: (NSE 451 [C] or NE 451 [C] or NSE 551 [C] or NE 551 [C] ) and (NSE 452 [C] or NE 452 [C] or NSE 552 [C] or NE 552 [C] )

## NSE 467. NUCLEAR REACTOR THERMAL

HYDRAULICS (4). Hydrodynamics and conductive, convective and radiative heat transfer in nuclear reactor systems. Core heat removal design; critical heat flux, hot spot factors, singleand two-phase flow behavior. Advanced thermal hydraulic computer codes. PREREQS: ME 332 [C] or ME 332H [C] or NSE 332 [C] or NSE 332H [C] or NE 332 [C] or NE 332H [C]

NSE 468. NUCLEAR REACTOR SAFETY (3). Focused on probability risk assessment and system reliability analysis techniques applied to nuclear reactor safety. Application of these methods will be performed specifically through examination of neutronics and thermal hydraulic transients, effectiveness of emergency systems, accident prevention and mitigation, and assessment of radioactive release to the environment. PREREQS: (NSE 451 [C] or NE 451 [C] ) and (NSE 467 [C] or NE 467 [C] )

NSE 473. NUCLEAR REACTOR SYSTEMS ANALYSIS (3). Analysis of nuclear light water reactor (pressurized water reactor and boiling water reactor) design and operation, including the nuclear steam supply system, engineered safety features and balance of plant systems; regulatory design requirements; industry standards; plant
engineering and instrumentation drawings Advanced reactor system designs. PREREQS: NSE 452 [C] or NE 452 [C] and approval of the instructor or graduate standing.
NSE 474. ${ }^{\wedge}$ NUCLEAR SYSTEMS DESIGN I (4). Part I of a two-part series aimed at developing the student's ability to utilize fundamental nuclear and radiation protection skills to transform concepts into practical designs. Design projects involve the integration of neutronics, thermal hydraulics, safety and risk analysis, power production materials, radiation protection, economic optimization, statistics and other skills. (Writing Intensive Course) PREREQS: Senior standing. NSE 474 and NSE 475 must be taken in order.

NSE 475. ^NUCLEAR SYSTEMS DESIGN II (4). Part II of a two-part series aimed at developing the student's ability to utilize fundamental nuclear and radiation protection skills to transform concepts into practical designs. Design projects involve the integration of neutronics, thermal hydraulics, safety and risk analysis, power production, materials, radiation protection, economic optimization, statistics and other skills. (Writing Intensive Course) PREREQS: (NSE 452 [C] or NE 452 [C] ) and (NSE 474 [C] or NE 474 [C] or RHP 474 [C] ) and senior standing. NSE 474 and NSE 475 must be taken in order.
NSE 481. RADIATION PROTECTION (4). Fundamental principles and theory of radiation protection; regulatory agencies, dose units; source of radiation; biological effects and risk; dose limits; applications of external and internal dosimetry; shielding and atmospheric dispersion. PREREQS: NSE 235 [C] or NE 235 [C] or RHP 235 [C]
NSE 483. RADIATION BIOLOGY (3). Biological effects of ionizing radiation at the molecular, cellular, and organismal levels with emphasis on vertebrates; both acute and chronic radiation effects are considered. PREREQS: NSE 481 [C] or RHP 481 [C] or MP 481 [C] and /or senior standing.
NSE 488. RADIOECOLOGY (3). Radionuclides in the environment: their measurement and identification, uptake and transfer through food chains. Effect of radiation on natural populations of plants and animals. PREREQS: NSE 481 [C] or RHP 481 [C] or NE 481 [C] and /or graduate standing.
NSE 499. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

NSE 501. RESEARCH (1-16). This course is repeatable for a maximum of 99 credits.
NSE 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits

NSE 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

NSE 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

NSE 507. SEMINAR (1). Graded P/N. This course is repeatable for a maximum of 16 credits.

NSE 510. INTERNSHIP (1-12). Supervised technical work experience at approved organizations. Graded $P / N$. This course is repeatable for a maximum of 16 credits. PREREQS: Graduate standing.
NSE 515. NUCLEAR RULES AND
REGULATIONS (2). An introduction to the
key nuclear regulatory agencies; major nuclear legislation; current radiation protection standards and organizations responsible for their implementation. Offered alternate years.
NSE 516. RADIOCHEMISTRY (4). Selected methods of radiochemical analysis. Actinide chemistry, activation analysis, radionuclide solvent extraction, and microbial reactions with radionuclides. Designed for majors in chemistry, chemical engineering, nuclear engineering, and radiation health physics. Lec/lab. CROSSLISTED
as CH 516. PREREQS: (NSE 531 [C] or NE 531 [C] or RHP 531 [C] ) and (NSE 536 [C] or NE 536 [C] or RHP 536 [C] ) and /or instructor approval.

NSE 517. RADIONUCLIDES IN LIFE SCIENCES (4). Chemistry of actinides and fission products, radioseparations, selected medical generators, radiolabeling of organic molecules. Designed for majors in medical physics, radiation health physics, chemistry, pharmacy. PREREQS: (NSE 531 [C] or NE 531 [C] or RHP 531 [C] ) and (NSE 536 [C] or NE 536 [C] or RHP 536 [C] )
NSE 519. RADIOCHEMICAL ANALYSIS (4). Hands-on learning of radiochemistry, practical training with open radiation sources for preparation of irradiation targets, counting samples from contaminated soils or separation of medical radionuclides. Fundamentals of chemical dosimetry are also covered. Designed for a broad range of majors in chemistry, nuclear engineering, radiation health physics, radioecology, chemical and environmental engineering. Lec/lab. The lecture part of the course also is delivered online as video stream via Canvas. PREREQS: NSE 536 [C] or NE 536 [C] or RHP 536 [C] and NSE 516 recommended but not required. Graduate standing.

NSE 521. RADIOLOGICAL ANATOMY AND PHYSIOLOGY (4). Anatomy and physiology with correlating images for use by medical physicists, therapists, dosimetrists. This course adheres to the AAMD requirements for Cross Sectional Anatomy. PREREQS: Instructor approval and advanced standing.

NSE 526. NUMERICAL METHODS FOR
ENGINEERING ANALYSIS (3). Numerical solutions of linear equations, difference equations, ordinary and partial differential equations. CROSSLISTED as ME 526. PREREQS: Programming experience and previous exposure to numerical methods, or instructor approval.

NSE 531. RADIOPHYSICS (3). Expands understanding of concepts and applications of atomic and nuclear physics to enable continued study in nuclear engineering and health physics. Includes fundamental concepts of nuclear and atomic physics, atomic and nuclear shell structure, radioactive decay, radiation interactions, radiation biology, and the characteristics of fission PREREQS: Graduate standing.

NSE 535. RADIATION SHIELDING AND EXTERNAL DOSIMETRY (4). Theoretical principles of shielding for neutron and gamma radiation; external dosimetry fundamentals for neutrons, photons, and charged particles; applications to problems of practical interest; analytical, numerical, and computer solutions emphasized.

NSE 536. ADVANCED RADIATION DETECTION AND MEASUREMENT (4). Principles and mechanisms underlying nuclear radiation detection and measurements; operation of nuclear electronic laboratory instrumentation; application of gas-filled, scintillation and semiconductor laboratory detectors for measurement of alpha, beta, gamma, and neutron radiation, liquid scintillation equipment; use of Bonner spheres for neutron energy profiles; experimental investigation of interactions of radiation with matter. Lec/lab. PREREQS: NSE 531 [C] or NE 531 [C] or RHP 531 [C] or MP 531 [C]
NSE 537. DIGITAL RADIATION MEASUREMENT
AND SPECTROSCOPY (3). Principles of digital spectroscopy; application of digital filters in digital processing of detector pulses; hardware implementation of a typical digital spectrometer; introduction of Field-Programmable Gate Array (FPGA) devices programming a digital spectrometer using Hardware Description Language (VHDL); simulation, synthesis and spectroscopy; experimental design tests and evaluation. Lec/lab. PREREQS: NSE 536 [C] or NE 536 [C] or RHP 536 [C] and instructor approval required.

NSE 539. SELECTED TOPICS IN INTERACTION OF NUCLEAR RADIATION (1-6). Topics
associated with interactions of nuclear radiation not covered in other graduate courses; topics may vary from year to year. PREREQS: Instructor approval required

NSE 540. NUCLEAR FUEL CYCLE AND WASTE
MANAGEMENT (4). Mining, milling, conversion, enrichment, fuel fabrication, reprocessing, and waste management of nuclear fuel, including disposal of low- and high-level radioactive waste.
NSE 541. DIAGNOSTIC IMAGING PHYSICS I
(3). An introduction to the production and usage of ionizing radiation in medicine. The course will cover x-ray production, x-ray spectrum, characteristics and manipulation, and how x-rays are utilized to obtain anatomical information in diagnostics imaging. Imaging modalities to be covered in this course are general and portable planar radiography, mammography, and fluoroscopy (including interventional radiography). PREREQS: NSE 531 [C] or MP 531 [C] or RHP 531 [C] and instructor approval and graduate standing.
NSE 542. DIAGNOSTIC IMAGING PHYSICS II (3). An introduction to Computed Tomography (CT) and Ultrasound (US) imaging, and their applications in medicine. The course will cover x-ray production, detection, and image processing as it relates specifically to CT, as well as general acoustic physics principles and how they are applied to US imaging. Additionally, clinical radiation protection and dosimetry in diagnostic imaging will be taught. PREREQS: NSE 531 [C] or PP 531 [C] or RHP 531 [C] and instructor approval and graduate standing.

NSE 543. ADVANCED DIAGNOSTIC IMAGING
PHYSICS (3). An introduction to the areas of health informatics and magnetic resonance imaging (MRI). The health informatics portion of the course will specifically cover picture archiving and communication systems (PACS), including DICOM standards, data transfer and storage, digital image displays, and clinical implementation of PACS systems. The MRI portion of the course will provide instruction on the physical principles behind nuclear magnetic response (NMR) and how these phenomenon are exploited in MRI. Advanced MRI techniques and applications, along with clinical testing requirements, will also be covered. PREREQS: NSE 531 [C] or MP 531 [C] or RHP 531 [C] and instructor approval, graduate standing.
NSE 544. NUCLEAR MEDICINE IMAGING (3).
An introduction to the uses of radionuclides in medical imaging. The theory and application of detectors and imaging systems in nuclear medicine including collimators, scintillation probes cameras, SPECT, PET, and hybrid technologies (SPECT/CT, PET/CT, and PET/MRI) will be covered. PREREQS: (NSE 541 [C] or MP 541 [C] ) and (NSE 531 [C] or RHP 531 [C]) and instructor approval and graduate standing.
NSE 545. DIAGNOSTIC IMAGING PRACTICUM (3). Provides an introduction to the medical physicist's role in a clinical department; an opportunity to integrate principles learned throughout the graduate program as they apply to diagnostic imaging physics. Observations of procedures in radiography, fluoroscopy, ED, OR, interventional radiology, CT, MRI, ultrasound, and nuclear medicine. Experience in regulatory testing of x-ray equipment; observations of testing of CT and other x-ray modalities. Graded P/N. PREREQS: (NSE 541 [C] or MP 541 [C] ) and (NSE 531 [C] or MP 531 [C] or RHP 531 [C] ) and instructor approval and graduate standing.

NSE 549. SELECTED TOPICS IN NUCLEAR FUEL CYCLE ANALYSIS (1-6). Topics associated with the nuclear fuel cycle not covered in other graduate courses; topics may vary from year to year. This course is repeatable for a maximum of 45 credits.

NSE 550. PRINCIPLES OF NUCLEAR
MEDICINE (3). Basic principles of nuclear medicine; detectors; radiopharmaceutical; dosimetry; imaging procedures.
NSE 551. NEUTRONIC ANALYSIS I (3). Physical models of neutronic systems; nuclear physics; steady state and transient neutronic system behavior; introductory neutron transport theory; one speed diffusion theory; numerical methods; fast and thermal spectrum calculations; multigroup methods; transmutation and burnup; reactor fuel management; reactivity control; perturbation theory; neutronic laboratory sessions. PREREQS: NSE 551 and NSE 552 must be taken in order.

NSE 552. NEUTRONIC ANALYSIS II (3). Physical models of neutronic systems; nuclear physics; steady state and transient neutronic system behavior; introductory neutron transport theory; one speed diffusion theory; numerical methods; fast and thermal spectrum calculations; multigroup methods; transmutation and burnup; reactor fuel management; reactivity control; perturbation theory; neutronic laboratory sessions. PREREQS: NSE 551 [C] or NE 551 [C] and NSE 551 and NSE 552 must be taken in order.

NSE 553. ADVANCED NUCLEAR REACTOR PHYSICS (3). Advanced analytic and numerical techniques for the prediction of the neutron population in nuclear reactor systems. Topic will include long characteristic neutron transport, collision probabilities, nodal methods, equivalence theory, and perturbation theory. PREREQS: (NSE 551 [C] or NE 551 [C] ) and (NSE 552 [C] or NE 552 [C] ) and computer programming experience or instructor approval.
NSE 555. REACTOR OPERATOR TRAINING I
(3). The Oregon State University TRIGA Reactor Operator I class is one of a two-course series. Student interested in participating in this course are expected to enroll in both the NSE 455/555 and NSE 456/556 classes taught during spring and summer terms. Students successfully completing the NSE 455/555 and NSE 456/556 series will culminate their course work with the opportunity to take a certification test proctored by the Nuclear Regulatory Commission.
NSE 556. REACTOR OPERATOR TRAINING II (4). The Oregon State University TRIGA Reactor Operator Training II class is one of a two-course series. Students interested in participating in this course must have already taken and successfully passed NSE 455/NSE 555. Students successfully completing NSE $456 /$ NSE 556 will culminate their course work with the opportunity to take a certification test proctored by the Nuclear Regulatory Commission. PREREQS: NSE 555 [C] or NE 555 [C] and instructor approval required.
NSE 557. NUCLEAR REACTOR LABORATORY (2). Experimental investigation of the principles of nuclear reactor operation. Use of the OSU TRIGA Reactor and other laboratory facilities. Preparation and presentation of laboratory reports. Lec/lab. PREREQS: (NSE 551 [C] or NE 550 [C] ) and (NSE 552 [C] or NE 552 [C] )
NSE 559. SELECTED TOPICS IN NUCLEAR REACTOR ANALYSIS (1-3). Topics associated with nuclear reactor theory not covered in other graduate courses; topics may vary from year to year. This course is repeatable for a maximum of 45 credits.

NSE 561. NUCLEAR REACTOR SYSTEMS LABORATORY (3). Operational aspects of nuclear reactor systems; neutronic and thermalhydraulic characterization of nuclear reactors; examination of design basis accident prevention and mitigation; loss of coolant accidents; loss of flow accidents; station blackouts. Lec/lab. PREREQS: (NSE 553 [C] or NE 553 [C]) and (NSE 567 [C] or NE 567 [C] )
NSE 562. RADIATION THERAPY (3). The physics of radiation generation and delivery relevant to the field of clinical radiation oncology. Topics will include external beam radiation therapy;
dosimetric calculations; high dose-rate and low dose-rate brachytherapy; electron beam dosimetry and treatment planning; special techniques in radiotherapy; and clinical radiation protection and quality assurance. PREREQS: NSE 531 [C] or MP 531 [C] or NE 531 [C] or RHP 531 [C] and graduate standing
NSE 563. APPLIED RADIATION THERAPY PHYSICS LABORATORY I (3). The applied practice of therapeutic radiation physics for clinical radiation oncology. Topics will include current methodologies in treatment delivery and planning algorithms, best practices and protocols for quality assurance, special techniques in radiotherapy, and oncology. PREREQS: NSE 562 [C] or MP 562 [C]

## NSE 564. APPLIED RADIATION THERAPY

 PHYSICS LABORATORY II (3). Covers the applied practice of therapeutic radiation physics for clinical radiation oncology. Topics include current methodologies in SRS and ARC QA treatment planning QA, adaptive radiotherapy, eye plaque brachytherapy and HDR braytherapy.NSE 565. APPLIED THERMAL HYDRAULICS (3). Advanced topics in the computational modeling of the hydrodynamic and heat transfer phenomena of nuclear reactors. Steady-state and transient solutions of one-dimensional nuclear reactor thermal hydraulic models. Nuclear reactor behavior analysis during various accident scenarios.
NSE 567. NUCLEAR REACTOR THERMAL HYDRAULICS (4). Hydrodynamics and conductive, convective and radiative heat transfer in nuclear reactor systems. Core heat removal design; critical heat flux, hot spot factors, singleand two-phase flow behavior. Advanced thermal hydraulic computer codes.
NSE 568. NUCLEAR REACTOR SAFETY
(3). Focused on probability risk assessment and system reliability analysis techniques applied to nuclear reactor safety. Application of these methods will be performed specifically through examination of neutronics and thermal hydraulic transients, effectiveness of emergency systems, accident prevention and mitigation, and assessment of radioactive release to the environment. PREREQS: (NSE 551 [C] or NE 551 [C] ) and (NSE 567 [C] or NE 567 [C] )

## NSE 569. SELECTED TOPICS IN NUCLEAR

 REACTOR ENGINEERING (1-6). Advanced nuclear engineering design concepts, reactor systems analysis techniques and innovative nuclear engineering applications. Artificial intelligence and expert system applications to nuclear engineering problems. Topics may vary from year to year. This course is repeatable for a maximum of 30 credits.NSE 573. NUCLEAR REACTOR SYSTEMS
ANALYSIS (3). Analysis of nuclear light water reactor (pressurized water reactor and boiling water reactor) design and operation, including the nuclear steam supply system, engineered safety eatures and balance of plant systems; regulatory design requirements; industry standards; plant engineering and instrumentation drawings. Advanced reactor system designs. PREREQS: NSE 552 [C] or NE 552 [C]
NSE 574. NUCLEAR SYSTEMS DESIGN I (4). Part I of a two-part series aimed at developing the student's ability to utilize fundamental nuclear and radiation protection skills to transform concepts into practical designs. Design projects involve the integration of neutronics, thermal hydraulics, safety and risk analysis, power production, materials, radiation protection, economic optimization, statistics and other skills. PREREQS: NSE 574 and NSE 575 must be taken in order.
NSE 575. NUCLEAR SYSTEMS DESIGN II (4). Part II of a two-part series aimed at developing the student's ability to utilize fundamental nuclear and radiation protection skills to transform concepts into practical designs. Design projects involve the integration of neutronics, thermal hydraulics,
safety and risk analysis, power production, materials, radiation protection, economic optimization, statistics and other skills. PREREQS: (NSE 551 [C] or NE 551 [C] ) and (NSE 552 [C] or NE 552 [C] ) and (NSE 574 [C] or NE 574 [C] ) and NSE 574 and NSE 575 must be taken in order.

NSE 582. APPLIED RADIATION SAFETY (4). Application of radiation protection as practiced in the fields of nuclear science and engineering; application of health physics principles to reduce health hazards at each of the following stages: design, prevention, assessment, and post-incident A history of key nuclear regulatory agencies; early and current radiation protection standards and organizations responsible for their formulation; major nuclear legislation; pertinent nuclear rules and regulations and their application. Lec/lab.

NSE 583. RADIATION BIOLOGY (3). Biological effects of ionizing radiation at the molecular, cellular, and organismal levels with emphasis on vertebrates; both acute and chronic radiation effects are considered.
NSE 584. RADIATION BIOLOGY II (3).
Application of radiobiological models in radiation therapy. Some background in radiation biology is strongly recommended.

NSE 588. RADIOECOLOGY (3). Radionuclides in the environment: their measurement and identification, uptake and transfer through food chains. Effect of radiation on natural populations of plants and animals. PREREQS: NSE 481 or RHP 481 or NE 481 or graduate standing.
NSE 590. INTERNAL DOSIMETRY (3). Further development and more in-depth treatment of internal dosimetry concepts introduced in NE/ RHP 582, in NE/RHP 582, theoretical basis of energy deposition, biokinetics, and estimation of radiation risk from ingested, inhaled, or injected radionuclides. PREREQS: (NSE 531 [C] or NE 531 [C] or RHP 531 [C] ) and (NSE 535 [C] or NE 535 [C] or RHP 535 [C] ) and /or equivalent or instructor approval.
NSE 599. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.
NSE 601. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 99 credits.
NSE 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits
NSE 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

NSE 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

NSE 607. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits

NSE 610. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.

NSE 654. COMPUTATIONAL PARTICLE TRANSPORT (3). Properties of and methods for solution of the linear Boltzmann equation for nuclear reactors; spherical and double-spherical harmonics; integral equation methods; Monte Carlo methods. PREREQS: (NSE 551 [C] or NE 551 [C] ) and (NSE 552 [C] or NE 552 [C] )
NSE 667. ADVANCED THERMAL HYDRAULICS
(3). Advanced topics in single- and two-phase hydrodynamics and heat transfer for nuclear reactors. Two-phase flow patterns, flow instabilities, condensation induced transients, convective boiling heat transfer, and current topics in reactor safety thermal hydraulics. Offered alternate years. PREREQS: NSE 567 [C] or NE 567 [C]
NSE 699. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.
NSE 808. WORKSHOP (1-4). This course is repeatable for a maximum of 16 credits.

## OTHER DECBEES $\varepsilon_{2}$ <br> PROCRAMS WITHIN THE COLLECE OF ENCINEERING

## UNDERGRADUATE MAJORS

 WITH OPTIONS
## INTERNATIONAL STUDIES (BA, HBA)

See International Programs for information on the International Studies undergraduate major.

## Major Code: 910

## SUSTAINABILITY (BS, HBS)

## Also available via Ecampus.

## OSU Main Campus Contact: Ann

Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.
OSU-Cascades Campus Contact: Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@ osucascades.edu.

## Sustainability Core (17-20)

All Sustainability Majors and Minors must take the five courses that make up the Sustainability Core: SUS 304, SUS 350, an ecological sustainability course (SUS 102 recommended), a social sustainability course (choose one below), and an economic sustainability course (choose one below):
SUS 304. *Sustainability Assessment (4) SUS 350. *Sustainable Communities (4)

## Ecological Dimensions of

## Sustainability (3-4)

Select 3 to 4 credits from the following:
BI 301. *Human Impacts on Ecosystems (3)
SUS 102. *Introduction to Environmental Science and Sustainability (4)

## Social Dimensions of Sustainability

 (3-4)
## Select 3 to 4 credits from the

## following:

SOC 381. Social Dimensions of
Sustainability (4)(Ecampus only)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/FES/ANS/FW 485. *Consensus and
Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)(Ecampus, Cascades Campus )

## Economic Dimensions of

Sustainability (3-4)
Select 3 to 4 credits from the

## following:

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 351. *Natural Resources Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)

AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)

## Practicum (3-12)

Sustainability majors are required to complete a minimum of 3 Practicum credits. Before registering for a practicum, students must get practicum approved by Sustainability Double Degree advisor. Email: Sus.advising@oregonstate.edu.
SUS 401. Research (3-12)
SUS 410. Internship (3-12)
SUS 499. Special Topics (3-12)
Note: SUS 410 credits may be achieved by participation in an $\mathrm{IE}_{3}$ Global Internship with advisor approval.
Remaining Elective Credits (4-16)
In addition to the required credits specified above, students must work with the sustainability program advisor to select courses relevant to their discipline and career path interests.

## Credits total=36

Classes that can be used to fulfill remaining requirements are listed below. Students are NOT limited to taking courses within their primary major of study. The Sustainability advisor(s) will approve courses not listed here if they have an obvious link to sustainability and fulfill the intent of the double degree. See the OSU Sustainability Office list of sustain-ability-related courses.

## Business

AEC 250. *Introduction to Environmental
Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 465. *Systems Thinking and Practice (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 311. Intermediate Microeconomic
Theory (4)
ECON 315. Intermediate Macroeconomic
Theory (4)
MGMT 452. Leadership (4)

## Engineering

BEE 221. Fundamentals of Ecological
Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative
Energy Systems (3)

CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering Fundamentals (4)
ENVE 322. Fundamentals of Environmental Engineering (4)
HEST 310. *Introduction to Community Engagement and Community-Based Design (3)

## Natural Sciences

ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ATS 320. *The Changing Climate (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 348. *Human Ecology (3)
BI 370. Ecology (3)
BRR 325. *Energy Technology and Social Change (3)
BRR 350. Introduction to Regional Bioenergy (2)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
DHE/WSE 415. *Renewable Materials in the Modern Age (3)
FES 341. Forest Ecology (3)
FES 354. Communities, Natural Areas, and Sustainable Tourism (3)
FES 355. Management for Multiple Resource Values (3)
FES 360. Collaboration and Conflict Management (3)
FES 365. *Issues in Natural Resources Conservation (3) Ecampus or Cascades campus only
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FES/FW 445. Ecological Restoration (4)
FES/HORT 455. Urban Forest Planning,
Policy and Management (4) Ecampus only
FES/NR/RNG 477. *Agroforestry (3)
FES/SOC/ANS/FW 485. *Consensus and Natural Resources (3)
FOR 462. Natural Resource Policy and Law (3)

FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information Systems in Natural Resource (3)
FW 321. Applied Community and Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society, and Sustainability (3)
FW 435. ^Wildlife in Agricultural
Ecosystems (3)
FW 489. Effective Communications in
Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 309. *Environmental Justice (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and

Environment (3)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and
Development (3)
GEOG 441. International Water Resources
Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
SOIL 475. Soil Resource Potentials (4)
SOIL 499. Special Topics (1-16)
SUS 103. *Introduction to Climate Change (4)

WSE 111. Renewable Materials for a Green Planet (2)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 392. *Bamboolooza: The Fascinating World of Bamboo (3)
WSE 453. ${ }^{\wedge}$ Global Trade in Renewable Materials (3)
WSE 455. Marketing and Innovation in Renewable Materials (4)
WSE 473. Bioenergy and Environmental Impact (3)
WSE 475. Environmental Assessment of Building Materials (4)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy, and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ANTH 481. *Natural Resources and Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature, Culture and the Environment (4)
FES/SOC/ANS/FW 485. *Consensus and Natural Resources (3)
HEST 310. *Introduction to Community Engagement and Community-Based Design (3)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL/REL 443. *World Views and Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion, and Politics (4)
PS 374. *Sustainable Living: Practices and Policies (4)
PS 449. ^Topics in Comparative Politics (4)

PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy
(4)

PS 477. International Environmental Politics and Policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
WGSS 440. *Women and Natural Resources
(3)

WGSS 450. Ecofeminism (3)

## Footnotes:

* Bacc Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Major Code: $\mathbf{8 7 0}$
UNDERGRADUATE MINORS


## HUMANITARIAN

## ENGINEERING MINOR

The Humanitarian Engineering minor provides multidisciplinary academic course work for students interested in the application of engineering, science, and technology-based solutions to global development challenges such as access to basic resources (e.g., clean water, clean energy), improved quality of life, and increased ability to earn a livelihood particularly in rural, resource-limited or low-to-middle income settings. A core of course work in humanitarian engineering, science and technology (HEST) is required with an emphasis on engineering as demonstrated by completion of the engineering design class (with engineering prerequisites). Both in the core course work and in the electives, there is an emphasis on context including social, cultural, economic, resource, political, and environmental.
Humanitarian Engineering, Science
and Technology (HEST) Core with
Engineering Emphasis (13)
All humanitarian engineering
students must take (7)
ANTH 482/ANTH 582. *Anthropology of International Development (4)
HEST 411/HEST 511. Engineering
Design For Emergency \& Low-Resource Environments (3)
Select from the following courses, or new HEST courses that will be approved (6):
HEST 310. *Introduction to Community
Engagement and Community-Based Design (3)
HEST 412/HEST 512. *Multidisciplinary
Case Studies in Humanitarian
Engineering, Science and Technology (3)

## Thematic Electives (11-14)

Students will work with their academic advisor/humanitarian engineering advisor to select electives relevant to their interests from the HEST Bacc Core Playlist included at the end of this block. Electives related to HEST outside of the Bacc Core Playlist can be approved on a case-by-case basis based on relevance to HEST and the student's interest in HEST. Case-by-case approvals may be granted,
for example, for non-Bacc core courses in political science, public health, anthropology, sociology, engineering, economics, business, geography or others.

## International or Service Learning

 Component (0-3)Study abroad, HEST 310, internship, Engineers without Borders (EWB) or other service learning/civic engagement as approved by an academic advisor. OSU's Center for Civic Engagement can serve to connect students with service opportunities.
Note on counting credits towards each category: The credits from a single course cannot be applied to satisfy the credit requirements for more than one category (Core, Thematic Electives, International or Service Learning Component). For example, 3 credits of HEST 310 cannot count towards both 11-credit minimum for thematic electives AND 3 credits of service learning. However, 3 credits of HEST 310 could count towards a total of 14 credits thematic electives AND satisfy the service learning requirement at the 0 -credit level. Similarly, 4 credits of ANTH 482 cannot be counted towards the 13 -credit HEST Core and towards the 11-credit minimum of thematic electives.

## Bacc Core Playlist for Thematic Electives

There are two categories of baccalaureate core courses that will count for thematic electives.

1. List I shows courses that are particularly recommended because of the relevance of material and/ or instructor affiliation with the program.
2. List II contains all of the courses that will fulfill thematic elective credits for the minor.

## List I (recommended):

Cultural Diversity
WGSS 280. *Women Worldwide (3)

## Literature and the Arts

ENG 322. *Studies in Globalism, Text, and Event (4)

## Physical Science

WSE 210. *Renewable Materials Technology and Utilization (4)

## Social Processes and Institutions

H 225. *Social and Individual Health Determinants (4)
WGSS 223. *Women: Self and Society (3)

## Western Culture

PHL 205. *Ethics (4)

## Difference, Power, and Discrimination

ENG 220/FILM 220. *Topics in Difference,
Power, and Discrimination (4)
FW 340. *Multicultural Perspectives in Natural Resources (3)
GEO 309. *Environmental Justice (3)
MB 330. *Disease and Society (3)
WGSS 223. *Women: Self and Society (3)
WGSS 414. *Systems of Oppression in

Women's Lives (4)
Synthesis-Contemporary Global Issues
ANTH 374. *Anthropology and Global Health (3)
ANTH 380. *Cultures in Conflict (3)
ANTH 466. *Rural Anthropology (4)
ANTH 482. *Anthropology of International Development (4)
FW 325. *Global Crisis in Resource Ecology (3)

GEO 308. *Global Change and Earth Sciences (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 330. *^Geography of International Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
HDFS 447. *Families and Poverty (4)
PHL 443. *World Views and Environmental Values (3)
PS 345. *The Politics of Developing Nations (4)

PS 458. *International Political Economy (4)
SOC 480. *Environmental Sociology (4)
SUS 350. *Sustainable Communities (4)
WGSS 380. *Muslim Women (3)
WGSS 480. *International Women (3)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)
Synthesis-Science, Technology, and Society
ANTH 330. *Evolution of People, Technology, and Society (3)
ANTH 481. *Natural Resources and
Community Values (3)
ATS 320. *The Changing Climate (3)

## [Terminated fall 2017]

DHE 415/WSE 415. *Renewable Materials in the Modern Age (3)
ENGR 350. *Sustainable Engineering (3)
ES 445. *Native American Science and Technology (4)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 340. *Introduction to Water Science and Policy (3)
H 445. *Occupational Health (3)
IE 380. *The Responsible Engineer (3)
NUTR 312. *Issues in Nutrition and Health (3)

PH 313. *Energy Alternatives (3)
SOC 481. *Society and Natural Resources (3)
WGSS 440 . *Women and Natural Resources (3)

## List II (all eligible thematic <br> electives from Bacc Core) <br> Biological Science

BOT 101. *Botany: A Human Concern (4)
SOIL 205. *Soil Science (3) and SOIL 206.
*Soil Science Laboratory for Soil 205 (1)
SUS 102. *Introduction to Environmental
Science and Sustainability (4)

## Cultural Diversity

ANTH 210. *Comparative Cultures (3)
ANTH 311. *Peoples of the World-North America (3)
ANTH 313. *Peoples of the World-Latin America (3)
ANTH 314. *Peoples of the World-Middle East (3)
ANTH 315. *Peoples of the World-Africa (3)

ANTH 316. *Peoples of the World-South and Southeast Asia (3)
ANTH 317. *Peoples of the World-Pacific (3)
ANTH 318. *Peoples of the World-China (3)
ANTH 319. *Peoples of the World-Japan and Korea (3)
ES 101. *Introduction to Ethnic Studies (3)
ES 231. *Introduction to Asian American Studies (4)
ES 241. *Introduction to Native American
Studies (4)
GEOG 105. *Geography of the Non-Western
World (3)
GEOG 313. *Geography of Asia (3)
HST 351. *Modern Latin America (4)
HST 391. *Traditional China and Japan (4)
HST 392. *Modern China and Japan (4)
JPN 331. *Japanese Culture (3)
[Terminated summer 2017]
MUS 108. *Music Cultures of the World (3)
NUTR 216. *Food in Non-Western Culture (3)

PHL 160/REL 160. *Quest for Meaning:
World Religions (4)
PHL 315. *Gandhi and Non-Violence (4)
WGSS 280. *Women Worldwide (3)

## Literature and the Arts

ENG 210. *Literatures of the World: Asia (4)
ENG 212. *Literatures of the World: Meso/
South America, Caribbean (4)
ENG 213. *Literatures of the World: Middle East (4)
ENG 260. *Literature of American
Minorities (4)
ENG 322. *Studies in Globalism, Text, and Event (4)
ES 334. *Asian Pacific American Literature (4)

## Physical Science

GEO 221. *Environmental Geology (4)
SOIL 205. *Soil Science (3) and SOIL 206.
*Soil Science Laboratory for SOIL 205 (1)
WSE 210. *Renewable Materials Technology and Utilization (4)

## Social Processes and Institutions

AEC 250. *Introduction to Environmental Economics and Policy (3)
ANTH 110. *Introduction to Cultural Anthropology (3)
ECON 201. .Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
H 225. *Social and Individual Health Determinants (4)
PS 205. *Introduction to International Relations (4)
SOC 204. *Introduction to Sociology (3)
SOC 205. *Institutions and Social

## Change (3)

WGSS 223. *Women: Self and Society (3)
WGSS 224. *Women: Personal and Social Change (3)

## Western Culture

AEC 253. *Environmental Law, Policy, and Economics (4)
GEOG 106. *Geography of the Western World (3)
Total=24-30
Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course
Minor Code: 769


## INTERNATIONAL

## ENGINEERING MINOR

The International Engineering minor offers undergraduate engineering students an opportunity to certify their global competencies and demonstrate their understanding of the intercultural needs of modern engineers. By combining an engineering experience abroad, courses from a generalized global core, thematic elective courses, and the signature course for the minor, students may demonstrate their readiness for the increasingly global field of engineering.

## Requirements

## Global Core (9-12 credits)

Each course in the global core also satisfies a baccalaureate core requirement. Students may complete some of these courses to fulfill their baccalaureate core while also applying those credits to the International Engineering minor if they choose.
ANTH 210. *Comparative Cultures (3)
ANTH 330. *Evolution of People,
Technology, and Society (3)
FW 325. *Global Crises in Resource Ecology (3)

GEOG 105. *Geography of the Non-Western World (3)
PHL 205. *Ethics (4)
PS 205. *Introduction to International Relations (4)

## Engineering Abroad (0-6 credits)

## Study Abroad

International Internship
Service Learning (e.g., EWB)
Thematic Electives (6-15 credits)
Courses related to the location of the abroad experience.

## Signature Course (3 credits)

ENGR 399. Special Topics: Cultural
Competencies for Engineering (3)

## Upper-Division Credits

A minimum of 12 credits in any student's minor must be upper-division courses.

## Total=27+

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course


## Minor Code: 476

## SUSTAINABILITY MINOR

Available on the Corvallis and OSU-Cascades campuses, and via Ecampus.

## OSU Main Campus Contact: Ann

Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.

OSU-Cascades Campus Con-
tact: Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt. shinderman@osucascades.edu.

The Sustainability minor includes core sustainability courses (5) and tailored elective courses to expand students' knowledge and experience of their primary major in the context of sustainability principles and frameworks. Courses from a student's major course of study will not count towards minor requirements. Completion of the Sustainability minor requires 27 credits beyond the 180-credit minimum for graduation.

## Sustainability Core (17-20)

All Sustainability students must take (8):
SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)

## Social Dimensions of

## Sustainability:

## Select 3 to 4 credits from the

 following:SOC 381. Social Dimensions of Sustainability (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC 485/ANS 485/FES 485/FW 485.
*Consensus and Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)
Ecological Dimensions of Sustainability:

## Select 3 to 4 credits from the

 following:BI 306. *^Environmental Ecology (3)
SUS 102. *Introduction to Environmental Science and Sustainability (4)
Economic Dimensions of
Sustainability:
Select 3 to 4 credits from the following:
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)

## Sustainability Individualized Study/

## Elective Credits (7-10)

Students will work with their primary academic advisor and the Sustainability academic advisor to select electives in the theme relevant to their interests for a total of 7-10 credits. Students should discuss with Sustainability advisor to apply elective courses that may not be listed below.
Total Credits=27

## Elective Courses:

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)

BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. Introduction to
Macroeconomics (4)
ECON 315. Intermediate Macroeconomic Theory (4)

## Engineering

BEE 221. Fundamentals of Ecological Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Electric

## Vehicles (4)

ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering
Fundamentals (4)
ME 312. Thermodynamics (4)

## Natural Sciences

ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 370. Ecology (3)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FOR 462. Natural Resource Policy and Law (3)

FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information Systems in Natural Resource (3)
FW 321. Applied Community and Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society and Sustainability (3)
FW 435. ^Wildlife in Agricultural Ecosystems (3)
FW/ANS/FES/SOC 485. *Consensus and Natural Resources (3)
FW 488. Problem Solving in Fisheries and Wildlife Science (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water and the Environment (3)
GEO 309. *Environmental Justice (3)
GEO 453. Resource Evaluation Methods/ EIS (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and

Environment (3)
GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and
Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 322. Physical and Mechanical
Properties of Renewable Materials (4)
SOIL 499. Special Topics [Organic Farming] (1-16)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ANTH 481. *Natural Resources and
Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 442. Bargaining and Negotiation
Processes (3)
ENG 482. Studies in American Literature,
Culture and the Environment (4)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL 443. *World Views and Environmental
Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion and Politics (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy
(4)

PS 477. International Environmental
Politics and policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 381. Social Dimensions of
Sustainability (4)
SOC 480. *Environment Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/ANS/FES/FW 485. *Consensus and
Natural Resources (3)

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 871

## ■ ENGINEERING SCIENCE COURSES

ENGR 111. ENGINEERING ORIENTATION I (3). Engineering as a profession, historical development, ethics, curricula and engineering careers. Introduction to problem analysis and solution, data collection, accuracy and variability. Lec/rec.
ENGR 112. INTRODUCTION TO ENGINEERING COMPUTING (3). Systematic approaches to engineering problem solving using computers. Logical analysis, flow charting, input/output design, introductory computer programming and use of engineering software. Lec/lab/rec.

## ENGR 112H. INTRODUCTION TO

ENGINEERING COMPUTING (3). Systematic approaches to engineering problem solving using computers. Logical analysis, flow charting, input/ output design, introductory computer programming and use of engineering software. Lec/lab/rec.
PREREQS: Honors College approval required.
ENGR 199. SPECIAL TOPICS (0-16). Graded $P / N$. This course is repeatable for a maximum of 16 credits.
ENGR 201. ELECTRICAL FUNDAMENTALS I
(3). Analysis of linear circuits. Circuit laws and theorems. DC responses of circuits. Operational amplifier characteristics and applications. Lec/lab. PREREQS: ((MTH 251 [C] or MTH 251H [C] ) and (MTH 252 [C] or MTH 252H [C] )) and sophomore standing in engineering.
ENGR 201H. ELECTRICAL FUNDAMENTALS
I (3). Analysis of linear circuits. Circuit laws and theorems. DC responses of circuits. Operational amplifier characteristics and applications. Lec/lab. PREREQS: (MTH 251 [C] or MTH 251H [C] ) and (MTH 252 [C] or MTH 252 H [C] ) and sophomore standing in engineering. Honors College approval required.
ENGR 202. ELECTRICAL FUNDAMENTALS II
(3). Sinusoidal steady-state analysis and phasors. Application of circuit analysis to solve singlephase and three-phase circuits including power, mutual inductance, transformers and passive filters. Lec/lab. PREREQS: ENGR 201 [C] or ENGR 201H [C]
ENGR 203. ELECTRICAL FUNDAMENTALS
III (3). Laplace transforms, Fourier series, Bode plots, and their application to circuit analysis. PREREQS: (ENGR 201 [C] or ENGR 201H [C] ) and (ENGR 202 [C] or ENGR 202H [C] ) and (MTH 256 [C] or MTH 256 H [C] )
ENGR 211. STATICS (3). Analysis of forces induced in structures and machines by various types of loading. Lec/rec. PREREQS: (MTH 252 [C] or MTH 252 H [C] ) and sophomore standing in engineering.
ENGR 211H. STATICS (3). Analysis of forces induced in structures and machines by various types of loading. Lec/rec. PREREQS: (MTH 252 [C] or MTH 252 H [C] ) and sophomore standing in engineering. Honors College approval required.
ENGR 212. DYNAMICS (3). Kinematics, Newton's laws of motion, and work-energy and impulsemomentum relationships applied to engineering systems. Lec/rec. PREREQS: (ENGR 211 [C] or ENGR 211H [C] ) and (PH 211 [C] or PH 211H [C] )
ENGR 212H. DYNAMICS (3). Kinematics, Newton's laws of motion, and work-energy and impulse-momentum relationships applied to engineering systems. Lec/rec. PREREQS: (ENGR 211 [C] or ENGR 211H [C] ) and (PH 211 [C] or PH 211 H [C] ) and Honors College approval required.
ENGR 213. STRENGTH OF MATERIALS (3).
Properties of structural materials; analysis of stress and deformation in axially loaded members, circular shafts, and beams, and in statically indeterminate systems containing these components. Lec/rec. PREREQS: (ENGR 211 [C]

## or ENGR 211H [C] )

ENGR 213H. STRENGTH OF MATERIALS (3).
Properties of structural materials; analysis of stress and deformation in axially loaded members, circular shafts, and beams, and in statically indeterminate systems containing these components. Lec/rec. PREREQS: (ENGR 211 [C] or ENGR 211 H [C] ) and Honors College approval required.

ENGR 221.THE SCIENCE, ENGINEERING AND SOCIAL IMPACT OF NANOTECHNOLOGY (3).
Nanotechnology is an emerging engineering field that manipulates atoms and molecules to fabricate new materials and tiny devices. Properties of nanostructured materials, manufacturing methods, characterization methods, and impact on health and safety. Benefits and concerns about nanotechnology will be assessed. Lec/rec. CROSSLISTED as MATS 221. PREREQS: One year of college science.
ENGR 231. UNDERSTANDING ENERGY (3).
Provides a basic knowledge of how the many different types of energy, e.g., mechanical, thermal, chemical, nuclear, potential, kinetic, can be compared, how energy can be converted from one form into another for convenient use, storage, or transmission, and how to assess the validity of energy claims by scientists, engineers, manufacturers, marketers, and hucksters.
ENGR 248. ENGINEERING GRAPHICS AND 3-D MODELING (3). Introduction to graphical communication theory, including freehand sketching techniques, geometric construction, multi-view, pictorial, sectional and auxiliary view representation and dimensioning techniques. Practical application of theoretical concepts using solid modeling software to capture design intent and generate engineering drawings. Lec/Lab.
ENGR 299. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

## ENGR 299H. SPECIAL TOPICS (0-16). This

 course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.ENGR 321. INTRODUCTION TO MATERIALS
SCIENCE (4). Crystal structure, microstructure, and physical properties of metals, ceramics, polymers, composites, and amorphous materials. Also includes elementary mechanical behavior and phase equilibria. Lec. CROSSLISTED as MATS 321. PREREQS: (CH 202 [C] or CH 222 [C] or CH 224 H [C] or ((CH 232 [C] or CH 232 H [C] ) and (CH 262 [C] or CH 262 H [C] or CH 272 [C] )))
ENGR 321H. INTRODUCTION TO MATERIALS
SCIENCE (4). Crystal structure, microstructure,
and physical properties of metals, ceramics, polymers, composites, and amorphous materials. Also includes elementary mechanical behavior and phase equilibria. Lec. CROSSLISTED as MATS 321. PREREQS: (CH 202 [C] or CH 222 [C] or CH 224 H [C] or ((CH 232 [C] or CH 232 H [C] ) and (CH 262 [C] or CH 262 H [C] or CH 272 [C] ))) and Honors College approval required.
ENGR 322. MECHANICAL PROPERTIES OF MATERIALS (3). Mechanical behavior of materials, relating laboratory test results to material structure, and elements of mechanical analysis. Lec/lab. CROSSLISTED as MATS 322. PREREQS: ((ENGR 213 [C] or ENGR 213H [C] ) and (ENGR 321 [C] or ENGR 321 H [C] or MATS 321 [C] ))
ENGR 350. *SUSTAINABLE ENGINEERING (3).
Examination of technological innovations and alternatives required to maintain human quality of life and environmental sustainability. (Bacc Core Course)
ENGR 350H. *SUSTAINABLE ENGINEERING
(3). Examination of technological innovations and alternatives required to maintain human quality of life and environmental sustainability. (Bacc Core Course) PREREQS: Honors College approval required.

ENGR 352. *CREATIVE COLLABORATION: DESIGNING AND BUILDING (3). Working in multi-disciplinary teams, design, implement, and document a piece of public art work or science museum display. Projects may be made of any media, but must demonstrate creativity both in the engineering used to create them and the technology and society message they convey. (Bacc Core Course) CROSSLISTED as ART 352.

## ENGR 363. *ENERGY MATTERS (3).

Establishes a basic energy vocabulary, applies the fundamental concepts of identifying energy use and determining efficiency, and studies the implications of energy decisions in the context of traditional, alternative, and sustainable energy resources. (Bacc Core Course) PREREQS: MTH 112 or higher
ENGR 363H. *ENERGY MATTERS (3).
Establishes a basic energy vocabulary, applies the fundamental concepts of identifying energy and determining efficiency, and studies the implications of energy decisions in the context of traditional, alternative, and sustainable energy resources. (Bacc Core Course) PREREQS: MTH 112 or higher

## ENGR 390. ENGINEERING ECONOMY (3).

Time value of money; economic study techniques, depreciation, taxes, retirement, and replacement of engineering facilities. PREREQS: Sophomore standing in engineering.
ENGR 391. ENGINEERING ECONOMICS AND PROJECT MANAGEMENT (3). Critical issues in the management of engineering and hightechnology projects are discussed. Economic, time, and performance parameters of engineering projects are analyzed from the organizational and resource perspectives. Network optimization and simulation concepts are introduced. Fundamental engineering economics concepts are introduced and applied to planning and managing projects. PREREQS: Sophomore standing in engineering.

## ENGR 391H. ENGINEERING ECONOMICS AND

 PROJECT MANAGEMENT (3). Critical issues in the management of engineering and hightechnology projects are discussed. Economic, time, and performance parameters of engineering projects are analyzed from the organizational and resource perspectives. Network optimization and simulation concepts are introduced. Fundamental engineering economics concepts are introduced and applied to planning and managing projects. PREREQS: Sophomore standing in engineering. Honors College approval required.ENGR 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ENGR 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
ENGR 407. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
ENGR 407H. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

## ENGR 421. APPLIED ROBOTICS (4).

Multidisciplinary teams of students design, build, and demonstrate a robotic system, including all sensing, computation, and actuation. The specific task, such as checkers-playing robots, changes each year, and is designed to be challenging for ambitious students. Robots will compete in a friendly competition at the end of the term. Lec/ lab. PREREQS: College of Engineering students (pro-school or graduate students) or approval of instructor.
ENGR 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ENGR 499H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
ENGR 521. APPLIED ROBOTICS (4).
Multidisciplinary teams of students design, build, and demonstrate a robotic system, including all sensing, computation, and actuation. The specific task, such as checkers-playing robots, changes each year, and is designed to be challenging for ambitious students. Robots will compete in a friendly competition at the end of the term. Lec/ lab. PREREQS: College of Engineering students (pro-school or graduate students) or approval of instructor.

## ENGR 555. FOUNDATIONS OF ENGINEERING

EDUCATION RESEARCH AND PRACTICE
(3). An examination as to why engineering education is practiced and researched the way that it is through reading, discussion and writing. The focus of the course will be on written and verbal interactions informed by careful reading of assigned texts.
ENGR 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

The College of Forestry at Oregon State University is one of the world's premier education, research, and outreach institutions that focuses on broad areas related to forest resources, terrestrial systems, wood products, ecosystem services, recreation, tourism, and their management.
We provide our graduates with an understanding of the complexity of forests and the economic and social systems that depend upon them; to work with nature to keep land healthy for future generations; to know the science, technology and business associated with managing and using forests and related resources; and to work effectively with others in a culturally diverse, global society.
The OSU College of Forestry has educated students for over 100 years. We offer a breadth of undergraduate and graduate programs that prepare students for a variety of careers in the public and private sectors. Our programs are ranked among the very best in the world. Our world-class faculty and modern facilities, combined with remarkable access to local forests, private industries, public agencies, international travel, and research through paid internships, cooperative education, and mentored work experiences, provide our students with necessary knowledge and skills for fulfilling careers.

## DEGREES AND ACCREDITATIONS

The college offers Bachelor of Science (BS, HBS) degrees in Forest Engineering, Forestry, Natural Resources, Recreation Resource Management, Renewable Materials, and Tourism and Outdoor Leadership; and, in coordination with the College of Engineering, a double degree in Forest EngineeringCivil Engineering.
BS degrees in Forestry, Forest Engineering, and Forest Engineering-Civil Engineering are accredited by the Society of American Foresters (SAF). In addition, the BS degree in Forest Engineering and the BS double degree in Forest Engineering-Civil Engineering are accredited by the Engineering Accreditation Commission of ABET, www.abet.org. The BS degree in Renewable Materials is accredited by the Society of Wood Science and Technology (SWST).
Graduate programs in Sustainable Forest Management, Forest Ecosystems and Society, and Wood Science and Engineering include the Master of Forestry (MF), Master of Science (MS), and Doctor of Philosophy (PhD). Each department also participates in the Master of Arts in Interdisciplinary Studies (MAIS). The college also offers an online-only Master of Natural Resources (MNR) and an online-only graduate certificate in Sustainable Natural Resources (SNR).

## DOUBLE DEGREES

Undergraduates with majors in the College of Forestry also can earn secondary degrees in education, innovation management, international studies, or sustainability. See the College of Education, College of Business, International Programs or College of Agricultural Sciences sections of this catalog for more information.

## MINORS

The college offers minors in Forestry, Recreation Resource Management, Natural Resources, Renewable Materials, and Tourism and Outdoor Leadership.

## HIGH SCHOOL PREPARATION

Students planning to study at Oregon State University should include the following subjects in their high school programs: English, 4 years; mathematics, 3 years; science, 3 years (to include at least one year each of two different sciences-biology, chemistry, physics, etc.); social studies, 3 years; and foreign language, 2 years.

## TRANSFER STUDENTS

Because of the technical and professional nature of the college's curricula, the college reserves the right to determine whether courses taken at another institution satisfy the college's curricular requirements. In general, equivalent college-level courses successfully completed at an accredited college or university are accepted. OSU students requesting a transfer to the College of Forestry must be in good academic standing at the university. Please contact the Head Advisor at 541-737-1592 for additional information.

## ADVISING

The College of Forestry is committed to helping students succeed. Students are required to meet with an advisor each term. Advisors are valuable sources of information about degree programs, mentoring, and other special opportunities in line with students' interests. Advising personnel and the Student Services Office are available to help with university rules and regulations, job placement, exchange programs, and referrals to cross-campus programs and services. Students are encouraged to take an active role in their program planning, and to use their time at OSU to develop themselves both academically and professionally.

The college and the OSU Career Development Center provide up-to-date information for both seasonal and permanent work and offer a full array of career services to prepare undergraduates and graduates for jobs.

## EDUCATION FACILITIES

Richardson Hall contains modern classroom, laboratory, computer, and study facilities that support learning. We also offer a Self-Learning Center where students

## 109 Richardson

Hall
Oregon State
University Corvallis, OR 97331-5704 541-737-2004 Email: forestrystudentservices@ oregonstate.edu Website: http:// www.forestry. oregonstate.edu
Administration
Thomas Maness,
Cheryl Ramberg and Allyn C. Ford Dean, 541-737-1585, thomas.maness@ oregonstate.edu
Randall S. Rosenberger, Associate Dean for Undergraduate Studies, 541-7374425, r.rosenberger@ oregonstate.edu

Anthony Davis, Associate Dean for Research, 541-7375097, anthony.davis@ oregonstate.edu

## Nicole Kent,

Head Advisor, 541-737-1592, nicole. kent@oregonstate. edu
have access to educational materials, computers, and group study space. Our Wood Innovation Center promotes great relationships between students, employers, and faculty.

Classes use the nearby college forests for field instruction and research projects. In addition to the 11,500 acres in the McDonald-Dunn Forests, the college manages other forests in Oregon for education and research.

The college also makes extensive use of various public and private programs and facilities for student benefit. Numerous field trips to forests, wood processing and manufacturing operations, recreation facilities, and research sites enable students to observe contemporary problems and practices.

Corvallis is one of the largest forestry and wood science research centers in the world. An innovative research program is conducted by the college through its Forest Research Laboratory and by the campus-based Forest Sciences Laboratory of the U.S. Forest Service. These organizations offer state-of-the-art facilities for educational and employment opportunities for superior students.
A Forest Products Collection contains approximately 2,500 species of wood, primarily from North and South America, Southeast Asia, and Africa, while the grounds around the college are planted with an extensive collection of Pacific Northwest trees and shrubs.

## STUDENT ACTIVITIES

Numerous opportunities exist for students to participate in social and academic activities related to forestry and natural resources, sports logging, and international travel. Clubs and student chapters of several professional societies are active in the college, as well as Xi Sigma Pi, a national honorary society to which College of Forestry students may belong. These clubs offer students the chance to develop leadership and teambuilding skills.

## SCHOLARSHIPS

The College of Forestry offers over $\$ 500,000$ in undergraduate scholarships annually. Many scholarships are merit based, and awards range from between $\$ 1,000$ and $\$ 9,000$ per year. Online applications are available at http://undergrad. forestry.oregonstate.edu/student-services/ scholarships and are due February 15 of each year.

Graduate students are commonly supported with teaching and research assistantships, as well as fellowships with awards totaling over $\$ 300,000$ per year. Information is available at http://www. forestry.oregonstate.edu/fellowships.

Scholarships and fellowships are awarded each spring for the following academic year.

## GRADUATION

## Academic Requirements

To earn a bachelor of science degree, a student must complete 180 quarter credits of university-level courses for the Forestry, Natural Resources, Recreation Resource Management, Renewable Materials, and Tourism and Outdoor Leadership programs. 192 quarter credits of university-level courses are required for the BS in Forest Engineering, and 242 credits are required for the double degree in Forest Engineering and Civil Engineering. These curricula include:

- Written and oral communications, 12-13 credits including a senior writing intensive course.
- OSU Baccalaureate Core curriculum.
- Completion of an approved departmental curriculum.
- Students majoring in Recreation Resource Management, Renewable Materials, and Tourism and Outdoor Leadership must earn grades of C- or better in all required forestry courses (with FE, FOR, FES, TOL, WSE course designators or crosslisted courses or approved substitutions for majors, minors, and options). Students majoring in Natural Resources must earn a C- or better in upper-division core or breadth courses.
- Forestry, Forest Engineering, and Forest/Civil Engineering majors must earn grades of C or better in all required forestry courses or approved substitutions for majors, minors, and options.
- No courses used to complete major requirements in Forest Engineering, Forest/Civil Engineering, Forestry, Recreation Resource Management, Tourism and Outdoor Leadership, and Renewable Materials can be taken with S/U grading. Natural Resources majors can take up to two S/U graded courses in their major.
- All undergraduate College of Forestry courses serving as prerequisites for other undergraduate College of Forestry courses must be completed with a grade of $\mathrm{C}, \mathrm{C}-$ or better, depending on the program.
- Approved work experience as noted below.


## PROFESSIONAL AND PERSONAL REQUIREMENTS

Those majoring in Forest Engineering, Forest Engineering-Civil Engineering, Forestry, Recreation Resource Management, and Renewable Materials must complete six months of satisfactory employment in an area related to their major. Forestry students may opt into our Cooperative Education program, which requires two six-month internships with our external partners. Those majoring in Tourism and Outdoor Leadership
must satisfactorily complete a supervised internship.

Students are personally responsible for fulfilling all curricular requirements in proper sequence. Work performance and personal conduct are thoroughly appraised by the college. Since the profession of forestry and natural resources are highly regarded for their ethical and academic standards, students are responsible for observing the Professional Code of Conduct of the college in its entirety. Departure from these ethical requirements may result in dismissal from the college.

## FOREST ECOSYSTEMS <br> AND SOCIETY

Troy Hall, Department Head
321 Richardson Hall
Oregon State University
Corvallis, OR 97331-5752
541-737-2088
Email: fesdept@oregonstate.edu Website: http://fes.forestry.oregonstate. edu/

## FACULTY

Professors Bondi, T. Hall, Lachenbruch, Law, Oester, Puettmann, K.N. Johnson, R. Johnson, Nelson, Ripple, Rosenberger, Ross, Strauss
Associate Professors Betts, Creighton, Ganio, Grotta, Howe, Lindberg, Needham, Reuter, Still, Withrow-Robinson
Assistant Professors Ahrens, Campbell, D'Antonio, Davis, Hajjar, Krawchuk, Luoma, Munanura, Rivers, Rosenberg, Schmidt, Schulze, Warren Senior Instructors Anzinger, Bishaw Instructors Diebel, Gassner, K. Hall, Liegel, Mangla, Olsen, Painter, Perry, Ries, Stemper

## ADJUNCT FACULTY

Bailey, Lach, Lajtha, Walker Courtesy/Affiliate Faculty Alexander, Baur, Bell, Brooks, Castellano, Cazeres-Gonzalez, Charnley, Cohen, Eisenberg, Fettig, Gray, GrimmGreenblatt, Hagar, Kim, Kraft, Kroll, McCulloh, McKane, Meinzer, Morzillo, Murden, Newsome, Perakis, Phillips, Smith, Spies, Swanson, Taylor, Trappe, Vogeler, Woodruff, Zhao

## Undergraduate Majors

Natural Resources (BS, CRED, HBS)
This program is an interdisciplinary offering of the colleges of Agricultural Sciences, Forestry, Liberal Arts, and Science but is administered within Forestry.

[^2]
## Forest Ecosystems

Human Dimensions in Natural Resources Individualized Specialty Option
Landscape Analysis
Law Enforcement in Natural Resources Natural Resource Education
Natural Resources Conservation and Technology
Natural Resource Policy and Management
Recreation and Tourism Management Sustainable Agroforestry
Urban Forest Landscapes
Watershed Management
Wildland Fire Ecology
Sustainability (BS, HBS)
This major is available from all colleges that offer undergraduate majors.
Tourism, Recreation, and Adventure
Leadership (BS, CRED, HBS) (Offered
on the Corvallis and OSU-Cascades
campuses.)
Options
Adventure Leadership Education Nature, Eco- and Adventure Tourism Outdoor Recreation Management
Sustainable Tourism Management

## Undergraduate Minors

Natural Resources
Recreation Resource Management
Tourism and Outdoor Leadership
Graduate Majors
Forest Ecosystems and Society (MAIS, MF, MS, PhD)

Graduate Areas of Concentration Forest Biology
Forest, Wildlife and Landscape Ecology
Genetics and Physiology
Integrated Social and Ecological Systems Silviculture
Science of Conservation, Restoration and Sustainable Management
Social Science, Policy, and Natural Resources
Soil-Plant-Atmosphere Continuum
Sustainable Recreation and Tourism
Master of Natural Resources (MNR)
Graduate Areas of Concentration
Fisheries Management
Forests and Climate Change
Geographic Information Systems
Sustainable Natural Resources Urban Forestry
Water Conflict Management
Wildlife Management
Affiliated Interdisciplinary

## Graduate Major

Applied Economics (MA, MS, PhD) (See Graduate School)

## Graduate Certificates

Forests and Climate Change
Sustainable Natural Resources
Urban Forestry

The faculty, staff, and students in the Department of Forest Ecosystems and Society are dedicated to the discovery and dissemination of knowledge related to the interactions among landscapes, forests, and people. Humans are dependent on forests in many ways. We seek to understand the diversity of benefits derived from forests and expand our knowledge of how forests function to provide those benefits. We provide the expertise needed by scientists, managers, and the general public as they jointly decide how these values can be sustained in the face of climate change, land use pressures and economic uncertainties. We contribute scientific understanding to decisions that lead to sustaining these important values on forestlands in Oregon, in the U.S., and around the globe now and in the future.

The Department of Forest Ecosystems and Society offers a graduate program in Forest Ecosystems and Society. The program includes Master of Forestry (MF), Master of Science (MS), and Doctor of Philosophy (PhD) degrees. The department also offers an online-only Master of Natural Resources (MNR) degree and online-only graduate certificates in Sustainable Natural Resources; Urban Forestry; and Forests and Climate Change.

## RESEARCH

Research in the Department of Forest Ecosystems and Society focuses on fundamental and applied research to help solve complex natural resource challenges. We integrate biophysical and social sciences across scales within natural and managed forest ecosystems. Graduate education emphasizes the ability to define and solve researchable problems and function in interdisciplinary terms. Graduate students are encouraged to participate actively in the department's large, diverse program of seminars, continuing education courses and workshops, international research, and other professional and educational activities.

## FOREST ECOSYSTEMS AND SOCIETY GRADUATE DEGREE PROGRAMS

## The MS and PhD degrees in Forest

 Ecosystems and Society are structured specifically for those interested in careers in resource management, research, teaching, and specialized areas of forest science, social science, and interdisciplinary science. The degrees are available in seven areas of concentration: forest, wildlife and landscape ecology; genetics and physiology; integrated social and ecological systems; the science of conservation, restoration and sustainable management; social science, policy, and natural resources; soil-plant-atmosphere continuum; and sustainable recreation and tourism.The Master of Forestry degree is a non-thesis degree that supports advancement in non-research professional forestry and forestry-related professional positions. The degree emphasizes one of two areas: biology or silviculture. Students in either area prepare for careers as professional forest biologists, silviculturists, or other specialists capable of analyzing opportunities for natural resource management for landowners. This degree typically takes 12-15 months to complete and requires the student work on a capstone project.

The Master of Natural Resources (MNR) degree is offered as a nonthesis option only. Certificates in Sustainable Natural Resources, Urban Forestry, and Forests and Climate Change are available in association with the MNR program. The MNR curriculum facilitates learning by natural resource professionals who work in settings that require crossdisciplinary competency to find solutions to natural resource problems. The MNR is taught entirely online through OSU Ecampus (although it may be possible for some students to work toward the MNR degree while in residence at OSU).

## INTERDISCIPLINARY GRADUATE DEGREE PROGRAMS

The Department of Forest Ecosystems and Society participates in a number of other interdisciplinary graduate degree programs at OSU, including the Master of Arts in Interdisciplinary Studies (MAIS), Master of Environmental Arts and Humanities, PhD in Molecular and Cellular Biology, Environmental Sciences, Water Resources, and Applied Economics.

## UNDERGRADUATE MAJORS WITH OPTIONS

## NATURAL RESOURCES (BS, CRED, HBS)

Also available at OSU-Cascades, Eastern Oregon University, and via Ecampus.
Troy Hall, Director
Terina McLachlain, Program Manager 408 Snell Hall
Oregon State University
Corvallis, OR 97331-5703
541-207-3580
Email: naturalresources@oregonstate.edu Website: http://nr.forestry.oregonstate. edu/

## Undergraduate Major

Natural Resources (BS, HBS) -
An interdisciplinary program offered by the colleges of Forestry, Agricultural Sciences, Science, and Liberal Arts. It is administered by the College of Forestry.
Options
Arid Land Ecology
Conservation and Technology
Ecological Restoration
Fish and Wildlife Conservation
Forest Ecosystems
Human Dimensions in Natural Resources
Individualized Specialty Option
Landscape Analysis
Law Enforcement in Natural Resources
Natural Resource Education
Natural Resource Policy and
Management
Recreation and Tourism Management
Sustainable Agroforestry
Urban Forest Landscapes
Watershed Management
Wildland Fire Ecology

## Minor

Natural Resources
Students who graduate with a BS degree in Natural Resources from OSU should be able to integrate technical field or laboratory skills with analytical skills to solve important natural resource problems. The curriculum is designed to help students acquire knowledge about a range of natural resource issues, work with experts in a variety of resource fields, and deal with social and political aspects of resource management. This program is an interdisciplinary offering supported by the colleges of Agricultural Sciences, Forestry, Liberal Arts, and Science. It is administered by the College of Forestry.

The Natural Resources major is also available at the OSU-Cascades Campus in Bend, the OSU Agricultural Program at Eastern Oregon University, and through the OSU Extended Campus program.

Students acquire knowledge and background in physical and biological systems, math and statistics, natural resource policy, ecology, economics, and decision making. Breadth is acquired in seven key areas of resource management. Finally, students develop depth in their specialty option, choosing from a number of pre-approved options, or creating an individualized specialty option. An option is required to earn the Natural Resources major.

In addition to the baccalaureate core, the three main areas for course work include the natural resources core ( 74 credits), breadth requirements ( 21 credits), and the specialty option ( 40 credits). Within these areas, students have many courses to choose from to fulfill requirements.
Only two courses used to complete the natural resources major requirements may be taken S/U. The Natural Resources Core and Breath will have a minimum GPA of 2.0. The Natural Resources Specialty Option will have a minimum GPA
of 2.25 .
Core and Breadth Requirements for the Natural Resources (BS):
Natural Resources Core (74)

## Animal ID

Choose one course from below:
FW 312. Systematics of Birds (2)
FW 316. Systematics of Fishes (3)
FW 318. Systematics of Mammals (2)
Z 477. Aquatic Entomology (4)

## Atmospheric Science

Choose one course from below:
ATS 201. Climate Science (4)
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
GEOG 323. ^Climatology (4)

## Biology

BI 101, BI 102, BI 103. *General Biology (4,4,4) or BI 204, BI 205, BI 206. *Introductory Biology I, II, III (4,4,4)
or BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)

## Chemistry

CH 121. General Chemistry (5)
or CH 231. *General Chemistry (4) and
CH 261. *Laboratory for Chemistry 231 (1)

## Communications

Choose one course from below:
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
COMM 321. Introduction to
Communication Theory (3)
COMM 328. Nonverbal Communication (3)
COMM 385. Communication and Culture in Cyberspace (3)
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
FES 430. Forest as Classroom (4)
FES 493. Environmental Interpretation (4)
NR 312. Critical Thinking for Natural Resource Challenges (3)

## Earth Science

Choose one course from below:
GEO 101. *The Solid Earth (4)
GEO 201. *Physical Geology (4)
GEO 202. *Earth Systems Science (4)
GEO 221. *Environmental Geology (4)
GEOG 102. *Physical Geography (4)

## Environmental Assessment and Planning <br> Choose one course from below:

FES/FW 445. Ecological Restoration (4)
FES/FW/SOC 485. *Consensus and Natural Resources (3)
FW 435. ^Wildlife in Agricultural
Ecosystems (3)
GEOG 450. Land Use in the American West (3)

PS 449. ^Topics in Comparative Politics (4)
PS 477. International Environmental
Politics and Policy (4)
RNG 421. Wildland Restoration and Ecology (4)
RNG 490. Rangeland Management Planning (4)
SUS 304. *Sustainability Assessment (4) SUS 350. *Sustainable Communities (4)

## General Ecology

Choose one course from below:
BI 370. Ecology (3)
BOT 341. Plant Ecology (4)
FES 240. *Forest Biology (4)
FES 341. Forest Ecology (3)

## GIS

## Choose one course from below:

CROP/HORT 414. Precision Agriculture (4)
FE 257. GIS and Forest Engineering
Applications (3)
FW 303. Survey of Geographic Information
Systems in Natural Resource (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)

## Managing Natural Resources for

## the Future

NR 201. Managing Natural Resources for the Future (3)
or Seminars-Natural Resources (1)+(1)

## Mathematics

Choose one course from below:
MTH 112. *Elementary Functions (4)
MTH 241. *Calculus for Management and Social Science (4)
MTH 245. *Mathematics for Management,
Life, and Social Sciences (4)
MTH 251. *Differential Calculus (4)

## Measurements

Choose one course from the area most related to student's interests:

## Biological/Physical Science

Choose one course from below:
BI 371. ^Ecological Methods (3)
BOT 440. Field Methods in Plant Ecology (4)

FE 208. Forest Surveying (4)
FOR 321. Forest Mensuration (5)
FW 255. Field Sampling of Fish and Wildlife (3)

GEOG 452. Sustainable Site Planning (3)
RNG 441. Rangeland Analysis (4)

## Social Science

FES 422. Research Methods in Social Science (4)

Natural Resource Decision Making
NR 455. Natural Resource Decision Making (4)

## Natural Resource Policy

Choose one course from below:
AEC 454. Rural Development Economics and Policy (3)
FOR 460. ^Forest Policy (4)
FOR 462. Natural Resource Policy and Law (3)
GEOG 340. *Introduction to Water Science and Policy (3)
PS 475. Environmental Politics and Policy (4)
PS 477. International Environmental
Politics and Policy (4)

## Resource Economics

Choose one course from below:
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 454. Rural Development Economics and Policy (3)
FES 432. Economics of Recreation and Tourism (3)
FOR 330. Forest Resource Economics I (4)

## Society and Natural Resources

Choose one course from below:
ANTH 110. *Introduction to Cultural
Anthropology (3)
FES 251. Recreation Resource Management (4)

FES 355. Management for Multiple Resource Values (3)
GEOG 240. *Climate Change, Water and Society (3)

## Soil Science

CSS 205. *Soil Science (4)
or CSS 305. Principles of Soil Science (4)
or SOIL 205. Soil Science (3) [Bacc core course only when taken in conjunction with a laboratory course]
and FOR 206. *Forest Soils Laboratory for SOIL 205 (1) or SOIL 206. *Soil Science Laboratory for SOIL 205 (1)

## Statistics

Choose one course from below:
ST 201. Principles of Statistics (4)
ST 351. Introduction to Statistical Methods (4)

## Vegetation ID

## Choose one course from below:

BOT 321. Plant Systematics (4)
BOT 414. Agrostology (4)
BOT 425. Flora of the Pacific Northwest (3)
FES 241. Dendrology (3)
HORT 226. Landscape Plant Materials I:
Deciduous Hardwoods and Conifers (4)
HORT 228. Landscape Plant Materials II:
Spring Flowering Trees and Shrub (4)
RNG 353. Wildland Plant Identification (4)

## Water Science

## Choose one course from below:

FE 430. Watershed Processes (4)
FW 326. Integrated Watershed Management (3)

OC 201. *Oceanography (4)
OC 332. Coastal Oceanography (3)
RNG 355. Desert Watershed Management (4)
Note: Particular option programs may specify additional core courses to assure that students meet prerequisites for option courses, or develop the background in fields important for the option. Students should not assume that the core courses listed above include all of the necessary background in science or math for every option.

## Breadth (21)

Students must complete one course from each of the following groups:
Fisheries and Wildlife (Choose one)
FES 440. Wildland Fire Ecology (3)
FES/FW 445. Ecological Restoration (4)
FES/FW 452. Biodiversity Conservation in Managed Forests (3)
FOR 346. Topics in Wildland Fire (3)
FW 311. Ornithology (3)
FW 315. Ichthyology (3)
FW 317. Mammalogy (3)
FW 320. Introductory Population Dynamics (4)

FW 321. Applied Community and
Ecosystem Ecology (3)
FW 323. Management Principles of Pacific Salmon in the Northwest (3)

FW 350. *Endangered Species, Society and Sustainability (3)
FW 426. Coastal Ecology and Resource
Management (5)
FW 427. Principles of Wildlife Diseases (4)
FW 435. ${ }^{\wedge}$ Wildlife in Agricultural
Ecosystems (3)
FW 451. Avian Conservation and
Management (3)
FW 454. ^Fishery Biology (4)
FW 458. Mammal Conservation and Management (4)
FW 465. Marine Fisheries (4)
FW 473. Fish Ecology (4)
FW 481. Wildlife Ecology (3)

## Forestry (Choose one)

FE 370. Harvesting Operations (4)
FE/FOR 456. *International Forestry (3)
FES 341. Forest Ecology (3)
FES 342. Forest Types of the Northwest (3)
FES/HORT 350. Urban Forestry (3)
FES 412. Forest Entomology (3)
FES 440. Wildland Fire Ecology (3)
FES/FW 445. Ecological Restoration (4)
FES/FW 452. Biodiversity Conservation in
Managed Forests (3)
FES/NR/RNG 477. *Agroforestry (3)
FOR 346. Topics in Wildland Fire (3)
FOR/BOT 413. Forest Pathology (3)
FOR 436. Wildland Fire Science and Management (4)
FOR 441. Silviculture Principles (4)
FOR 460. ${ }^{\wedge}$ Forest Policy (4)
WSE 470. *Forests, Wood, and Civilization (3)

## Land and Water (Choose one)

FE 430. Watershed Processes (4)
FW 456. Limnology (5)
FW 479. Wetlands and Riparian Ecology (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 307. *National Park Geology and Preservation (3)
GEO 308. *Global Change and Earth
Sciences (3)
GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 440. Water Resources Management in the United States (3)
GEOG 441. International Water Resources Management (3)
RNG 355. Desert Watershed Management (4)

RNG 455. Riparian Ecology and
Management (4)
SOIL 395. *World Soil Resources (3)
SOIL 466. Soil Morphology and Classification (4)
Political Dimensions (Choose one)
AEC 432. Environmental Law (4)
ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ENT 300/HORT 330. *Plagues, Pests, and Politics (3)
BI 301. *Human Impacts on Ecosystems (3)
FES 351. Outdoor Recreation Management on Public Lands (3)
FES 352. Wilderness Management (3)
FES 365. *Issues in Natural Resources Conservation (3)
FES 454. Managing at the Wildland-Urban Interface (3)
FOR 462. Natural Resource Policy and Law
(3)

FW 325. *Global Crises in Resource Ecology (3)

FW 350. *Endangered Species, Society and Sustainability (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 450. Land Use in the American West (3)

HST 481. *Environmental History of the
United States (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics:
Environmental Politics and Policy (4)
PS 455. *The Politics of Climate Change (4)
PS 475. Environmental Politics and Policy (4)

PS 476. *Science and Politics (4)
PS 477. International Environmental Politics and Policy (4)

## Range (Choose one)

FES 440. Wildland Fire Ecology (3)
FES/FW 445. Ecological Restoration (4)
FES/NR/RNG 477. *Agroforestry (3)
FOR 346. Topics in Wildland Fire (3)
FOR 436. Wildland Fire Science and Management (4)
RNG 341. Rangeland Ecology and Management (3)
RNG 351. Range Ecology I-Grasslands (3)
RNG 352. Range Ecology II-Shrublands (3)
RNG 421. Wildland Restoration and Ecology (4)
RNG 441. Rangeland Analysis (4)
RNG 442. Rangeland-Animal Relations (4)
RNG 490. Rangeland Management Planning (4)
Resource Values/Philosophy (Choose one)
AG 301. *Ecosystem Science of Pacific NW Indians (3)
ANTH 477. Ecological Anthropology (4)
ANTH 481. *Natural Resources and Community Values (3)
ANTH 482. *Anthropology of International Development (4)
FW 340. *Multicultural Perspectives in Natural Resources (3)
GEO 309. *Environmental Justice (3)
GEOG 430. Resilience-Based Natural
Resource Management (3)
HST 481. *Environmental History of the United States (4)
PHL 440. *Environmental Ethics (3)
PHL/REL 443. *World Views and
Environmental Values (3)
Social Issues (Choose one)
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ANTH 330. *Evolution of People,
Technology, and Society (3)
FE/FOR 459. Forest Management Planning and Design I (4)
FES 351. Outdoor Recreation Management on Public Lands (3)
FES 352. Wilderness Management (3)
FES 353. Nature, Eco, and Adventure Tourism (3)
FES 493. Environmental Interpretation (4)
SOC 360. *Population Trends and Policy (4)
SOC 381. Social Dimensions of Sustainability (4)

SOC 424. Social Psychology (4)
SOC 454. *Leisure and Culture (4)
SOC 456. *Science and Technology in Social Context (4)
SOC 475. Rural Sociology (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
WGSS 440. *Women and Natural Resources (3)

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Major Code: 671


## OPTIONS

## ARID LAND ECOLOGY OPTION

The student pursuing this option will develop the skills and knowledge necessary to manage natural resources in the arid lands of western North America.
No more than 24 credits from one department; no more than 20 lowerdivision credits.

## Rangeland Resources (18 credits)

RNG 341. Rangeland Ecology and Management (3)
RNG 352. Range Ecology II-Shrublands (3)
RNG 353. Wildland Plant Identification (4)
RNG 421. Wildland Restoration and
Ecology (4)
RNG 442. Rangeland-Animal Relations (4)
Animals, Plants, Soils, and Ecology ( 23 credits)
BOT 313. Plant Structure (4)
BOT 321. Plant Systematics (4)
BOT 414. Agrostology (4)
FOR 436. Wildland Fire Science and Management (4)
FOR 446. Wildland Fire Ecology (3)
[Terminated winter 2017]
SOIL 466. Soil Morphology and Classification (4)
Additional courses required in Natural Resources Core and Breadth:
RNG 441. Rangeland Analysis (4)
RNG 490. Rangeland Management Planning (4)

## Total=41

Option Code: 669

## CONSERVATION AND <br> TECHNOLOGY OPTION

Available at OSU-Cascades Campus only.
Students will develop the skills necessary to apply natural resources techniques and ecological concepts on the ground and to acquire the knowledge necessary to assist management within both the ecosystem and socio-political components of natural resource management.
Note: This option is designed for the OSU-Cascades Campus. Students utilize course work from the Cascades campus partner institution Central Oregon Community College (COCC). The option may be modified to provide ap-
propriate transfer of courses from other community colleges with forest technology degree programs.
No more than 24 credits from one department; no more than 20 lowerdivision credits.
These courses in the lists below are only available at Central Oregon Community College (COCC): FW 251, FOR 220A, FOR 230A, FOR 230B, FOR 240B.
COCC Course Catalog: http://www.
cocc.edu/admissions/catalog/
Conservation Courses ( 3 courses, 9 credits)
FES 365. *Issues in Natural Resources Conservation (3)
FW 251. Principles of Fish and Wildlife
Conservation (3) [COCC]
FW 325. *Global Crises in Resource Ecology (3)

FW 350. *Endangered Species, Society and Sustainability (3)
Technology Courses (3 courses, 8-9 credits)
BI 371. ^Ecological Methods (3)
FOR 199. Special Studies [Datasets in NR]
(3) [OSU-Cascades]

FOR 220A. Aerial Photo (3) [COCC]
FOR 230A. Map, Compass, and GPS (3)
[COCC]
FOR 230B. Forest Surveying (3) [COCC]
SOIL 408. Workshop [Soil Judging] (1) and NR 499. Special Topics [Field Instruments] (1)
Sustainability ( 1 course, 4 credits)
SUS 350. *Sustainable Communities (4)

## Ecology and Ecosystems

Choose 18-19 credits from the following or electives approved by petition by OSU-Cascades:
ENSC 479. *^Environmental Case Studies (3)
FES 342. Forest Types of the Northwest (3)
FES 444. Ecological Aspects of Park
Management (3)
FES/FW 445. Ecological Restoration (4)
FOR 240B. Wildlife Ecology (3) [COCC]
FW 311. Ornithology (3)
FW 317. Mammalogy (3)
FW 320. Introductory Population Dynamics (4)

FW 326. Integrated Watershed Management (3)

FW 479. Wetlands and Riparian Ecology (3)
FW 481. Wildlife Ecology (4)
GEO 322. Surface Processes (4)
PS 475. Environmental Politics and Policy (4)

RNG 351. Range Ecology I-Grasslands (3)
SOIL 366. Ecosystems of Wildland Soils (3)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)
Z 477. Aquatic Entomology (4)

## Minimum Total=40

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 688


## ECOLOGICAL RESTORATION

 OPTIONThis option will help students understand complexities associated with restoration of terrestrial and aquatic ecosystems, and how restoration decisions involve significant interactions between ecological and social systems.
No more than 24 credits from one department; no more than 20 lower-division credits.

## Required Courses (28-30 credits)

BI 345. *Introduction to Evolution (3) or PBG 430. Plant Genetics (3)
BOT 321. Plant Systematics (4)
CH 122. *General Chemistry (5)
or CH 232 . *General Chemistry (4) and
CH 262. *Laboratory for Chemistry 232
(1)

FES/FW 445. Ecological Restoration (4)
FOR 436. Wildland Fire Science and Management (4)
FW 479. Wetlands and Riparian Ecology (3)
or RNG 455. Riparian Ecohydrology and Management (4)
GEO 423/GEOG 450. Land Use in the American West (3)
SOIL 466. Soil Morphology and Classification (4) or SOIL 366. Ecosystems of Wildland Soils (3)
Social and Ethical Considerations
Choose one course from below:
PHL 440. Environmental Ethics (3)
PHL 443. *World Views and Environmental Values (3)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
Ecological and Natural Resource

## Electives

Choose a minimum of $\mathbf{8}$ credits:
BI 351. Marine Ecology (3)
BI/FW 464. Marine Conservation Biology (3)

BOT 415. Forest Insect and Disease Management (5) [Terminated winter 2017]
BOT 488. Environmental Physiology of Plants (3)
FES/FW 452. Biodiversity Conservation in Managed Forests (3)
FOR 441. Silviculture Principles (4)
FW 320. Introductory Population Dynamics (4)

FW 321. Applied Community and Ecosystem Ecology (3)
FW 426. Coastal Ecology and Resource Management (5) Hatfield Marine Science Center only.
FW 451. Avian Conservation and Management (3)
FW 454. ^Fishery Biology (4)
FW 456. Limnology (5)
FW 458. Mammal Conservation and Management (4)
FW 473. Fish Ecology (4)
FW 481. Wildlife Ecology (4)
RNG 421. Wildland Restoration and Ecology (4)
SOIL 468. Soil Landscape Analysis (4)
Total=39-42

Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 663


## FISH AND WILDLIFE

 CONSERVATION OPTIONAlso available on the OSU-Cascades campus and via Ecampus.
This option prepares students for a career in the broad arena of natural resource and wildlife conservation. It emphasizes understanding the relationship between animal species and their habitat requirements and the ability to apply this knowledge to the management of ecosystems as a means of conserving fish and wildlife.

No more than 24 credits from one department; no more than 20 lowerdivision credits.

## Required (23-24 credits)

FES/FW 445. Ecological Restoration (4)
FOR 111. Introduction to Forestry (3)
or FES 342. Forest Types of the Northwest (3)

FOR 346. Topics in Wildland Fire (3) or FES 440. Wildland Fire Ecology (3)
or FOR 436. Wildland Fire Science and
Management (4)
FW 251. Principles of Fish and Wildlife Conservation (3)
FW 323. Management Principles of Pacific Salmon in the Northwest (3) or FW/HSTS 470. *Ecology and History: Landscapes of the Columbia Basin (3) or FW 360. *Origins of F\&W Management-Evolution, Genetics, and Ecology (3)
RNG 341. Rangeland Ecology and Management (3)
RNG 455. Riparian Ecology and Management (4)
Fish and Wildlife Biology
Choose three of the following:
FW 311. Ornithology (3)
FW 315. Ichthyology (3)
FW 317. Mammalogy (3)
FW 320. Introductory Population Dynamics (4)

FW 321. Applied Community and Ecosystem Ecology (3)

## Habitat Management

Choose two of the following:
FW 326. Integrated Watershed Management (3)

FW 435. ^Wildlife in Agricultural
Ecosystems (3)
FW 479. Wetlands and Riparian Ecology (3)
Natural Resources Policy
Choose one of the following:
PS 475. Environmental Politics and Policy (4)
SOC 481. *Society and Natural Resources (4)

## Total=42-44

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Option Code: 672


## FOREST ECOSYSTEMS OPTION

This option will assist students in understanding the nature of forest ecosystems and the processes by which they function. Course work includes an understanding of the multiple resources and values associated with forest ecosystems and some of the techniques involved in managing them.
Ecological Foundations ( $\mathbf{2 2}$ credits)
FES 341. Forest Ecology (3)
FES 412. Forest Entomology (3)
FES/FW 452. Biodiversity Conservation in
Managed Forests (3)
FOR 346. Topics in Wildland Fire (3)
FOR/BOT 413. Forest Pathology (3)
FOR 441. Silviculture Principles (4)
FW 251. Principles of Fish and Wildlife Conservation (3)

## Ecology Breadth Courses (Choose

## at least 9 credits)

BOT 321. Plant Systematics (4)
BOT 442. Plant Population Ecology (3)
FES/FW 445. Ecological Restoration (4)
FES/NR/RNG 477. *Agroforestry (3)
FOR 436. Wildland Fire Science and
Management (4)
or FES 440. Wildland Fire Ecology (3)
FW 458. Mammal Conservation and
Management (4)
RNG 351. Range Ecology I-Grasslands (3)
RNG 352. Range Ecology II-Shrublands (3)
RNG 455. Riparian Ecology and
Management (4)

## Technical Electives (Choose at least

## 10 credits)

BOT 425. Flora of the Pacific Northwest (3)
FE 208. Forest Surveying (4)
FE 209. Forest Photogrammetry and Remote Sensing (4)
FE 370. Harvesting Operations (4)
FOR 321. Forest Mensuration (5)
ST 352. Introduction to Statistical Methods (4)

Total=41
Footnote:

* Baccalaureate Core Course (BCC)

Option Code: 673

## HUMAN DIMENSIONS IN

 NATURAL RESOURCES OPTIONAlso available via Ecampus.
The student will develop an understanding of the interconnectedness of human behavior and natural resource issues. It includes skills and knowledge to better understand the cultural, social, and philosophical issues associated with natural resources.
No more than 24 credits from one department; no more than 20 lowerdivision credits.

## Ethical Issues

Select 6 credits from the following:
ANTH 110. *Introduction to Cultural Anthropology (3)
BI/FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
PHL 201. *Introduction to Philosophy (4)

PHL 205. *Ethics (4)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL/REL 443. *World Views and
Environmental Values (3)
PHL 470. Philosophy of Science (3)

## Management and Communication

## Issues

Select 13 credits from the following:
AEC 253. *Environmental Law, Policy, and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
FES 351. Outdoor Recreation Management on Public Lands (3)
FES 352. Wilderness Management (3)
FES 355. Management for Multiple Resource Values (3)
FES 365. *Issues in Natural Resources
Conservation (3) (Ecampus only)
FES 440. Wildland Fire Ecology (3)
FW 251. Principles of Fish and Wildlife Conservation (3)
FW 326. Integrated Watershed Management (3)

NR 202. Natural Resource Problems and Solutions (3)

## Social Issues ( 21 credits)

Required background course
SOC 204. *Introduction to Sociology (3)
Select 18 credits from the following:
AEC 432. Environmental Law (4)
ANTH 477. Ecological Anthropology (4)
ANTH 481. *Natural Resources and
Community Values (3)
FW 340. *Multicultural Perspectives in
Natural Resources (3)
FW 350. *Endangered Species, Society, and Sustainability (3)
GEOG 300. *Sustainability for the Common Good (3)
HST 481. *Environmental History of the United States (4)
PS 475. Environmental Politics and Policy (4)

SOC 360. *Population Trends and Policy (4)
SOC 454. *Leisure and Culture (4)
SOC 456. *Science and Technology in Social Context (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SUS 350. *Sustainable Communities (4)
WGSS 440. *Women and Natural Resources (3)

WGSS 450. Ecofeminism (3)
Total=40
Footnote:

* Baccalaureate Core Course (BCC)

Option Code: 675

## INDIVIDUALIZED SPECIALTY <br> OPTION

Natural Resources Specialty Option

## (40 credits)

Incorporated in a student's course of study is the specialty option, 40 credits that support an academic theme related
to natural resources. It is in the specialty option that the student develops depth and a particular focus on natural resources.

## Individualized Specialty Options

If you are interested in creating your own specialty area, discuss this with your advisor as soon as possible. The advisor will be able to guide you in creating an option that works for you and satisfies the program requirements.

Student-designed specialty op-

## tions must:

- contain at least 20 credits of upperdivision courses
- consist of a minimum of 40 credits, encompassing at least three departments, with not more than 24 credits from one department
- have course work that reflects stated knowledge and skill "goals"
- not come close to "duplicating" existing majors


## Option Code: 676

## LANDSCAPE ANALYSIS OPTION

## Also available via Ecampus.

This option prepares students to work with Geographic Information Science technology in a natural resource field such as wildfire ecology, land use planning, ecological restoration, and more. The pairing of the technical skills of GIScience with a disciplinary knowledge in a natural resource area will prepare students for the practical application of technical skills in the real world.

In addition, this specialty option will allow students to earn the GIScience Undergraduate Certificate through the College of Earth, Ocean, and Atmospheric Sciences concurrently with their BS degree through the College of Forestry. The student will apply to the GIS Certificate Program as well as the Natural Resources Program.

Students should contact Kuuipo Walsh, GIScience Certificate Program Director, to enroll in the GIScience Certificate Program. The GIScience Undergraduate Certificate is not currently a stand-alone Ecampus certificate but can be completed online through this option. More information about the certificate program is available here at http://ceoas. oregonstate.edu/giscience/.

No S/U grades are accepted for the GEO courses that are counted for the GIS Certificate.

No more than 24 credits from one department; no more than 20 lowerdivision credits.

## GIScience Required Courses (16 credits) <br> GEOG 201. *Foundations of Geospatial

 Science and GIS (4)GEOG 370. Geovisualization: Cartography (4)

GEOG 480. Remote Sensing I: Principles
and Applications (4)
ST 202. Principles of Statistics (4)
or ST 352. Introduction to Statistical Methods (4)

## GIScience Electives (Choose 7-8

## credits)

CE 413. GIS In Water Resources (3)
ECE 468. Digital Image Processing (3)
FE 209. Forest Photogrammetry and Remote Sensing (4)
FE 310. Forest Route Surveying (4)
FE 423. Unmanned Aircraft System Remote Sensing (3)
FW 303. Survey of Geographic Information
Systems in Natural Resources (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 361. GIScience II: Analysis and Applications (4)
GEOG 371. Geovisualization: Web Mapping (4)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 462. GIScience III: Programming for
Geospatial Analysis (4)
GEOG 463. GIS IV: Spatial Modeling (4)
GEOG 464. Geospatial Perspectives on
Intelligence, Security, and Ethics (3)
GEOG 472. Geovisualization: Geovisual Analytics (3)
GEOG 481. Remote Sensing II: Digital
Image Processing (4)
HORT/CROP 414. Precision Agriculture (4)
RNG 430. Applied GIS in Rangeland Science (4)

SOIL 468. Soil Landscape Analysis (4)
ENSC 410. Internship (4)
or FOR 410. Internship (4)
or GEO 410. Internship (4)
or GEOG 410. Internship (4)
Natural Resources Electives (16-17
credits minimum)

- Choose a minimum of 16-17 credits in a disciplinary area related to GIScience to reach a minimum of 40 credits in the option.
- Students will be required to submit an academic plan for completion of the option which will be approved by the Natural Resources Program Director.
The following courses in the NR Core and Breadth are required
prerequisites for courses in this


## option:

NR Core Mathematics Requirement: MTH
112. *Elementary Functions (4)

NR Core Measurements Requirement: FE
208. Forest Surveying (4)

NR Core GIS Requirement: GEOG 360.
GIScience I: Geographic Information Systems and Theory (4) or FE 257. GIS and Forest Engineering Applications (3)

## Minimum Total=40

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Option Code: 689


## LAW ENFORCEMENT NATURAL

## RESOURCES OPTION

The student will develop skills and knowledge necessary to practice natural resource law enforcement.

No more than 24 credits from one department; no more than 20 lowerdivision credits.
COMM 440. Theories of Conflict and Conflict Management (3)
FES 251. Recreation Resource Management (4)

FES/FW 452. Biodiversity Conservation in Managed Forests (3)
FW 251. Principles of Fish and Wildlife Conservation (3)
FW 316. Systematics of Fishes (3)
FW 318. Systematics of Mammals (2)
FW 341. Fish and Wildlife Law Enforcement (2)

FW 458. Mammal Conservation and Management (4)
SOC 204. *Introduction to Sociology (3)

## Choose four of the following classes:

SOC 340. Deviant Behavior and Social

## Control (4)

SOC 440. Juvenile Delinquency (4)
SOC 441. Criminology and Penology (4)
SOC 442. Sociology of Drug Use and Abuse (4)

SOC 448. Law and Society (4)

## Recommended additional train-

ing (not required): Students may
consider attending an approved law enforcement training program.

## Total=41

Option Code: 677

## NATURAL RESOURCE <br> EDUCATION OPTION

This option will prepare students for careers as educators within the broad field of natural resources and to help them learn to bridge the gap in knowledge that exists between experts and others. The focus is on youth or community education that occurs outside of formal school settings. Those interested in becoming K-12 teachers should explore options offered by the College of Education, including their dual degree option.
No more than 24 credits from one department; no more than 20 lowerdivision credits.

## Natural Resource Base (17 credits)

FES 251. Recreation Resource Management (4)

FW 251. Principles of Fish and Wildlife Conservation (3)
RNG 341. Rangeland Ecology and Management (3)
Plus 7 additional credits from AG, FE, FOR, FW, GEO or another area of natural resources.

## Education/Communication <br> Processes ( 23 credits)

ED 216. *Purpose, Structure, and Function of Education in a Democracy (3)
ED 219. Civil Rights and Multicultural Issues in Education (3)

ED 253. Learning Across the Lifespan (3)
FES 493. Environmental Interpretation (4)
or FES 430. Forest as Classroom (4)
SOC 450. Sociology of Education (4)
WR 327. *Technical Writing (3)
Plus 3 upper-division credits in speech communication, education (see especially Teacher and Counselor Education), agriculture education, writing, or an allied communication/education field; supervised internships can be used to meet this requirement, if approved in advance.

Note: Writing I, Writing II, and Speech are required by the baccalaureate core, and may not be used toward the "3 upper-division credits" requirement above. WR 327 must be taken in addition to Writing I, Writing II, and Speech.

## Minimum Total=40

The course below should be taken in the Natural Resources Core: From the Vegetation ID area of the Natural Resources Core:
FES 241. Dendrology (3)
Footnote:

* Baccalaureate Core Course (BCC)

Option Code: 679

## NATURAL RESOURCE POLICY

 AND MANAGEMENT OPTION
## Also available via Ecampus.

This option will prepare students for careers in the broad arena of natural resource and environmental conservation, with an emphasis on the social and political aspects of resource issues.

No more than 24 credits from one department; no more than 20 lowerdivision credits.

## Social Science Foundation

Students must take at least two courses from the following. [PS and SOC are prerequisites for certain upper-division courses]
PHL 201. *Introduction to Philosophy (4)
PS 201. *Introduction to United States
Government and Politics (4)
PSY 201. *General Psychology (3)
or PSY 202. *General Psychology (3)
SOC 204. *Introduction to Sociology (3)

## Social Sciences and Natural

## Resources

Students must take at least three courses from the following, with no more than two from any one department:
AG 301. *Ecosystem Science of Pacific NW Indians (3)
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
COMM 321. Introduction to Communication Theory (3)
FOR 111. Introduction to Forestry (3)
FW 251. Principles of Fish and Wildlife Conservation (3)
FW 323. Management Principles of Pacific Salmon in the Northwest (3)
FW 340. *Multicultural Perspectives in Natural Resources (3)

FW/HSTS 470. *Ecology and History:
Landscapes of the Columbia Basin (3)
GEOG 300. *Sustainability for the Common Good (3)
SOC 360. *Population Trends and Policy (4)
SOC 454. *Leisure and Culture (4)
SOC 456. *Science and Technology in Social Context (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)

## Natural Resource Policy and

Management
Students choose 25 credits from the

## list of courses below.

AEC 253. *Environmental Law, Policy, and Economics (4)
BOT 440. Field Methods in Plant Ecology (4)
ENSC 479. *^Environmental Case Studies (3)
FES 342. Forest Types of the Northwest (3)
FES 352. Wilderness Management (3)
FES 365. *Issues in Natural Resources

## Conservation (3)

FES 440. Wildland Fire Ecology (3)
FES/FW 445. Ecological Restoration (4)
FOR 346. Topics in Wildland Fire (3)
FOR 436. Wildland Fire Science and
Management (4)
FW 303. Survey of Geographic Information Systems in Natural Resources (3)
FW 311. Ornithology (3)
FW 315. Ichthyology (3)
FW 317. Mammalogy (3)
FW 320. Introductory Population Dynamics (4)

FW 321. Applied Community and
Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 350. *Endangered Species, Society, and Sustainability (3)
FW 427. Principles of Wildlife Diseases (4)
FW 435. ^Wildlife in Agricultural Ecosystems (3)
FW 479. Wetlands and Riparian Ecology (3)
GEO 308. *Global Change and Earth Sciences (3)
GEOG 201.*Foundations of Geospatial Science and GIS (4)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
NR 202. Natural Resource Problems and Solutions (2)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 475. Environmental Politics and Policy (4)

RNG 455. Riparian Ecology and
Management (3)
RNG 490. Rangeland Management Planning (4)

## Total=40

Footnotes

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 680


## RECREATION AND TOURISM

 MANAGEMENT OPTIONThis option prepares students for careers managing people and natural resource areas to provide high-quality recreation
and tourism opportunities.
No more than 24 credits from one department; no more than 20 lowerdivision credits.

## Recreation and Tourism <br> Management Foundation (19-20 credits)

FES 251. Recreation Resource Management (4)

FES 351. Outdoor Recreation Management on Public Lands (3)
FES 357. Parks and Protected Areas
Management (3)
FES 352. Wilderness Management (3)\# or FES 353. Nature, Eco, and Adventure Tourism (3)\#
or FES 493. Environmental Interpretation (4) \#

FES 422. Research Methods in Social Science (4)

FES 456. Planning for Sustainable
Recreation (4)
FES 457. Planning for Sustainable Tourism (4)
\# Of these three courses, the two courses not taken for this option must be taken in the Natural Resources Breadth sections (e.g., Social Issues, Resource Values/Philosophy, Political Dimensions).
Technical/Field Skills (choose 10-11 credits)
CS 195. Website Design (4)
FE 208. Forest Surveying (4)
FW 255. Field Sampling of Fish and Wildlife (3)

FW 341. Fish and Wildlife Law Enforcement (2)

GEOG 201. *Foundations of Geospatial Science and GIS (4)
GEOG 370. Geovisualization: Cartography (4)

GEOG 472. Geovisualization: Geovisual Analytics (3)
Applications in Recreation and
Social Science (choose 10-11
credits)
AEC 253. *Environmental Law, Policy, and Economics (4)
ANTH 477. Ecological Anthropology (4)
COMM 324. Communication in
Organizations (3)
COMM 326. Intercultural Communication (3)

PS 475. Environmental Politics and Policy
(4)

SOC 454. *Leisure and Culture (4)
SOC 481. *Society and Natural Resources (4)

## Minimum Total=40

Footnote:

* Baccalaureate Core Course

Option Code: 681

## SUSTAINABLE

AGROFORESTRY OPTION
The student pursuing this option will develop skills and knowledge necessary to design and manage integrated sustainable land management systems involving co-production of woody plants and agricultural plants and animals.
No more than 24 credits from one
department; no more than 20 lowerdivision credits.

## Required Courses

BOT 488. Environmental Physiology of Plants (3)
CH 122. *General Chemistry (5) or CH 232. *General Chemistry (4) and CH 262. *Laboratory for Chemistry 232 (1)

CROP/HORT 300. Crop Production in
Pacific Northwest Agroecosystems (4)
CROP 440. Weed Management (4)
or FES/FW 445. Ecological Restoration (4)
CSS 306. Problem Solving: Soil Science Applications (1)
CSS 315. ${ }^{\wedge}$ Nutrient Management and Cycling (4)
or HORT 316. Plant Nutrition (4)
FES 433. Planning Agroforestry Projects (2)
FES/NR/RNG 477. *Agroforestry (3)
FOR 441. Silviculture Principles (4)
or HORT 301. The Biology of Horticulture (3)

HORT 311. Plant Propagation (4)
RNG 442. Rangeland-Animal Relations (4)
Choose one of the following courses:
ANS 215. Beef/Dairy Industries (3)
ANS 216. Sheep/Swine Industries (3)
CROP 310. Forage Production (4)
HORT 451. Tree Fruit Physiology and Culture (4)
HORT 452. Berry and Grape Physiology and Culture (4)
NR 202. Natural Resource Problems and Solutions (2)

## Total=39-42

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 684
URBAN FOREST


## LANDSCAPES OPTION

## Available via Ecampus.

This option will help students understand the complexities surrounding the culture and management of urban forest ecosystems. It includes an examination of the economic, social, and environmental benefits and values of trees in urban areas, and the relationship between people and trees.

No more than 24 credits from one department; no more than 20 lowerdivision credits.

## Urban Forest Foundations (22-23

## credits)

FES/HORT 350. Urban Forestry (3)
FES/FW 445. Ecological Restoration (4)
FES/HORT 447. Arboriculture (4)
FES/HORT 455. Urban Forest Planning, Policy and Management (4)
HORT 226. Landscape Plant Materials I: Deciduous Hardwoods and Conifers (4)
HORT 318. ^Applied Ecology of Managed Ecosystems (3)
or HORT 315. Sustainable Landscapes: Maintenance, Conservation, Restore (4)

ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ANTH 481. *Natural Resources and
Community Values (3)
FOR 462. Natural Resource Policy and Law (3)
or PS 475. Environmental Politics and Policy (4)
FW 462. Ecosystem Services (3)
GEOG 450. Land Use in the American West (3)
or FW 435. ${ }^{\wedge}$ Wildlife in Agricultural
Ecosystems (3)
SOC 481. *Society and Natural Resources (4)

## Total=41-43

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 685


## WATERSHED

## MANAGEMENT OPTION

Students will obtain skills and knowledge about watersheds, natural water systems, and water quality, specifically management of surface water in forest and rangeland ecosystems.
No more than 24 credits from one department; no more than 20 lowerdivision credits.
CH 122. *General Chemistry (5) or CH 232 . *General Chemistry (4) and CH 262. *Laboratory for Chemistry 232 (1)

FE 430. Watershed Processes (4)
FES/FW 445. Ecological Restoration (4)
FW 315. Ichthyology (3) and FW 316. Systematics of Fishes (3)
or just GEO 487. Hydrogeology (4)
FW 456. Limnology (5)
MTH 252. Integral Calculus (4)
PH 201, PH 202. *General Physics $(5,5)$ or PH 211, PH 212. *General Physics with Calculus $(4,4)$
RNG 455. Riparian Ecology and
Management (4)
or FW 479. Wetlands and Riparian Ecology (3)
SOIL 466. Soil Morphology and
Classification (4)

## Total=43-45

The following courses in the NR
Core and Breadth are required
prerequisites for courses in this

## option:

BI 204, BI 205, BI 206. *Introductory
Biology I, II, III (4, 4, 4)
or BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
BI 370. Ecology (3)
FE 208. Forest Surveying (4)
GEO 202. *Earth Systems Science (4)
MTH 251. *Differential Calculus (4)
RNG 355. Desert Watershed Management (3)

## Footnote:

* Baccalaureate Core Course (BCC)

Option Code: 686

## WILDLAND FIRE

## ECOLOGY OPTION

This option will help students understand the nature of fire in wildland ecosystems. It includes an understanding of the dynamics of fire behavior and post-fire response.
No more than 24 credits from one department; no more than 20 lowerdivision credits.

## Foundations in Wildland Fire and <br> \section*{Recovery ( 21 Credits)}

FES 440. Wildland Fire Ecology (3)
FES/FW 445. Ecological Restoration (4)
or RNG 421. Wildland Restoration and Ecology (4)
FES 454. Managing at the Wildland-Urban Interface (3)
FOR 346. Topics in Wildland Fire (3)
FOR 436. Wildland Fire Science and
Management (4)
FOR 441. Silviculture Principles (4)

## Ecological and Natural Resource

## Electives (Choose 19 credits)

BOT/FES 415. Forest Insect and Disease Management (5)
BOT 442. Plant Population Ecology (3)
CROP 440. Weed Management (4)
FES 342. Forest Types of the Northwest (3)
FES/FW 452. Biodiversity Conservation in Managed Forests (3)
FW 458. Mammal Conservation and
Management (4)
SOIL 466. Soil Morphology and
Classification (4)
SOIL 468. Soil Landscape Analysis (4)

## Total=40

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 687
TOURISM, RECREATION, AND ADVENTURE LEADERSHIP (BS, HBS)
Available on the Corvallis and OSU-


## Cascades campuses.

The Bachelor of Science (BS) in Tourism, Recreation and Adventure Leadership (TRAL) explores the importance of tourism and recreation in natural settings for community development, human health and quality of life, and the sustainable use of natural resources. Students will learn about management practices and public preferences to address contemporary tourism, recreation and outdoor leadership opportunities, and issues in natural settings. Studies include decision making within applicable laws and across cultural contexts, as well as communication to a variety of audiences, and successful supervision of employees and volunteers. The TRAL program covers best practices for planning, developing, and managing recreation resources in natural settings. Students learn to evaluate and integrate experiential, economic, biophysical, and social concepts. They
study interaction across natural resources and the consequences of development, management, and marketing decisions.

Completion of an approved option is required for the Tourism, Recreation, and Adventure Leadership degree. Declaration of the option must be done by the end of the sophomore year, or at least six (6) terms prior to graduation. Courses for an option are in addition to the core curriculum. Some courses may require prerequisites not included in the core curriculum.

The following two options are available to Corvallis-based students majoring in TRAL:

1. Outdoor Recreation Management
2. Sustainable Tourism Management

The following two options are available to Cascades-campus students majoring in TRAL:

1. Nature, Eco and Adventure Tourism
2. Adventure Leadership Education

All students pursuing the BS in TRAL must earn grades of $C$ or better in all courses for the major (or approved substitutions).

All students pursuing the BS in TRAL
must complete at least six months of work experience related to the major.

## TRAL Core

COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
FES 353. Nature, Eco, and Adventure Tourism (3)
FES 357. Parks and Protected Areas
Management (3)
or FES 352. Wilderness Management (3) or FES 444. Ecological Aspects of Park
Management (3)
FES 422. Research Methods in Social Science (4)

FES 485. Consensus and Natural Resources (3)
or ANTH 481. *Natural Resources and
Community Values (3)
or FW 340. *Multicultural Perspectives in
Natural Resources (3)
or FW 350. *Endangered Species, Society
and Sustainability (3)
or SOC 481. *Society and Natural Resources (4)
or WGSS 440. *Women and Natural
Resources (3)
FOR 112. Computing Applications in Forestry (3)
FOR 255. Resource Interpretation (3)
[COCC course]
or FES 493. Environmental Interpretation (4)

ST 201. Principles of Statistics (4)
or TOL 378. Tourism and Recreation Data Analysis (3)
SUS 350. *Sustainable Communities (3)
WR 121. *English Composition (3)
Total=32-33
Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: 872

## ADVENTURE LEADERSHIP

 EDUCATION OPTION
## Available only on the OSU-

 Cascades Campus.Designed for students pursuing careers as educators, guides and managers/owners in the outdoor and adventure education field.

## Sophomore Year (24) (COCC

## Courses)

OL 111. Introduction to Outdoor
Leadership (3)
OL 255. Outdoor Living Skills (5)
OL 271. Facilitating Group Experiences (5)
OL 273. Outdoor Recreation Leadership (5)

## 6 credits of skills (choose 2 courses

## from below):

OL 294AC. Alpine Climbing (3)
OL 294RC. Teaching Rock Climbing (3)
OL 294WG. Whitewater Raft Guiding (3)
COCC Course Catalog: https://www.cocc. edu/admissions/catalog/

## Junior Year (16)

TOL 270. Pre-internship Seminar (1)
TOL 370. Design and Management of Outdoor Experiences (4)
TOL 372. Ethics and Adventure Leadership (3)

TOL 373. Wilderness and Adventure Education (4)
TOL 375. ${ }^{\wedge}$ Experiential Education (4)
Senior Year (31)
TOL 377. Expeditions I (4)
TOL 379. Expeditions II-Land (10)
TOL 380. Expeditions II-Water (3)
TOL 410. Internship (8)
TOL 476. Risk Management in Tourism and Outdoor Leadership (3)
TOL 479. *Nature and the Human Experience (3)

## Total=71

Plus additional free electives if necessary to meet university requirement of 180 minimum credits.

## Footnotes:

*Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
OL COCC Course

## Sample Four-Year Plan: TRAL

Adventure Leadership Education
Option
Year 1
Fall (16)
ALS 199. Special Topics: U-Engage Cascades (2)

MTH 111. *College Algebra (4)
PAC 110. Introduction to White Water Kayaking (2)
PAC 111. Introduction to Canoeing (2)
WR 121. *English Composition (3)
Elective, TOL 130. Introduction to Outdoor and Adventure Professions (3)

## Winter (14)

COMM 111. *Public Speaking (3)
ST 201. Principles of Statistics (4)
WR 222. *English Composition (3)
Bacc Core, Western Culture (3)
Elective, PAC 1xx, Kayak (1)

Spring (14)
FOR 112. Computing Applications in Forestry (3)
FOR 255. Resource Interpretation (3) COCC Course
HHS 231. *Lifetime Fitness for Health (2)
Bacc Core, Physical Science (4)
Elective, PAC 1xx, Land Skills (2)

## Year 2

Fall (15)
OL 111. Introduction to Outdoor
Leadership (3)
OL 171. Technical Skills for Outdoor
Leadership (2)
OL 255. Outdoor Living Skills (5)
OL 263. Basic Wilderness Life Support (5)

## Winter (12)

OL 207. Seminar in Outdoor Leadership (2)
OL 271. Facilitating Group Experiences (5)
OL 273. Outdoor Recreation Leadership (5)

## Spring (14)

FES 352. Wilderness Management (3) Via Ecampus
Bacc Core, Additional Science (4)
Bacc Core, Cultural Diversity (3)
Bacc Core, Social Processes and Institutions (4)

## Year 3

## Fall (15)

FES 353. Nature, Eco and Adventure Tourism (3)
TOL 373. Wilderness and Adventure Education (4)
TOL 375. Experiential Education (4)
Bacc Core, Biological Science (4)
Winter (14)
TOL 270. Pre-Internship Seminar (1)
TOL 370. Design and Management of Outdoor Experiences (4)
TOL 479. *Nature and the Human Experience (3)
Bacc Core, Literature and the Arts (3)
Elective (3)

## Spring (17)

TOL 377. Expeditions I (4)
TOL 379. Expeditions II-Land (10)
TOL 380. Expeditions II-Water (3)

## Summer

TOL 410. Internship (8)

## Year 4

Fall (14)
SUS 350. Sustainable Communities (4)
TOL 372. Ethics and Adventure Leadership (3)

Elective Course (3)
Elective Course (4)

## Winter (13)

FW 350. Endangered Species, Society and Sustainability (3)
TOL 476. Risk Management in Tourism and Outdoor Leadership (3)
Elective Course (3)
Elective Course (4)

## Spring (14)

FES 422. Research Methods in Social Science (4)

Elective Course (3)
Elective Course (3)

Bacc Core, Difference, Power, and Discrimination (4)

## Total=180

COCC Course catalog: https://www.cocc. edu/uploadedfiles/departments_/admis-sions/catalog/cocc_catalog_17-18_courses.pdf

## Option Code: 875

NATURE, ECO, AND ADVENTURE TOURISM OPTION

## Available only on the OSU-

## Cascades Campus.

Designed for students pursuing careers as managers or owners and guides in outfitter-guide and other natural resource based commercial recreation businesses (i.e., micro-level tourism).

## Sophomore Year (24) (COCC

## Courses)

OL 111. Introduction to Outdoor
Leadership (3)
OL 255. Outdoor Living Skills (5)
OL 271. Facilitating Group Experiences (5)
OL 273. Outdoor Recreation Leadership (5)
6 credits of skills (choose 2 courses from below):
OL 294AC. Alpine Climbing (3)
OL 294RC. Teaching Rock Climbing (3)
OL 294WG. Whitewater Raft Guiding (3)
COCC Course Catalog: https://www.cocc. edu/admissions/catalog/

## Junior Year (29)

BA 217. Accounting Fundamentals (4) [COCC course]
BA 260. Introduction to Entrepreneurship (4)

BA 352. Managing Individual and Team
Performance (4)
BA 390. Marketing (4)
ECON 201. *Introduction to
Microeconomics (4)
TOL 270. Pre-Internship Seminar (1)
TOL 370. Design and Management of Outdoor Experiences (4)
TOL 375. ${ }^{\wedge}$ Experiential Education (4)

## Senior Year (18)

TOL 377. Expeditions I (4)
TOL 410. Internship (8)
TOL 476. Risk Management in Tourism and Outdoor Leadership (3)
TOL 479. *Nature and the Human Experience (3)

## Total=71

Plus additional free electives if necessary to meet university requirement of 180 minimum credits.

## Footnotes:

*Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
OL=COCC Course

## Option Code: 876

## OUTDOOR RECREATION

## MANAGEMENT OPTION

Available only on the Corvallis campus.
Designed for students pursuing careers as outdoor recreation planners and
managers in public land management agencies and non-profit organizations at local, state, and federal levels. Students study land management, the process of permitting, and laws relevant to outdoor recreation. They create monitoring and assessment protocols for recreation resources in natural settings, and they learn to respectfully engage with individuals and groups that may have diverse perspectives and priorities regarding recreation opportunities. Students are trained to facilitate understanding and conflict resolution across these individuals and groups.

## First Year (16-18)

ECON 201. *Introduction to
Microeconomics (4)
or AEC 250. *Introduction to
Environmental Economics and Policy (3)
FES 240. *Forest Biology (4)
or FES/FW 452. Biodiversity Conservation
in Managed Forests (3)
or FES 341. Forest Ecology (3)
or FES 440. Wildland Fire Ecology (3)
FES 251. Recreation Resource Management
(4)

FW 251. Principles of Fish and Wildlife Conservation (3)
NR 201. Managing Natural Resources for the Future (3)
or NR 202. Natural Resource Problems and Solutions (3)
or FOR 111. Introduction to Forestry (3)

## Sophomore Year (13)

AEC 351. *Natural Resource Economics and Policy (3)
or FES 432. Economics of Recreation and Tourism (3)
FES 351. Outdoor Recreation Management on Public Lands (3)
FES 354. Communities, Natural Areas, and Sustainable Tourism (3)
ST 202. Principles of Statistics (4)

## Junior Year (6-7)

FES 485. *Consensus and Natural Resources (3)
or FES 360. Collaboration and Conflict Management (3)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4) or FE 257. GIS and Forest Engineering Applications (3)
or FW 303. Survey of Geographic Information Systems in Natural Resource (3)

## Senior Year (13-15)

FES 456. Planning for Sustainable Recreation (4)
FOR 460. ^Forest Policy (4) or AG 421. ^Leadership Development (3) or ENSC 479. *^Environmental Case Studies (3)
or TOL 375. ^Experiential Education (4)
GEOG 452. Sustainable Site Planning (3)
PS 477. International Environmental Politics and Policy (4)
or AEC 432. Environmental Law (4)
or FOR 460. ${ }^{\wedge}$ Forest Policy (4)
or FOR 462. Natural Resource Policy and Law (3)
or TOL 478. Legal Issues in Tourism and Outdoor Leadership (3)

## Total=48-53

Plus additional free electives if necessary to meet university requirement of 180 minimum credits.
Note: FOR 460 is listed in two places but may be counted only once. If selected to meet one requirement then a different class must be selected to meet the other requirement.

## Option Code: 873

## Footnotes:

*Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)

## SUSTAINABLE TOURISM

## MANAGEMENT OPTION

## Available only on the Corvallis campus.

Designed for students pursuing careers as tourism destination planners, developers, and marketers in government, non-profit, or the private sector, in both domestic and international locations. This option applies business concepts to tourism, and explains best practices for planning, developing, and managing sustainable nature-based tourism. Students learn to create a business plan, apply business law principles, create marketing strategies, create financial statements, explain land management goals and permit processes. They learn to plan, develop and manage sustainable nature-based tourism in a manner that integrates experiential, economic, biophysical, and social data. They explore the consequences of development of natural resources in domestic and international tourism.

## First Year (7)

FES 251. Recreation Resource Management (4)

NR 201. Managing Natural Resources for the Future (3)
or NR 202. Natural Resource Problems and Solutions (3)
or FOR 111. Introduction to Forestry (3)

## Sophomore Year (11)

ECON 202. *Introduction to
Macroeconomics (4)
FES 354. Communities, Natural Areas, and Sustainable Tourism (3)
ST 202. Principles of Statistics (4)

## Junior Year (17-18)

BA 260 Introduction to Entrepreneurship (4)
FES 485. Consensus and Natural Resources (3)
or FES 360. Collaboration and Conflict Management (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
or FE 257. GIS and Forest Engineering
Applications (3)
or FW 303. Survey of Geographic
Information Systems in Natural Resource (3)

GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)

Senior Year (20-22)
AEC 454. Rural Development Economics and Policy (3)
or FES 432. Economics of Recreation and Tourism (3)
BA 432 Environmental Law, Sustainability, and Business (4)
FES 457. Planning for Sustainable Tourism (4)

FOR 460. ${ }^{\wedge}$ Forest Policy (4)
or AG 421. ${ }^{\wedge}$ Leadership Development (3)
or ENSC 479. *^Environmental Case Studies (3)
or TOL 375. ^Experiential Education (4)
GEOG 452. Sustainable Site Planning (3)
PS 477. International Environmental
Politics and Policy (4)
or AEC 432. Environmental Law (4) or FOR 460. ^Forest Policy (4)
or FOR 462. Natural Resource Policy and Law (3)
or TOL 478. Legal Issues in Tourism and Outdoor Leadership (3)

## Total=55-58

Plus additional free electives if necessary to meet university requirement of 180 minimum credits.

Note: FOR 460 is listed in two places but may be counted only once. If se-
lected to meet one requirement then a different class must be selected to meet the other requirement.

## Footnotes:

*Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Sample Four-Year Plan: TRAL
Sustainable Tourism Management

## Option

## Year 1

Fall (15)
FOR 111. Introduction to Forestry (3) or NR 201. Managing Natural Resources for the Future (3)
FES 251. Recreation Resource Management (4)

WR 121. *English Composition (3)
Bacc Core Biological Science (4)
Elective (1)
Winter (15)
Comm 111. *Public Speaking (3) or COMM 114. *Argument and Critical Discourse (3)
FOR 112. Computing Applications in Forestry (3)
HHS 231. *Lifetime Fitness for Health (2)
MTH 111. *College Algebra (4)
Elective (3)

## Spring (13-14)

AEC 250. *Introduction to Environmental Economics and Policy (3)
or ECON 201. *Introduction to
Microeconomics (4)
MTH 245. *Mathematics for Management,
Life, and Social Sciences (4)
Bacc Core, WR II (3)
Bacc Core, Western Culture (3)

## Summer

Work experience, volunteer, or internship

## Year 2

Fall (17)
ECON 202. *Introduction to
Macroeconomics (4)
FES 353. Nature, Eco and Adventure
Tourism (3)
ST 201. Principles of Statistics (4)
Bacc Core, Cultural Diversity (3)
Elective Course (3)

## Winter (15)

AEC 311. Intermediate Applied Economics
I: Producers and Consumers (4)
FES 354. Communities, Natural Areas,
Sustainable Tourism (3)
SUS 350. Sustainable Communities (4)
PAC (1)
Bacc Core, Literature and the Arts (3)

## Spring (15-16)

FW 340. Multicultural Perspectives in
Natural Resources (3)
ST 202. Principles of Statistics (4)
Bacc Core, Physical Science (4-5)
Elective Course (1)
Social Science Elective (3)

## Summer

Work experience, volunteer, or internship

## Year 3

Fall (14-15)
FES 352. Wilderness Management (3) or FES 357. Parks and Protected Areas Management (3)
GEOG 450. Land Use in the American West (3)

Bacc Core, Bio/Physical Science (4-5)
Elective Course (3)

## Winter (15)

BA 260. Introduction to Entrepreneurism (4)
FES 485. *Consensus and Natural Resources (3)

FES 493. Environmental Interpretation (4)
GEOG 451. Planning Principles and Practices for Resilient Communities (4)

## Spring (16)

GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
Elective Course (3)
Elective Course (3)
Elective Course (3)
Elective Course (3)

## Summer

Work experience, volunteer, or internship

## Year 4

Fall (15-16)
FOR 462. Natural Resource Policy and Law (3)
or AEC 432. Environmental Law (4)
GEOG 452. Sustainable Site Planning (3)
Elective Course (3)
Elective Course (3)
Elective Course (3)

## Winter (15)

AEC 454. Rural Development and Economic Policy (3)
BA 432. Environmental Law, Sustainability and Business (4)
FES 422. Research Methods in Social Science (4)

FOR 460. Forest Policy (4)
Spring (16)

FES 457. Planning for Sustainable Tourism (4)

Elective Course (3)
Elective Course (3)
Elective Course (3)
Elective Course (3)

## Total=180

Option Code: 874

## UNDERGRADUATE MINORS

## NATURAL RESOURCES MINOR

Also available at OSU-Cascades and

## via Ecampus.

Students majoring in other programs at OSU can choose to complete the Natural Resources minor. The minor is intended to provide a broad exposure to the natural resources field. It offers course work that integrates a number of natural resource disciplines.
Choose four of the following five courses:
FES 251. Recreation Resource Management (4)

FOR 111. Introduction to Forestry (3)
FW 251. Principles of Fish and Wildlife Conservation (3)
NR 201. Managing Natural Resources for the Future (3)
RNG 341. Rangeland Ecology and Management (3)
One upper-division course from each of the following breadth requirements courses list:
Land and Water (3-5)
Political Dimensions (3-4)
Resource Values/Philosophy (3)
Any additional classes from the breadth
requirements course list to total 28 credits.

## Total=28

Minor Code: 643

## RECREATION RESOURCE

## MANAGEMENT MINOR

Students may elect to earn the Recreation Resource Management minor.
This minor provides basic knowledge about recreation resource planning and management.

## Core

FES 251. Recreation Resource Management (4)

FES 351. Outdoor Recreation Management on Public Lands (3)
FES 352. Wilderness Management (3) or FES 357. Parks and Protected Areas Management (3)
FES 356. Planning for Recreation and Tourism (4)
or FES 456. Planning for Sustainable Recreation (4)
or FES 457. Planning for Sustainable Tourism (4)
FES/ANS/FW/SOC 485. *Consensus and Natural Resources (3)
or FW 340. *Multicultural Perspectives in Natural Resources (3)

## Select 10 credits from below:

FES 353. Nature, Eco, and Adventure Tourism (3)

FES 354. Communities, Natural Areas, and Sustainable Tourism (3)
FES 432. Economics of Recreation and Tourism (3)
or AEC 351. *Natural Resource Economics and Policy (3)
FES/FW 445. Ecological Restoration (4)
FES 493. Environmental Interpretation (4)

## Total=27

Footnote:

* Baccalaureate Core Course


## Minor Code: 460

## TOURISM AND OUTDOOR

## LEADERSHIP MINOR

The Tourism and Outdoor Leadership program is only available at the OSUCascades Campus. Corvallis Campus students may enroll in the program but will have to attend some courses in Bend. All lower-division courses listed below are Central Oregon Community College courses.

## Lower Division (12 credits)

FOR 255. Resource Interpretation (3) (COCC course)
Plus 9 credits from the following COCC courses:
HHP 253. Wilderness Advanced First Aid (3) or HHP 255. Outdoor Living Skills (3) or HHP 294RC. Teaching Rock Climbing (3)
or HHP 294CC. Challenge Course Practices (3)
or HTRM 233. Event Planning (3)
or HHP 294WG. Whitewater Raft Guiding
(3) (only one of these skills courses can be taken in the minor)
HHP 111. Introduction to Outdoor Leadership (3)
HHP 244. Psychology of Risk and Adventure (3)

HHP 271. Facilitating Group Experiences (3)
HHP 273. Outdoor Recreation Leadership (3)

## Upper Division ( $\mathbf{1 5}$ credits)

TOL 373. Wilderness and Adventure Education (4)
Plus additional credits from other upper-division TOL courses for a total of 15 credits:
TOL 372. Ethics and Adventure Leadership (3)

TOL 375. ^Experiential Education (4)
TOL 377. Expeditions I (4)
TOL 378. Tourism and Recreation Data Analysis (3)
TOL 471. Sustainability in Tourism and Outdoor Leadership (3) [Terminated winter 2017]
TOL 474. Entrepreneurship in Tourism and Outdoor Leadership (3)
TOL 476. Risk Management in Tourism and Outdoor Leadership (3)
TOL 478. Legal Issues in Tourism and Outdoor Leadership (3)
TOL 479. *Nature and the Human Experience (3)
Total=27

## Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course (WIC)


## Minor Code: 653

## GRADUATE MAJORS

## FOREST ECOSYSTEMS AND SOCIETY (MF, MS, PhD, MAIS)

Graduate Areas of Concentration
Forest biology; forest, wildlife and landscape ecology; genetics and physiology; integrated social and ecological' systems; silviculture; science of conservation, restoration and sustainable management; social science, policy, and natural resources; soil-plant-atmosphere continuum; sustainable recreation and tourism
This graduate program combines a strong social science faculty with a strong biological and ecological science faculty and so provides a rare opportunity to focus on the interface of social science and ecological science. The FES graduate program provides specific disciplinary opportunities in both ecological and social sciences in natural resource settings and also strives to develop interdisciplinary skills and knowledge. Our program objective is to develop interdisciplinary thinkers, highly capable scientists, and natural resource leaders who are prepared to solve complex socio-ecological problems. The students will be able to identify and contribute to collaborative science-based solutions in ecology and natural resourc-es-related social science.

## Master of Forestry (MF) in Forest Ecosystems-Areas of <br> Concentration

1. Forest Biology. Management of natural resources is an increasingly complex and technical undertaking. In some cases, breadth or depth of specialization beyond the BS degree is required or is highly desirable in entry-level professional forestry positions or for advancement in non-research professional forestry positions. The MF in Forest Biology program emphasizes graduate course work in one of five areas of emphasis in forest biology, with supporting work in another area. The program can be completed in 12 months, but it may be extended in accordance with personal needs and the policies of the OSU Graduate School.
2. Silviculture. The MF in Silviculture program provides graduate-level preparation in the full range of disciplines essential for analyzing opportunities, solving problems, and making decisions in silviculture and forest resource management. Graduates from this program must demonstrate competence in the preparation of well-documented silvicultural prescriptions and in the supervision of prescription implementation. The program also provides the
background for sustained career development in forest resource management.

## Master of Science and Doctor

 of Philosophy in Forest Ecosystems and Society-Areas of concentrationMS and PhD students may focus their work in one of these areas of concentration or a hybrid of them: forest, wildlife and landscape ecology; genetics and physiology; integrated social and ecological systems; science of conservation, restoration and sustainable management; social science, policy, and natural resources; soil-plant-atmosphere continuum; sustainable recreation and tourism

1. Forest, Wildlife and Landscape Ecology. The many dimensions of biodiversity are the focus of this area of concentration. Species and communities of species, act, react and interact at many spatial and temporal scales. These dynamics take place in an environment that can change gradually or quite rapidly and that can have a large impact on dynamics through direct and indirect effects on species and interspecific relationships.
2. Genetics and Physiology. This concentration explores the genetic and physiological mechanisms, from the scale of molecules and tissues to whole organisms, populations, and species, that determine how plants grow, reproduce, respond to the environment, and are managed and modified for human benefit.
3. Integrated Social and Ecological Systems. Many issues in the broad natural resources arena are truly interdisciplinary across the biophysical and the social sciences. This area of concentration focuses on the integration of these sciences in developing basic concepts and in resolving management issues.
4. Science of Conservation, Restoration and Sustainable Management. The bases for these applied sciences are found in the more basic biophysical and social sciences but their application to these complex goals generates new scientific challenges. This area of concentration seeks to develop these new scientific understandings.
5. Social Science, Policy, and Natural Resources. This concentration involves exploration of social aspects, human dimensions, and policy aspects of natural resource issues by examining linkages among humans, society, and the natural resources on which humans and society depend.
6. Soil-Plant-Atmosphere Continuum. The movement
of energy and matter within and among ecosystems controls how these systems function and the services they provide. This area of concentration investigates the mechanisms controlling ecosystem behavior over a range of levels from the whole-plant to the globe.
7. Sustainable Recreation and Tourism. This concentration explores social and/or ecological topics in sustainable recreation and tourism including recreation and tourism behavior; social and ecological impacts; and planning, management, and policy.
For more information, contact the head of the department or any faculty member.

## Major Code: 1100

## NATURAL RESOURCES (MNR)

Graduate Areas of Concentration Fisheries management, forests and climate change, geographic information science (GIScience), sustainable natural resources, urban forestry, water conflict management, and wildlife management

## Also available via Ecampus.

The MNR is a 45 -credit online degree program with curriculum organized into three sections: core ( 18 credits), area of emphasis (18 credits), and capstone project ( 9 credits). It is taught entirely online through OSU Ecampus, although some students work toward the MNR degree while inresidence at OSU.

The MNR degree is offered as a nonthesis program with a capstone project, rather than a thesis. The MNR's contemporary content is for natural resource professionals who work in settings that require cross-disciplinary competency to find solutions to natural resource problems. Integration of multiple disciplines occurs through the curriculum, assignments, and a capstone project. All MNR students integrate concepts and approaches developed throughout the entire program in a final capstone project.

## Core Courses

18 credits are required from four thematic areas. These must be courses that are not already being used to satisfy units in the area of emphasis.

## Theme: Overview/Introduction

Select 3 credits from below:
MNR 511. Introduction to Sustainable Natural Resources (3)
WR 525. Advanced Scientific and Technical Writing (4)

## Theme: Ecology/Production

Select 6 credits from below:
BI/FW 564. Marine Conservation Biology (3)
CROP 599. Special Topics in Crop Science
and Social Science (1-3)
FE 530. Watershed Processes (4)
FES 536. Carbon Sequestration in Forests (2)

FES 537. Belowground Ecosystems (3)
FES/FW 545. Ecological Restoration (4) FES/HORT 547. Arboriculture (4)
FES 548. Invasive Plants: Biology, Ecology and Management (3)
FES/BI/TOX/MCB 535. Genes and
Chemicals in Agriculture: Value and Risk (3)

FES/FW 552. Forest Wildlife Habitat
Management (4)
FES 560. Green Infrastructure (4)
FOR 526. Forest Carbon Measurements and
Analysis (4) (pending approval \#97452)
FW 519. The Natural History of Whales and
Whaling (3)
FW 520. Ecology and Management of
Marine Fishes (3)
FW 521. Aquatic Biological Invasions (4)
FW 527. Principles of Wildlife Diseases (4)
FW 531. Dynamics of Marine Biological Resources (4)
FW 535. Wildlife in Agricultural Ecosystems (3)

FW 538. Structured Decision Making in Natural Resource Mgmt Lab (2)
FW 540. Vertebrate Population Dynamics (4)
FW 551. Avian Conservation and
Management (3)
FW 554. Fishery Biology (4)
FW 556. Limnology (5)
FW 558. Mammal Conservation and Management (4)
FW 562. Ecosystem Services (3)
FW 563. Conservation Biology of Wildlife (3)
FW 565. Marine Fisheries (4)
FW/HSTS 570. Ecology and History:
Landscapes of the Columbia Basin (3)
FW 571. Environmental Physiology of Fishes (4)
FW 573. Fish Ecology and Conservation (4)
FW/OC 574. Early Life History of Fishes (4)
FW 575. Wildlife Behavior (4)
FW 576. Fish Physiology (4)
FW 579. Wetlands and Riparian Ecology (3)
FW 580. Stream Ecology (3)
FW 581. Wildlife Ecology (3)
FW 583. Species Recovery Planning and
Restoration (3)
FW 597. Aquaculture (3)
FOR 526. Forest Carbon Measurements and Analysis (4)
MNR 530. Tropical Forest Ecology and Management: A Global Perspective (3)
MNR 538. Adapting Forests to Climate Change (3)
MNR 550. Climate Change Impacts on
Forest Ecosystems (3)
MRM 530. Principles and Practice of Marine
Resource Management (3)
MRM 535. Rights-Based Fisheries
Management (3)
NSE 540. Nuclear Fuel Cycle and Waste
Management (4)
NSE 583. Radiation Biology (3)
NSE 588. Radioecology (3)
OEAS 540. The Biogeochemical Earth (4)
SNR 511. Sustainable Natural Resource Development (1)
SNR 530. Ecological Principles of Sustainable Natural Resources (3)
SNR 531. Sustainable Silviculture and Forest Certification (3)
SNR 532. Planning Agroforestry Projects (2)

SNR 533. Alternative (Nontimber) Forest
Products (2)
SNR 534. Reduced Impact Timber Harvest (2)
SNR 535. Sustainable Management of
Aquatic and Riparian Resources (3)
SNR 540. Global Environmental Change (3)
TOX 555. Ecotoxicology: Aquatic
Ecosystems (3)

## Theme: Human Systems

Select 6 credits from at least 3 of the 5 areas below:

## Economics

AEC 534. Environmental and Resource Economics (3)
AEC/MRM 552. Marine Economics (3)
FES/MNR 500. Market Tools for Managing Greenhouse Gas Emissions (3)
FW 537. Structured Decision Making in Natural Resource Management (2)
SNR 521. Economics of Sustainable Natural Resource Management (3)

## Policy

AEC 532. Environmental law (4)
BA 532. Environmental law, Sustainability, and Business (4)
ES 544. Native American Law: Tribes, Treaties, and the U.S. (4)
FES/HORT 555. Urban Forest Planning,
Policy and Management (4)
FES 565. Urban Forestry Leadership (2)
FW 515. Fisheries and Wildlife Law and Policy (3)
FW 522. Introduction to Ocean Law (3)
FW 620. Ecological Policy (3)
GEO 599. Special Topics (1-3)
GEOG 540. Water Resources Management in the United States (3)
GEOG 541. International Water Resources Management (3)
GEOG 552. Sustainable Site Planning (3)
PS 575. Environmental Politics and Policy (4)

PS 577. International Environmental Politics and Policy (4)
WRP 521. Water Conflict Management and Transformation (3)

## Sociology

ANS/FES/FW/SOC 585. Consensus and
Natural Resources (3)
ANTH 581. Natural Resources and Community Values (4)
FES 554. Managing at the Wildland-Urban Interface (3)
SOC 554. Leisure and Culture (4)
SOC 580. Environmental Sociology (4)
SOC 581. Society and Natural Resources (4)
SNR 520. Social Aspects of Sustainable
Natural Resources (3)

## Ethics

FW 549. History of Fisheries Science (3)
GEOG 564. Geospatial Perspectives on
Intelligence, Security, \& Ethics (4)
PHL 540. Environmental Ethics (3)
PHL/REL 543. World View and
Environmental Values (3)
SNR 522. Basic Beliefs and Ethics in Natural Resources (3)

## Communication

COMM 550. Communication and the
Practice of Science (3)
FES 593. Environmental Interpretation (4)
FW 514. Professional Development:
Meeting Communications (1)

GEO 518. Geosciences Communication (3)

## Theme: Methodology

Select 3 credits from below:
BOT 540. Field Methods in Plant Ecology (4)
CH 590. Computer Programming for Scientists (3)
FW 524. Introduction to Fisheries Assessment (3)
GEOG 560. GIScience I: Introduction to
Geographic Information Science (4)
GEOG 561. GIScience II: Analysis and Applications (4)
GEOG 580. Remote Sensing I: Principles and Applications (4)

## Area of Emphasis (18 credits)

Students may select a certificate listed below or design their own option. A certificate may not be used to satisfy core requirements.
Geographic Information Science (GIScience) Contact: Kuuipo Walsh
Sustainable Natural Resources (SNR)
Contact: Badege Bishaw
Water Conflict Management and
Transformation (WCMT)
Contact: Lynette de Silva
Fisheries Management
Contact: fw.gradadvising@oregonstate. edu
Urban Forestry
Contact: Paul Ries
Forests and Climate Change
Contact: Badege Bishaw
Wildlife Management
Contact: fw.gradadvising@oregonstate. edu
OR
Design own option (no certificate)
Contact: Badege Bishaw
Capstone Project (1-9 credits)
Choose one option below:
Option 1: MNR 560. Master's Case Study (1-9)
Option 2: 6-7 credits of MNR plus 2-3 credits from an independent study project that was completed as part of an 18-credit graduate certificate.
Major Code: 2430

## CERTIFICATES

## SUSTAINABLE NATURAL RESOURCES GRADUATE CERTIFICATE

## Available via Ecampus only.

The Sustainable Natural Resources graduate certificate is an 18-credit interdisciplinary program offered online through OSU Extended Campus. Students have a choice among 12 courses designed to build personal and organizational capacity to examine the many aspects of natural resource problems-environmental, economic, and social-in the search for innovative solutions. The courses are organized into three main sections: integration, human dimensions, and ecology and management of sustainable
natural resources. All courses in the certificate program are integrated through a student-designed capstone project that addresses a specific sustainability problem in the student's own organization or region. Throughout the program, students will work with faculty members and other students, and under the guidance of an assigned mentor to design and complete the project.

Traditional university training provides rigor in individual disciplines. However, natural resource problems require synthesis of multiple perspectives and fields of knowledge. In addition, natural resource problems can be international in scope. Globalization clearly reveals how decisions and practices in any part of the world affect natural resources elsewhere and highlights a need for natural resource professionals who can apply multidisciplinary systems-thinking to address these complex issues. The SNR graduate certificate program is designed to meet that need.

By offering this program as an online series of courses, it is possible for people from around the world to participate and to receive their graduate certificate without having to take a leave of absence from their work. The opportunity to collaborate with natural resource managers or graduate students from other regions or countries offers all participants a broader perspective on management issues and potential solutions.

For additional information and advising, contact Badege Bishaw, Program Director, 208 Richardson Hall, Oregon State University, Corvallis, OR 97331; 541-737-9495, badege.bishaw@oregonstate.edu.

More information, including international admissions requirements, may also be found at http://ecampus. oregonstate.edu/online-degrees/graduate/ sustainable-natural-resources/.

## Required courses (12 credits)

SNR 506. Independent Project in Natural Resource Sustainability (2)
SNR 511. Sustainable Natural Resource Development (1)
SNR 520. Social Aspects of Sustainable Natural Resources (3)
SNR 521. Economics of Sustainable Natural Resource Management (3)
SNR 530. Ecological Principles of
Sustainable Natural Resources (3)

## Elective courses ( 6 credits)

Select at least 2 or 3 courses for a minimum 6 credits from below:
SNR 522. Basic Beliefs and Ethics in Natural Resources (3)
SNR 531. Sustainable Silviculture and Forest Certification (3)
SNR 532. Planning Agroforestry Projects (2)
SNR 533. Alternative (Non-Timber) Forest Products (2)
SNR 534. Reduced Impact Timber Harvest (2)

SNR 535. Sustainable Management of
Aquatic and Riparian Resources (3)
SNR 540. Global Environmental Change (3)

## Total=18

Major Code: CG01

## URBAN FORESTRY GRADUATE CERTIFICATE

## Only available via Ecampus.

Urban forestry involves the planning, planting, and management of trees and related vegetation in and around cities. The urban forest is made up of the mosaic of the planted landscape and native forest remnants left behind as cities have developed. Urban forestry is an academic discipline that is related to forestry, horticulture, urban planning, landscape architecture, and land use planning. Urban foresters work in municipal governments, non-profit organizations, other public agencies, and the private sector.
The Graduate Certificate in Urban Forestry helps prepare students for leadership roles in a variety of different urban forestry programs. The course work covers important aspects of program management, policy development, and leadership. The capstone study allows the student to tailor the program to a particular interest within the field.

Students complete 14 required credits, and take one or two elective courses resulting in a combined credits total of between 18 and 20 depending on the electives selected.

## Required Courses (14 credits)

FES 506. Projects: Urban Forestry Capstone (3)

FES/HORT 555. Urban Forest Planning,
Policy, and Management (4)
FES 560. Green Infrastructure (4)
FES 565. Urban Forestry Leadership (2)
SNR 511. Sustainable Natural Resource
Development (1)

## Elective Courses

## Choose one or two courses from the

list below (4-6 credits total):
FES/FW 545. Ecological Restoration (4)
FES/HORT 547. Arboriculture (4)
FES 554. Managing at the Wildland-Urban Interface (3)
FES 585. Consensus and Natural Resources (3)

FES 593. Environmental Interpretation (4)
FW 562. Ecosystem Services (3)
GEOG 551. Planning Principles and
Practices for Resilient Communities (4)
GEOG 560. GIScience I: Introduction to
Geographic Information Science (4)

## Total=18-20

Major Code: CG13

## FORESTS AND CLIMATE CHANGE

## GRADUATE CERTIFICATE

This certificate is delivered primarily by Ecampus though some courses may also be offered on the Corvallis campus.
Forests worldwide have begun to be
impacted by global climate change, and over the coming century, they will be profoundly altered by it. The adaptation of managed forests to climate change may require both silvicultural and genet-ics-based options. Because forests have the capacity to both emit and sequester carbon dioxide, a leading greenhouse gas contributing to climate change, there is tremendous interest in managing forests for the mitigation of climate change. These considerations suggest that a good understanding of the relationship between forests and climate change will be a critical requirement for the sustainable management of forest resources. The Forests and Climate Change (FCC) graduate certificate is designed to provide a thorough grounding in methods for assessing the impacts of climate change on forests, the evaluation of proposed adaptation strategies, and the development of management practices to enhance forest carbon sequestration for the mitigation of climate change.
The Forests and Climate Change graduate certificate is appropriate for many students, especially mid-career, company, industry or agency employees who want more training and experience in natural resources management and climate change.

## Required Core Courses

FES/MNR 500. Market Tools for Managing Greenhouse Gas Emissions (3)
FES 536. Carbon Sequestration in Forests (2)
MNR 538. Adapting Forests to Climate Change (3)
MNR 550. Climate Change Impacts on Forest Ecosystems (3)
SNR 506. Independent Project in Natural Resource Sustainability (2)

## Recommended Electives

FOR 526. Forest Carbon Measurements and Analysis (4) [Pending approval]
SNR 511. Sustainable Natural Resource Development (1)
SNR 530. Ecological Principles of
Sustainable Natural Resources (3)
SNR 540. Global Environmental Change (3)
Additional elective courses will be
considered in consultation with the FCC
Program Director Badege Bishaw.

## Total=19

Major Code: CG15

## - FOREST ECOSYSTEMS AND

 SOCIETY COURSESFES 115. ECOLOGY OF OREGON COAST
FOREST (1). A combination of lecture, lab, and field exercises to explore the ecology and development of Oregon coastal forests. Lec/lab. Graded P/N

FES 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
FES 240. *FOREST BIOLOGY (4). Structure, function, development and biology of forest vegetation and their relationships to forestry and natural resource applications. Field trips required. Lec/lab/rec. (Bacc Core Course)

FES 240H. *FOREST BIOLOGY (4). Structure, function, development and biology of forest vegetation and their relationships to forestry and natural resource applications. Field trips required. Lec/lab/rec. (Bacc Core Course) PREREQS: Honors College approval required.
FES 241. DENDROLOGY (3). Learn to identify the principal forest trees of North America, and the principal trees and shrubs of the Pacific Northwest. Also learn about forested regions of the world. Lec/lab/rec.
FES 242. FOREST PLANTS OF THE PACIFIC NORTHWEST (3). Field course on the identification and ecology of forest trees, shrubs, and herbs of the Pacific Northwest. Overnight camping required. Students should be prepared to hike 3-5 miles per day.

## FES 251. RECREATION RESOURCE

MANAGEMENT (4). Overview of recreation resource management including study of land and water resources used for outdoor recreation. The planning and management of natural and cultural resources for long-term resource productivity, with a focus on rural and wildlife areas of the forest, range and coast.
FES 341. FOREST ECOLOGY (3). Basic physiological characteristics of trees, succession, climax, and related concepts. Vegetation classification. Stand structure, diversity, competition, growth, soils-forests interactions, biomass and nutrient distribution, energy relations, nutrient element dynamics, ecology of disturbances.

## FES 342. FOREST TYPES OF THE

NORTHWEST (3). Forest trees in nature are aggregated into stable or transitory associations known as forest cover types. Knowledge of forest cover types, their species composition and ecology, is applicable to the fields of forestry, fire management, wildlife management, and forest ecology.
FES 350. URBAN FORESTRY (3). Introduction to principles and practices of planting and managing trees as a system of urban environment;
understanding the economic, environmental, social aspects of urban forests, and an overview of contemporary land use issues and societal perspectives between people and plants.
CROSSLISTED as HORT 350. PREREQS:
Foundational forestry and horticulture courses are recommended.

## FES 351. OUTDOOR RECREATION

MANAGEMENT ON PUBLIC LANDS (3).
Explores current issues and problems in outdoor recreation management on public lands and approaches to address these. Emphasis on day-to-day, field-based management of recreation resources, rather than broad-scale planning.

## PREREQS: FES 251 [C-]

FES 352. WILDERNESS MANAGEMENT (3). Wilderness as land use concept. Wilderness history, preservation, planning and management. Wilderness in the context of other land uses.
FES 353. NATURE, ECO, AND ADVENTURE TOURISM (3). Introduces students to natural resource-based tourism issues in both domestic and international contexts. Explores distinctions between nature, eco, and adventure tourism and other forms of tourism, positive and negative impacts, and contemporary issues such as accreditation/certification, and sustainable design.
FES 354. COMMUNITIES, NATURAL AREAS, AND SUSTAINABLE TOURISM (3). Introduces students to macro-level community and regional issues associated with tourism in natural areas. Explores positive and negative community impacts associated with tourism, traditional government-based tourism management and policies; community-based tourism management, and partnerships and stakeholder collaboration. Domestic and international examples are used to illustrate concepts and principles.

FES 355. MANAGEMENT FOR MULTIPLE RESOURCE VALUES (3). Management of a variety of resource attributes in multiple use context, including considerations for recreation, fish, wildlife, aesthetics, watersheds, and forest products. This course is repeatable for a maximum of 6 credits.

FES 357. PARKS AND PROTECTED AREAS
MANAGEMENT (3). Provides a broad yet comprehensive understanding of the theories, problems, and techniques of managing parks, wild and scenic rivers, wilderness, and other protected areas. Covers the evolution of policies and recent issues in management of these protected areas, in the United States and around the world.
FES 360. COLLABORATION AND CONFLICT MANAGEMENT (3). Conflict assessment, negotiation, and consensus building in contentious forest resource situations. Topics addressed include conflict and negotiation theory, collaboration principles, analysis techniques to determine when collaboration might be fruitful, and approaches to joint fact-finding and mutual learning in public and private forest management. Specific cases of real conflicts in forest management will be examined.

FES 365. *ISSUES IN NATURAL RESOURCES
CONSERVATION (3). Background of major current issues in natural resources conservation with emphasis on forests, soils, and water and potential sustainable carrying capacity. Focus on evaluating facts and opinions related to issues. Basics of terrestrial and aquatic ecology, recent and current issues of soil, water, and forest use and management. (Bacc Core Course)
FES 399. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.
FES 401. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits.
FES 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FES 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
FES 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
FES 410. INTERNSHIP (1-16). Full-time supervised professional experience emphasizing functional proficiency under joint sponsorship of university and agency personnel. Graded P/N. This course is repeatable for a maximum of 16 credits.
FES 412. FOREST ENTOMOLOGY (3). Role of insects in natural and managed forests. Recognition of important forest insect pest groups and species, prediction of forest insect responses to environmental changes, and management strategies and treatments to protect forest resource values. PREREQS: BI 204 [C] or BI 211 [C] or $\mathrm{BI} 211 \mathrm{H}[\mathrm{C}]$ or $\mathrm{BI} 212[\mathrm{C}]$ or $\mathrm{BI} 212 \mathrm{H}[\mathrm{C}]$ and /or equivalent.
FES 422. RESEARCH METHODS IN SOCIAL
SCIENCE (4). An introduction to research methods applied to social science issues and problems. Emphasis is on the nature of the research process, how to conduct research, and how to interpret and disseminate research results. Lec/lab. PREREQS: ST 351 [D-] or ST 351H [D-]
FES 430. FOREST AS CLASSROOM (4).
Investigates instructional methods used to teach K-12 students about natural resources. Reveals how forest exploration can be used as a means to teach others about science, ecology, mathematics, social science, and history. Provides an opportunity for future teachers, naturalists, interpreters, and scientists to improve their teaching and communication skills.
FES 432. ECONOMICS OF RECREATION AND TOURISM (3). Applications of economic theory,
concepts, and methods to outdoor recreation and nature-based tourism resources, projects and plans. Key topics include analyses of economic impacts, benefits and costs, demand and supply, and non-market valuation (e.g., revealed, stated, and benefit transfer methods). PREREQS: (AEC 250 [D-] or ECON 201 [D-] or ECON 202 [D-] ) and (ST 202 [D-] or ST 352 [D-] )

## FES 433. PLANNING AGROFORESTRY

PROJECTS (2). Helps forestry and other natural resource students understand various agroforestry concepts, systems and technologies and practices worldwide. Lays the groundwork for students to identify different systems, characterize socio-economic conditions and plan sustainable agroforestry systems. Class activities examine how biological, economic, and social factors influence agroforestry farming decisions. PREREQS: BOT 341 [D-] and /or equivalent course in ecology.
FES 435. *GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK (3). A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. Lec/rec. CROSSLISTED as BI 435/BI 535, BI 435H, MCB 535, TOX 435/TOX 535, TOX 435H. (Bacc Core Course) PREREQS: One quarter each of biology and chemistry helpful but not essential.

FES 440. WILDLAND FIRE ECOLOGY (3).
Fire histories and ecology of major forest, rangeland, and wetland ecosystems. Includes fire interactions with physical and biotic components of ecosystems, role of fire in ecological processes, and utilization in natural resource management. PREREQS: Junior or senior standing, with course work in ecology and natural resource management.
FES 444. ECOLOGICAL ASPECTS OF PARK MANAGEMENT (3). Ecological principles applied to the management of park recreation uses. The relationship between biological and physical science information and recreation management decisions is explored. CROSSLISTED as TOL 444. PREREQS: (FES 251* or FOR 251*) plus an ecology course.
FES 445. ECOLOGICAL RESTORATION
(4). Fundamentals of restoring and reclaiming disturbed landscapes and ecosystems. Topics to be covered include types and assessment of site conditions; determining restoration goals and feasibility; hydrologic, biotic, and soil functions and their importance in restoration; and measures of successful restoration. Lec/lab/rec. CROSSLISTED as FW 445. PREREQS: BI 370 or BI 370 H , equivalent course work, or instructor approval required
FES 447. ARBORICULTURE (4). The principles and practices of arboriculture, the art and science of selecting, planting, establishing and maintaining trees in urban, suburban, commercial and residential landscapes. Lec/lab. CROSSLISTED as HORT 447. PREREQS: (FES 141 or FES 241 or HORT 226 or HORT 228) and (FOR 111 or HORT 112)

FES 452. BIODIVERSITY CONSERVATION IN MANAGED FORESTS (3). Designed for students in forestry, wildlife, fisheries and related fields. Introduces the concepts of, and approaches to, managing forest stands, landscapes and regions to achieve desired habitat conditions for indicator species and conservation of biological diversity. CROSSLISTED as FW 452. PREREQS: FES 240 or FES 341 or BI 370
FES 454. MANAGING AT THE WILDLANDURBAN INTERFACE (3). Course targets
fire-prone communities where resource professionals need to work cooperatively with ocal and federal agencies and citizens to gain acceptance for fire management programs and build joint responsibility for fuel reduction activities PREREQS: FOR 111 (Not required of Ecampus
students)
FES 455. URBAN FOREST PLANNING, POLICY
AND MANAGEMENT (4). Examination of
planning, policy, and management strategies used in the stewardship of urban natural resources. Fundamentals for developing effective programs to maximize the economic, environmental, and social values and benefits of urban forest landscapes. CROSSLISTED as HORT 455. PREREQS: FES 350 or HORT 350
FES 456. PLANNING FOR SUSTAINABLE
RECREATION (4). Concepts related to the creation and design of outdoor recreation plans. Techniques for collecting data pertaining to visitor experiences and preferences. Recreation planning at several levels, both for public and private lands, with emphasis on larger scale site planning where recreation is integrated with other resource uses. PREREQS: FES 251 [D-]
FES 457. PLANNING FOR SUSTAINABLE TOURISM (4). Examines relationships among tourists, tourism developments, and the planning of tourist attractions and services. Focuses on planning tourist resources and programs within a geographic region, as well as at both the destination and site levels. Planning tools and design concepts are reviewed, analyzed, and applied. PREREQS: FES 251 [C]
FES 477. *AGROFORESTRY (3). Theory and worldwide practice of multiple-crop low input sustainable systems involving concurrent production of tree and agricultural products. Biological, economic, social, and political factors that underlie the application of agroforestry technology. CROSSLISTED as NR 477, RNG 477/RNG 577. (Bacc Core Course) PREREQS: Introductory course in biology.
FES 485. *CONSENSUS AND NATURAL
RESOURCES (3). Students will use a working group approach. They will select a natural resource topic, study the team process and interaction as a method of learning, explore the issue using systems practice, and strive for consensus on solutions to their issue. CROSSLISTED as ANS 485, FW 485/FW 585, SOC 485/SOC 585. (Bacc Core Course)
FES 493. ENVIRONMENTAL INTERPRETATION
(4). Interpretation of natural and cultural features in parks, museums, and similar settings. Emphasis on learning and applying effective communication techniques in the development of brochures, exhibits, talks, museums, and visitor centers.

FES 499. SELECTED TOPICS IN FOREST SCIENCE (0-16). In-depth studies of specific topics within a field of specialization. Examples include biotechnology in forestry, mycorrhizal ecology, tree improvement, landscape ecology, global climatic change in relation to forestry, advanced silviculture prescriptions, agroforestry, and others. This course is repeatable for a maximum of 16 credits.
FES 500. MARKET TOOLS FOR MANAGING GREENHOUSE GAS EMISSIONS (3). Examines the use of market-based approaches to managing greenhouse gas emissions; the role of forestry and natural resource management in mitigating greenhouse gas emissions; and the design of carbon and offset markets in the context of broader climate change policies. CROSSLISTED as MNR 500. PREREQS: MTH 111 or equivalent.
FES 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.

FES 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

FES 505. READING AND CONFERENCE (116). Some sections graded $P / N$. This course is repeatable for a maximum of 16 credits.
FES 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
FES 507. SEMINAR (1-16). Some sections
graded A-F. This course is repeatable for a maximum of 16 credits.

FES 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

## FES 511. COMMUNITIES AND NATURAL

RESOURCES (5). Provides students from diverse backgrounds with interdisciplinary, experiential learning exposure to contemporary community and natural resource issues in rural Oregon. Social science concepts are employed to critically appraise current conditions and future prospects for rural, natural resource-dependent communities. This course is repeatable for a maximum of 15 credits.
FES 512. FOREST ENTOMOLOGY (3). Role of insects in natural and managed forests. Recognition of important forest insect pest groups and species, prediction of forest insect responses to environmental changes, and management strategies and treatments to protect forest resource values. PREREQS: BI 204 or BI 211 or Bl 211 H or BI 212 or BI 212 H or equivalent.

FES 520. POSING RESEARCH QUESTIONS (3). Acquaints beginning graduate students in the natural resources to the scientific method and formation of good researchable questions.
The course consists of lectures, readings and discussions. Concepts in the course are reinforced and amplified by discipline-specific companion modules. Students prepare and orally present a researchable question in their area of interest that is critiqued by the class and instructors.
FES 521. NATURAL RESOURCE RESEARCH
PLANNING (3). Research planning and study plan development, investigative procedures, the principles and ethics of natural resource science, principles and practices in scientific communication.
FES 522. RESEARCH METHODS SOCIAL SCIENCE (4). An introduction to research methods applied to social science issues and problems. Emphasis is on the nature of the research process, how to conduct research, and how to interpret and disseminate research results. Lec/lab. CROSSLISTED as MNR 522. PREREQS: Upper-division or graduate level statistics.
FES 523. QUANTITATIVE ANALYSIS IN SOCIAL SCIENCE (4). Application and interpretation of statistical approaches to human dimensions of natural resources, recreation, and other social sciences. Emphasis is on an applied approach focusing on understanding data, selecting appropriate statistics for theoretical and managerial problems, using statistical software for analyses, and interpreting findings. PREREQS: (FES 522 or FOR 522) or equivalent and ST 511 or equivalent. Discuss course equivalency with professor.

FES 524. NATURAL RESOURCES DATA
ANALYSIS (4). Hands-on experience in applied statistical modeling and data analysis for natural resources. Emphasis is on understanding of statistical models and the application and actual implementation of statistical analysis techniques, use of statistical software for analyses (e.g., R), and interpretation of findings. Students analyze data from their own research for final projects. PREREQS: ST 511 [B] and ST 512 [B]
FES 530. FOREST AS CLASSROOM (4). Investigates instructional methods used to teach K-12 students about natural resources. Reveals how forest exploration can be used as a means to teach others about science, ecology, mathematics, social science, and history. Provides an opportunity for future teachers, naturalists, interpreters, and scientists to improve their teaching and communication skills.
FES 533. PLANNING AGROFORESTRY PROJECTS (2). Helps forestry and other natural resource students understand various agroforestry concepts, systems and technologies and practices worldwide. Lays the groundwork for students to identify different systems,
characterize socio-economic conditions and plan sustainable agroforestry systems. Class activities examine how biological, economic, and social factors influence agroforestry farming decisions. PREREQS: BOT 341 and/or equivalent course in ecology.
FES 535. GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK (3). A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. Lec/rec. CROSSLISTED as B 435/BI 535, BI 435H, MCB 535, TOX 435/TOX 535, TOX 435H. PREREQS: One quarter each of biology and chemistry helpful but not essential.
FES 536. CARBON SEQUESTRATION IN FORESTS (2). Examines processes controlling the sequestration of carbon in the forest system including the forest itself and wood products. Also examines how forests can be managed to sequester carbon as well as the important economic, policy, and other constraints. Lectures readings, discussion, simulation models, and home work will be used to cover the material. PREREQS: Undergraduate-level biology or ecology.
FES 537. BELOWGROUND ECOSYSTEMS (3). Physical and biological components and their interactions in different soil ecosystems with description and examination of the relationships between producers and decomposers in the soil. PREREQS: Undergraduate level Biology or Ecology courses. BS degree in arts, humanities or science.

## FES 538. VALUATION OF NON-MARKET

 RESOURCES (3). Focuses on the theory and methods for estimating the economic value of non-market resources (e.g. clean air and water, biodiversity, nature-based recreation, etc.) Blends the theory and econometrics of nonmarket valuation through hands-on applications of methods with real datasets. The valuation of non-market resources is a burgeoning field within applied economics and should continue to grow in both importance and applications. PREREQS: AREC 512 or ECON 512 or equivalent.FES 540. WILDLAND FIRE ECOLOGY (3). Fire histories and ecology of major forest, rangeland, and wetland ecosystems. Includes fire interactions with physical and biotic components of ecosystems, role of fire in ecological processes, and utilization in natural resource management.
PREREQS: Junior or senior standing, with course work in ecology and natural resource management.

FES 543. ADVANCED SILVICULTURE (3).
The scientific basis of forest regeneration and silvicultural practices and prescriptions in immature and mature stands. Field trips are required. Lec/lab. PREREQS: FOR 442 and FOR 443

FES 545. ECOLOGICAL RESTORATION
(4). Fundamentals of restoring and reclaiming disturbed landscapes and ecosystems. Topics to be covered include types and assessment of site conditions; determining restoration goals and feasibility; hydrologic; biotic, and soil functions and their importance in restoration; and measures of successful restoration. CROSSLISTED as FW 545. PREREQS: BI 370 or BI 370H, equivalent course work, or instructor approval required
FES 546. ADVANCED FOREST COMMUNITY ECOLOGY (4). Fundamental concepts of community including disturbance, diversity and succession. Strong emphasis on field skills and data interpretation. Saturday field trip required Lec/lab.
FES 547. ARBORICULTURE (4). The principles and practices of arboriculture, the art and science of selecting, planting, establishing and maintaining trees in urban, suburban, commercial and residential landscapes. Lec/lab. CROSSLISTED
as HORT 547. PREREQS: (FES 141 or FES 241 or HORT 226 or HORT 228) and (FOR 111 or HORT 112)

FES 548. INVASIVE PLANTS: BIOLOGY,
ECOLOGY AND MANAGEMENT (3). Concepts of plant physiology, genetics and population dynamics are used to understand how plant invasions occur and some communities continue to exist. Management implications are explored.

FES 550. TROPHIC CASCADES (2-3).
Theory and empirical analysis of terrestrial carnivore effects on plants and ecosystems as mediated through herbivores. Emphasis on large carnivores, frequency/strength of trophic cascades, implications for ecosystem function, management, and restoration. Lectures, current literature, discussions, field exercise, term paper and student presentations. CROSSLISTED as FW 550. This course is repeatable for a maximum of 3 credits.

FES 552. FOREST WILDLIFE HABITAT
MANAGEMENT (4). Management of terrestrial vertebrates in forest ecosystems. Effects on silvicultural practices and landscape pattern on habitats and populations. Lec/lab. CROSSLISTED as FW 552. PREREQS: FOR 341 or equivalent course in ecology.

FES 554. MANAGING AT THE WILDLAND-
URBAN INTERFACE (3). Course targets fire-prone communities where resource professionals need to work cooperatively with ocal and federal agencies and citizens to gain acceptance for fire management programs and build joint responsibility for fuel reduction activities PREREQS: FOR 111 (Not required of Ecampus students)
FES 555. URBAN FOREST PLANNING, POLICY AND MANAGEMENT (4). Examination of planning, policy, and management strategies used in the stewardship of urban natural resources. Fundamentals for developing effective programs to maximize the economic, environmental, and social values and benefits of urban forest landscapes. CROSSLISTED as HORT 555. PREREQS: FES 350 or HORT 350 for undergraduates.

FES 558. CONCEPTS OF FOREST
RECREATION PLANNING AND MANAGEMENT (3). Examines research that forms the conceptual basis for tools, techniques, and approaches used in recreation planning and management. PREREQS: Senior or graduate standing.
FES 560. GREEN INFRASTRUCTURE (4).
Explores the relationship between the natural and built environments in cities and examines how planning for and managing green infrastructure assets (such as urban tree canopy, watersheds, and natural areas) increases economic health, community livability and ecological resilience in cities.

FES 561. PHYSIOLOGY OF WOODY PLANTS
(3). The structure, growth and physiological processes of trees and shrubs. PREREQS: ((CH 231 or CH 231 H ) and ( CH 232 or CH 232 H ) and (CH 233 or CH 233 H )) and CH 331 and CH 332 and BOT 331

FES 565. URBAN FORESTRY LEADERSHIP (2).
Examines the application of leadership theories and principles to the decision-making, policy creation, and effective administration of urban forestry programs in the public, private, and nonprofit sectors. Taught via Ecampus only.
FES 577. AGROFORESTRY (3). Theory and worldwide practice of multiple-crop low input sustainable systems involving concurrent production of tree and agricultural products Biological, economic, social, and political factors that underlie the application of agroforestry technology. CROSSLISTED as NR 477, RNG 477/ RNG 577. PREREQS: Any basic ecology course.

FES 580. WRITING SCIENTIFIC MANUSCRIPTS (1). Discussion of parts of a scientific manuscript and the submission, review, and publication
process. Brief presentations and discussion of examples provided by the instructor and students. Students write their own manuscripts and work in teams to provide feedback on manuscript components. PREREQS: Instructor permission required (students must be in the proper stage of their research and writing).

FES 585. CONSENSUS AND NATURAL
RESOURCES (3). Students will use a working group approach. They will select a natural resource topic, study the team process and interaction as a method of learning, explore the issue using systems practice, and strive for consensus on solutions to their issue. CROSSLISTED as ANS 485, FW 485/585, SOC 485/SOC 585.
FES 593. ENVIRONMENTAL INTERPRETATION
(4). Interpretation of natural and cultural features in parks, museums, and similar settings. Emphasis on learning and applying effective communication techniques in the development of brochures, exhibits, talks, museums, and visitor centers.
FES 599. SELECTED TOPICS IN FOREST SCIENCE (1-16). In-depth studies of specific opics within a field of specialization. Examples include biotechnology in forestry, mycorrhizal ecology, tree improvement, landscape ecology, global climatic change in relation to forestry, advanced silviculture prescriptions, agroforestry, and others. This course is repeatable for a maximum of 16 credits.
FES 600. GLOBAL CHANGE ECOLOGY: IMPACTS, MITIGATION, AND ADAPTATION (3). An interdisciplinary discourse on what is known about global change and dynamics of the earth system, including principles of climate, influences on ecosystem functioning and connectivity needed to understand responses of the earth system to human activities.

FES 601. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.

FES 603. THESIS (1-16). This course is
repeatable for a maximum of 999 credits.
FES 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
FES 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
FES 629. TEACHING PRACTICUM IN FOREST SCIENCE (1). Preparation of graduate students in forest science and related disciplines for their first teaching experiences. Using concepts and information introduced in the class, students will develop the curriculum for one credit of collegelevel instruction (or an equivalent approved by the instructor) in a topic of their choice.

FES 646. FOREST ECOSYSTEMS ANALYSIS AND APPLICATION (4). The structure and function of forests and associated streams in natural and managed landscapes; application of ecosystem analysis to policy management decisions; roles of models; scaling from individual processes to ecosystems, landscapes, and beyond. Required classroom discussions, field trip. PREREQS: College-level ecology/biology, chemistry, and math; familiarity with Excel.
FES 699. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## - MASTER OF NATURAL RESOURCES COURSES

MNR 500. MARKET TOOLS FOR MANAGING GREENHOUSE GAS EMISSIONS (3). Examines the use of market-based approaches to managing greenhouse gas emissions; the role of forestry and natural resource management in mitigating greenhouse gas emissions; and the design of carbon and offset markets in the context of broader climate change policies. CROSSLISTED as FES 500. PREREQS: MTH 111 or equivalent.

MNR 511. INTRODUCTION TO SUSTAINABLE NATURAL RESOURCES (3). Overview of economic, environmental, social, cultural, ethical, and policy considerations of sustainable natural resource management. International collaborative efforts to address global natural resource issues. Key policy drivers, key stressors, balancing competing interests. Introductory course required for all Master of Natural Resources students; open to other graduate students. Taught via Ecampus only. PREREQS: Bachelor's degree. Recommended: Undergraduate biology or ecology course.

## MNR 522. RESEARCH METHODS SOCIAL

SCIENCE (4). An introduction to research methods applied to social science issues and problems. Emphasis is on the nature of the research process, how to conduct research, and how to interpret and disseminate research results. Lec/lab. CROSSLISTED an FES 522. PREREQS: Upper-division or graduate level statistics.
MNR 530. TROPICAL FOREST ECOLOGY AND MANAGEMENT: A GLOBAL PERSPECTIVE (3).
Study of tropical forest ecology and the common ecological patterns found within tropical forests. The threats and challenges that tropical forests face in the 21st century and the issues of human use and their impacts. Developing strategies for sustainable management and restoration approaches to alleviate pressure on remaining tropical forests. Taught via Ecampus only.

## MNR 538. ADAPTING FORESTS TO CLIMATE

 CHANGE (3). Climate change is expected to have profound effects on forests. Society can respond by managing in forests in ways that can help mitigate climate change or help forests adapt. Nonetheless, changes in climate and forest responses are uncertain, making management and policy decisions difficult and controversial. We will investigate the effects of climate change on forests, focusing on potential forest management and policy responses.MNR 550. CLIMATE CHANGE IMPACTS ON FOREST ECOSYSTEMS (3). Forest management responses to climate change will rely on understanding the mechanisms of interaction between forests and climate, as well as the capacity to evaluate impacts of future climate scenarios on forests. This course will consider effects of rising CO2 and changing climate at the level of ecophysiological processes, changes in species distribution, changes in disturbance regimes, and ecosystem-level impacts mediated by the water, carbon, and nitrogen cycles. Modeling approaches will include statisticallybased bioclimatic envelopes, and dynamic global vegetation models that treat ecosystem processes and changes in biome distribution. PREREQS: A basic ecology course is highly recommended. Students should have a bachelor's degree in the arts, humanities, or science and preferably at least two years experience working in a natura resources-related field. Students seeking the FCC Graduate Certificate should take SNR 511 their first term because it explains overall certificate program goals.
MNR 560. MASTER'S CASE STUDY (1-9).
Capstone project integrating course work, readings, and assignments to address complex natural resource problems of local or regional importance. Taught via Ecampus only. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 9 credits.
NR 201. MANAGING NATURAL RESOURCES
FOR THE FUTURE (3). Overview of the
complexities involved in managing natural resources of the Pacific Northwest. Exposure to major natural resource issues of the region. Development of critical thinking skills useful in seeking solutions.
NR 202. NATURAL RESOURCE PROBLEMS
AND SOLUTIONS (3). Exploration of the multiple components (ecological, social, political, ethical)
of selected natural resource problems. Uses case studies to illustrate how social and biophysical characteristics of environmental problems influence the methods used to try to solve these problems and their potential for success. PREREQS: NR 201 is recommended but not required.

NR 312. CRITICAL THINKING FOR NATURAL RESOURCE CHALLENGES (3). Provides an introduction to critical thinking as it applies to issues and problems in natural resources. Attention is given to formal argument analysis, fallacies of argumentation, and critical scientific and philosophical concepts. PREREQS: Sophomore standing desirable

## NR 325. SCIENTIFIC METHODS FOR

ANALYZING NATURAL RESOURCE
PROBLEMS (3). Approaches to disciplinary and interdisciplinary problem analysis in natural resources. Introduces systems thinking and the benefits and limitations of different tools used to integrate information from multiple disciplines and stakeholders. Applications of alternative analysis tools are illustrated through selected forest-related case studies. Lec/lab. PREREQS: MTH 111 [C-] or Placement Test MPAL(060) and /or (ST 201 or ST 351 or equivalent) and NR 201
NR 351. *WHEN SCIENCE ESCAPES THE LAB:
SCIENCE AND RESOURCE MANAGEMENT
(3). Role of science in solving natural resource problems. Selecting the "best available science." How science is portrayed, filtered, and used by the media and interests groups to affect policy and management. Analysis of case studies on use of science in natural resource decision making. Lec/ lab. (Bacc Core Course) PREREQS: Sophomore standing. NR 312 recommended.

NR 399. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

NR 401. RESEARCH AND SCHOLARSHIP (1-
16). This course is repeatable for a maximum of 16 credits.
NR 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
NR 405. READING AND CONFERENCE (1-9). This course is repeatable for a maximum of 18 credits.

NR 406. PROJECTS (1-9). This course is repeatable for a maximum of 16 credits.

NR 407. SEMINAR (1-9). This course is
repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.

NR 410. INTERNSHIP (1-6). This course is repeatable for a maximum of 12 credits.

NR 455. NATURAL RESOURCE DECISION
MAKING (4). Students will participate on collaborative planning teams that effectively engage stakeholders in the decision making process, and offer sound natural resource decisions that are supported by multiple interests. PREREQS: Senior standing.
NR 477. *AGROFORESTRY (3). Theory and worldwide practice of multiple-crop low input sustainable systems involving concurrent production of tree and agricultural products. Biological, economic, social, and political factors that underlie the application of agroforestry technology. CROSSLISTED as FES 477/FES 577, RNG 477/RNG 577. (Bacc Core Course) PREREQS: Introductory course in biology.
NR 499. SPECIAL TOPICS (1-16). This is a hybrid course when offered by Ecampus. This course is repeatable for a maximum of 16 credits.

NR 499H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

## © SUSTAINABLE NATURAL RESOURCES COURSES

SNR 506. INDEPENDENT PROJECT IN
NATURAL RESOURCE SUSTAINABILITY (2).
Students identify, pose, frame, and analyze the various components of an important natural resource sustainability problem within their country, region, or organization and, at the end of term, present a workplan for its resolution. Oral and written reports are expected. Graded P/N. PREREQS: Admission to SNR Graduate Certificate Program and non-degree/credential seeking students.
SNR 511. SUSTAINABLE NATURAL
RESOURCE DEVELOPMENT (1). Using
readings, class discussions, and field trips, we introduce the program sessions and pedagogical methods, familiarize students with basic working definitions of sustainability, and build capacity to work as group on a common project. PREREQS This is an introduction to the 18-credit Graduate Certificate in Sustainable Natural Resources (SNR) and is also open to other graduate students and non-degree/credential seeking students. For students who have been admitted to the SNR Graduate Certificate Program, this course should be taken during the first term.
SNR 520. SOCIAL ASPECTS OF SUSTAINABLE
NATURAL RESOURCES (3). Using readings, personal experiences, and class discussions, students explore five principles of socially sustainable natural resource management, and review the role they play in creating natural resource-based sustainable communities. PREREQS: Graduate standing. Highly recommended: SNR 511. Recommended: Students should have a bachelor's degree in the arts, humanities, or science and preferably at least two years' experience working in a natural resources-related field. Students seeking the SNR Graduate Certificate should take SNR 511 their first term because it explains overall certificate program goals. There are no prerequisites for non-degree seeking students other than graduate standing. Part of the Sustainable Natural Resources Graduate Certificate program; also open to other graduate students and non-degree/ credential seeking students.
SNR 521. ECONOMICS OF SUSTAINABLE NATURAL RESOURCE MANAGEMENT (3)
Focuses on the sources of market failure, the means of correcting market failure, and the real-world examples of making progress toward sustainable resource use by means of market mechanisms. PREREQS: Recommended: Students should have a bachelor's degree in the arts, humanities, or science and preferably at least two years' experience working in a natura resources-related field. Students seeking the SNR Graduate Certificate should take SNR 511 their first term because it explains overall certificate program goals. There are no prerequisites for non-degree seeking students other than graduate standing. Part of the Sustainable Natural Resources Graduate Certificate program; also open to other graduate students and non-degree/ credential seeking students.

## SNR 522. BASIC BELIEFS AND ETHICS IN

 NATURAL RESOURCES (3). Examines basic philosophies and ethical systems in American forestry, including Pinchot's agricultural/utilitarian approach and Leopold's biotic/ecological model, compares them to contemporary public attitudes and considers their implications for sustainability. PREREQS: Part of SNR Graduate Certificate, and also open to other graduate students and nondegree/credential seeking students.SNR 530. ECOLOGICAL PRINCIPLES OF SUSTAINABLE NATURAL RESOURCES (3). Focus an ecological sustainability and ecological concepts and principles, with examples drawn from forests and arid lands. Exploration of global ecosystems, ecological processes and services, factors that create and maintain
diversity, ecosystem health and integrity. Principles for sustainable natural resource management and use. PREREQS: Graduate standing. Highly recommended: Basic ecology course. Recommended: Students should have a bachelor's degree in the arts, humanities, or science and preferably at least two years' experience working in a natural resourcesrelated field. Students seeking the SNR Graduate Certificate should take SNR 511 their first term because it explains overall certificate program goals. There are no prerequisites for non-degree seeking students other than graduate standing. Part of the Sustainable Natural Resources Graduate Certificate program; also open to other graduate students and non-degree/credential seeking students.

SNR 531. SUSTAINABLE SILVICULTURE AND FOREST CERTIFICATION (3). Strategies for sustainable silviculture, and measuring and verifying environmental performance (including certification systems) are examined using classroom lectures, case studies, and field exercises. Part of the 18-credit Sustainable Natural Resources (SNR) Graduate Certificate; also open to other graduate students. PREREQS: Graduate standing. Recommended: Students should have a bachelor's degree in the arts, humanities, or science and preferably at least two years' experience working in a natural resourcesrelated field. Students seeking the SNR Graduate Certificate should take SNR 511 their first term because it explains overall certificate program goals. There are no prerequisites for non-degree seeking students other than graduate standing. Part of the Sustainable Natural Resources Graduate Certificate program; also open to other graduate students and non-degree/credential seeking students.

SNR 532. PLANNING AGROFORESTRY PROJECTS (2). Develop basic understanding and appreciation of agroforestry concepts, systems, technologies and practices as used and applied in tropical and temperate zones of the world. PREREQS: SNR 530 or equivalent course in ecology and SNR 511 are corequisites. Part of SNR Graduate Certificate; also open to other graduate students and non-degree/credentia seeking students.
SNR 533. ALTERNATIVE (NONTIMBER) FOREST PRODUCTS (2). Explores the economic, environmental, and sociocultural components of understanding and managing alternative forest products, also known as nontimber forest products (NTFPs), while considering other natural/social resources. Part of the 18-credit Sustainable Natural Resources (SNR) Graduate Certificate; also open to other graduate students. PREREQS: Graduate standing. Recommended: Students should have a bachelor's degree in the arts, humanities, or science and preferably at least two years' experience working in a natural resourcesrelated field. Students seeking the SNR Graduate Certificate should take SNR 511 their first term because it explains overall certificate program goals. There are no prerequisites for non-degree seeking students other than graduate standing. Part of the Sustainable Natural Resources Graduate Certificate program; also open to other graduate students and non-degree/credential seeking students.

## SNR 534. REDUCED IMPACT TIMBER

HARVEST (2). Explores planning, implementation, monitoring, and evaluation of reduced impact timber harvesting. Part of the 18-credit Sustainable Natural Resources (SNR) Graduate Certificate; also open to other graduate students. PREREQS: Graduate standing. Recommended: Students should have a bachelor's degree in the arts, humanities, or science and preferably at least two years' experience working in a natural resourcesrelated field. Students seeking the SNR Graduate Certificate should take SNR 511 their first term because it explains overall certificate program goals. There are no prerequisites for non-degree
seeking students other than graduate standing and non-degree/credential seeking students

SNR 535. SUSTAINABLE MANAGEMENT OF AQUATIC AND RIPARIAN RESOURCES (3). Explores integrated strategies for sustainable management of watersheds, estuaries, coastal zones, and aquatic resources. Special emphasis given to links between land uses and aquatic environments. Part of the 18-credit Sustainable Natural Resources (SNR) Graduate Certificate; also open to other graduate students. PREREQS: Graduate standing. Recommended: Students should have a bachelor's degree in the arts, humanities, or science and preferably at least two years' experience working in a natural resourcesrelated field. Students seeking the SNR Graduate Certificate should take SNR 511 their first term because it explains overall certificate program goals. There are no prerequisites for non-degree seeking students other than graduate standing. Part of the Sustainable Natural Resources Graduate Certificate program; also open to other graduate students and non-degree/credential seeking students.

SNR 540. GLOBAL ENVIRONMENTAL CHANGE
(3). Explore biophysical and social sciences that underlie contemporary global change issues: global biogeochemical cycles, climate system, climate change, threats to biodiversity; human dimensions of climate change, globalization, land cover and land use change, global environmental governance and management tools. PREREQS: Graduate standing. Highly recommended: Basic biology course. Recommended: Bachelor's degree in arts, sciences, or humanities; preferably at least two years working in a natural resourcesrelated field. Part of the SNR Graduate Certificate Program; also open to other graduate students and non-degree/credential seeking students

SNR 808. WORKSHOP (1-4). This course is repeatable for a maximum of 4 credits.

## - TOURISM AND OUTDOOR LEADERSHIP COURSES

TOL 130. INTRODUCTION TO OUTDOOR AND ADVENTURE PROFESSIONS (3). Outdoor and adventure professions will be explored. Introduces students to practical and conceptual aspects of land and water trips in outdoor tourism, adventure, and educational settings. Innovative people and products will be examined in the context of outdoor and adventure professions and their impact; past, present, and future.
TOL 132. *FOUNDATIONS AND HISTORY OF OUTDOOR AND ADVENTURE PROFESSIONS (3). History, evolution, and theoretical underpinning of outdoor and adventure professions as an important and evolving feature of Western culture within the United States and beyond. Influential ideas, paradigm shifts, events, and developments that have led to professionalism, institutionalization, dissemination, and impact on other subject areas and professions. Impact of other cultures on current state of the professions. (Bacc Core Course)
TOL 270. PRE-INTERNSHIP SEMINAR
(1). Exploration of career goals, internship opportunities, and the variety of practice areas in the tourism and outdoor leadership (TOL) professions. Student preparation in planning, obtaining, and completing TOL internships. The course is designed to assist undergraduate majors in TOL prepare for the required internship. PREREQS: Tourism and Outdoor Leadership (TOL) majors only.

## OL 370. DESIGN AND MANAGEMENT OF

 OUTDOOR EXPERIENCES (4). Introduction to pedagogical, administrative, and organizational knowledge, skills, and dispositions for effective design and management of effective short and extended duration outdoor experiences in wilderness-like areas. Covers personnel logistics, site planning, itinerary planning, educational and skills progression, communication with volunteersand program contacts, budgets. PREREQS: TOL 375 [D-] and /or similar WIC class, junior standing

TOL 372. ETHICS AND ADVENTURE LEADERSHIP (3). Examines ethical issues and situations inherent in adventure leadership and other experiential education settings. Leading adventure programs entails judgment-laden decisions that are made every hour of every day with regards to participants, leaders, and programs. Students will become familiar with predominant ethical theories and apply these theories to practical situations with a view to assessing the values that influence their decisions and subsequent actions. Students will better understand how their decisions influence their professional work and those of others within the context of adventure leadership. PREREQS: TOL 375 or other writing intensive course

TOL 373. WILDERNESS AND ADVENTURE
EDUCATION (4). Rationale for and methods used in the application of wilderness and outdoor adventure education programs in education, recreation, corporate and human service settings. Covers historical and contemporary philosophies and practices in adventure education, with a primary emphasis on outdoor adventure education. Explores the educational, social, and ethical consequences of outdoor adventure education programs. Also explores the role of wilderness in the context of the United States and differing views of what constitutes wilderness from an international perspective. PREREQS: TOL 375

TOL 375. ^EXPERIENTIAL EDUCATION (4). Theory, techniques, and practice of experiential education. Students will define learning objectives, design curriculum, develop teaching materials and effectively teach a variety of audiences. (Writing Intensive Course)

TOL 377. EXPEDITIONS I (4). Students will research, design, and plan a three- to fourweek extended backcountry expedition. Content includes determination of expedition purpose, length, and location, followed by planning and programming. Includes logistical arrangements, risk management procedures, and required permits. Students will design skill and knowledge progressions for participants. PREREQS: Instructor approval

TOL 378. TOURISM AND RECREATION DATA ANALYSIS (3). Introduce students to descriptive and inferential statistics. The focus is on 1) applying relevant statistical analyses to tourism and recreation data and 2 ) interpreting results. PREREQS: MTH 111
TOL 379. EXPEDITIONS II-LAND (10). Fieldbased course that develops the knowledge, skills, and dispositions needed to safely and effectively lead and participate in an extended land-based backcountry expedition of three weeks or longer. Includes a service component tied to a relevant local organization. PREREQS: TOL 377 [D-] and (HHP 253 (WAFA) or Wilderness First Responder (WFR)) and HHP 111 and HHP 255 and HHP 271 and HHP 273 and (HHP 294WG or HHP 294RC) and instructor approval.
TOL 380. EXPEDITIONS II-WATER (3). Fieldbased course that develops the knowledge, skills, and dispositions needed to safely and effectively lead and participate in an extended water-based backcountry expedition of one week or longer. ncludes a service component tied to a relevant local organization. PREREQS: TOL 377 [D-] and (HHP 253 (WAFA) or Wilderness First Responder (WFR)) and HHP 111 and HHP 255 and HHP 271 and HHP 273 and (HHP 294WG or HHP 294RC) and instructor approval.
TOL 401. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.
TOL 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
TOL 410. INTERNSHIP (1-16). Full-time supervised professional experience emphasizing
functional proficiency under joint sponsorship of university and agency personnel. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: FES 251 and FES 351 and FES 356 and FOR 391 and FOR 407-Section 020 are recommended and may be taken concurrently. Departmental approval required.

TOL 474. ENTREPRENEURSHIP IN TOURISM AND OUTDOOR LEADERSHIP (3). Creation and management of tourism and outdoor leadership businesses. Covers principles of running a successful business and includes special considerations for operations on public lands (e.g. concessionaires). PREREQS: BA 101

TOL 476. RISK MANAGEMENT IN TOURISM AND OUTDOOR LEADERSHIP (3). Risk management in tourism and outdoor leadership from an operational perspective. Focuses on risk in tourism and outdoor education programs as a contributing factor for learning, growth, and satisfaction of client motivations. Covers the nature of accidents in outdoor settings, addresses the practitioner's perspective of risk in the field, and describes theories and methods of implementing risk management. Covers the ethics of utilizing risk and potentially dangerous activities as a basis for enhancing client education and experience. PREREQS: TOL 478 [D-]
TOL 477. ADVENTURE THERAPY (3). Provides students with an overview of adventure therapy, including its history, theory, current status and future trends. Includes program design, ethical issues, and best practices in the field.
TOL 478. LEGAL ISSUES IN TOURISM AND OUTDOOR LEADERSHIP (3). Covers the legal dimensions of tourism and outdoor leadership activities. Students will learn about the civil and criminal judicial system from a tourism and outdoor leadership perspective. They will learn to apply risk management methodologies and instruments, such as contracts, insurance, waivers and releases to address legal liability. The basic principles of intentional and negligent torts will be discussed, with an emphasis on practical applications. Also covers employment issues and general business law, including business structure and the use of entities as liability shields. PREREQS: TOL 375 [D-] or FOR 375 [D-]

## TOL 479. *NATURE AND THE HUMAN

EXPERIENCE (3). Examines the human experience with (and within) nature from biological, psychological, spiritual, and international/cultural perspectives. Identifies opportunities for fostering the human-nature connection to achieve organizational goals and individual and societal health. (Bacc Core Course) PREREQS: TOL 375 or other equivalent WIC course.
TOL 499. SPECIAL TOPICS (1-16). Topics of current importance in forest resources issues, education, policies, economics, management, business, social values, silviculture, and biometrics. Topics will change from term to term. May be repeated with different topics for credit. Section 8: Social aspects of natural resource management (3 credits) graded. This course is repeatable for a maximum of 16 credits. PREREQS: Senior or graduate standing.

## FOREST ENCINEERING, RESOURCES AND <br> MAMACEMENT

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## FACULTY

Professors Bailey, Fitzgerald,
J. Johnson, Landgren, Maguire, Montgomery, Reed, Sessions ${ }^{\mathrm{PE}}$, Temesgen Associate Professors Bennett, Bowers, Chung, Davis, Hatten, Olsen, Parker, Punches, Shaw, Wing ${ }^{\text {cwre, Pe, PIS }}$
Assistant Professors Belart, Bladon, Cushing, Gonzalez-Benecke, Kuusela, LeBoldus, Leshchinsky ${ }^{\text {PE }}$, Segura, Souder, Strimbu
Senior Instructors Huntington, Wimer
Instructors Kiser, Powers
Emeritus D. Adams, P. Adams, Atkinson, Bell, Boyle, Brodie, Brown, Elwood, Fletcher, Garland ${ }^{\mathrm{PE}}$, Hann, Hermann, Hobbs, Kellogg, Murphy, Newton, Olsen, Pyles ${ }^{\mathrm{PE}}$, Skaugset ${ }^{\text {RPF }}$,Tappeiner, Tesch, Walstad

## COURTESY/AFFILIATE FACULTY

Ager, Amisher, Anderson, Argerich, Brungardt, Clark, Danehy, Dombeck, Ferreiro, Fried, Kerns, Gould, Latta, Light, McDonnell, McNassar, Monleon, Moriarty, Sloat, Sobota, Stednick, Strunk, White, Zald, Zamora
cwre Certified Water Right Examiner
${ }^{\text {PE }}$ Registered Professional Engineer in one or more states
${ }^{\text {RPF }}$ Registered Professional Forester in one or more states
${ }^{\text {PLS }}$ Registered Professional Land Surveyor in one or more states

## Undergraduate Majors

Forest Engineering (BS, CRED, HBS)
Forest Engineering-Civil Engineering
(Two BS degrees) (BS, CRED, HBS)
Forestry (BS, HBS)

## Options

Forest Management
Forest Operations Management
Forest Restoration and Fire
Undergraduate Minor
Forestry

## Graduate Major

Sustainable Forest Management (MF, MS, PhD)
Graduate Areas of Concentration Engineering for Sustainable Forestry
Forest Biometrics and Geomatics

Forest Operations Planning and Management
Forest Policy Analysis and Economics
Forest Soil and Watershed Processes
Silviculture, Fire, and Forest Health

## Affiliated Interdisciplinary <br> Graduate Major

Applied Economics (MA, MS, PhD) (See
Graduate School)
Water Resources Engineering
Water Resources Policy and Management
Water Resources Science

## Graduate Minor

Sustainable Forest Management
The mission of the Department of Forest Engineering, Resources and Management (FERM) is to develop, communicate, and teach the science, knowledge and engineering necessary for the sustainable management of forest, land, and water resources to achieve economic, environmental, and social objectives. Teaching and research focus on support and enhancement of active forest management across the full range of owner objectives, from ecosystem restoration to timber production. FERM includes biologists, engineers, economists, biometricians, hydrologists, silviculturists and applied ecologists.
The Department of Forest Engineering, Resources and Management offers undergraduate degree programs leading to professional practice in forestry and forest engineering. It also offers more broadly defined graduate programs at the master's and doctorate levels in Sustainable Forest Management, including six areas of concentration.

## FORESTRY <br> UNDERGRADUATE PROGRAM

The forest management profession requires an understanding of natural resource systems and the management of forest resources for multiple uses. The Bachelor of Science (BS) degree in Forestry provides a broad-based education with the goal of preparing students to be successful forest managers. Graduates must understand biological and physical processes occurring in forests, the social and economic forces that influence policies and actions affecting forests, natural resource systems, and management of forest resources for multiple uses. Students also learn how values affect forest management planning so they can communicate effectively with others and make relevant decisions.
The core curriculum provides a broadbased education which includes basic courses in the biological, physical, social sciences, as well as professional courses designed to prepare students to manage forest resources. The Forestry BS also re-
quires six months of relevant work experience intended to provide the enhanced understanding of the professional workplace. Students are required to select one of three options and serves to fulfill the 180 credits for graduation:

## - Forest Management

- Forest Operations


## Management

- Forest Restoration and Fire

Graduates are employed by private and public organizations. The private sector includes the timber and forest products industry, forestry consulting firms, environmental organizations, and selfemployment. Public employers include federal, state, and local government agencies such as the U.S. Forest Service, Bureau of Land Management, National Park Service, and state departments of forestry and natural resources.

The Bachelor of Science degree in Forestry is accredited by the Society of American Foresters.

## FOREST ENGINEERING

UNDERGRADUATE PROGRAM
The Forest Engineering Undergraduate Program provides an engineering education within a strong forestry context. The program is founded on fundamental principles of forest science and engineering science. Forest Engineering program objectives are to prepare graduates to plan and implement complex forestry and natural resource operations that help meet global demands for wood products while sustaining water, habitat, and other forest resources. It provides "work-ready" graduates for entry into the diverse professional field of forest engineering. Early career accomplishments include harvest unit design, forest road location and design, contract inspection and administration, cost analysis, and forest transportation management. Mid-career accomplishments commonly expand to involve aspects of engineering management, including planning and budgeting, supervision, wood supply procurement, harvest and road design reviews, and scheduling and controlling forest operations.

Specifically, the Forest Engineering Undergraduate Program provides fundamental coverage of the following:

- Fundamental engineering and forestry principles
- Physical and biological aspects of soil and water resources
- Surveying and measurement of land and forest resources
- Analysis and design of the forest transportation system
- Analysis and design of harvesting operations
- Economics and operational planning principles
Integration of these topics enables forest engineering graduates to develop
and manage safe, economical, and environmentally sound forest operations. Design experiences that integrate the topics listed above and steadily build on previous course material are distributed throughout the upper-division portion of the program. The Forest Engineering capstone sequence during the senior year provides an opportunity for students to bring together all the topics from the curriculum in a project framework that includes the field and office engineering tasks associated with the planning and design of forest operations. The capstone sequence is integrated with the Forestry capstone sequence to provide realistic interdisciplinary planning and design experience.

Forest engineering graduates are employed by private forestry firms, public forestry agencies, logging and construction companies, engineering consulting firms, and surveying firms. Some graduates establish their own consulting businesses after a few years of field experience. Career progression following graduation can be quite varied. Some graduates gravitate toward technical positions while others move quickly toward management of harvesting and other forest operations, or more broadly defined management of the forest land base.

The Bachelor of Science degree in Forest Engineering can be earned through completion of the Forest Engineering program or the Forest Engineering-Civil Engineering double degree program. The BS degree in Forest Engineering is accredited by the Engineering Accreditation Commission of ABET, http://www. abet.org/.

The BS in Forest Engineering is also accredited by the Society of American Foresters.

Completion of the five-year, doubledegree Forest Engineering-Civil Engineering program results in a BS in Forest Engineering and a BS in Civil Engineering, offered by the School of Civil and Construction Engineering. The BS in Civil Engineering is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org/.

Forest engineering is a licensed profession in the state of Oregon. The BS in Forest Engineering meets the administrative rules established by the Oregon State Board of Examiners for Engineering and Land Surveying (OSBEELS) as evidence of adequate preparation for the Fundamentals of Engineering Examination, the first of two examinations required for professional engineering licensing. The BS in Forest Engineering, with the completion of appropriate program electives, also meets the OSBEELS administrative rules for evidence of adequate preparation for the Fundamentals of Land Surveying Examination, the first of two examinations
required for professional land surveyor licensing.

## UNDERGRADUATE MAJORS WITH OPTIONS

## FOREST ENGINEERING

(BS, CRED, HBS)
The BS degree in Forest Engineering is offered through a four-year resident curriculum and as part of a five-year double degree program from which graduates receive two bachelor of science degrees, one in forest engineering and one in civil engineering. The BS degree in Forest Engineering is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. The BS degree in Forest Engineering is also accredited by the Society of American Foresters. The double degree program is offered in cooperation with the School of Civil and Construction Engineering. Curricula for the double degree program is listed under a separate heading. Both programs begin with basic science and mathematics, progress on through engineering science and forest science, to arrive at profession-al-level courses in forest engineering that include surveying, soil and water resources, timber harvesting, operations analysis, road design, and planning. Graduates are eligible to take the Fundamentals of Engineering Examination.

In addition to the listed courses, all students are required to complete a total of six months of satisfactory employment in an area related to their major. This is usually accomplished by two or more summers of work, but it may include work during the academic year. Work performance and personal conduct are thoroughly appraised by the College of Forestry.

## PRE-PROFESSIONAL FOREST ENGINEERING PROGRAM

Admission to the pre-professional program requires that students be admitted as a degree-seeking undergraduate or post-baccalaureate level student at Oregon State University. Courses included in the first and sophomore years comprise a pre-professional program of study that produces a solid foundation for professional program studies at the junior, senior, and advanced degree levels. The pre-professional program may be taken at Oregon State University or at any accredited college or university that offers equivalent courses transferable to OSU in conjunction with foundation forestry available via OSU Ecampus.

## PROFESSIONAL FOREST ENGINEERING PROGRAM

Students must be admitted to the professional Forest Engineering program following completion of the pre-professional forest engineering course work in order
to progress to the junior year in forest engineering. Students in the double degree program also must be admitted to the College of Engineering professional program following completion of the pre-engineering course work.

Enrollment in professional program courses is restricted to those students who have clearly demonstrated an ability to achieve the standards required for professional studies. The number of students admitted to the program is based on available resources. Students meeting the minimum pre-forest engineering GPA of 2.25 may or may not be admitted depending on available resources.

Admission to the professional program will be granted for students meeting the admission requirements prior to fall term of the junior year. Application for the professional program will be made as of the end of winter term for the following fall term. For admission, students must earn:

1. a grade of " C " or better is required in all courses for the major (marked E on course list). Grade repeat (replacement) policy will follow OSU Academic Regulation 20.
2. a minimum GPA of 2.25 in all courses required for the major.
Students who have completed their pre-professional studies at a college or university other than Oregon State University must apply both to the OSU Office of Admissions for admission to OSU as a degree-seeking undergraduate or post-baccalaureate level student and to the College of Forestry for admission to the professional program. Application forms for the Forest Engineering professional program and information on policies and programs are available from the College of Forestry.

Students who have not satisfactorily completed all of the pre-professional courses when they apply may be provisionally accepted. Final acceptance is contingent on completion of any remaining pre-professional course work with grade of " C " or better by the end of the summer term prior to entrance into the professional program. Students who receive provisional acceptance and then fail to attain a grade of "C" or better in remaining pre-professional course work prior to the beginning of fall term will be re-directed to the pre-professional forest engineering program.

All required courses for admission to the professional program must be completed before entering the professional program. Students may only enter the professional program in the fall term each academic year.

The professional program begins with Forestry Field School prior to fall term of the professional program.

Pre-Professional Forest Engineering
Program (Major code 825)
Grade standards for the pre-professional program as listed in the program description apply.

## First Year (46-47 credits)

CH 201. Chemistry for Engineering Majors (3) ${ }^{\text {E }}$

COMM 111. *Public Speaking (3) ${ }^{\mathbf{1 E}}$
or COMM 114. *Argument and Critical
Discourse (3) ${ }^{1 \mathbf{E}}$
ECON 201. *Introduction to
Microeconomics (4) ${ }^{1 \mathbf{E}}$
FE 101. Introduction to Forest Engineering (2) ${ }^{\mathrm{E}}$

FE 102. Forest Engineering Problem Solving and Technology (3) ${ }^{\text {E }}$
FOR 111. Introduction to Forestry (3) ${ }^{\mathbf{E}}$
FES 240. *Forest Biology (4) ${ }^{\mathbf{1 E}}$
HHS 231. *Lifetime Fitness for Health (2) ${ }^{\mathbf{1}}$
HHS 241. *Lifetime Fitness (1) ${ }^{1}$
or any PAC course (1-2)
MTH 251. *Differential Calculus (4) ${ }^{\mathbf{1 E}}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}}$
MTH 254. Vector Calculus I (4) ${ }^{\mathbf{E}}$
PH 211. *General Physics with Calculus (4) ${ }^{1 \mathbf{E}}$

WR 121. *English Composition (3) ${ }^{1 \mathbf{E}}$ Free Electives (2)

## Sophomore Year (50-51 credits)

CCE 201. Civil and Construction Engineering Graphics and Design (3) ${ }^{\mathbf{E}}$
ENGR 211. Statics (3) ${ }^{\text {E }}$
ENGR 212. Dynamics (3) ${ }^{\mathbf{E}}$
ENGR 213. Strength of Materials (3) ${ }^{\mathbf{E}}$
FE 208. Forest Surveying (4) ${ }^{\mathbf{E}}$
FE 209. Forest Photogrammetry and Remote Sensing (4) ${ }^{\mathbf{E}}$
FE 257. GIS and Forest Engineering Applications (3) ${ }^{\mathbf{E}}$
FES 241. Dendrology (3) ${ }^{\text {E }}$
MTH 256. Applied Differential Equations (4) ${ }^{\mathrm{E}}$

PH 212. *General Physics with Calculus (4) ${ }^{1 \mathrm{E}}$

SOIL 205. *Soil Science (3) ${ }^{1 \mathbf{E}}$
and FOR 206. *Forest Soils Laboratory for SOIL 205 (1) ${ }^{1 \mathrm{E}}$
or SOIL 206. *Soil Science Laboratory for SOIL 205 (1) and FOR 208. Forest
Soils Recitation (1)
ST 201. Principles of Statistics (4) ${ }^{\mathbf{E}}$
WR 327. *Technical Writing (3) ${ }^{\mathbf{1 E}}$
Bacc Core Course (3)
Free Electives (2)

## Professional Forest Engineering Program (Major code 380)

Grade standards for the professional program as listed in the program description apply.
All students pursuing the BS in Forest Engineering;

1. must earn grades of " C " or better in all courses required for the major;
2. must maintain a 2.0 GPA in all courses required for the major.

## Junior Year ( $\mathbf{5 0}$ credits)

FE/FOR 307. Junior Seminar (1)
FE 310. Forest Route Surveying (4)
FE/FOR 312. Forestry Field School (2)
FE 315. Soil Engineering (4)

FE 316. Soil Mechanics (4)
FE 330. Forest Engineering Fluid Mechanics and Hydraulics (3)
FE 371. Harvesting Process Engineering (4)
FE 434. Forest Watershed Management (4)
FE 440. Forest Operations Analysis (4)
FE 470. Logging Mechanics (4)
FE 471. Harvesting Management (3)
FOR 321. Forest Mensuration (5)
FOR 331. Forest Resource Economics II (4)
FOR 441. Silviculture Principles (4)

## Senior Year (45-46 credits)

FE 415. Forest Road Engineering (3)
FE 416. Forest Road System Management (4)
FE/FOR 456. *International Forestry (3) ${ }^{\mathbf{1}}$ [or other CGI Bacc Core course]
FE/FOR 457. Techniques for Forest Resource Analysis (4)
FE/FOR 459. Forest Management Planning and Design I (4)
FE 460. $\wedge$ Forest Operations Regulations and Policy Issues (3)
or FOR 460. ${ }^{\wedge}$ Forest Policy (4)
FE/FOR 469. Forest Management Planning and Design II (4)
FE 480. Forest Engineering Practice and Professionalism (1)
FOR 330. Forest Resource Economics I (4)
GEOG 300. *Sustainability for the Common Good (3) ${ }^{1}$
or FW 350. *Endangered Species, Society
and Sustainability (3) ${ }^{1}$
Bacc Core Courses (9)
Free Electives (3)

## Total=192 credits

Curriculum Four-Year plan for the

## Forest Engineering major

## Year 1

## Fall Term

CH 201. Chemistry for Engineering Majors (3)

FE 101. Introduction to Forest Engineering (2)

FOR 111. Introduction to Forestry (3)
MTH 251. *Differential Calculus (4)
WR 121. *English Composition (3)

## Winter Term

ECON 201. *Introduction to
Microeconomics (4)
FE 102. Forest Engineering Problem Solving and Technology (3)
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1)
or any PAC course (1-2)
MTH 252. Integral Calculus (4)
Free Electives (1)

## Spring Term

COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
FES 240. *Forest Biology (4)
MTH 254. Vector Calculus I (4)
PH 211. *General Physics with Calculus (4)
Free Electives (1)

## Year 2

## Fall Term

ENGR 211. Statics (3)
FE 208. Forest Surveying (4)
MTH 256. Applied Differential Equations (4)

PH 212. *General Physics with Calculus (4) Free Electives (2)

## Winter Term

CCE 201. Civil and Construction Engineering Graphics and Design (3)
ENGR 213. Strength of Materials (3)
FE 209. Forest Photogrammetry and Remote Sensing (4)
FE 257. GIS and Forest Engineering
Applications (3)
ST 201. Principles of Statistics (4)

## Spring Term

ENGR 212. Dynamics (3)
FES 241. Dendrology (3)
SOIL 205. *Soil Science (3)
and FOR 206. *Forest Soils Laboratory for SOIL 205 (1)
or SOIL 206. *Soil Science Laboratory for SOIL 205 (1) and FOR 208. Forest
Soils Recitation (1)
WR 327. *Technical Writing (3)
Bacc Core Course (3)

## Year 3

## Fall Term

FE/FOR 312. Forestry Field School (2)
FE 330. Forest Engineering Fluid Mechanics and Hydraulics (3)
FE 371. Harvesting Process Engineering (4)
FE 434. Forest Watershed Management (4)
FOR 321. Forest Mensuration (5)

## Winter Term

FE/FOR 307. Junior Seminar (1)
FE 315. Soil Engineering (4)
FE 440. Forest Operations Analysis (4)
FE 470. Logging Mechanics (4)
FOR 331. Forest Resource Economics II (4)

## Spring Term

FE 310. Forest Route Surveying (4)
FE 316. Soil Mechanics (4)
FE 471. Harvesting Management (3)
FOR 441. Silviculture Principles (4)

## Year 4

## Fall Term

FE/FOR 457. Techniques for Forest Resource Analysis (4)
GEOG 300. *Sustainability for the Common Good (3) ${ }^{1}$
or FW 350. *Endangered Species, Society and Sustainability (3) ${ }^{\mathbf{1}}$
Bacc Core Courses (6)
Free Electives (3)

## Winter Term

FE 415. Forest Road Engineering (3)
FE/FOR 456. *International Forestry (3) ${ }^{\mathbf{1}}$ [or other CGI Bacc Core course]
FE/FOR 459. Forest Management Planning and Design I (4)
FE 460. ${ }^{\wedge}$ Forest Operations Regulations and Policy Issues (3) or FOR 460. ^Forest Policy (4)
FE 480. Forest Engineering Practice and Professionalism (1)

## Spring Term

FE 416. Forest Road System Management (4) FE/FOR 469. Forest Management Planning and Design II (4)
FOR 330. Forest Resource Economics I (4)
Bacc Core Courses (3)

Footnotes:
${ }^{\mathbf{E}}$ Required for entry into the professional program

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
${ }^{\mathbf{1}}$ Must be selected to satisfy baccalaureate core requirements.
Pre-Forest Engineering Major Code: 825


## Major Code: 380

FOREST ENGINEERING - CIVIL ENGINEERING (BS, CRED, HBS)
The Forest Engineering-Civil Engineering program results in a BS degree in Forest Engineering and a BS degree in Civil Engineering. The BS degree in Forest Engineering and the BS degree in Civil Engineering are both accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. The BS in Forest Engineering is also accredited by the Society of American Foresters. This unique five-year, double degree program is offered in cooperation with the School of Civil and Construction Engineering. This program begins with basic science and mathematics and progresses on through engineering science and forest science to arrive at professional-level courses in forest engineering that include surveying, soil and water resources, timber harvesting, operations analysis, road design, and planning. Graduates are eligible to take the Fundamentals of Engineering Examination.

In addition to the listed courses, all students are required to complete a total of six months of satisfactory employment in an area related to their major. This is usually accomplished by two or more summers of work, but it may include work during the academic year.

## Admission to the Pre-Professional Forest Engineering - PreProfessional Civil Engineering <br> Program

Admission to the pre-professional program requires that a student is admitted as a degree-seeking undergraduate or post-baccalaureate level student at Oregon State University. Courses included in the first and sophomore years comprise a pre-professional program of study that produces a solid foundation for professional program studies at the junior, senior, and advanced degree levels. The pre-professional program may be taken at Oregon State University or at any accredited college or university that offers equivalent courses transferable to OSU in conjunction with foundation forestry available via OSU Ecampus.

## Professional Forest EngineeringCivil Engineering Program

Students must be admitted to the professional forest engineering program following completion of the pre-professional forest engineering course work in order
to progress to the junior year in forest engineering. Students in the double degree program must also be admitted to the College of Engineering professional program prior to beginning the civil engineering junior year. Students should consult the College of Engineering for requirements of the College of Engineering professional program.

Enrollment in professional forest engineering program courses is restricted to those students who have clearly demonstrated an ability to achieve the standards required for professional studies. The number of students admitted to the program is based on available resources. Students meeting the minimum pre-forest engineering GPA of 2.25 may or may not be admitted depending on available resources.

Admission to the professional forest engineering program will be granted for students meeting the admission requirements prior to fall term of the junior year. Application for the professional program will be made at the end of winter term for the following fall term. For admission, students must earn:

1. a grade of "C" or better in all preprofessional courses required for entry into the professional program (marked with an $\mathbf{E}$ ). Grade repeat (replacement) policy will follow OSU Academic Regulation \#20.
2. a minimum GPA of 2.25 based on the pre-professional courses (or transfer equivalents) satisfactorily completed.
Students who have completed their pre-professional studies at a college or university other than Oregon State University must apply both to the OSU Office of Admissions for admission to OSU as a degree-seeking undergraduate or post-baccalaureate level student and to the College of Forestry for admission to the professional program. Application forms for the forest engineering professional program and information on policies and programs are available from the College of Forestry.

Students who have not satisfactorily completed all of the pre-professional courses when they apply may be provisionally accepted. Final acceptance is contingent on completion of any remaining pre-professional course work with grade of "C" or better by the end of the summer term prior to entrance into the professional program. Students who receive provisional acceptance and then fail to attain a grade of "C" or better in remaining pre-professional course work prior to the beginning of fall term will be re-directed to the pre-professional forestry program.

All required courses for admission to the professional program must be completed before entering the professional program. Students may only enter the
professional program in the fall term of each academic year.

The professional forest engineering program begins with Forestry Field School prior to fall term of the professional program.
Pre-Professional Forest Engineering
(825)-Pre-Professional Civil

Engineering (336) Program
Grade standards for the pre-professional program as listed in the program description apply.

## First Year (47-48 credits)

CCE 101. Civil and Construction
Engineering Orientation (2) ${ }^{\text {E }++}$
CH 201. Chemistry for Engineering Majors (3) ${ }^{\text {E }+}$

CH 202. Chemistry for Engineering Majors (3) ${ }^{\mathbf{E}++}$

CH 205. Laboratory for Chemistry 202 (1)
COMM 111. *Public Speaking (3) ${ }^{1 \mathbf{1 E}+}$ or COMM 114. *Argument and Critical Discourse (3) ${ }^{\mathbf{E}+}$
ECON 201. *Introduction to Microeconomics (4) ${ }^{\mathbf{1 E}}$
FE 101. Introduction to Forest Engineering (2) ${ }^{\mathrm{E}}$

FE 102. Forest Engineering Problem Solving and Technology (3) ${ }^{\mathbf{E}+}$
FES 240. *Forest Biology (4) ${ }^{\mathbf{1 E}++}$
HHS 231. *Lifetime Fitness for Health (2) ${ }^{\mathbf{1}}$
HHS 241. *Lifetime Fitness (1) ${ }^{1}$
or any PAC course (1-2) ${ }^{1}$
MTH 251. *Differential Calculus (4) ${ }^{\text {E+ }}$
MTH 252. Integral Calculus (4) ${ }^{\mathbf{E}+}$
MTH 254. Vector Calculus I (4) $)^{\mathbf{E}+}$
PH 211. *General Physics with Calculus (4) ${ }^{\mathbf{1 E}+}$
WR 121. *English Composition (3) ${ }^{\mathrm{E}+}$

## Sophomore Year (49-50 credits)

CCE 201. Civil and Construction Engineering Graphics and Design (3) ${ }^{\mathbf{E}}$
ENGR 211. Statics (3) ${ }^{\mathbf{E}+}$
ENGR 212. Dynamics (3) ${ }^{\text {E++ }}$
ENGR 213. Strength of Materials (3) ${ }^{\mathbf{E}+}$
FE 208. Forest Surveying (4) ${ }^{\mathbf{E}}$
FE 209. Forest Photogrammetry and Remote Sensing (4) ${ }^{\mathbf{E}}$
FE 257. GIS and Forest Engineering Applications (3) ${ }^{\text {E+ }+}$
FES 241. Dendrology (3) ${ }^{\mathbf{E}}$
MTH 256. Applied Differential Equations (4) ${ }^{\mathrm{E}+}$

MTH 306. Matrix and Power Series Methods (4) ${ }^{\mathrm{E}+}$

PH 212. *General Physics with Calculus (4) ${ }^{1 \mathbf{E E}+}$
PH 213. *General Physics with Calculus (4) ${ }^{\mathbf{1 E +}}$
SOIL 205. *Soil Science (3) ${ }^{\text {E }}$
and FOR 206. *Forest Soils Laboratory for SOIL 205 (1) ${ }^{1 \mathbf{E}}$
or SOIL 206. *Soil Science Laboratory for SOIL 205 (1) ${ }^{1 \mathbf{E}}$ and FOR 208. Forest Soils Recitation (1) ${ }^{\mathbf{1 E}}$
ST 314. Introduction to Statistics for Engineers (3) ${ }^{\mathbf{E}++}$

## Professional Forest Engineering (380)-Professional Civil Engineering (306) Program

Grade standards for the professional program as listed in the program description apply.

## All students pursuing the

 BS in Forest Engineering-Civil Engineering:1. must earn grades of " C " or better in all required professional courses, or approved substitutions for majors and options, and
2. must maintain a 2.0 GPA in all major course work, and courses used for substitution of required courses.
College of Engineering specific

## requirements:

1. Must earn grades of " $C$ " or better in all required civil engineering major courses in the pre-professional and professional core.
2. Must maintain a cumulative 2.25 GPA in all civil engineering major course work and an overall OSU GPA of 2.25 .

## Forest Engineering Junior Year

( 48 credits)
FE/FOR 307. Junior Seminar (1)
FE 310. Forest Route Surveying (4)
FE/FOR 312. Forestry Field School (2)
FE 315. Soil Engineering (4)
FE 316. Soil Mechanics (4)
FE 371. Harvesting Process Engineering (4)
FE 434. Forest Watershed Management (4)
FE 440. Forest Operations Analysis (4)
FE 470. Logging Mechanics (4)
FOR 321. Forest Mensuration (5)
FOR 330. Forest Resource Economics I (4)
FOR 331. Forest Resource Economics II (4)
FOR 441. Silviculture Principles (4)

## Civil Engineering Junior Year

## (48 credits)

CCE 321. Civil and Construction
Engineering Materials (4)
CE 311. Fluid Mechanics (4)
CE 313. Hydraulic Engineering (4)
CE 361. Surveying Theory (4)
CE 381, CE 382. Structural Theory I, II $(4,4)$
CE 383. Design of Steel Structures (4)
CE 392. Introduction to Highway Engineering (4)
ENGR 201. Electrical Fundamentals I (3)++
ENVE 321. Environmental Engineering
Fundamentals (4)
WR 327. *Technical Writing (3) ${ }^{1}$
Plus additional Bacc Core Courses (6)

## Senior Year ( 52 credits)

CE Design Elective (3)
CE 418. ${ }^{\wedge}$ Civil Engineering Professional Practice (3)
CE 419. Civil Infrastructure Design (3)
CE 481. Reinforced Concrete I (4)
CE 491. Transportation Engineering (3)
FE 415. Forest Road Engineering (3)
FE 416. Forest Road System Management (4)
FE/FOR 456. *International Forestry (3) [or other CGI Bacc Core course]
FE/FOR 457. Techniques for Forest Resource Analysis (4)
FE/FOR 459. Forest Management Planning and Design I (4)
FE 460. ${ }^{\wedge}$ Forest Operations Regulations and Policy Issues (3)
or FOR 460. ${ }^{\wedge}$ Forest Policy (4)
FE/FOR 469. Forest Management Planning
and Design II (4)
FE 480. Forest Engineering Practice and Professionalism (1)
GEOG 300. *Sustainability for the Common Good (3) ${ }^{1}$
or FW 350. *Endangered Species, Society and Sustainability (3) ${ }^{1}$
Plus additional Bacc Core Courses (6)

## Total=244 credits

Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
+ Required courses for Pre-Civil Engineering Program
++ Additional recommended courses for Pre-
Civil Engineering Program
${ }^{\mathbf{E}}$ Required for entry into the Forest Engineering
Professional Program.
${ }^{1}$ Must be selected to satisfy baccalaureate core requirements.


## Pre-Professional Forest <br> Engineering-Civil Engineering <br> Program Major Code: 361 <br> Major Code: 381

## FORESTRY (BS, HBS)

The successful forester must understand the biological and physical processes of forest ecosystems, as well as the social, economic, and operational forces that influence forest policies and management actions. The forestry core curriculum includes basic courses in the biological, physical, social sciences, and six months of work experience as well as professional courses designed to prepare students to manage forest resources.

Students are required to select one of the following required options:

- Forest Restoration and Fire
- Forest Management
- Forest Operations Management

The Bachelor of Science degree in Forestry is accredited by the Society of American Foresters (SAF).

In addition to the listed courses, all students are required to complete a total of six months of satisfactory employment in an area related to their major. This is usually accomplished by two or more summers of work, but it may include work during the academic year. Work performance and personal conduct are thoroughly appraised by the College of Forestry.

Six months of forestry or related natural resource work experience and completion of an option is required in the forestry degree program. The option courses compliment the forestry core and serve to fulfill the 180 credits for graduation.

## Pre-Professional Forestry Program

Admission to the pre-professional program requires that a student be admitted as a degree-seeking undergraduate or post-baccalaureate level student at Oregon State University. Courses included in the first and sophomore years comprise a pre-professional program of study that
produces a solid foundation for professional program studies at the junior, senior, and advanced degree levels. The pre-professional program may be taken at Oregon State University or at any accredited college or university that offers equivalent courses transferable to OSU in conjunction with foundation forestry available via OSU Ecampus.

## Professional Forestry Program

Successful completion of the pre-professional program will result in acceptance into the professional program. This requires selection of an option and: 1. a grade of "C" or better in all preprofessional courses required for entry into the professional program (marked with an E on the course list). Grade repeat (replacement) policy will follow OSU Academic Regulation 20.
2. a minimum GPA of 2.25 based on the pre-professional courses (or transfer equivalents) satisfactorily completed. Admission to the professional program will be granted for students meeting the admission requirements prior to fall term of the junior year. Application for the professional program will be made as of the end of winter term for the following fall term.

Enrollment in professional program courses is restricted to those students who have clearly demonstrated an ability to achieve the standards required for professional studies. The number of students admitted to the program is determined based on available resources. Students meeting the minimum Pre-Forestry GPA of 2.25 may or may not be admitted depending on available resources.

Students who have completed their pre-professional studies at a college or university other than Oregon State University must apply both to the OSU Office of Admissions for admission to OSU as a degree-seeking undergraduate or post-baccalaureate level student and to the College of Forestry for admission to the professional program. Application forms and information on policies and programs are available from the College of Forestry.

Students who have not satisfactorily completed all of the pre-professional courses when they apply may be provisionally accepted. Final acceptance is contingent on completion of any remaining pre-professional course work with grade of "C" or better by the end of the summer term prior to entrance into the professional program. Students who receive provisional acceptance and then fail to attain " C " or better grades in any remaining pre-professional course work prior to the beginning of fall term will be re-directed to the pre-professional forestry program.
All courses required for admission to
the professional program must be completed before entering the professional program. Students may only enter the professional program for fall term each academic year.

The professional program begins with Forestry Field School during the two weeks prior to the first fall term of the professional program.

## Pre-Professional Forestry (Major code 810)

Grade standards for the pre-professional program as listed in the program description apply.

## First Year (42-44 credits)

AEC 250. *Introduction to Environmental
Economics and Policy (3) ${ }^{1 \mathbf{E}}$
or ECON 201. *Introduction to
Microeconomics (4) ${ }^{1 \mathrm{E}}$
CH 231. *General Chemistry (4) ${ }^{1 \mathbf{1 E}}$
CH 261. *Laboratory for Chemistry 231 (1) ${ }^{\mathbf{1 E}}$
COMM 111. *Public Speaking (3) ${ }^{\text {IE }}$
or COMM 114. *Argument and Critical Discourse (3) ${ }^{1 \mathbf{E}}$
FES 240. *Forest Biology (4) ${ }^{\mathbf{1 E}}$
FES 241. Dendrology (3) ${ }^{\text {E }}$
FOR 111. Introduction to Forestry (3) ${ }^{\mathbf{E}}$ or NR 201. Managing Natural Resources for the Future (3) ${ }^{\text {E }}$
FOR 112. Computing Applications in Forestry (3) ${ }^{\mathbf{E}}$
HHS 231. *Lifetime Fitness for Health (2) ${ }^{1}$
HHS 241. *Lifetime Fitness (1) ${ }^{1}$
or any PAC course (1-2) ${ }^{1}$
MTH 111. *College Algebra (4) ${ }^{\text {E }}$
MTH 112. *Elementary Functions (4) ${ }^{\mathbf{E}}$
MTH 241. *Calculus for Management and Social Science (4) ${ }^{\mathbf{I E}}$
WR 121. *English Composition (3) ${ }^{1 \mathbf{E}}$ Option course (3)

## Sophomore Year (42-47 credits)

BI 204. *Introductory Biology I (4) ${ }^{\mathbf{1 E}}$ or BI 212. *Principles of Biology (4) ${ }^{\mathbf{1 E}}$
FE 208. Forest Surveying (4) ${ }^{\mathbf{E}}$
FE 209. Forest Photogrammetry and Remote Sensing (4) ${ }^{\mathbf{E}}$
FE 257. GIS and Forest Engineering Applications (3) ${ }^{\mathbf{E}}$
PH 201. *General Physics (5) ${ }^{\text {E }}$
SOIL 205. *Soil Science (3) ${ }^{1 \mathbf{E}}$
and FOR 206. *Forest Soils Laboratory for SOIL 205 (1) ${ }^{1 \mathbf{E}}$
or SOIL 206. *Soil Science Laboratory for SOIL 205 (1) ${ }^{\mathbf{1 E}}$ and FOR 208. Forest Soils Recitation (1) ${ }^{1 \mathbf{E}}$
ST 201. Principles of Statistics (4) ${ }^{\mathbf{E}}$
WR 327. *Technical Writing (3) ${ }^{1 \mathbf{E}}$
or WR 362. *Science Writing (3) ${ }^{\mathbf{1 E}}$
Option Courses and/or Bacc Core Courses (12-16)

## Professional Forestry

(Major code 820)
All students pursuing the BS in Forestry;

1. must earn grades of " C " or better in all required professional forestry courses (with FE, FES, FOR course designators), or crosslisted course designators, or approved substitutions for majors and options, and;
2. must maintain a 2.0 GPA in all major course work, defined as courses listed by prefix (e.g., FOR, BA, BOT) and number, or used for substitution of required courses, and as part of option lists.

## Junior Year (43-48 credits)

FE/FOR 307. Junior Seminar (1)
FE/FOR 312. Forestry Field School (2)
FE 370. Harvesting Operations (4)
FE 434. Forest Watershed Management (4)
FOR 321. Forest Mensuration (5)
FOR 330. Forest Resource Economics I (4)
FOR 331. Forest Resource Economics II (4)
FOR 442. Silviculture Reforestation (4)
FOR 443. Silvicultural Practices (4)
Option Courses and/or Bacc Core Courses (16-20)

## Senior Year (42-45 credits)

FE/FOR 457. Techniques for Forest Resource Analysis (4)
FE/FOR 459. Forest Management Planning and Design I (4)
FE/FOR 456. *International Forestry (3) [or other CGI Bacc Core course] ${ }^{1}$
FOR 460. ^Forest Policy (4)
or FE 460. $\wedge$ Forest Operations Regulations and Policy Issues (3)
FOR/FE 469. Forest Management Planning and Design II (4)
Option Courses and/or Bacc Core Courses (23-29)

## Total=180 credits

## Footnotes:

${ }^{\text {E }}$ Required for entry into the professional
program
${ }^{1}$ Must be selected to satisfy baccalaureate core
requirements.

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Pre-Professional Forestry Major


## Code: 810

Major Code: $\mathbf{8 2 0}$

## OPTIONS

## FOREST MANAGEMENT OPTION

## Pre-Professional Forestry

Grade standards for the pre-professional program as listed in the program description apply.

## Sophomore Year (13 credits)

FES 251. Recreation Resource Management (4)

Bacc Core Courses (9)
Professional Forestry
Grade standards for the professional program as listed above apply.

## Junior Year (15-16 credits)

FES 341. Forest Ecology (3)
FES 355. Management for Multiple Resource Values (3)
or ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
or FES/NR/RNG 477. *Agroforestry (3) or GEOG 300. *Sustainability for the Common Good (3)
or NR 455. Natural Resource Decision
Making (4)
FES/FW 452. Biodiversity Conservation in

Managed Forests (3)
FOR 322. Forest Models (3)
Bacc Core Course (3)

## Senior Year (24 credits)

FES 412. Forest Entomology (3)
FOR/BOT 413. Forest Pathology (3)
Bacc Core Courses (3)
Select at least 15 credits from the following list:
CROP 440. Weed Management (4)
FE 310. Forest Route Surveying (4)
FE 423. Unmanned Aircraft System Remote Sensing (3)
FE 435. Forest Watershed Management Impacts (3)
FE 499. Special Topics [ST/Mechanical Harvest \& Simulation] (2)
FES 342. Forest Types of the Northwest (3)
FES/HORT 350. Urban Forestry (3)
FES 351. Outdoor Recreation Management on Public Lands (3)
FES 352. Wilderness Management (3)
FES 357. Parks and Protected Areas Management (3)
FES 360. Collaboration and Conflict Management (3)
FES 433. Planning Agroforestry Projects (2)
FES 440. Wildland Fire Ecology (3)
FES/FW 445. Ecological Restoration (4)
FES 454. Managing at the Wildland-Urban Interface (3)
FES/NR/RNG 477. *Agroforestry (3)
FES/ANS/FW/SOC 485. *Consensus and Natural Resources (3)
FOR 346. Topics in Wildland Fire (3)
FOR 407. Seminar [Sem/Fire Field Trip] (1)
FOR 417. Advanced Forest Soils (4)
FOR 431. Economics and Policy of Forest Wildland Fire (3)
FOR 436. Wildland Fire Science and Management (4)
FOR 442. Silviculture Reforestation (4)
FOR 462. Natural Resource Policy and Law (3)

FOR 499. Special Topics (1-16) [Must be preapproved by academic advisor]
GEOG 201. *Foundations of Geospatial Science and GIS (4)
GEOG 370. Geovisualization: Cartography (4)

GEOG 480. Remote Sensing I: Principles and Applications (4)
WSE/DHE 415. *Renewable Materials in the Modern Age (3)
WSE 453. ${ }^{\wedge}$ Global Trade in Renewable Materials (3)
WSE 470. *Forest, Wood, and Civilization (3)
Study Abroad [Must be pre-approved by academic advisor]

## Footnotes:

${ }^{\text {e }}$ Required for entry into the professional program.

* Baccalaureate Core Course (BCC)


## SAMPLE FOUR-YEAR PLAN: <br> FOREST MANAGEMENT

## Year 1

## Fall Term

FES 240. *Forest Biology (4)
FOR 111. Introduction to Forestry (3) or NR 201. Managing Natural Resources for the Future (3)

MTH 111. *College Algebra (4)
WR 121. *English Composition (3)

## Winter Term

CH 231. *General Chemistry (4)
CH 261. *Laboratory for Chemistry 231 (1)
FOR 112. Computing Applications in Forestry (3)
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1)
or any PAC course (1-2)
MTH 112. *Elementary Functions (4)

## Spring Term

COMM 111. *Public Speaking (3) or COMM 114. *Argument and Critical Discourse (3)
AEC 250. *Introduction to Environmental Economics and Policy (3)
or ECON 201. *Introduction to
Microeconomics (4)
FES 241. Dendrology (3)
MTH 241. *Calculus for Management and Social Science (4)

## Year 2

## Fall Term

FE 208. Forest Surveying (4)
FES 251. Recreation Resource Management (4)

PH 201. *General Physics (5)
Bacc Core course (3)

## Winter Term

FE 209. Forest Photogrammetry and Remote Sensing (4)
BI 204. *Introduction to Biology I (4)
or BI 212. *Principles of Biology (4)
FE 257. GIS and Forest Engineering Applications (3)
WR 327. *Technical Writing (3)
or WR 362. *Science Writing (3)

## Spring Term

FOR 206. *Forest Soils Laboratory for SOIL 205 (1)
or SOIL 206. *Soil Science Laboratory for SOIL 205 (1) and FOR 208. Forest Soils Recitation (1)
SOIL 205. *Soil Science (3)
ST 201. Principles of Statistics (4)
Bacc Core course (6)

## Year 3

## Fall Term

FE/FOR 312. Forestry Field School (2)
FE 370. Harvesting Operations (4)
FE 434. Forest Watershed Management (4)
FES 341. Forest Ecology (3)
FOR 321. Forest Mensuration (5)

## Winter Term

FE/FOR 307. Junior Seminar (1)
FES 355. Management for Multiple Resource Values (3)
or ANS/FES/FW/SOC 485. Consensus and Natural Resources (3)
or FES/NR/RNG 477. Agroforestry (3) or GEOG 300. Sustainability for the Common Good (3)
or NR 455. Natural Resource Decision Making (4)
FOR 322. Forest Models (3)
FOR 331. Forest Resource Economics II (4)
Bacc Core course (3)

## Spring Term

FES/FW 452. Biodiversity Conservation in Managed Forests (3)
FOR 330. Forest Resource Economics I (4)
FOR 442. Silviculture Reforestation (4)
FOR 443. Silviculture Practices (4)

## Year 4

## Fall Term

FOR/BOT 413. Forest Pathology (3)
FE/FOR 457. Techniques for Forest Resource Analysis (4)
Restricted Electives (6) [see list below]

## Bacc Core course (3)

## Winter Term

FE/FOR 456. *International Forestry (3) [or other CGI Bacc Core course]
FE/FOR 459. Forest Management Planning and Design I (4)
FOR 460. Forest Policy (4)
or FE 460. ${ }^{\wedge}$ Forest Operations Regulations and Policy Issues (3)
Restricted Elective (3) [see list below]

## Spring Term

FE/FOR 469. Forest Management Planning and Design II (4)
FES 412. Forest Entomology (3)
Restricted Electives (6) [see list below]
Free Electives (2)

## Restricted Electives for the Forest

Management Option

## Select at least 15 credits from the

## following list:

CROP 440. Weed Management (4)
FE 310. Forest Route Surveying (4)
FE 423. Unmanned Aircraft System Remote Sensing (3)
FE 435. Forest Watershed Management Impacts (3)
FE 499. Special Topics [ST/Mechanical
Harvest \& Simulation] (2)
FES 342. Forest Types of the Northwest (3)
FES 350. Urban Forestry (3)
FES 351. Outdoor Recreation Management on Public Lands (3)
FES 352. Wilderness Management (3)
FES 357. Parks and Protected Areas
Management (3)
FES 360. Collaboration and Conflict
Management (3)
FES 433. Planning Agroforestry Projects (2)
FES 440. Wildland Fire Ecology (3)
FES/FW 445. Ecological Restoration (4)
FES 454. Managing at the Wildland-Urban Interface (3)
FES/NR/RNG 477. Agroforestry (3)
FES/ANS/FW/SOC 485. *Consensus and Natural Resources (3)
FOR 346. Topics in Wildland Fire (3)
FOR 407. Seminar [Sem/Fire Field Trip] (1)
FOR 417. Advanced Forest Soils (4)
FOR 431. Economics and Policy of Forest
Wildland Fire (3)
FOR 436. Wildland Fire Science and Management (4)
FOR 442. Silviculture Reforestation (4)
FOR 462. Natural Resource Policy and Law (3)

FOR 499. Special Topics (1-16) [Must be pre-
approved by academic advisor]
GEOG 201. Foundations of Geospatial
Science and GIS (4)
GEOG 370. Geovisualization: Cartography
(4)

GEOG 480. Remote Sensing I: Principles and Applications (4)
WSE/DHE 415. *Renewable Materials in the Modern Age (3)
WSE 453. ^Global Trade in Renewable Materials (3)
WSE 470. Forest, Wood, and Civilization (3)
Study Abroad [Must be pre-approved by academic advisor]
Option Code: 822

## FOREST OPERATIONS <br> MANAGEMENT OPTION

The Forest Operations Management option requires the completion of 7 business courses that can be taken as a minor if the student gains entrance to the College of Business Entrepreneurship minor.

## Pre-Professional Forestry

Grade standards for the pre-professional program as listed in the program description apply.

## Sophomore Year (12 credits)

BA 215. Fundamentals of Accounting (4) ${ }^{\mathbf{E}}$ BA 230. Business Law I (4) ${ }^{\mathbf{E}}$
BA 260. Introduction to Entrepreneurship (4) ${ }^{\mathbf{E}}$

## Professional Forestry

Grade standards for the professional program as listed above apply.

## Junior Year (11 credits)

BA 390. Marketing (4)
FE 440. Forest Operations Analysis (4) Plus additional Bacc Core Courses (3)

## Senior Year (23 credits)

BA 351. Managing Organizations (4)
BA 460. Venture Management (4)
FE 471. Harvesting Management (3)
Plus additional Bacc Core Courses (12)

## Footnotes:

${ }^{\text {E }}$ Required for entry into the professional
program

* Baccalaureate Core Course (BCC)

SAMPLE FOUR-YEAR PLAN:

## FOR FOREST OPERATIONS

MANAGEMENT

## Year 1

## Fall Term

FES 240. *Forest Biology (4)
FOR 111. Introduction to Forestry (3)
or NR 201. Managing Natural Resources for the Future (3)
MTH 111. *College Algebra (4)
WR 121. *English Composition (3)

## Winter Term

CH 231. *General Chemistry (4)
CH 261. *Laboratory for Chemistry 231 (1)
FOR 112. Computing Applications in Forestry (3)
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1)
or any PAC course (1-2)
MTH 112. *Elementary Functions (4)

## Spring Term

COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical
Discourse (3)

AEC 250. *Introduction to Environmental Economics and Policy (3)
or ECON 201. *Introduction to
Microeconomics (4)
FES 241. Dendrology (3)
MTH 241. *Calculus for Management and Social Science (4)

## Year 2

## Fall Term

BA 260. Introduction to Entrepreneurship (4) FE 208. Forest Surveying (4)
PH 201. *General Physics (5)

## Free Elective (3)

## Winter Term

BA 215. Fundamentals of Accounting (4)
FE 209. Forest Photogrammetry and Remote Sensing (4)
BI 204. *Introduction to Biology I (4)
or BI 212. *Principles of Biology (4)
FE 257. GIS and Forest Engineering Applications (3)

## Spring Term

BA 230. Business Law I (4)
FOR 206. *Forest Soils Laboratory for SOIL 205 (1)
or SOIL 206. *Soil Science Laboratory for SOIL 205 (1) and FOR 208. Forest Soils Recitation (1)
SOIL 205. *Soil Science (3)
ST 201. Principles of Statistics (4)
WR 327. *Technical Writing (3)
or WR 362. *Science Writing (3)

## Year 3

## Fall Term

FE/FOR 312. Forestry Field School (2)
FE 370. Harvesting Operations (4)
FE 434. Forest Watershed Management (4)
FOR 321. Forest Mensuration (5)

## Winter Term

BA 390. Marketing (4)
FE/FOR 307. Junior Seminar (1)
FE 440. Forest Operations Analysis (4)
FOR 331. Forest Resource Economics II (4)
Bacc Core course (3)

## Spring Term

FOR 330. Forest Resource Economics I (4)
FOR 442. Silviculture Reforestation (4)
FOR 443. Silviculture Practices (4)
Free Electives (3)

## Year 4

## Fall Term

BA 351. Managing Organizations (4)
FE/FOR 457. Techniques for Forest Resource Analysis (4)
Bacc Core courses (6)

## Winter Term

BA 460. Venture Management (4)
FE/FOR 456. *International Forestry (3) [or other CGI Bacc Core course]
FE/FOR 459. Forest Management Planning and Design I (4)
FOR 460. Forest Policy (4)
or FE 460. ${ }^{\wedge}$ Forest Operations Regulations and Policy Issues (3)

## Spring Term

FE/FOR 469. Forest Management Planning and Design II (4)
FE 471. Harvesting Management (3)

Bacc Core courses (6)
Free Elective (1)
Option Code: 823

## FOREST RESTORATION <br> AND FIRE OPTION

Disturbance processes, such as wildland fire, insect or disease outbreak, landslide, and windthrow, are important considerations in any actively managed forest, regardless of the specific management objective. The Forest Restoration and Fire option prepares students to understand, manage, mitigate and/or use forest dis-
turbance processes, especially wildland
fire, as part of a forest management plan.

## Sophomore Year (12)

ATS 201. *Climate Science (4) ${ }^{\mathbf{E}}$
or ATS 210. Introduction to the
Atmospheric Sciences (3) ${ }^{\mathbf{E}}$
or ATS 310. Meteorology (4) ${ }^{\mathbf{E}}$
Bacc Core Courses (9)

## Junior Year (16)

FES 341. Forest Ecology (3)
FES 360. Collaboration and Conflict
Management (3)
or FES/ANS/FW/SOC 485 *Consensus and Natural Resources (3)
FES/FW 445. Ecological Restoration (4)
FOR 322. Forest Models (3)
FOR 346. Topics in Wildland Fire (3)

## Senior Year (22)

FE 435. Forest Watershed Management Impacts (3)
FES 412. Forest Entomology (3)
FES 440. Wildland Fire Ecology (3)
FOR/BOT 413. Forest Pathology (3)
FOR 431. Economics and Policy of Forest Wildland Fire (3)
FOR 436. Wildland Fire Science and
Management (4)
Bacc Core Courses (3)

## Footnotes:

${ }^{\mathbf{E}}$ Required for entry into the professional
program

* Baccalaureate Core Course (BCC)

Note: Courses in Black are Forestry major core courses. Courses in Blue are required for the option.

## SAMPLE FOUR-YEAR PLAN: FOREST RESTORATION AND FIRE

## Year 1

## Fall Term

FES 240. *Forest Biology (4)
FOR 111. Introduction to Forestry (3) or NR 201. Managing Natural Resources for the Future (3)
MTH 111. *College Algebra (4)
WR 121. *English Composition (3)

## Winter Term

CH 231. *General Chemistry (4)
CH 261. *Laboratory for Chemistry 231 (1)
FOR 112. Computing Applications in Forestry (3)
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1)
or any PAC course (1-2)
MTH 112. *Elementary Functions (4)

## Spring Term

COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
AEC 250. *Introduction to Environmental
Economics and Policy (3)
or ECON 201. *Introduction to
Microeconomics (4)
FES 241. Dendrology (3)
MTH 241. *Calculus for Management and Social Science (4)

## Year 2

## Fall Term

ATS 201. *Climate Science (4)
or ATS 210. Introduction to the
Atmospheric Sciences (3)
or ATS 310. Meteorology (4)
FE 208. Forest Surveying (4)
PH 201. *General Physics (5)
Bacc Core course (3)

## Winter Term

FE 209. Forest Photogrammetry and Remote Sensing (4)
BI 204. *Introduction to Biology I (4)
or BI 212. *Principles of Biology (4)
FE 257. GIS and Forest Engineering
Applications (3)
WR 327. *Technical Writing (3)
or WR 362. *Science Writing (3)

## Spring Term

FOR 206. *Forest Soils Laboratory for SOIL 205 (1)
or SOIL 206. *Soil Science Laboratory for SOIL 205 (1) and FOR 208. Forest Soils Recitation (1)
SOIL 205. *Soil Science (3)
ST 201. Principles of Statistics (4)
Bacc Core courses (6)

## Year 3

## Fall Term

FE/FOR 312. Forestry Field School (2)
FE 370. Harvesting Operations (4)
FE 434. Forest Watershed Management (4)
FES 341. Forest Ecology (3)
FOR 321. Forest Mensuration (5)

## Winter Term

FE/FOR 307. Junior Seminar (1)
FES 360. Collaboration and Conflict
Management (3)
or ANS/FES/FW/SOC 485. Consensus and
Natural Resources (3)
FOR 322. Forest Models (3)
FOR 331. Forest Resource Economics II (4) Bacc Core course (3)

## Spring Term

FES 445. Ecological Restoration (4)
FOR 330. Forest Resource Economics I (4)
FOR 346. Topics in Wildland Fire (3)
FOR 442. Silviculture Reforestation (4)
FOR 443. Silviculture Practices (4)

## Year 4

## Fall Term

FE/FOR 457. Techniques for Forest Resource Analysis (4)
FOR/BOT 413. Forest Pathology (3)
FOR 436. Wildland Fire Science and Management (4)
Bacc Core course (3)

## Winter Term

FE/FOR 456. *International Forestry (3) [or other CGI Bacc Core course]
FE/FOR 459. Forest Management Planning and Design I (4)
FES 440. Wildland Fire Ecology (3)
FOR 460. Forest Policy (4)
or FE 460. ${ }^{\wedge}$ Forest Operations Regulations and Policy Issues (3)

## Spring Term

FE 435. Forest Watershed Management Impacts (3)
FE/FOR 469. Forest Management Planning and Design II (4)
FES 412. Forest Entomology (3)
FOR 431. Economics and Policy of Forest Wildland Fire (3)
Free elective (1)
Option Code: 824

## FORESTRY MINOR

The Forestry minor provides basic knowledge about management of forest resources.

## Core

FES 240. *Forest Biology (4)
FES 241. Dendrology (3)
FOR 111. Introduction to Forestry (3)
FOR 330. Forest Resource Economics I (4)
FOR 441. Silviculture Principles (4)
Select a minimum of 10 credits from:
FE 370. Harvesting Operations (4)
FE 434. Forest Watershed Management (4)
FE/FOR 456. *International Forestry (3)
FE 460. ^Forest Operations Regulations and
Policy Issues (3)
FES 251. Recreation Resource Management (4)

FES 355. Management for Multiple Resource Values (3)
FES 412. Forest Entomology (3)
FOR 321. Forest Mensuration (5)
FOR 331. Forest Resource Economics II (4)
FOR 346. Topics in Wildland Fire (3)
FOR/BOT 413. Forest Pathology (3)
FOR/FE 457. Techniques for Forest Resource Analysis (4)
FOR 460. ${ }^{\wedge}$ Forest Policy (4)
FOR 462. Natural Resource Policy and Law (3)

## Total=28

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 706

## SUSTAINABLE FOREST MANAGEMENT (MF, MS, PhD)

## Graduate Areas of Concentration

Engineering for sustainable forestry; forest biometrics and geomatics; forest operations planning and management;
forest policy analysis and economics; forest soil and watershed processes; silviculture, fire, and forest health
The Sustainable Forest Management (SFM) graduate program emphasizes the conservation of forest-dominated landscapes to meet a defined set of ecological, economic and social criteria over long time frames. The program follows the
sustainable principles outlined by the Montreal Process Criteria and Indicators. These principles have been adopted by the state of Oregon.

The program provides a strong grounding in the principles and techniques of active management of forests to improve forest health and condition while producing a full range of products and ecosystems services. It consists of a common core in the principles and criteria of sustainable forest management; statistics for design and interpretation of experiments; and specialization in one of six areas of concentration. The MF degree requires a project, MS a thesis, and PhD a dissertation.

## Areas of Concentration

Engineering for Sustainable For-estry-Designing forest operations to achieve sustainable forest management objectives; ecological restoration operations; road design and construction. Supporting course work often draws from slope and embankment, industrial systems optimization, watershed impacts of forest disturbance,

GIScience II: analysis and applications, forest transportation systems, forest hydrology, forest geomatics, forest road engineering, forest road system management, water quality and forest land use, forest operations analysis, advanced logging mechanics, harvesting management, advanced silviculture, heuristics for combinatorial optimization, economics of the forest resource, and human factors engineering. Contacts: Belart, Chung, Leshchinsky, Olsen, Segura, Sessions, Wing

Forest Biometrics and Geomat-ics-Modeling tree and stand development; forest data sampling and monitoring methods; forest measurements and assessments; mapping and data management technologies. Supporting course work often draws from forest biometrics, forest geomatics, geospatial data and analysis, digital terrain modeling, GIScience II: analysis and applications, geodesy, spatio-temporal variation in ecology and earth sciences, remote sensing, advanced landscape and seascape ecology, generalized regression models, scientific visualization, forest models, statistical methods, forest policy analysis, advanced silviculture, aerial and terrestrial LiDAR applications. Contacts: Hailemariam, Kiser, Maguire, Strimbu, Wing

Forest Operations Planning and Management-Planning, organizing, and executing forest plans; enhancing supply chain efficiency and improving international competitiveness. Supporting course work often draws from tactical and operational planning, geospatial data and analysis, forest policy analysis, industrial systems optimization, advanced
silviculture, harvesting management, spatial analysis of forested landscapes, organization leadership and management, marketing and innovation in renewable materials forestry supply chain management, forest geomatics, production planning, forest transportation systems, forest operations regulations and policy issues, heuristics for combinatorial optimization, forest wildlife habitat management, industrial systems optimization, statistical methods, forest biometrics, lean systems manufacturing, advanced production planning and control. Contacts: Belart, Chung, Sessions, Strimbu

## Forest Policy Analysis and

Economics-Analyzing tradeoffs in the forest and resource policy decision process; public land use policy; interpretations of regulations; markets for forest products; forest certification; theoretical and applied research related to ecosystem services. Supporting course work often draws from natural resource policy and law, micro and macroeconomic theory, environmental policy and law interactions, forest policy analysis, industrial systems optimization, preliminaries for quantitative methods economics of the forest resource, spatial analysis of forested landscapes, applied econometrics, markets and prices in the forest sector, valuation of non-market resources, analytic techniques for forest managers, heuristics for combinatorial optimization; and work in other fields to support thesis or dissertation research. This area of concentration is jointly sponsored by FERM, the Applied Economics Graduate Program and the Applied Economics Department. Contacts: Cushing, Huntington, Kuusela, Montgomery, Souder

## Forest Soil and Watershed

Processes-Understanding watershed conditions and processes in forested ecosystems and the effects of management activities; evaluating and improving soil and water quality and related practices and policies for forest operations. Supporting course work often draws from forest hydrology, soil physics, environmental soil chemistry, geomorphology and landscape ecology, geospatial data analyses, principles of fluid mechanics, stream ecology, nutrient cycling, snow hydrology, hydrogeology, river engineering, natural resources and forest ecosystems analysis, mineral organic matter interactions, open channel flow, managing forest nutrition, GIS in water resources, ecological restoration stream ecology, mineral-organic matter interactions, limnology, water quality and forest land use, hillslope and watershed hydrology, design and analysis of planned experiments, statistical methods, riparian ecology and management, sediment transport, and principles of stable isotopes. Contacts: Bladon, Hatten,

## Segura, Souder

Silviculture, Fire, and Forest Health-Manipulating vegetation to achieve management objectives, from restoration to intensive timber production; fire ecology and fire management; forest ecosystem health. Supporting course work often draws from advanced silviculture, geospatial data analysis, forest Pathology, forest entomology, environmental policy and law interactions, natural resource policy and law, plant pathology, advanced forest community ecology, community structure and analysis, spatial analysis of forested landscapes, wildland fire science and management, ecological restoration, forest policy analysis, statistical methods, sampling methods, forest hydrology, water quality and forest land use, natural resource data analysis, advanced forest community ecology, wildland fire ecology, biology of invasive plants, forest wildlife habitat management, global change ecology, weed management, and wildlife ecology. Contacts: Bailey, Fitzgerald, Davis, Gonzalez-Benecke, Kiser, LeBoldus, Maguire, Powers, Shaw

## Major Code: 1090 <br> - FOREST ENGINEERING COURSES

FE 101. INTRODUCTION TO FOREST
ENGINEERING (2). Introduction to the forest engineering discipline. Discussion of critical issues, available resources, career opportunities and professional opportunities. Overview of field instruments and analytical approaches.
FE 102. FOREST ENGINEERING PROBLEM SOLVING AND TECHNOLOGY (3). A technology applications course designed to introduce students to formulating and implementing computational solutions to engineering analysis and design problems in a digital environment. Students will learn to evaluate engineering problems, formulate one or more solution techniques or algorithms, and code the solution using spreadsheet and/or programming software. Professionalism in completing and presenting laboratory exercises is emphasized. Laboratory examples draw from a variety of engineering topics. This course may be substituted for CE 102, Civil Engineering I: Problem Solving and Technology. PREREQS: Calculus
FE 208. FOREST SURVEYING (4). Introduction to theory and practice of surveying methods and measurements as applied to the specifics of forestry problems and their solutions. This is the first of a four-course sequence (FE 208, 209, 310, 311). Together with FE 257 it is designed to prepare students for the Fundamentals of Land Surveying exam, which is necessary to become a professional land surveyor. PREREQS: MTH 112 [C] or MTH 241 [C] or MTH 251 [C] or MTH 251H [C] or MTH 252 [C] or MTH 252H [C] and with a grade of C or better.

## FE 209. FOREST PHOTOGRAMMETRY AND

 REMOTE SENSING (4). Management and conservation of natural resources with the fundamentals of spatial data acquisition from airborne and spaceborne sensors. Introduction to theory of spectral reflectance properties of vegetation, the principles of photographic analysis and aerial photo-interpretation and new advances such as LIDAR. PREREQS: MTH 112 [C] or MTH 241 [C] or MTH 251 [C] or MTH 251H [C] or MTH 252 [C] or MTH 252H [C]FE 257. GIS AND FOREST ENGINEERING APPLICATIONS (3). An introduction to the appropriate use and potential applications of geographic information systems (GIS) and related technologies (GPS and remote sensing) in forest management and operational planning and problem solving. Students are presented with lectures and exercises that cover a wide range of GIS and GIS-related topics and issues including spatial database creation, structure, analysis, and modeling. Lec/lab.
FE 307. JUNIOR SEMINAR (1). College is the time to develop the skills necessary for the transition between academics and career. In conjunction with the expertise already available on campus, this course will guide students through career planning, exploration, placement, and employer expectations. CROSSLISTED as FOR 307. PREREQS: Professional forestry students only.
FE 310. FOREST ROUTE SURVEYING (4). Route surveying and site surveying applied to forestry problems. Use of surveying equipment; traversing; computations; leveling; horizontal, vertical, compound, reverse and spiral curves; earthwork; construction staking as applied to new road and existing road P-line survey. Includes rapid survey techniques. Lec/lab. PREREQS: (FE 208 [C] or FE 308 [C] ) or CE 361 [C] or CEM 263 [C]
FE 312. FORESTRY FIELD SCHOOL (2).
A hands-on experience in the major aspects of forestry, including regeneration surveys, silviculture, cruising, recreation, forest disturbances, logging site and mill visits, east and west of the Cascades Range. CROSSLISTED as FOR 312. PREREQS: Admission to a professional school in the Forestry, Forest Engineering, or Forest-Civil Engineering program.
FE 315. SOIL ENGINEERING (4). Use of soil in engineering and construction. Identification and classification. Engineering properties of soil: permeability, compressibility, and strength. Compaction principles and methods. Field control of soil engineering projects. PREREQS: ENGR 213* [D-] and CE 311 or CEM 311 or FE 330
FE 316. SOIL MECHANICS (4). Soil strength and soil mechanics theories applied to analysis of slope stability, retaining structures, foundations, and pavements. Lec/lab. PREREQS: (FE 315* [C-] or CE 372* [D-] )
FE 330. FOREST ENGINEERING FLUID MECHANICS AND HYDRAULICS (3). Fluid properties, pressure, fluid statics, continuity, energy equation, single and series pipe flow, open channel hydraulics, peakflow estimates for culvert design, stream crossing design. Lec/lab. PREREQS: (ENGR 213* [D-] and FE 102* [C-] )
FE 370. HARVESTING OPERATIONS (4). Timber harvesting and transport methods from the forest to the mill. Technical feasibility, economic, and environmental relationships in forestry operations. PREREQS: Junior standing in forestry. For nonforest engineering students.
FE 371. HARVESTING PROCESS
ENGINEERING (4). Timber harvesting equipment and systems. Harvesting process evaluation and decisions aided by forest engineering analysis. Lec/lab. PREREQS: ENGR 211 [C] and FE 102 [C] and COREQS: FE 208 and FE 357
FE 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits.
FE 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

FE 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

FE 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

FE 411. COOPERATIVE EDUCATION MENTORED WORK EXPERIENCE (1). College is the time to develop the skills necessary
for the transition between academics and career. Cooperative Education Mentored Work Experience is a graded field experience in which the student protege will apply academic study in a This course is repeatable for a maximum of 4 credits. PREREQS: Professional forestry students only.

FE 415. FOREST ROAD ENGINEERING (3). Location, surveying, design, cost estimation, and construction practices for forest roads. Lecture on principles, and laboratory field practice in locating, surveying, designing, and cost estimating.
PREREQS: FE 310 [C-]

## FE 416. FOREST ROAD SYSTEM

MANAGEMENT (4). Structural characteristics of bridges, load rating, structural design of culverts, aggregate testing and evaluation, environmental assessment of forest road systems, road maintenance cycles and management. PREREQS: ((ENGR 211 [D-] or ENGR 211H [D-] ) and (ENGR 213 [D-] or ENGR 213H [D-] ) and FE 316 [C-] and FE 415 [C-] )
FE 422. FOREST GEOMATICS (4). Topics include digital techniques for geospatial database creation, computer programming techniques for database manipulation and analysis, and applications of geospatial data for natural resource measurement and analysis. Class meetings include lectures and applied spatial analysis laboratory assignments. A final term project must be designed, conducted, and presented. Lec/lab. PREREQS: (CE 202 [D-] or FE 357 [C-] or GEO 365 [D-] or (GEO 465 [D-] or GEO 565 [D-] ))

## FE 423. UNMANNED AIRCRAFT SYSTEM

REMOTE SENSING (3). Unmanned Aircraft System (UAS) Geomatics presents techniques in UAS design and applications for remote sensing measurements of both natural and constructed landscapes. PREREQS: FE 309 [C] or GEO 444 [C] or GEO 466 [C]
FE 430. WATERSHED PROCESSES (4). Effects of land use practices on the physical hydrology (interception, infiltration, evapotranspiration, subsurface flow and surface runoff, water yields, and peak flows) of forested watersheds. Surface erosion, mass soil movements, stream temperatures, nutrient levels and effects of management activities upon riparian systems; forest practice rules. Lec/lab. PREREQS: Junior standing.

FE 434. FOREST WATERSHED MANAGEMENT
(4). Physical hydrology, erosion processes, streams, and riparian areas of forested ecosystems. The material can be widely applied, but is applicable primarily to the humid, temperate rainforests of the Pacific Northwest. PREREQS: (CH 121 [C] or CH 201 [C] or CH 231 [C] ) and (SOIL 205 [C] or CSS 305 [C] or CSS 205 [C] ) and (MTH 241 [C] or MTH 251 [C] or MTH 251 H [C] )
FE 435. FOREST WATERSHED MANAGEMENT
IMPACTS (3). Impacts of forest disturbance,
timber harvest, wildfire, insect outbreaks, and low frequency storms and floods on watershed hydrology and streams. PREREQS: FE 434 [C] and /or equivalent
FE 440. FOREST OPERATIONS ANALYSIS (4). Identification and measurement of production components in harvesting systems. Methods analysis, productivity improvement and engineering economics. Report writing skills emphasized. Lec/lab. PREREQS: FE 102 [C-] and (FE 370 [C-] or FE 371 [C-] ) and basic statistics
FE 456. *INTERNATIONAL FORESTRY (3). An introduction to the biological, physical, and sociological factors that shape the world's forests and the activities used to manage those forests. What influence these factors have on forest policies, practices, and outcomes. CROSSLISTED as FOR 456. (Bacc Core Course) PREREQS: Introductory course in biology.
FE 457. TECHNIQUES FOR FOREST
RESOURCE ANALYSIS (4). Use of linear
programming, nonlinear programming, dynamic programming, and simulation to solve complex forest management problems, with emphasis on intertemporal multiple-use scheduling. Forestry transportation problems, multiple-use allocation, and investment analysis. Filed trips required. CROSSLISTED as FOR 457/FOR 557. PREREQS: AREC 351 [C] or FOR 330 [C]
FE 459. FOREST MANAGEMENT PLANNING AND DESIGN I (4). Integration of environmental, economic, and social aspects of forestry in management planning. Development of strategic and tactical plans using diverse data types and sources. Senior capstone class projects. Lec/lab. CROSSLISTED as FOR 459. PREREQS: FE 457 or FOR 457 and senior standing or departmental approval required.

## FE 460. ^FOREST OPERATIONS

REGULATIONS AND POLICY ISSUES (3).
Reviews regulations and other policies that affect timber harvesting and other forest practices, particularly policies that address concerns of environment, safety, employment and transportation. Discusses how such rules and other policies evolve, including the role of public perceptions, forestry professionals and other key policy players. (Writing Intensive Course) PREREQS: Senior standing.
FE 469. FOREST MANAGEMENT PLANNING
AND DESIGN II (4). A team-based, project-centric course for integrated timber harvest planning. Establish tactical and operational planning goals and constraints, identify feasible harvesting and transportation systems, and design harvest units to meet objectives and constraints. Lec/lab. CROSSLISTED as FOR 469. PREREQS: FE 459 [C] or FOR 459 [C]

FE 470. LOGGING MECHANICS (4). Relationship of torque, power, and thrust to the operation of cable and ground-based harvesting systems. Onhighway and off-highway heavy truck performance. PREREQS: ((ENGR 211 [D-] or ENGR 211H [D-] ) and ENGR 213 [D-] and FE 371 [C-] )
FE 471. HARVESTING MANAGEMENT (3).
Verification of harvesting assessment plans and operational planning/field layout. Practical logging skills related to harvest planning, operations monitoring, and designing worker training programs. Lec/lab. PREREQS: FE 371 and FE 470

FE 479. SLOPE AND EMBANKMENT DESIGN
(3). A comprehensive overview of evaluating stability and performance for natural and engineering slopes. Design aspects include construction of road embankments, slope remediation techniques and application of geosynthetics for slope stabilization, slope and wall construction, and drainage. CROSSLISTED as CE 479/CE 579. PREREQS: CE 373 [C] or FE 316 [C]
FE 480. FOREST ENGINEERING PRACTICE
AND PROFESSIONALISM (1). Personal and professional skills, attributes, and issues in forest engineering practice. Includes topics such as ethics, land stewardship, media relations and risk management. PREREQS: Senior standing.
FE 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 8 credits.
FE 501. RESEARCH AND SCHOLARHSIP (116). This course is repeatable for a maximum of 16 credits.
FE 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
FE 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

FE 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

FE 507. SEMINAR (1-16). Subject matter as required by graduate programs. This course is repeatable for a maximum of 16 credits.

FE 515. FOREST ROAD ENGINEERING (3).
Location, surveying, design, cost estimation, and construction practices for forest roads. Lecture on principles, and laboratory field practice in locating, surveying, designing, and cost estimating. PREREQS: Basic surveying and permission of instructor.

FE 516. FOREST ROAD SYSTEM
MANAGEMENT (4). Structural characteristics of bridges, load rating, structural design of culverts, aggregate testing and evaluation, environmental assessment of forest road systems, road maintenance cycles and management. PREREQS: FE 415 or FE 515

FE 522. FOREST GEOMATICS (4). Topics include digital techniques for geospatial database creation, computer programming techniques for database manipulation and analysis, and applications of geospatial data for natural resource measurement and analysis. Class meetings include lectures and applied spatial analysis laboratory assignments. A final term project must be designed, conducted, and presented. Lec/lab.
PREREQS: CE 202 or FE 357 or GEO 365 or (GEO 465 or GEO 565)

FE 523. UNMANNED AIRCRAFT SYSTEM
REMOTE SENSING (3). Unmanned Aircraft System (UAS) Geomatics presents techniques in UAS design and applications for remote sensing measurements of both natural and constructed landscapes. PREREQS: GEO 544 [C] or GEO 566 [C] or OC 678 [C]

FE 530. WATERSHED PROCESSES (4). Effects of land use practices on the physical hydrology (interception, infiltration, evapotranspiration, subsurface flow and surface runoff, water yields, and peak flows) of forested watersheds. surface erosion, mass soil movements, stream temperatures, nutrient levels and effects of management activities upon riparian systems; forest practice rules. Lec/lab. PREREQS: Junior standing.
FE 532. FOREST HYDROLOGY (4). Physical hydrology, erosion processes, and attributes of stream ecosystems for forested watersheds. Material can be widely applied, but is applicable primarily to the humid, temperate rainforests of the Pacific Northwest. Lec/rec. PREREQS: BEE 512 or equivalent Intro to Hydrology course.
FE 535. WATER QUALITY AND FOREST LAND USE (3). Influence of natural and land-use factors on water quality; monitoring strategies and analytical methods; municipal watershed management. PREREQS: FE 430 or FE 530
FE 536. WATERSHED IMPACTS OF FOREST
DISTURBANCE (4). Impacts of forest
disturbances that include timber harvest; wildfire; insect outbreaks; and large, low frequency storms and floods on the watershed hydrology, erosion processes, and stream ecosystems of forested watersheds. Lec/rec. PREREQS: FE 532 [C]
FE 537. HILLSLOPE AND WATERSHED
HYDROLOGY (4). Advanced course on hillslope hydrology covering the physical, chemical and isotopic nature of runoff generation from the pore scale to the catchment scale.

FE 540. FOREST OPERATIONS ANALYSIS (4). Identification and measurement of production components in harvesting systems. Methods analysis, productivity improvement and engineering economics. Report writing skills emphasized. Lec/lab. PREREQS: FE 102 and (FE 370 or FE 371) and basic statistics.

FE 545. SEDIMENT TRANSPORT (4). Principles of sediment erosion, transportation and deposition in rivers, reservoirs, and estuaries; measurement, analysis, and computational techniques. Offered even years in winter term. CROSSLISTED as BEE 545. PREREQS: CE 313 or FE 330

FE 552. FOREST TRANSPORTATION SYSTEMS (4). Analysis of interactions between harvesting and road systems. Advanced topics in road and
landing spacing, determination of road standards, analysis of logging road networks, transfer and sort yard facility location. Simultaneous resource scheduling and transportation planning. PREREQS: FE 102 and (FE 440 or FE 540)
FE 555. FOREST SUPPLY CHAIN MGMT (3). Develop and implement operational planning and logistics scheduling systems to manage a forestry supply chain for typical forest organizations in the Pacific Northwest. Once developed, these supply chain plans will be implemented using simulation software that will allow students to view the results of their forest operations plans. PREREQS: (CS 151 or FE 102) and FE 357 and FOR 457

## FE 557. TECHNIQUES FOR FOREST

RESOURCE ANALYSIS (4). Use of linear programming, nonlinear programming, dynamic programming, and simulation to solve complex forest management problems, with emphasis on intertemporal multiple-use scheduling. Forestry transportation problems, multiple-use allocation, and investment analysis. Field trips required. CROSSLISTED as FOR 457/FOR 557. PREREQS: AREC 351 or FOR 330
FE 560. FOREST OPERATIONS REGULATIONS AND POLICY ISSUES (3). Reviews regulations and other policies that affect timber harvesting and other forest practices, particularly policies that address concerns of environment, safety, employment and transportation. Discusses how such rules and other policies evolve, including the role of public perceptions, forestry professionals and other key policy players. PREREQS: Senior standing.
FE 570. LOGGING MECHANICS (4). Relationship of torque, power, and thrust to the operation of cable and ground-based harvesting systems. Onhighway and off-highway heavy truck performance. PREREQS: ENGR 211 and ENGR 213 and FE 371
FE 571. HARVESTING MANAGEMENT (3). Verification of harvesting assessment plans and operational planning/field layout. Practical logging skills related to harvest planning, operations monitoring, and designing worker training programs. PREREQS: FE 371 and FE 470
FE 579. SLOPE AND EMBANKMENT DESIGN
(3). A comprehensive overview of evaluating stability and performance for natural and engineering slopes. Design aspects include construction of road embankments, slope remediation techniques and application of geosynthetics for slope stabilization, slope and wall construction, and drainage. CROSSLISTED as CE 479/CE 579. PREREQS: CE 373 or FE 316
FE 599. SPECIAL TOPICS (0-16). Advanced topics in isotope hydrology. This course is repeatable for a maximum of 16 credits.

FE 601. RESEARCH AND SCHOLARSHIP (116). This course is repeatable for a maximum of 16 credits.

FE 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

FE 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
FE 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
FE 607. SEMINAR (1-16). Subject matter is required by graduate programs. This course is repeatable for a maximum of 16 credits.

## FE 640. SPECIAL TOPICS IN FOREST

ENGINEERING (1-3). Recent advances in logging engineering, forest engineering, and forest operations. Content will vary with instructor. May be retaken for credit. This course is repeatable for a maximum of 99 credits.

## FORESTRY COURSES

FOR 111. INTRODUCTION TO FORESTRY (3).
Forest resources in the world; forests and human well-being; where and how forests grow; environmental and human values; products, characteristics, and uses; basic elements of use, planning and management. Interpretation of forestry literature; professional origins in the U.S. Field trips required.

FOR 112. COMPUTING APPLICATIONS IN FORESTRY (3). An overview of computing applications used in all aspects of forestry work, but largely focused on development of intermediate and advanced spreadsheet skills using Microsoft Excel (e.g., complex formulas and functions, charting, and pivot tables). Additionally, the course rounds out essential skills in document formatting and presentation development.
FOR 199. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.
FOR 206. *FOREST SOILS LABORATORY FOR SOIL 205 (1). Laboratory exercise and field trips designed to develop student competency in soil processes, description, analysis, and assessment with a particular emphasis on the role of soils in managed and unmanaged forest ecosystems. (Bacc Core Course if taken with SOIL 205) COREQS: SOIL 205

FOR 208. FOREST SOILS RECITATION (1). Readings, exercises, discussions designed to develop student competency in forest soil processes, description, analysis, and assessment. A particular emphasis will be placed on the role of soils in managed and unmanaged forest ecosystems. PREREQS: An introductory soils course.

FOR 307. JUNIOR SEMINAR (1). College is the time to develop the skills necessary for the transition between academics and career. In conjunction with the expertise already available on campus, this course will guide students through career planning, exploration, placement, and employer expectations. CROSSLISTED as FE 307.

FOR 312. FORESTRY FIELD SCHOOL (2). A hands-on experience in the major aspects of forestry, including regeneration surveys, silviculture, cruising, recreation, forest disturbances, logging site and mill visits, east and west of the Cascades Range. CROSSLISTED as FE 312. PREREQS: Admission to a professional school in the Forestry, Forest Engineering, or Forest-Civil Engineering program.

FOR 321. FOREST MENSURATION (5). Theory and practice of sampling and cruising techniques; stratified and nonstratified sampling systems with fixed plots, variable plots, and 3-P designs. PREREQS: (FOR 141 [C] or FES 141 [C] or FOR 241 [C] or FES 241 [C] ) and FE 208 [C] and FE 209 [C] and (MTH 241 [C] or MTH 245 [C] or MTH 251 [C] or MTH 251H [C] ) and (ST 201 [C] or ST 314 [C] or ST 314 H [C] or ST 351 [C] or ST 351 H [C] )
FOR 322. FOREST MODELS (3). Introduction to static and dynamic forest models: defining what they are, how they might be used, and, in general terms, how they are developed. PREREQS: FOR 321 [C-] and MTH 241 [D-] and (ST 201 [D-] or ST 351 [D-] )
FOR 330. FOREST RESOURCE ECONOMICS I (4). Basic arithmetic of interest and capital budgeting. Basic wood products markets. Forest resource markets and market failures. Nonmarket valuation and multiple-use forestry. Impacts of forest management and policy decisions on forest resource use. Lec/lab. PREREQS: ((AEC 250 [C] or AREC 250 [C] or ECON 201 [C] or ECON 201H [C] ) and (MTH 241 [C] or MTH 245 [C] or MTH 251 [C] or MTH 251 H [C] or MTH 252 [C] or MTH 252H [C] ))
FOR 331. FOREST RESOURCE ECONOMICS II (4). Forest products markets, appraisal, rotation,
thinning, uneven-aged management and forest regulation. Economics of timber management and harvest scheduling. PREREQS: FOR 330 [C] and (ST 201 [C] or ST 351 [C] ) and /or instructor approval.
FOR 346. TOPICS IN WILDLAND FIRE (3). An interdisciplinary survey of concepts relating to fire science, ecology, management, and policy Includes case studies of several representative ecosystems, ranging from west- and eastside forests of the Pacific Northwest to shrub steppe ecosystems of the Intermountain West and chaparral ecosystems of southern California. Distance and campus-based delivery using videos, website, and discussion. PREREQS: Course work in forest biology or ecology (e.g., (FOR 240 or FES 240 or FES 341) or equivalent.
FOR 399. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.
FOR 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

FOR 401. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits.

FOR 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FOR 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
FOR 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
FOR 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
FOR 408. WORKSHOP (1-3). This course is repeatable for a maximum of 16 credits.
FOR 410. INTERNSHIP (1-16). Full-time supervised professional experience emphasizing functional proficiency under joint sponsorship of university and agency personnel. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FOR 411. COOPERATIVE EDUCATION MENTORED WORK EXPERIENCE (1). College
is the time to develop the skills necessary for the transition between academics and career. Cooperative Education Mentored Work Experience is a graded field experience in which the student protege will apply academic study in a This course is repeatable for a maximum of 4 credits. PREREQS: Professional forestry students only.
FOR 413. FOREST PATHOLOGY (3). Effects of diseases on forest ecosystems. Recognition of important groups, prediction of pathogen responses to environmental changes, and management strategies for protection of forest resources. Field trips. Lec/lab. CROSSLISTED as BOT 413. PREREQS: BI 204 [C] or BI 212 [C] or BI 212 H [C] or BI 213 [C] or BI 213 H [C] and /or equivalent.
FOR 417. ADVANCED FOREST SOILS (4). Synthesize current information on fundamental properties and processes of forest soils with emphasis on applications to silviculture, soil conservation, and sustainable management of forested ecosystems. Lec/lab. PREREQS: SOIL 205 [C-] and ( CH 231 [C-] or $\mathrm{CH} 231 \mathrm{H}[\mathrm{C}-]$ ) and (CH 261 [C-] or CH 261 H [C-] ) or CH 201 [C-]) and (MTH 241 [C-] or MTH 251 [C-] or MTH 251H [C-] or MTH 252 [C-] or MTH 252H [C-] )
FOR 429. INTEGRATED PRESCRIPTIONS (3). Using an actual stand and real data, we will cultivate systematic approaches for: 1) characterizing site conditions and limiting factors; 2) harmonizing multiple management objectives; 3) modeling long-term responses to silvicultural manipulations; 4) assessing environmental impacts; 5) building public acceptance; and 6)
communicating alternatives and rationales for decisions. This expanded course will allow a deeper project experience and more integration among the faculty in the co-requisite course, and providing the lab component of three other interrelated forest management courses. PREREQS: (FOR 240 [C-] or FES 240 [C-] and FOR 321 [C-] and /or equivalents. COREQS: FOR 443

## FOR 431. ECONOMICS AND POLICY OF

 FOREST WILDLAND FIRE (3). General overview of the history of fire and the interaction of people with fire on forested landscapes. Forest fire policy history and current issues in the U.S. Basic legal concepts relevant to forest fire policy. An economic framework for understanding spatial externalities, decision-making under certainty, institutional economics, and incentives. PREREQS: AEC 35 [C] or FOR 331 [C]
## FOR 436. WILDLAND FIRE SCIENCE AND

MANAGEMENT (4). Principles and applications of fire as a natural resource management tool; the role of fire in conservation management, restoration, and preservation of ecosystems Covers basic techniques and current research used to describe fire behavior and spread, fuels and fuel manipulation, and fire effects on the biota. Focus will be on fire as a natural process in ecosystem dynamics. Lec/lab.
FOR 441. SILVICULTURE PRINCIPLES (4). Nursery operation, vegetation management, herbivores, fire, seeding and planting techniques. Introduction to principles and techniques involving vegetation control, thinning, fertilizing, and harvesting. Environmental considerations related to forest stand treatments. Lec/lab. PREREQS: ((FES 240 [C] or FOR 240 [C] ) and (FES 141 [C] or FES 241 [C] ))

FOR 442. SILVICULTURE REFORESTATION (4). Silvicultural principles and practices needed to successfully regenerate forestlands in North America. Topics include artificial and natural regeneration, genetic improvement, seed orchards, forest tree nurseries, site preparation, seedling quality and handling, vegetation management, animal damage protection, early stand management, and ecological and ecophysiological considerations. Emphasis is placed on regeneration methods applied to plantations in western Oregon. Field trips required PREREQS: (SOIL 205 [C] and (FES 240 [C] or FES 240 H [C] or FOR 240 [C] )) COREQS: FOR 443
FOR 443. SILVICULTURAL PRACTICES (4).
Manipulation of forest stand structure and dynamics to meet various resource management objectives. Covers key concepts and practices associated with vegetation control, thinning, fertilization, even-aged and uneven-aged regeneration systems including social and environmental considerations associated with treatments. Two-day field trip required. Lec/ lab. PREREQS: (FES 240 [C] or FES 240H [C] or FOR 240 [C] ) and FOR 321 [C] and /or equivalents. COREQS: FOR 442
FOR 456. *INTERNATIONAL FORESTRY (3). An introduction to the biological, physical, and sociological factors that shape the world's forests and the activities used to manage those forests. What influence these factors have on forest policies, practices, and outcomes. CROSSLISTED as FE 456. (Bacc Core Course) PREREQS: Introductory course in biology.

FOR 457. TECHNIQUES FOR FOREST RESOURCE ANALYSIS (4). Use of linear programming, nonlinear programming, dynamic programming, and simulation to solve complex forest management problems, with emphasis on intertemporal multiple use scheduling. Forestry transportation problems, multiple-use allocation, and investment analysis. Field trips required CROSSLISTED as FE 457/FE 557. PREREQS: AREC 351 [C] or FOR 330 [C]

FOR 459. FOREST MANAGEMENT PLANNING AND DESIGN I (4). Integration of environmental, economic, and social aspects of forestry in management planning. Development of strategic and tactical plans using diverse data types and sources. Senior capstone class projects. Lec/lab. CROSSLISTED as FE 459. PREREQS: FE 457 or FOR 457 and senior standing or departmental approval required.
FOR 460. ^FOREST POLICY (4). Policy formulation and analysis for forest resources Consideration of policy affecting land management approaches to planning, management, and social and economic development. Major forestry policy areas covered include outdoor recreation, range, timber, wilderness, and wildlife and fish. Lec/lab. (Writing Intensive Course) PREREQS: Senior standing.
FOR 462. NATURAL RESOURCE POLICY
AND LAW (3). First of two offerings designed to provide an introduction to current environmental and natural resource law issues and disputes for students who will have to meet, consult, and work with lawyers throughout their professional career. Focus is on mechanisms governing resource allocation within the constraints of private property rights. Emphasis is placed on the federal Endangered Species Act and its relation to water allocation and public trust doctrines. Students will also gain a broad understanding of regulatory

FOR 469. FOREST MANAGEMENT PLANNING AND DESIGN II (4). A team-based, project-centric course for integrated timber harvest planning. Establish tactical and operational planning goals and constraints, identify feasible harvesting and transportation systems, and design harvest units to meet objectives and constraints. Lec/lab CROSSLISTED as FE 469. PREREQS: FE 459 [C] or FOR 459 [C]
FOR 499. SPECIAL TOPICS (0-16). Topics of current importance in forest resources issues, education, policies, economics, management, business, social values, silviculture, and biometrics. Topics will change from term to term. May be repeated with different topics for credit. Section 8: Social aspects of natural resource management (3 credits) graded. This course is repeatable for a maximum of 16 credits. PREREQS: Senior or graduate standing.

FOR 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits

FOR 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
FOR 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

FOR 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
FOR 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
FOR 508. WORKSHOP (1-3). This course is repeatable for a maximum of 16 credits.
FOR 510. INTERNSHIP (1-9). This course is repeatable for a maximum of 16 credits.
FOR 513. FOREST PATHOLOGY (3). Effects of diseases on forest ecosystems. Recognition of important groups, prediction of pathogen responses to environmental changes, and management strategies for protection of forest resources. Field trips. Lec/lab. CROSSLISTED as BOT 513. PREREQS: BI 204 or BI 212 or BI 212 H or Bl 213 or Bl 213 H or equivalent.

FOR 517. ADVANCED FOREST SOILS (4). Synthesize current information on fundamenta properties and processes of forest soils with emphasis on applications to silviculture, soil conservation, and sustainable management of forested ecosystems. Lec/lab. PREREQS: SOIL 205 and (((CH 231 or CH 231 H$)$ and $(\mathrm{CH} 261$ or CH 261H)) or CH 201) and (MTH 241 or MTH 251
or MTH 251 H or MTH 252 or MTH 252 H ) all with C- or instructor's permission.

FOR 518. MANAGING FOREST NUTRITION
(3). Synthesize current information on nutrient limitations of forest productivity, long-term forest productivity, and mitigating and managing forest nutrition with emphasis on forests of the Pacific Northwest. PREREQS: Graduate student standing or consent of instructor.

FOR 520. GEOSPATIAL DATA ANALYSIS
WITH MATLAB (3). An introduction into analysis of spatial and other data using Matlab. The course will provide a practical introduction and is designed as a hands-on learning experience.
FOR 524. FOREST BIOMETRICS (3). Advanced topics in forest biometrics, including measurement of forest structure and dynamics, application of sampling theory and methods, and statistical techniques for interpreting forestry data.
PREREQS: FOR 322 and ST 511
FOR 525. FOREST MODELING (3). Examination of regression techniques and assumptions used to develop static and dynamic equations of tree and stand attributes. PREREQS: ST 552 [C] and /or instructor approval.

## FOR 534. ECONOMICS OF THE FOREST

RESOURCE (3). Economic aspects of forest production, regulation, and silvicultural applications. Microeconomic interactions of forest production and regulation and environmenta constraints. Offered alternate years. PREREQS: FOR 330 and FOR 331 or equivalent

FOR 536. WILDLAND FIRE SCIENCE AND MANAGEMENT (4). Principles and applications of fire as a natural resource management tool the role of fire in conservation management, restoration, and preservation of ecosystems Covers basic techniques and current research used to describe fire behavior and spread, fuels and fuel manipulation, and fire effects on the biota. Focus will be on fire as a natural process in ecosystem dynamics. Lec/lab.

FOR 542. INTERNATIONAL INTENSIVE SILVICULTURE (2). Operational and ecological aspects of intensive silvicultural management of planted forests around the world. Guest speakers in different countries will describe the type of silvicultural management that is carried out in the speakerss country from species and genetic selection, to harvest and rotation length, including site preparation and planting techniques Emphasis on comparing silvicultural practices in each country to the management of plantations in western Oregon. PREREQS: Graduate standing.

FOR 543. SILVICULTURAL PRACTICES (5).
Manipulation of immature and mature forest stands for various resource management objectives. Principles and techniques involving vegetation control, thinning, fertilizing, and harvesting. Environmental considerations related to stand treatments. Two-day field trips required. PREREQS: (FOR 240 or FES 240) and FOR 321 or equivalents. COREQS: FOR 429.
FOR 549. SILVICULTURAL INFLUENCES ON FOREST ECOSYSTEM DYNAMICS (3). Fundamental biological and ecological principles for the design and implementation of silvicultura regimes that achieve a wide diversity of forest ecosystem management objectives. PREREQS: Undergraduate course in silviculture and in forest mensuration.

## FOR 550. SUSTAINABLE FOREST

MANAGEMENT (3). Sustainable forestry as part of the global sustainability movement. History of sustainability and its influence on decisionmaking in forest management. Current dimensions of sustainability: forest certification, climate change, role of environmental ethics, biodiversity conservation, maintenance of long-term site productivity, conservation of soil and water resources, roles of social institutions, and links to concerns for social justice. PREREQS: Graduate student standing or permission of instructor.

FOR 557.TECHNIQUES FOR FOREST RESOURCE ANALYSIS (4). Use of linear programming, nonlinear programming, dynamic programming, and simulation to solve complex forest management problems, with emphasis on intertemporal multiple use scheduling. Forestry transportation problems, multiple-use allocation, and investment analysis. Field trips required. CROSSLISTED as FE 457/FE 557. PREREQS: AREC 351 or FOR 330
FOR 561. FOREST POLICY ANALYSIS (3).
Basic elements of forest policy problems, including resource allocation and efficiency, distribution, and interpersonal equity, taxation, regulation, and control, and planning and uncertainty. Emphasis on policy and analysis and its uses in policy decision.
FOR 562. NATURAL RESOURCE POLICY
AND LAW (3). First of two offerings designed to provide an introduction to current environmental and natural resource law issues and disputes for students who will have to meet, consult, and work with lawyers throughout their professional career. Focus is on mechanisms governing resource allocation within the constraints of private property rights. Emphasis is placed on the federal Endangered Species Act and its relation to water allocation and public trust doctrines. Students will also gain a broad understanding of regulatory
FOR 563. ENVIRONMENTAL POLICY AND
LAW INTERACTIONS (3). Second of two offerings designed to provide an introduction to current environmental and natural resource law issues and disputes for students who will have to meet, consult, and work with lawyers throughout their professional career. Focus is on the arena of regulatory environmental laws. Environmental torts, regulation of point and non-point source pollution under the federal Clean Water Act, wetlands protection, and laws governing agricultural and forest practices will be examined as examples of regulatory frameworks for achieving resource protection. Students will be exposed to the basic framework of federal laws regulating air and hazardous waste pollutants.
FOR 599. SPECIAL TOPICS (1-16). Topics of current importance in forest resources issues, education, policies, economics, management, business, social values, silviculture, and biometrics. Topics will change from term to term. May be repeated with different topics for credit. Section 8: Social aspects of natural resource management (3 credits) graded. This course is repeatable for a maximum of 16 credits. PREREQS: Senior or graduate standing.
FOR 601. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.
FOR 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits
FOR 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

FOR 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
FOR 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

FOR 699. SPECIAL TOPICS (1-16). Topics of current importance in forest resources issues, education, policies, economics, management, business, social values, silviculture, and biometrics. Topics will change from term to term. May be repeated with different topics for credit. This course is repeatable for a maximum of 16 credits.

FOR 808. WORKSHOP (1-9). This course is repeatable for a maximum of 16 credits.

## WOOD SCIENCE AND <br> ENCINEERUN

Laurence Schimleck, Head
119 Richardson Hall
Oregon State University
Corvallis, OR 97331-5751
541-737-4257
Email: woodscience@oregonstate.edu
Website: http://woodscience.oregonstate. edu/

## FACULTY

Professors Gupta, Hansen, Kamke, Li, Milota ${ }^{1}$, Morrell, Nairn, Simonsen Associate Professors Leavengood, Muszyski
Assistant Professors Knowles, Robinson, Riggio, Sinha
Instructor Smith

## AFFILIATE FACULTY

Boehner, Broline, Leichti, Panwar, Tokarczyk, Toppinen

## ADJUNCT FACULTY

A. Barbosa (Civil and Construction Engineering), B. Lachenbruch (Forest Ecosystems and Society), T. Miller (Civil and Construction Engineering) ${ }^{1}$

## ${ }^{1}$ Licensed Professional Engineer

## Undergraduate Major

Renewable Materials (BS, CRED, HBS)
Options
Art and Design
Science and Engineering
Management and Marketing

## Minor

Renewable Materials

## Graduate Major

Wood Science (MAIS, MS, PhD)
Graduate Areas of Concentration
Biodeterioration and Materials Protection
Chemistry and Chemical Processing
Forest Products Business and Marketing
Physics and Moisture Relations
Process Modeling and Analysis
Renewable Materials Science and Engineered Composites
Wood Anatomy and Quality
Wood Engineering and Mechanics

## Graduate Minor <br> Wood Science

Use of renewable materials is increasing as the world becomes more concerned about climate change and population growth. Americans use thousands of different products from renewable wood each year-by weight more than we do of steel, cement and plastic combined. To meet the growing demand for renewable
materials and to maximize the benefits of bio-energy and renewable products we must be smarter in how and where we use them. New opportunities for the world through renewable materials is the core of wood science and engineering at OSU.

The department is a world leader in research, outreach and education related to renewable wood-based materials and products. It offers an undergraduate degree program that prepares students for diverse careers in the private sector that is a major component of the Pacific Northwest economy and around the world. Graduates are in high demand as climate change concerns and advanced technology accelerate the transformation to a globally competitive, green renewable materials-based industry.
The department also offers MS and PhD degrees in Wood Science. These graduate programs ensure a foundation in science that is supplemented with programs tailored to student interest. Many students pursue dual majors in science or engineering fields. Interested students should see the department Web page for more information or contact the department head.

## RENEWABLE MATERIALS

## (BS, CRED, HBS)

The Bachelor of Science degree in Renewable Materials program is a multidisciplinary professional program that prepares students to work with renewable, plant-based materials to solve challenging world problems. Renewable materials such as wood, bamboo, canes, and agricultural fibers are examined to understand their characteristics and how to make useful products. Students gain broad perspectives on current issues associated with the sustainable utilization of renewable materials, including global trade, business innovation, energy production, and environmental impacts.

Graduates with degrees in renewable materials are highly sought after to work in business, manufacturing operations, and technical support where they use their knowledge and expertise to help develop sustainable products, industrial systems, and economies.
The curriculum includes a lowerdivision core in science and math with a choice of one of the required upper-division options in Art and Design (A\&D), Marketing and Management (M\&M), or Science and Engineering (S\&E).

- The A\&D option prepares students to engage with renewable materials on an aesthetic level. Artisticallyoriented students learn how materials function within the human space and gain an understanding of green buildings and architecture.
- The M\&M option is designed for students interested in business.

Completion of the M\&M option and meeting additional grade requirements of the College of Business will fulfill the requirements for a transcript-visible Business and Entrepreneurship minor.

- The S\&E option is a flexible program that allows technically oriented students to design a personalized curriculum that opens doors to jobs that solve complex problems or to graduate school. Students select courses (often minors) that complement their interests.
In addition to the course work, all students must have six months of work experience in an area related to their major. This is usually accomplished by two summers of employment in business or industry, but it may include work during the academic year. The department has an established network of connections to help place students in internships and summer employment.


## Renewable Materials Core

## Curriculum (46)

CH 121. General Chemistry (5)
CH 122. *General Chemistry (5)
FOR 112. Computing Applications in Forestry (3)
ST 351. Introduction to Statistical Methods (4)

ST 352. Introduction to Statistical Methods (4)

WSE 111. Renewable Materials for a Green Planet (2)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 321. Chemistry of Renewable Materials (3)

WSE 322. Physical and Mechanical Properties of Renewable Materials (4)
WSE 324. Renewable Materials Laboratory (3)
WSE/DHE 415. *Renewable Materials in the Modern Age (3)
WSE 455. Marketing and Innovation in Renewable Materials (4)
WSE 465. Renewable Materials
Manufacturing Experience (2)

## Baccalaureate Core Courses (12)

Required to fulfill Renewable Materials Core Requirements.
Fitness: HHS 231. *Lifetime Fitness for Health (2)
and HHS 241. *Lifetime Fitness (1) or any PAC course (1-2)
Writing I: WR 121. *English Composition (3)
Writing II: WR 214. *Writing in Business (3) or WR 327. *Technical Writing (3)
Speech: COMM 111. *Public Speaking (3) or COMM 114. *Argument and Critical Discourse (3)
These courses must be taken for grades (not $S / U$ ).

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Major Code: 238


## OPTIONS

## ART AND DESIGN OPTION

The Art and Design option prepares students to engage with renewable materials on an aesthetic level, whether as interior designers, fine artists, or entrepreneurs. Students will gain not only an in-depth knowledge of renewable materials but also how these materials can function visually within the human space. In addition to the aesthetic aspect, students will gain an understanding of green building materials and green architecture. Students in the A\&D option may also earn a visual arts minor by completing 31 credits of applicable course work.

## Art and Design Core (

## 60 or 61 credits)

ART 115. Foundations: 2-D (4)
ART 117. Foundations: 3-D (4)
ART 121. Foundations: Computers in Visual Arts (4)
ART 131. Foundations: Drawing I (4)
ART 206. *Introduction to Art History Western (3)
ART 234. Drawing II/Figure (4)
ART 263. Digital Photography (4)
ART 291. Sculpture I (4)
ART 331. Drawing Concepts (4)
MTH 111. *College Algebra (4)
MTH 245. *Mathematics for Management,
Life, and Social Sciences (4)
WSE 266. *Industrial Hemp (3)
WSE 392. *Bamboolooza: The Fascinating World of Bamboo (3)
WSE 414. ${ }^{\wedge}$ Art and Design Capstone (3)
WSE 461. Manufacturing with Renewable Materials I (4)
or WSE 462. Manufacturing with
Renewable Materials II (4)
WSE 465. Renewable Materials
Manufacturing Experience (2)
WSE 471. Renewable Materials in Building Construction (3)
or WSE 475. Environmental Assessment of Building Materials (4)

## Approved Area of Concentra-

tion: A 30-credit program of study proposed by the student and approved by the WSE Department Head, including 12 upper division studio credits plus 12 credits of Restricted Electives from the list below.

## Restricted Electives (minimum of

## 12 credits)

ART 101. *Introduction to the Visual Arts (4)

ART 204. *Introduction to Art History Western (3)
ART 205. *Introduction to Art History Western (3)
ART 208. *Introduction to Asian Art (3)
ART 215. Color in the Visual Arts (4)
ART 310. *Early Chinese Art and Archaeology (3)
ART 311. *Late Chinese Art and Culture (3)
ART 313. *Art of Japan (3)
ART 351. Installation (4)
ART 367. *History of Design (3)
FES 341. Forest Ecology (3)

WSE 373. Wood Machining I (3)
WSE 374. Wood Machining II (3)
WSE 375. Wood Machining III (3)
WSE 499. Special Topics [Peru Study Abroad] (6)

## Total=90 or 91

Baccalaureate Core Courses (15-18)
(Not satisfied by the Renewable
Materials core or the option.)
Courses meeting other Baccalaureate requirements for the following categories not specified by the Renewable Materials Core or the option can be found in the OSU Catalog online at http://catalog. oregonstate.edu/bcc.aspx.
Biological Science (4)
One additional lecture/lab combination from either Physical Science or Biological Science (4)
Cultural Diversity (3) [If not met by a Restricted Elective]
Difference, Power, and Discrimination (3)
Contemporary Global Issues (3)
Plus additional Free Electives sufficient to ensure 180 total credits ( 60 must be upper division).
Note: Completion of the A\&D option and meeting additional studio and grade requirements will fulfill the requirements for a transcript visible Visual Arts minor.

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Option Code: 478

## MANAGEMENT AND

## MARKETING OPTION

The option provides students with the skills to manage organizations to be competitive in the global renewable materials marketplace or develop innovative and effective marketing programs for green products.
Marketing and Management Core (71)

BA 211. Financial Accounting (4)
BA 213. Managerial Accounting (4)
BA 230. Business Law (4)
BA 260. Introduction to Entrepreneurship (4)

BA 351. Managing Organizations (4)
BA 360. Introduction to Financial
Management (4)
BA 390. Marketing (4)
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
FES 141. Tree and Shrub Identification (3)
[Terminated winter 2017]
FES 240. *Forest Biology (4)
or BI 101. *General Biology (4)
or BI 211. *Principles of Biology (4)
FOR 111. Introduction to Forestry (3)
MTH 111. *College Algebra (4)
MTH 241. *Calculus for Management and Social Science (4)
WSE 453. ^Global Trade in Renewable Materials (3)
WSE 461. Manufacturing with Renewable Materials I (4)

WSE 462. Manufacturing with Renewable Materials II (4)
WSE 471. Renewable Materials in Building Construction (3)
WSE 473. Bioenergy and Environmental Impact (3)

## Restricted Electives

(minimum of 12)
Select a minimum of 12 credits from the following list, as a base for an "Area of Concentration" as described below:
AEC/ECON 352. *Environmental
Economics and Policy (3)
BA 357. Operation Management (4)
BA 458. Innovation and New Product Development (4)
BA 460. Venture Management (4)
ECON 340. International Economics (4)
MGMT 364. Project Management (4)
MGMT 452. Leadership (4)
MRKT 396. Fundamentals of Marketing Research (4)
MRKT 497. Global Marketing (4)
COF Study Abroad courses, various (6)
Approved "Area of Concentration" - A 24-credit program of study proposed by the student and approved by the WSE Department Head. Must include 12 credits of Restricted Electives from the list above, and 20 upper-division credits.

## Total=95

Baccalaureate Core Courses (22)
Not satisfied by the Renewable Materials core or the option.
Courses meeting other Baccalaureate requirements for the following categories not specified by the Renewable Materials Core or the option can be found in the
OSU Catalog online at http://catalog. oregonstate.edu/bcc.aspx.
One additional lecture/lab combination
from either Physical Science or Biological
Science (4)
Cultural Diversity (3)
Difference, Power, and Discrimination (3)
Literature and Arts (3)
Western Culture (3)
Science, Technology, and Society Synthesis (3)

Contemporary Global Issues (3)
Plus additional Free Electives sufficient to ensure 180 total credits ( 60 must be upper division).
Note: Completion of the Management and Marketing option and meeting additional grade requirements of the College of Business will fulfill the requirements for a transcript-visible Business and Entrepreneurship minor. Students who graduate and complete the minor may also apply to the College of Business to enroll in a 58-credit, four-term MBA

## degree program.

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 288


## SCIENCE AND

## ENGINEERING OPTION

This is a flexible, math- and scienceintensive program that allows students to design a personalized curriculum that opens doors to jobs that solve complex problems, create efficiencies, foster intelligent use of renewable materials, or to graduate school. Students select a group of courses (often minors) that complement their interests.

## Science and Engineering Core (72)

BA 215. Fundamentals of Accounting (4)
BA 230. Business Law I (4)
CH 123. *General Chemistry (5)
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
FES 141. Tree and Shrub Identification (3)
[Terminated winter 2017]
FES 240. *Forest Biology (4)
or BI 101. *General Biology (4)
or BI 211. *Principles of Biology (4)
FOR 111. Introduction to Forestry (3)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 254. Vector Calculus I (4)
PH 211. *General Physics with Calculus (4)
PH 212. *General Physics with Calculus (4)
PH 213. *General Physics with Calculus (4)
WSE 453. ${ }^{\wedge}$ Global Trade in Renewable Materials (3)
WSE 461. Manufacturing with Renewable Materials I (4)
WSE 462. Manufacturing with Renewable Materials II (4)
WSE 471. Renewable Materials in Building Construction (3)
WSE 473. Bioenergy and Environmental Impact (3)
Approved "Area of Concentration" - A 27-credit program of study proposed by the student and approved by the
WSE Department Head (minimum of 12 upper-division credits)

## Total=99

## Baccalaureate Core Courses (18)

(Not satisfied by the Renewable Materials core or the option.)

Courses meeting other baccalaureate core requirements for the following categories not specified by the Renewable Materials Core or the option can be found in the OSU Catalog online at http://catalog.oregonstate.edu/bcc.aspx. Cultural Diversity (3)
Difference, Power, and Discrimination (3)
Literature and Arts (3)
Western Culture (3)
Science, Technology, and Society Synthesis (3)

Contemporary Global Issues (3)
Plus additional Free Electives sufficient to ensure 180 total credits ( 60 must be upper division).

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 289


## RENEWABLE MATERIALS MINOR

The minor in Renewable Materials exposes students to the world of renewable materials science and technology and will enable students in other majors to gain a specialization that will make them more competitive for careers associated with green materials and allied industries.

## Core Courses ( 16 credits)

CH 122 . *General Chemistry (5)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 321. Chemistry of Renewable Materials (3)

WSE 322. Physical and Mechanical
Properties of Renewable Materials (4)
Select from the following courses
(minimum of 11 credits)
FOR 111. Introduction to Forestry (3)
WSE 266. Industrial Hemp (3)
WSE 324. Renewable Materials Laboratory (3)

WSE 373. Wood Machining I (3)
WSE/DHE 415. *Renewable Materials in the Modern Age (3)
WSE 453. ^Global Trade in Renewable
Materials (3)
WSE 455. Marketing and Innovation in
Renewable Materials (4)
WSE 458. Design of Wood Structures (3)
[Effective winter 2015]
WSE 461. Manufacturing with Renewable Materials I (4)
WSE 462. Manufacturing with Renewable Materials II (4)
WSE 465. Renewable Materials
Manufacturing Experience (2)
WSE 470. *Forests, Wood, and Civilization (3)

WSE 471. Renewable Materials in Building
Construction (3)
WSE 473. Bioenergy and Environmental Impact (3)
WSE 475. Environmental Assessment of Building Materials (4)
Students must complete a minimum of 27
credits for the minor, at least 12 of which must be upper division.

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Minor Code: 238

WOOD SCIENCE (MS, PhD, MAIS)
Graduate Areas of Concentration
Biodeterioration and materials protection, chemistry and chemical processing, forest products business and marketing, physics and moisture relations, process modeling and analysis, renewable materials science and engineered composites, wood anatomy and quality, wood engineering and mechanics
The Department of Wood Science and Engineering offers graduate programs leading toward the Master of Science and Doctor of Philosophy degrees in Wood Science. Thesis research and academic programs can be developed in the many special disciplines represented by the faculty. Minors are most commonly selected
from statistics, engineering, chemistry, botany, plant pathology, or business.
Many students pursue a dual major degree in wood science and a field of engineering or science. A wide variety of science, engineering and business opportunities are available.
Graduate students in wood science come from a wide range of undergraduate degree programs in science, engineering, and business.

Excellent laboratories are available for teaching and research in Richardson Hall, Peavy Hall, and the Oak Creek Laboratory. Student research involves seeking solutions to current problems in renewable materials science, other sciences such as chemistry, physics and biology, engineering, business or related fields. Most graduate students are employed as part-time graduate research assistants.
Graduates with advanced degrees find employment in research and development, management or technical positions in the private sector, as university faculty or in technical public service positions.

## MS in Wood Science (45 Credits)

## Required

WSE 503. Thesis (6-12)
WSE 507. Seminar: Section 1 (1) Required to be taken during 1st year
WSE 507. Seminar: Section 2 (1)
WSE 520. The Global Context of the Forest Sector (3)
WSE 521. Wood Science I (4)
WSE 522. Wood Science II (4)
Integrated minor course work or outside
minor course work* (Minimum of 15)
Additional approved courses** (6-8)

## PhD in Wood Science (108 Credits)

## Required

WSE 520. The Global Context of the Forest Sector (3)
WSE 521. Wood Science I (4)
WSE 522. Wood Science II (4)
WSE 603. Thesis (36+)
WSE 607. Seminar: Section 1 (1) Required to be taken during 1st year
WSE 607. Seminar: Section $2(1,1)$ To be taken twice
Integrated minor course work or outside
minor course work* (Minimum of 18)
Additional approved courses ** (40+)

* Course work to be determined by your committee at program of study meeting
** Approved courses include all 500- and 600-level courses in Wood Science and Engineering
Major Code: 3690


## WOOD SCIENCE

## GRADUATE MINOR

For more details, see the departmental advisor or major professor.
Minor Code: 3690

## ■ WOOD SCIENCE AND ENGINEERING COURSES

WSE 111. RENEWABLE MATERIALS FOR A GREEN PLANET (2). Renewable materials are an integral part of modern lifestyles, and current societal trends point to increased use of renewable materials. This course provides an overview of renewable materials and their current applications in society. As an overview course, it covers a breadth of renewable material uses and exposes students to life-cycle thinking.
WSE 210. *RENEWABLE MATERIALS
TECHNOLOGY AND UTILIZATION (4).
Characteristics and uses of renewable fiber products including wood, bamboo and grasses; manufacturing processes; effect of tree growth and harvesting on renewable products manufacturing and properties. Wood identification. Lec/lab. (Bacc Core Course)

WSE 211. WOODTURNING WITH SCIENCE I (4). An introduction to scientific woodturning. Students will get a grounding in tools, lathes, sharpening, and set-up, and then will transition into turning basic forms (spindle and bowl). Particular relevance will be placed upon grain orientation, wood moisture content, wood anatomy, wood chemistry, wood species and extractive effects, and how all of these attributed affect both form and function. Class instruction will be entirely studio based. CROSSLISTED as ART 211. This course is repeatable for a maximum of 8 credits. PREREQS: WSE 210* [D-]
WSE 266. *INDUSTRIAL HEMP (3). Introduction to the botany, biology and agronomy of the hemp plant, and the origins, historical contexts and implications of contemporary legal and social issues surrounding its use for food, fiber, and building products. Taught via Ecampus only. (Bacc Core Course)
WSE 299. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.
WSE 321. CHEMISTRY OF RENEWABLE
MATERIALS (3). Chemical structures and chemical properties of renewable plant-based materials will be taught at molecular levels. Chemical compositions of different renewable materials will be covered. Chemical and biochemical modifications and applications or renewable materials will be discussed in detail. Lec/lab. PREREQS: CH 122 [D-] or CH 202 [D-] or CH 232 [D-] or CH 232H [D-]
WSE 322. PHYSICAL AND MECHANICAL PROPERTIES OF RENEWABLE MATERIALS
(4). Introduction to thermodynamics and mechanics of plant fibers, solid wood and biobased composites: hygroscopicity; heat and mass transport; statics, elasticity and strength of materials; mechanical properties. PREREQS: WSE 321 [C-]

## WSE 324. RENEWABLE MATERIALS

LABORATORY (3). Integrates the knowledge gained in the core science courses (WSE 321 and WSE 322) to help students obtain a deeper understanding of how chemistry, physics, and anatomy affect renewable material properties. The course uses renewable fiber materials such as hardwoods, softwoods, natural fibers, bamboo, composite wood products (e.g. OSB, plywood, MDF, etc.) and fiber-based products (e.g. woodplastic composites, natural fiber composites, straw panels, paper, etc.) to examine the intricate relationships between fundamental properties and performance. Lec/lab. PREREQS: (WSE 321 [C-] and WSE 322 [C-] )

WSE 373. WOOD MACHINING I (3). Familiarizes students with precision, accuracy standards and procedures necessary in the manufacture of value-added secondary wood products. Lab fee. Lec/lab.
WSE 374. WOOD MACHINING II (3). Students will become familiar with using CAD/CAM software and CNC techniques to take 3D product designs
from concept through planning, to manufacturing, using modern wood product production workflows Skills, software and concepts developed through the course are applicable to a wide variety of industrial design and production situations. Lec/ lab/rec. Lab fee. PREREQS: Instructor's approval required. WSE 373 is recommended.

WSE 375. WOOD MACHINING III (3). An experiential learning environment in which students design, produce, market, and sell a custom wood product in a virtual business setting. This course is intended to foster creativity, innovation, entrepreneurship, and problem solving, as well as enhance skills with woodworking equipment. Lec/lab. PREREQS: WSE 373 and WSE 374 highly recommended.
WSE 392. *BAMBOOLOOZA: THE
FASCINATING WORLD OF BAMBOO (3)
An exploration of the world of bamboo and its application to renewable products. This course provides an in-depth understanding of a renewable material bamboo from its native form to processed products. Additionally, this course discusses the utilization and perception of bamboo in different societies of the world. Taught via Ecampus only. (Bacc Core Course) PREREQS: Junior in good academic standing.

WSE 399. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

WSE 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
WSE 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits.
PREREQS: Departmental approval required.
WSE 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

WSE 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

WSE 413. WOODTURNING WITH SCIENCE
II (4). An in-depth look at how character in wood (figure, spalting, knots, etc.) affects machinability and output in both functional and aesthetic turning. Students will work with a wide range of spalted wood types and figure across numerous species while working on advanced turning forms. Particular emphasis will be placed upon how figure affects grain orientation, how spalting affects density and stability, and how the challenges with character wood can be overcome without specialty tools. Class instruction will be entirely studio based. CROSSLISTED as ART 413. This course is repeatable for a maximum of 8 credits. PREREQS: WSE 210 [C-] and WSE 211 [C-]

WSE 414. ^ART AND DESIGN CAPSTONE (3). For the final term of a student's last year in the Renewable Materials Industrial Design program, this course brings together the basic collaborative design elements and technical background of each student in the creation of collaborative design projects with the intention of giving students real-world, problem-based design experience. (Writing Intensive Course) PREREQS: Senior standing
WSE 415. *RENEWABLE MATERIALS IN THE MODERN AGE (3). Micro-renewable materials anatomy course taught within an interdisciplinary, hands-on format. Suitable for all majors and backgrounds. Course covers the micro- and macro-anatomy of wood and other common renewable materials like bamboo and cellulose fibers. Utilizes studio-based learning. CROSSLISTED as DHE 415. (Bacc Core Course)

WSE 415H. *RENEWABLE MATERIALS IN
THE MODERN AGE (3). Micro-renewable materials anatomy course taught within an interdisciplinary, hands-on format. Suitable for all majors and backgrounds. Course covers the micro- and macro-anatomy of wood and other common renewable materials like bamboo and cellulose fibers. Utilizes studio-based learning.

CROSSLISTED as DHE 415H. (Bacc Core Course) PREREQS: Honors College approval required.

## WSE 444. STRAND-BASED COMPOSITES

 MANUFACTURE (1). The strand-based composites manufacturing process uses the results of research projects and the instructor's mill experience. All aspects of the process from wood procurement through pressing are discussed. This course will be valuable to those interested in a manufacturing career.WSE 453. ^ GLOBAL TRADE IN RENEWABLE MATERIALS (3). Provides basic skills to operate in the global business environment. To include understanding the role of culture in international business, types of international business, policy considerations, ethics, trade barriers, exchange rates, shipping, global industry structure, and other current issues. Examines specific examples from renewable materials industries. (Writing Intensive Course) PREREQS: ECON 201 and ECON 202 or instructor consent.

WSE 455. MARKETING AND INNOVATION IN RENEWABLE MATERIALS (4). Marketing, innovation and their application in the renewable products industries.
WSE 458. DESIGN OF WOOD STRUCTURES
(3). Study of basic wood properties and design considerations. Design of wood connectors, beams, columns, and beam columns. Introduction to plywood and glue laminated members. Design of structural diaphragms and shear walls. Taught via Ecampus only. PREREQS: CE 381 [C] and /or equivalent or instructor permission.

## WSE 461. MANUFACTURING WITH

RENEWABLE MATERIALS I (4). Manufacturing renewable materials such a wood, bamboo, hemp, and cereal straws into products requires size reduction and separation of components. The components are then further processed, in many cases by joining with glue or fasteners, to create a usable product. The major processing steps for the conversion of raw materials into products will be discussed. PREREQS: WSE 210 [C-] and WSE 321 and WSE 324

WSE 462. MANUFACTURING WITH RENEWABLE MATERIALS II (4). The second of a two-term series exploring technologies and management practices associated with manufacturing products from renewable materials. Subjects covered include process automation, quality control, safety, and preventive maintenance programs. PREREQS: WSE 461 or WSE 561; may be waived with instructor approval.

## WSE 465. RENEWABLE MATERIALS

MANUFACTURING EXPERIENCE (2). Learning about and visiting a number of renewable materials industrial and commercial operations representing all parts of the renewable materials value chain. The class will meet daily for one 5 -day week immediately prior to the start of fall term. During the week, the students and at least one instructor will meet daily. Lectures will precede visits to industrial plants, mills and sites. At the end of the day, an instructor will participate in a debriefing session, reiterating what was learned during the day. Students will then submit a report on the day's activities. The class includes daily travel and overnight stays. This course is repeatable for a maximum of 4 credits.

## WSE 470. *FORESTS, WOOD, AND

CIVILIZATION (3). Multidisciplinary examination of issues related to the roles of forests, trees, and wood in civilization, as providers of commodities, ecosystem services, and spiritual and artistic inspiration. Issues include global supply and demand, wood ownership and political power, and perceptions and uses of forest resources in different societies. (Bacc Core Course)
WSE 470H. *FORESTS, WOOD, AND
CIVILIZATION (3). Multidisciplinary examination of issues related to the roles of forests, trees, and wood in civilization, as providers of commodities,
ecosystem services, and spiritual and artistic inspiration. Issues include global supply and demand, wood ownership and political power, and perceptions and uses of forest resources in different societies. (Bacc Core Course) PREREQS: Honors College approval required.

WSE 471. RENEWABLE MATERIALS IN BUILDING CONSTRUCTION (3). Building construction is a major application of renewable materials, primarily wood. This course explores material selection options, applications, and performance characteristics. Residential construction is emphasized, but non-residential construction applications will also be discussed. Concepts and interpretation of life cycle assessment are introduced. PREREQS: Junior standing.
WSE 473. BIOENERGY AND ENVIRONMENTAL IMPACT (3). Explores world's use of woody biomass fuels, their potential to contribute to our region's energy supply, and conversion technologies such a direct combustion, pyrolysis, and thermochemical modification. Also examines emissions and other environmental impacts of utilizing renewable materials to generate energy and manufacture products. PREREQS: ((MTH 111 [D-] or MTH 112 [D-] or MTH 231 [D-] or MTH 241 [D-] or MTH 245 [D-] or MTH 251 [D-] or MTH 251 H [D-] ) and (CH 122 [D-] or CH 222 [D-] or CH 232 [D-] or CH 232 H [D-] )) and /or graduate standing.
WSE 475. ENVIRONMENTAL ASSESSMENT OF BUILDING MATERIALS (4). Study of sustainability in the built environment from a building material perspective. Understanding the ecology of building materials and assessing their environmental sustainability performance using life cycle analysis. Critical discussion of case studies and future of LCA in the built environment. PREREQS: Junior in good academic standing.
WSE 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 99 credits.
WSE 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.
WSE 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

WSE 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

WSE 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

WSE 507. SEMINAR (1). Section 1: Beginning Seminar. Section 2: Seminar. Graded P/N. This course is repeatable for a maximum of 99 credits.
WSE 514. ART AND DESIGN CAPSTONE
(3). For the final term of a student's last year in the Renewable Materials Industrial Design program, this course brings together the basic collaborative design elements and technical background of each student in the creation of collaborative design projects with the intention of giving students real-world, problem-based design experience. PREREQS: Senior standing

WSE 515. RENEWABLE MATERIALS IN THE MODERN AGE (3). Micro-renewable materials anatomy course taught within an interdisciplinary, hands-on format. Suitable for all majors and backgrounds. Course covers the micro- and macro-anatomy of wood and other common renewable materials like bamboo and cellulose fibers. Utilizes studio-based learning. CROSSLISTED as DHE 515.
WSE 520. THE GLOBAL CONTEXT OF THE FOREST SECTOR (3). Provides a broad knowledge base of business and marketing practices in the global forest industry. Includes a module on research ethics that fulfills OSU Graduate School requirements.
WSE 521. WOOD SCIENCE I (4). A
comprehensive overview and integration of wood
anatomy, wood physics, wood chemistry and wood mechanics; global contemporary issues impacting the wood and fiber sector; integration of basic wood sciences to understand the complex relationships between environment and wood material properties, and the influence of both on the use of wood-based materials.

WSE 522. WOOD SCIENCE II (4). Continuation of the comprehensive overview and integration of wood and fiber anatomy, physics, chemistry, and mechanics; integration of basic wood science to understand relationships with wood and fiber properties and their impact on final use. Focus on biological, chemical and physical degradation of wood; adhesion; and physical and engineering properties of wood. Lec/lab.
WSE 530. POLYMER COMPOSITES (3). A comprehensive survey of the material and mechanical properties of polymer-based composite materials including failure mechanisms, interfacial and nanoscale effects, and transport and thermal properties. PREREQS: CHE 545. Recommended: multivariable calculus.
WSE 535. POLYMER SYNTHESIS AND STRUCTURE (3). A comprehensive overview of various synthetic methods for various synthetic polymers; structures of various synthetic and natural polymers. PREREQS: 3 credits of undergraduate organic chemistry or CH 331 or CH 334 are recommended.
WSE 553. GLOBAL TRADE IN RENEWABLE MATERIALS (3). Provides basic skills to operate in the global business environment. To include understanding the role of culture in international business, types of international business, policy considerations, ethics, trade barriers, exchange rates, shipping, global industry structure, and other current issues. Examines specific examples from renewable materials industries. PREREQS: ECON 201 and ECON 202 or instructor consent.

WSE 555. MARKETING AND INNOVATION IN RENEWABLE MATERIALS (4). Marketing, innovation and their application in the renewable products industries.
WSE 558. WOOD DESIGN (4). Study of basic wood properties and design considerations. Design and behavior of wood connectors, beams, columns and beam columns. Introduction to plywood and glue laminated members. Analysis and design of structural diaphragms and shear walls. Lec/lab. CROSSLISTED as CE 584. PREREQS: CE 383 or CE 481 with minimum grade of C, senior standing or graduate

## WSE 561. MANUFACTURING WITH

RENEWABLE MATERIALS I (4). Manufacturing renewable materials such a wood, bamboo, hemp, and cereal straws into products requires size reduction and separation of components. The components are then further processed, in many cases by joining with glue or fasteners, to create a usable product. The major processing steps for the conversion of raw materials into products will be discussed. PREREQS: WSE 210 and WSE 321 and WSE 324

WSE 562. MANUFACTURING WITH RENEWABLE MATERIALS II (4). The second of a two-term series exploring technologies and management practices associated with manufacturing products from renewable materials. Subjects covered include process automation, quality control, safety, and preventive maintenance programs. Graduate students are responsible or preparing case studies to demonstrate how manufacturing management programs are integrated into operations. PREREQS: WSE 461 or WSE 561; may be waived with instructor approval.
WSE 571. RENEWABLE MATERIALS IN
BUILDING CONSTRUCTION (3). Building construction is a major application of renewable materials, primarily wood. This course explores material selection options, applications, and performance characteristics. Residential
construction is emphasized, but non-residential construction applications will also be discussed. Concepts and interpretation of life cycle assessment are introduced. PREREQS: Junior standing.
WSE 573. BIOENERGY AND ENVIRONMENTAL
IMPACT (3). Explores world's use of woody biomass fuels, their potential to contribute to our region's energy supply, and conversion technologies such as direct combustion, pyrolysis, and thermochemical modification. Also examines emissions and other environmental impacts of utilizing renewable materials to generate energy and manufacture products. PREREQS: (MTH 111 or MTH 112 or MTH 231 or MTH 241 or MTH 245 or MTH 251 or MTH 251 H ) and (CH 122 or CH 222) or graduate standing.

WSE 575. ENVIRONMENTAL ASSESSMENT OF BUILDING MATERIALS (4). Study of sustainability in the built environment from a building material perspective. Understanding the ecology of building materials and assessing their environmental sustainability performance using life cycle analysis. Critical discussion of case studies and future of LCA in the built environment. PREREQS: Junior in good academic standing.

## WSE 592. ADVANCED WOOD DESIGN (4)

 Study of advanced concepts in wood properties and design. Design and analysis of specialty wood connectors. Design of wood members for adverse conditions including fire design. Common failure mechanisms and forensic engineering concepts. Design for durability. Lec/lab. PREREQS:Graduate only. Undergraduates can take it for graduate credits. Understanding of basic concepts in mechanics and timber design is preferred.
WSE 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 99 credits.
WSE 601. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.

WSE 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

WSE 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
WSE 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
WSE 607. SEMINAR (1). Section 1: Beginning Seminar. Section 2: Graduate Seminar. This course is repeatable for a maximum of 99 credits.
WSE 611. SELECTED TOPICS IN WOOD AND FIBER SCIENCE (1-3). This course is repeatable for a maximum of 6 credits.

WSE 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## OTHER DECREES \& <br> PROCRAMS WHTHIN THE COLLECE OF FORESTRY <br> UNDERGRADUATE MAJORS WITH OPTIONS

## INTERNATIONAL STUDIES (BA, HBA)

See International Programs for information on the International Studies degree.

## Major Code: 910

## SUSTAINABILITY (BS, HBS)

Also available via Ecampus.
OSU Main Campus Contact: Ann
Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann.

Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.

OSU-Cascades Campus Contact:
Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@ osucascades.edu.

## Sustainability Core (17-20)

All Sustainability Majors and Minors must take the five courses that make up the Sustainability Core: SUS 304, SUS 350, an ecological sustainability course (SUS 102 recommended), a social sustainability course (choose one below), and an economic sustainability course (choose one below):

SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)

## Ecological Dimensions of

 Sustainability (3-4)Select 3 to 4 credits from the following:
BI 301. *Human Impacts on Ecosystems (3)
SUS 102. *Introduction to Environmental Science and Sustainability (4)

## Social Dimensions of Sustainability

 (3-4)Select 3 to 4 credits from the

## following:

SOC 381. Social Dimensions of
Sustainability (4)(Ecampus only)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/FES/ANS/FW 485. *Consensus and Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)(Ecampus, Cascades Campus )

## Economic Dimensions of

Sustainability (3-4)
Select 3 to 4 credits from the following:
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 351. *Natural Resources Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)

## Practicum (3-12)

Sustainability majors are required to complete a minimum of 3 Practicum credits. Before registering for a practicum students must get practicum approved by Sustainability Double Degree advisor. Email: Sus.advising@oregonstate.edu.
SUS 401. Research (3-12)
SUS 410. Internship (3-12)
SUS 499. Special Topics (3-12)
Note: SUS 410 credits may be achieved by participation in an $\mathrm{IE}_{3}$ Global Internship with advisor approval.

## Remaining Elective Credits (4-16)

In addition to the required credits specified above, students must work with the sustainability program advisor to select
courses relevant to their discipline and career path interests.

## Credits total=36

Classes that can be used to fulfill remaining requirements are listed below. Students are NOT limited to taking courses within their primary major of study. The Sustainability advisor(s) will approve courses not listed here if they have an obvious link to sustainability and fulfill the intent of the double degree. See the OSU Sustainability Office list of sustain-ability-related courses.

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 465. *Systems Thinking and Practice (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 311. Intermediate Microeconomic Theory (4)
ECON 315. Intermediate Macroeconomic Theory (4)
MGMT 452. Leadership (4)

## Engineering

BEE 221. Fundamentals of Ecological Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering Fundamentals (4)
ENVE 322. Fundamentals of Environmental Engineering (4)
HEST 310. *Introduction to Community
Engagement and Community-Based Design (3)

## Natural Sciences

ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ATS 320. *The Changing Climate (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 348. *Human Ecology (3)
BI 370. Ecology (3)
BRR 325. *Energy Technology and Social Change (3)

BRR 350. Introduction to Regional Bioenergy (2)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
DHE/WSE 415. *Renewable Materials in the Modern Age (3)
FES 341. Forest Ecology (3)
FES 354. Communities, Natural Areas, and Sustainable Tourism (3)
FES 355. Management for Multiple Resource Values (3)
FES 360. Collaboration and Conflict Management (3)
FES 365. *Issues in Natural Resources Conservation (3) Ecampus or Cascades campus only
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FES/FW 445. Ecological Restoration (4)
FES/HORT 455. Urban Forest Planning,
Policy and Management (4) Ecampus only
FES/NR/RNG 477. *Agroforestry (3)
FES/SOC/ANS/FW 485. *Consensus and Natural Resources (3)
FOR 462. Natural Resource Policy and Law (3)
FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information
Systems in Natural Resource (3)
FW 321. Applied Community and Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society, and Sustainability (3)
FW 435. ${ }^{\wedge}$ Wildlife in Agricultural Ecosystems (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 309. *Environmental Justice (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
SOIL 475. Soil Resource Potentials (4)
SOIL 499. Special Topics (1-16)
SUS 103. *Introduction to Climate Change (4)

WSE 111. Renewable Materials for a Green Planet (2)

WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 392. *Bamboolooza: The Fascinating World of Bamboo (3)
WSE 453. ${ }^{\wedge}$ Global Trade in Renewable Materials (3)
WSE 455. Marketing and Innovation in Renewable Materials (4)
WSE 473. Bioenergy and Environmental Impact (3)
WSE 475. Environmental Assessment of Building Materials (4)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy, and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ANTH 481. *Natural Resources and
Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature, Culture and the Environment (4)
FES/SOC/ANS/FW 485. *Consensus and
Natural Resources (3)
HEST 310. *Introduction to Community Engagement and Community-Based Design (3)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL/REL 443. *World Views and
Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion, and Politics (4)
PS 374. *Sustainable Living: Practices and Policies (4)
PS 449. ^Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)
PS 477. International Environmental Politics and Policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
WGSS 440. *Women and Natural Resources (3)

WGSS 450. Ecofeminism (3)

## Footnotes:

* Bacc Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Major Code: $\mathbf{8 7 0}$

SUSTAINABILITY MINOR
Sustainability Core (17-20)
All Sustainability students must take (8):
SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)
Social Dimensions of
Sustainability:
Select 3 to 4 credits from the following:
SOC 381. Social Dimensions of
Sustainability (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC 485/ANS 485/FES 485/FW 485.
*Consensus and Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)

## Ecological Dimensions of

## Sustainability:

Select 3 to 4 credits from the following:
BI 306. *^Environmental Ecology (3)
SUS 102. *Introduction to Environmental Science and Sustainability (4)

## Economic Dimensions of

Sustainability:
Select 3 to 4 credits from the following:
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)

## Sustainability Individualized Study/

## Elective Credits (7-10)

Students will work with their primary academic advisor and the Sustainability academic advisor to select electives in the theme relevant to their interests for a total of 7-10 credits. Students should discuss with Sustainability advisor to apply elective courses that may not be listed below.

## Total Credits=27

Elective Courses:

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. Introduction to
Macroeconomics (4)
ECON 315. Intermediate Macroeconomic Theory (4)

## Engineering

BEE 221. Fundamentals of Ecological Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Electric Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering Fundamentals (4)
ME 312. Thermodynamics (4)

## Natural Sciences

ATS 320. *The Changing Climate (3) [Terminated fall 2017]
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 370. Ecology (3)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FOR 462. Natural Resource Policy and Law (3)

FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information Systems in Natural Resource (3)
FW 321. Applied Community and Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society and Sustainability (3)
FW 435. ${ }^{\wedge}$ Wildlife in Agricultural Ecosystems (3)
FW/ANS/FES/SOC 485. *Consensus and Natural Resources (3)
FW 488. Problem Solving in Fisheries and Wildlife Science (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water and the Environment (3)
GEO 309. *Environmental Justice (3)
GEO 453. Resource Evaluation Methods/ EIS (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural Resource Management (3)
GEOG 431. Global Resources and Development (3)
GEOG 441. International Water Resources Management (3)

GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 322. Physical and Mechanical Properties of Renewable Materials (4)
SOIL 499. Special Topics [Organic Farming] (1-16)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ANTH 481. *Natural Resources and Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 442. Bargaining and Negotiation
Processes (3)
ENG 482. Studies in American Literature,
Culture and the Environment (4)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL 443. *World Views and Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion and Politics (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)

PS 477. International Environmental Politics and policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 381. Social Dimensions of Sustainability (4)
SOC 480. *Environment Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/ANS/FES/FW 485. *Consensus and Natural Resources (3)

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
Minor Code: 871

Exciting and diverse educational opportunities are offered through the graduate programs of Oregon State University's 11 colleges which encompass 73 major disciplines and 19 different graduate degree types. A land, sea, space, and sun grant university, OSU enrolls more than 4,400 graduate students, representing more than 70 countries and every state in the nation.

$\Delta$t OSU, maximum opportunity is provided for the integration of graduate instruction and research. The graduate faculty ( 1,800 members) is selected on the basis of training, experience, research, and evidence of the ability to successfully direct and supervise graduate students.

All study beyond the bachelor's degree at Oregon State University is conducted through the Graduate School. The establishment of departmental graduate programs and the formulation and direction of individual student programs are responsibilities of the departments, under the general rules and requirements of the Graduate School.

## INTRODUCTION

Oregon State University has a global reputation for excellence in teaching, research, and engagement.

Oregon State is one of only two land, sea, space and sun grant universities in the nation and is the only university in Oregon to have the Carnegie Classifications for both Very High Research Activity and Community Engagement. OSU is comprised of 11 academic colleges with strengths in natural resources, earth dynamics and sustainability, life sciences, innovation and entrepreneurship, and the arts and sciences. OSU has facilities and/ or programs in every county in the state, including 11 regional experiment stations, 35 county extension offices, a branch campus in Bend, a major marine science center in Newport, and a range of programs and facilities in Portland. OSU is Oregon's largest public research university, conducting more than 60 percent of the research funded throughout the state's university system.

A dedicated and highly regarded graduate faculty, a well-equipped library, comprehensive special collections, and exceptional research facilities keep Oregon State at the leading edge of graduate education. Linus Pauling, an Oregon State alumnus and the only person to win individual Nobel prizes in two different categories, selected OSU as the repository for his papers.

Research and teaching assistantships are available to allow you the opportunity to work with people who are leaders in their fields while furthering your education. In addition to being outstanding teachers, many OSU faculty members are internationally renowned for their research. In fiscal year 2012, Oregon State University received more than $\$ 81$ million in external support for research and scholarship.

With these strengths in research and teaching, Oregon State produces degree holders who can compete successfully with the best in their fields.
But life isn't all study and research, and when you're ready to take a break, you'll find that Oregon State is the ideal location
for that as well. Whether you want to be active or relax, attend a sports event or a lecture, go to a concert or a play, or do just about anything else, you're likely to find what you want at Oregon State or just a short distance away.

OSU is located in Corvallis, a community of 54,670 people situated in the Willamette Valley between Portland and Eugene. Ocean beaches, lakes, rivers, forests, high desert, the rugged Cascade and Coast Ranges, and the urban amenities of the Portland metropolitan area are all within a 100 mile drive of Corvallis. More than 24,500 undergraduate, 590 first professional, and 4,400 graduate students are enrolled at OSU, including more than 7,200 students of color and 3,500 international students.

The stunning, park-like setting of the OSU campus is comprised of 400 acres of stately buildings, seasonal landscaping and green, open spaces. Housing for many OSU undergraduate and graduate students is provided by residence halls on campus, and cooperatives, sororities, fraternities, and family student housing just off the central campus.

In addition to the main campus, the state owns and leases many acres of forest and farmland that are used by the university for instruction and research. OSU's Hatfield Marine Science Center at Newport serves as the main coastal facility for Sea Grant, oceanography, and fisheries programs. For many graduate students, study and research through these offcampus facilities means a direct look at the natural resources and characteristics of the Pacific Northwest.

The institution that is now OSU opened in 1858 as Corvallis College, a small academy. College-level study began about 1865, and the first three baccalaureate degrees were awarded in 1870. Graduate programs began a short time later. In 1868, Corvallis College was designated by the Oregon Legislature as the "agricultural college of the state of Oregon." From 1868 until 1885, the college continued under the direction of the Methodist Episcopal Church but was partly state supported. In 1885, the state of Oregon assumed full control of the institution.

Oregon State granted its first advanced degree (A.M.) in 1876. Residence requirements for the master's degree were announced in 1897.

Responsibility for graduate study at OSU has changed a number of times over the years. In 1910 it was placed under a standing committee of the faculty. In 1933 all graduate work in the State System of Higher Education was placed in an interinstitutional graduate division. At Oregon State, an associate dean and an institutional graduate council were put in immediate charge of graduate study. The

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Administration Building
[Relocating to Heckert Lodge in Fall 2017] 541-737-4881; FAX
541-737-3313
Website: http:// gradschool.
oregonstate.edu
Administration
Jennifer Brown,
Vice Provost and Dean, 541-737-1458

Stephanie Bernell,
Associate Dean
541-737-9162
Rosemary Garagnani, Assistant Dean for Enrollment Management and Student Services 541-737-1465

Jessica Beck,
Assistant Dean of Graduate Student Development 541-7378-8576

## Fran Saveriano,

Assistant Dean for Recruitment and Financial Support, 541-737-1459

## Kim Calder,

Executive Assistant to the Dean, 541-7371456

## Maureen

 ChildersAssistant to the Associate Dean and Assistant to the Office of Postdoc Programs, 541-7372033
first doctor of philosophy degrees were conferred by Oregon State in 1935. In October 1946, the State Board of Higher Education again gave the institutions direct responsibility for their graduate programs and assigned graduate work at Oregon State to the Graduate School.

The primary aims of the Oregon State University Graduate School are to prepare students to create new knowledge and to assist students in acquiring specialized knowledge in one or more disciplines(s). At the same time, graduate programs may provide the student with the opportunity to acquire an educational background broader than his or her specialty. The Graduate School and graduate programs provide additional opportunities to learn and practice vital professional and leadership skills.
The graduate educational process is designed to help the student attain a high level of scholarship. The student is assisted in developing the skills of assimilation, interpretation, organization, evaluation, and application of knowledge. Such scholarship increases the student's breadth of learning and prepares him or her for roles of leadership and participation in the broader areas of culture and society. The ideal graduate program permits the student to specialize, but at the same time develop a broad educational base.

The communication of new knowledge to both technical and non-technical audiences is an important part of the educational process. Creating, interpreting, and communicating knowledge are related processes at OSU. The Graduate School provides opportunities for students to develop these skills. Graduate students have the opportunity to distinguish themselves from their peers by taking advantage of a broad range of additional educational offerings. These include professional and leadership skills vital for student success in their future employment.

## CRADUATE DECREES, <br> CERTIFICATES, MAJORS, <br> DECREES, AND <br> CERTIFICATES BY COLLECE

## COLLEGE OF AGRICULTURAL

## SCIENCES

Agricultural Education, MS
Animal Science, MS, PhD
Applied Economics, MA, MS, PhD
Applied Systematics in Botany, PSM
Botany and Plant Pathology, MA, MS, PhD
Crop Science, MS, PhD
Entomology, MS, PhD
Fisheries Management, Graduate Certificate Fisheries Science, MS, PhD
Fisheries and Wildlife Administration, PSM
Food Science and Technology, MS, PhD
Horticulture, MS, PhD
Rangeland Ecology and Management, MS, PhD
Soil Science, MS, PhD
Toxicology, MS, PhD
Wildlife Management, Graduate Certificate Wildlife Science, MS, PhD

## COLLEGE OF BUSINESS

Business Administration, MBA, PhD
Business Administration and Accountancy, MBAA
Business Analytics, Graduate Certificate
Design and Human Environment, MA, MS, PhD
Financial Planning, Graduate Certificate

## COLLEGE OF EDUCATION

Adult Education, EdM
Counseling, MCoun, PhD
Education, EdM, MS, EdD, PhD
Mathematics Education, MA, MS, PhD
Science Education, MA, MS, PhD
Teaching, MAT

## COLLEGE OF EARTH, OCEAN,

 AND ATMOSPHERIC SCIENCESGeographic Information Science, Graduate Certificate
Geography, MA, MS, PhD
Geology, MA, MS, PhD
Marine Resource Management, MA, MS, Graduate Certificate
Ocean, Earth and Atmospheric Sciences, MA, MS, PhD
Water Conflict Management and
Transformation, Graduate Certificate

## COLLEGE OF ENGINEERING

Biological and Ecological Engineering, MEng, MS, PhD
Chemical Engineering, MEng, MS, PhD
Civil Engineering, MEng, MS, PhD
Computer Science, MA, MEng, MS, PhD
Electrical and Computer Engineering, MEng, MS, PhD
Environmental Engineering, MEng, MS, PhD
Industrial Engineering, MEng, MS, PhD
Materials Science, MS, PhD
Mechanical Engineering, MEng, MS, PhD
Medical Physics, MMP, MS, PhD
Nuclear Engineering, MEng, MS, PhD
Radiation Health Physics, MA, MHP, MS, PhD
Robotics, MEng, MS, PhD

## COLLEGE OF FORESTRY

Forest Ecosystems and Society, MF, MS, PhD
Forests and Climate Change, Graduate
Certificate
Natural Resources, MNR
Sustainable Forest Management, MF, MS, PhD
Sustainable Natural Resources, Graduate
Certificate
Urban Forestry, Graduate Certificate
Wood Science, MS, PhD

## COLLEGE OF LIBERAL ARTS

Applied Anthropology, MA, PhD
Applied Ethics, MA
College Student Services Administration,
EdM, MS
Contemporary Hispanic Studies, MA
Creative Writing, MFA
English, MA
History of Science, MA, MS, PhD
Psychology, MS, PhD
Public Policy, MPP, PhD
Women, Gender, and Sexuality Studies, MA, PhD

## COLLEGE OF PHARMACY

Pharmaceutical Sciences, MS, PhD

## COLLEGE OF PUBLIC HEALTH

## AND HUMAN SCIENCES

Athletic Training, MATRN
Health Management and Policy, Graduate Certificate
Human Development and Family Studies, MS, PhD
Kinesiology, MS, PhD
Nutrition, MS, PhD
Public Health, Graduate Certificate
Public Health, MPH, PhD

## COLLEGE OF SCIENCE

Applied Physics, PSM
Biochemistry and Biophysics, MA, MS, PhD
Chemistry, MA, MS, PhD
Data Analytics, Graduate Certificate
Data Analytics, MS
Integrative Biology, MS, PhD
Management for Science Professionals,
Graduate Certificate
Mathematics, MA, MS, PhD
Microbiology, MA, MS, PhD
Physics, MA, MS, PhD
Statistics, MA, MS, PhD

## INTERDISCIPLINARY/

## INSTITUTIONAL PROGRAMS

Applied Biotechnology, PSM
College and University Teaching, Graduate Certificate
Comparative Health Sciences, MS, PhD
Environmental Arts and Humanities, MA
Environmental Sciences, MA, MS, PhD, PSM
Interdisciplinary Studies, MAIS
Molecular and Cellular Biology, MS, PhD
Water Resources Engineering, MS, PhD
Water Resources Policy and Management, MS
Water Resources Science, MS, PhD

GRADUATE MAJORS, MINORS, AND ACADEMIC UNITS

| Graduate Major <br> Note: Most graduate majors may be used as a graduate minor. Also see Graduate Minor chart for additional fields approved as graduate minors only. | Graduate Degrees | Academic Unit <br> Note: The academic unit is responsible for directing and managing the majors and minors. | Graduate Areas of Concentration <br> Note: Areas of concentration are for reference only. They do not appear on transcripts or diplomas. |
| :---: | :---: | :---: | :---: |
| Adult and Higher Education | EdD, EdM, MAIS, PhD | College of Education |  |
| Agricultural Education | MS | Dept. of Agricultural Education and General Agriculture | Teacher preparation, leadership and communication in agriculture |
| Animal Science | MS, PhD | Dept. of Animal and Rangeland Sciences | Animal nutrition, dairy production (MS only), embryo physiology, endocrinology, growth and development, livestock management (MS only), nutritional biochemistry, reproductive physiology |
| Applied Anthropology | MA, PhD | School of Language, Culture, and Society |  |
| Applied Biotechnology | PSM | Graduate School |  |
| Applied Economics | MA, MS, PhD | College of Agricultural Sciences | Resource and environmental economics, trade and development, public health economics, transportation economics (MA, MS only) |
| Applied Ethics | MA | School of History, Philosophy and Religion | Bioethics, environmental ethics, and art and morality |
| Applied Systematics in Botany | PSM | Dept. of Botany and Plant Pathology |  |
| Applied Physics | PSM | Dept. of Physics |  |
| Athletic Training | MATRN | College of Public Health and Human Sciences or School of Biological and Population Health Sciences |  |
| Biochemistry and Biophysics | MA, MS, PhD | Dept. of Biochemistry and Biophysics | Biochemistry, biophysics |
| Bioengineering | MEng, MS, PhD | School of Chemical, Biological, and Environmental Engineering | Biomaterials, biomedical devices and instrumentation, human performance engineering, medical imaging, systems and computation biology |
| Biological and Ecological Engineering | $\begin{aligned} & \text { MEng, MS, } \\ & \text { PhD } \end{aligned}$ | Dept. of Biological and Ecological Engineering | Bio-based products and fuels, bioprocessing, biological systems analysis, ecosystems analysis and modeling, water quality, water resources |
| Botany and Plant Pathology | MA, MS, PhD | Dept. of Botany and Plant Pathology | Ecology, genetics, genomics and computational biology, molecular and cellular biology, mycology, plant pathology, plant physiology, systemics |
| Business Administration | MBA, PhD | College of Business | Clean technology, commercialization, executive leadership, global operations, marketing, research thesis, wealth management |
| Business Administration and Accountancy | MBAA | College of Business |  |
| Chemical Engineering | $\begin{array}{\|l} \text { MEng, MS, } \\ \text { PhD } \end{array}$ | School of Chemical, Biological, and Environmental Engineering | Chemical engineering |
| Chemistry | MA, MS, PhD | Dept. of Chemistry | Analytical chemistry, inorganic chemistry, materials chemistry, nuclear chemistry, organic chemistry, physical chemistry |
| Civil Engineering | $\begin{array}{\|l} \text { MEng, MS, } \\ \text { PhD } \end{array}$ | School of Civil and Construction Engineering | Civil engineering, coastal and ocean engineering, construction engineering management, engineering education, geomatics, geotechnical engineering, infrastructure materials, structural engineering, transportation engineering, water resources engineering |
| College Student Services Administration | EdM, MS | College of Liberal Arts | College and university characteristics and environments; history, development, and current issues in higher education; leadership and management of administrative departments; program oversight in specialized administrative areas such as financial aid, student activities, career services, multicultural affairs, recreational sports, and student housing; student development theory and application |
| Comparative Health Sciences | MS, PhD | Graduate School |  |
| Computer Science | MA, MEng, MS, PhD | School of Electrical <br> Engineering and Computer Science | Algorithms and cryptography, artificial intelligence, machine learning and data science; computer graphics, visualization, and vision; computer systems and networking; human-computer interaction; programming languages; software engineering |
| Contemporary Hispanic Studies | MA | School of Language, Culture, and Society | Contemporary Hispanic studies |
| Counseling | MCoun, PhD | College of Education | Counseling (PhD only) |
| Creative Writing | MFA | School of Writing, Literature, and Film | Fiction, poetry, and nonfiction writing |
| Crop Science | MS, PhD | Dept. of Crop and Soil Science | Crop breeding, genetics and cytogenetics (cereals, oilseeds, potatoes), forage and pasture management, grain crop production, post-harvest seed technology, seed biology, seed crop physiology, seed production, weed biology, weed management |
| Data Analytics | MS | College of Science |  |

## GRADUATE MAJORS, MINORS, AND ACADEMIC UNITS

| Graduate Major <br> Note: Most graduate majors may be <br> used as a graduate minor. Also see <br> Graduate Minor chart for additional fields <br> approved as graduate minors only. | Graduate <br> Degrees | Academic Unit <br> Note: The academic unit is <br> responsible for directing and <br> managing the majors and <br> minors. | Graduate Areas of Concentration <br> Note: Areas of concentration are for reference only, They do not appear on transcripts <br> or diplomas. |
| :--- | :--- | :--- | :--- |
| Design and Human Environment | MA, MS, PhD | School of Design and Human <br> Environment, College of <br> Business | Apparel design, cultural and historic aspects of the near environment, human behavior <br> in the near environment, interior design, merchandising management, and textiles |
| Education | EdM, MS, <br> EdD, PhD | College of Education | Community college leadership (EdD, PhD) |
| Electrical and Computer Engineering | MEng, MS, <br> PhD | School of Electrical <br> Engineering and Computer <br> Science | Analog and mixed signal; artificial intelligence and machine learning; communications <br> and signal processing; computer systems; energy systems; materials and devices; RF/ <br> microwaves/optoelectronics |
| English | MA | School of Writing, Literature, <br> and Film | Literature and culture; or rhetoric, writing, and culture |
| Entomology | MA, MS, PhD | Entomology Program <br> College of Agricultural <br> Sciences) | MS, |

## GRADUATE MAJORS, MINORS, AND ACADEMIC UNITS

| Graduate Major <br> Note: Most graduate majors may be <br> used as a graduate minor. Also see <br> Graduate Minor chart for additional fields <br> approved as graduate minors only. | Graduate <br> Degrees | Academic Unit <br> Note: The academic unit is <br> responsible for directing and <br> managing the majors and <br> minors. | Graduate Areas of Concentration <br> Note: Areas of concentration are for reference only, They do not appear on transcripts <br> or diplomas. |
| :--- | :--- | :--- | :--- |
| Mechanical Engineering | MEng, MS, <br> PhD | School of Mechanical, <br> Industrial and Manufacturing <br> Engineering |  |
| Medical Physics | MMP, MS, <br> PhD | Dept. of Nuclear Engineering <br> and Radiation Health Physics | Medical health physics, therapeutic radiologic physics |
| Microbiology | MA, MS, PhD | Dept. of Microbiology | Environmental microbiology, food microbiology, genomics, immunology, microbial <br> ecology, microbial evolution, parasitology, pathogenic microbiology, virology |
| Molecular and Cellular Biology | MS, PhD | Graduate School | Bioinformatics, biotechnology, cell biology, developmental biology, genome biology, <br> molecular biology, molecular pathogenesis, molecular virology, plant molecular <br> biology, structural biology |
| Natural Resources | MAT | MS, | College of Education |

## GRADUATE MAJORS, MINORS, AND ACADEMIC UNITS

| Graduate Major <br> Note: Most graduate majors may be <br> used as a graduate minor. Also see <br> Graduate Minor chart for additional fields <br> approved as graduate minors only. | Graduate <br> Degrees | Academic Unit <br> Note: The academic unit is <br> responsible for directing and <br> managing the majors and <br> minors. | Graduate Areas of Concentration <br> Note: Areas of concentration are for reference only. They do not appear on transcripts <br> or diplomas. |
| :--- | :--- | :--- | :--- |
| Wildlife Science | MS, PhD | Dept. of Fisheries and Wildlife | Animal-habitat relationships; behavior; biology of big game and small mammals; <br> conservation biology; community studies; ecology of avian and mammalian <br> predators; ecology of waterfowl and uppand gamebirds, effects of parasites, diseases, <br> and environmental contaminants; nutrition; population; population dynamics; <br> reproductive biology; toxicology of pesticides; wildlife ecology; wildlife-forestry <br> interactions; wildlife science |
| Women, Gender, and Sexuality Studies | MA | School of Language, Culture, <br> and Society | Contemporary women's issues; leadership and community engagement; race, class <br> and gender; sexuality studies; transnational perspectives |
| Wood Science | MS, PhD | Dept. of Wood Science and <br> Engineering | Biodeterioration and materials protection, chemistry and chemical processing, forest <br> products business and marketing, physics and moisture relations, process modeling <br> and analysis, renewable materials science and engineered composites, wood anatomy <br> and quality, wood engineering and mechanics |

GRADUATE MINORS THAT DO NOT HAVE CORRESPONDING MAJORS, AND ACADEMIC UNITS
(Also see Graduate Major chart for other fields that may be utilized as a graduate minor)

| Minor | Academic Unit | Graduate Areas of Concentration |
| :--- | :--- | :--- |
| Aging Science | School of Social and Behavioral Health Sciences |  |
| Anthropology | School of Language, Culture, and Society |  |
| Art | School of Arts and Communication | Art history, fine arts, photography |
| Biological Data Sciences | Graduate School |  |
| Community College Education | College of Education | Instruction, curriculum, management and adult extension, <br> community college |
| Ecosystem Informatics | College of Earth, Ocean, and Atmospheric Sciences | Ecosystem informatics |
| Ethnic Studies | School of Language, Culture, and Society | Ethnic studies |
| Food in Culture and Social Justice | School of Language, Culture, and Society |  |
| Foreign Languages and Literatures | School of Language, Culture, and Society | Modern languages, French, German, Spanish |
| Gerontology | School of Social and Behavioral Health Sciences | Gerontology |
| History | School of History, Philosophy, and Religion | American history (U.S.), Western U.S, history, European history, <br> non-American and non-European history (Asian, African, Latin <br> American, Islamic), history of science |
| International Agricultural Development | College of Agricultural Sciences | International agricultural development |
| Music | School of Arts and Communication | Composition, Conducting, music education, performance |
| Philosophy | School of History, Philosophy, and Religion | Ethics (including environmental ethics and biomedical ethics), <br> logic and philosophy of science, aesthetic theory, history of <br> philosophy, religious studies |
| Political Science | School of Public Policy | American politics, judicial politics, public administration, political <br> theory, state and local government, international relations, <br> comparative politics, gender politics, environmental policy |
| Risk and Uncertainty Quantification in Earth Systems | College of Earth, Ocean, and Atmospheric Sciences |  |
| Rural Studies | Graduate School | Rural studies |
| Sociology | School of Public Policy | Environmental and natural resources, international sociology, <br> social policy |
| Water Conflict Management and Transformation | Interpersonal and group communication; rhetoric and social <br> influence; theatre arts costume and scene design; theatre arts <br> directing, performance, and management; theatre arts history, <br> criticism/literature, and playwriting |  |
| Schter ocer Water and Environmental Sustainability | Hydrology, water quality, water resources planning and <br> management |  |
| (Coordinating Unit) | Water conflict management and transformation |  |

In addition to the minors listed above, most departments or schools offering a graduate major may also offer a graduate minor.

## GRADUATE OPTIONS

| Graduate Option | Graduate Major | Academic Unit |
| :---: | :---: | :---: |
| Accounting | Business Administration (PhD) | College of Business |
| Agricultural Education | Education (PhD) | College of Education |
| Advanced Manufacturing | Industrial Engineering and Mechanical Engineering | College of Engineering |
| Advanced Science and Mathematics Education | Education | College of Education |
| Biomedical Sciences | Comparative Health Sciences | Graduate School |
| Biostatistics | Public Health (MPH) | College of Public Health and Human Sciences |
| Business Analytics | Business Administration (MBA) | College of Business |
| Clinically Based Elementary (Ecampus only) | Teaching | College of Education |
| Clinical Mental Health Counseling | Counseling | College of Education |
| Clinical Sciences | Comparative Health Sciences | Graduate School |
| Commercialization | Business Administration (MBA) | College of Business |
| Community College Leadership | Adult and Higher Education | College of Education |
| Corporate Finance | Business Administration (MBA) | College of Business |
| Co-Tutelage Doctoral Degree [Pending approval] | Graduate School |  |
| Design | Mechanical Engineering | School of Mechanical, Industrial, and Manufacturing Engineering |
| Elementary (OSU-Cascades only) | Teaching | College of Education |
| Engineering Management | Industrial Engineering | School of Mechanical, Industrial, and Manufacturing Engineering |
| Entomology | Horticulture Crop Science | Department of Horticulture <br> Department of Crop and Soil Science |
| Environmental and Occupational Health | Public Health (MPH) | College of Public Health and Human Sciences |
| Epidemiology | Public Health (MPH) | College of Public Health and Human Sciences |
| Executive Leadership | Business Administration (MBA) | College of Business |
| Global Operations | Business Administration (MBA) | College of Business |
| Health Analytics Health [Pending approval] | Data Analytics | College of Business |
| Health Management and Policy | Public Health (MPH) | College of Public Health and Human Sciences |
| Health Promotion and Health Behavior | Public Health (MPH | College of Public Health and Human Sciences |
| Human Systems Engineering | Industrial Engineering | College of Engineering |
| Information Systems Engineering | Industrial Engineering | College of Engineering |
| Innovation/Commercialization | Business Administration (PhD) | College of Business |
| Innovation Management | Business Administration (MBA) | College of Business |
| International Health | Public Health (MPH) | College of Public Health and Human Sciences |
| Language Arts (OSU-Cascades only) | Teaching | College of Education |
| Language Equity and Educational Policy | Education (PhD) | College of Education |
| Leadership in Higher Education | Adult and Higher Education | College of Education |
| Manufacturing Systems Engineering | Industrial Engineering | School of Mechanical, Industrial, and Manufacturing Engineering |
| Marketing | Business Administration (MBA) | College of Business |
| Materials Mechanics | Mechanical Engineering | School of Mechanical, Industrial, and Manufacturing Engineering |
| Mathematics (OSU-Cascades only) | Teaching | College of Education |
| Organizational Leadership | Business Administration (MBA) | College of Business |
| PK-12 English to Speakers of Other Languages (ESOL) | Education | College of Education |
| Plant Breeding and Genetics | Horticulture Crop Science | Department of Horticulture Department of Crop and Soil Science |
| Renewable Energy | Mechanical Engineering | College of Engineering |
| Research Thesis | Business Administration (MBA) | College of Business |
| Robotics | Mechanical Engineering | School of Mechanical, Industrial, and Manufacturing Engineering |
| School Counseling | Counseling | College of Education |
| Science (OSU-Cascades only) | Teaching | College of Education |

## GRADUATE OPTIONS

| Graduate Option | Graduate Major | Academic Unit |
| :--- | :--- | :--- |
| Science/Mathematics Education | Education (PhD) | College of Education |
| Social Justice in Education | Education | College of Education |
| Social Studies (OSU-Cascades only) | Teaching | College of Education |
| Supply Chain and Logistics Management | Business Administration (MBA) | College of Business |
| Thermal Fluid Sciences | Mechanical Engineering | School of Mechanical, Industrial, and Manufacturing <br> Engineering |

## GRADUATE CERTIFICATES

| Graduate Certificate | Academic Unit |
| :--- | :--- |
| Business Analytics | College of Business |
| College and University Teaching | Graduate School |
| Data Analytics | College of Science |
| Financial Planning | College of Business |
| Fisheries Management | Dept. of Fisheries and Wildlife, College of Agricultural Sciences |
| Forests and Climate Change | Dept. of Forest Ecosystems and Society |
| Geographic Information Science | College of Earth, Ocean, and Atmospheric Sciences |
| Health Management and Policy | College of Public Health and Human Sciences |
| Management for Science Professionals | College of Science |
| Marine Resource Management | College of Earth, Ocean, and Atmospheric Sciences |
| Public Health | College of Public Health and Human Sciences |
| Sustainable Natural Resources | College of Forestry; Dept. of Forest Ecosystems and Society |
| Urban Forestry | College of Forestry; Dept. of Forest Ecosystems and Society |
| Water Conflict Management and Transformation | College of Earth, Ocean, and Atmospheric Sciences |
| Wildlife Management | Dept. of Fisheries and Wildlife, College of Agricultural Sciences |

## MISSION, GOALS, AND VALUES

## Preamble

Oregon State University is a comprehensive, public, research-intensive university and a member of the Oregon University System serving as the state's land, sea, space and sun grant institution-one of only two universities with such designation in the country. OSU programs and faculty are located in every county of the state and are dedicated to investigating the state's greatest challenges. OSU considers the state of Oregon its campus and works in partnership with the P-12 school system, Oregon community colleges and other OUS institutions to provide access to high quality educational programs. Strong collaborations with industry and state and federal agencies drive OSU's research enterprise.

## Mission

As a land grant institution committed to teaching, research, and outreach and engagement, Oregon State University promotes economic, social, cultural and environmental progress for the people of Oregon, the nation and the world. This mission is achieved by producing graduates competitive in the global economy, supporting a continuous search for new knowledge and solutions, and maintaining a rigorous focus on academic excellence, particularly in the three Signature Areas: Advancing the Science of Sustainable Earth Ecosystems; Improving Human Health and Wellness; and Promoting Economic Growth and Social Progress.

## Vision

To best serve the people of Oregon, Oregon State University will be among the Top 10 land grant institutions in America.

## Goals

1. Provide outstanding academic programs that further strengthen our performance and pre-eminence in three Signature Areas of Distinction: Advancing the Science of Sustainable Earth Ecosystems; Improving Human Health and Wellness; and Promoting Economic Growth and Social Progress.
2. Provide an excellent teaching and learning environment and achieve student access, persistence, and success through graduation and beyond that matches the best land grant universities in the country.
3. Substantially increase revenues from private fundraising, partnerships, research grants, and technology transfers while strengthening our ability to more effectively invest and allocate resources to achieve success. OSU Strategic Plan: http://leadership.
oregonstate.edu/strategicplan/

## Core Values

Accountability. We are committed stewards of the loyalty and good will of our alumni and friends of the human, fiscal, and physical resources entrusted to us.
Diversity. We recognize that diversity and excellence go hand-in-hand, enhancing our teaching, scholarship, and service as well as our ability to welcome, respect, and interact with other people.

Integrity. We practice honesty, freedom, truth, and integrity in all that we do.

Respect. We treat each other with civility, dignity, and respect.
Social responsibility. We contribute to society's intellectual, cultural, spiritual, and economic progress and well-being to the maximum possible extent.

## ORGANIZATION

## Graduate School

Graduate work at Oregon State University is administered by the Graduate School. The regulations, policies, and procedures governing graduate education are implemented by the dean of the Graduate School. The dean coordinates graduate programs, courses, admission standards, and certificate and degree requirements; enforces current regulations; recommends changes in graduate policy to the Graduate Council; acts on petitions to deviate from existing regulations; and is responsible for the efficient and effective operation of the Graduate School. The Graduate School office is in room A300 of OSU's Kerr Administration Building (relocating to Heckart Lodge in fall 2017). The telephone number is 541-737-4881, and the FAX number is 541-737-3313. The email address is Graduate. School@oregonstate.edu, and the Web address is http://gradschool.oregonstate. edu.

## Mission

The Graduate School contributes to OSU's goal of achieving top ten land grant status by providing leadership in all aspects of graduate education, through advocacy for the critical importance of the graduate enterprise to the university's mission, and by providing core centralized services to the graduate community. In partnership with the graduate faculty, the Graduate School plays a leadership and advocacy role to ensure that OSU attracts the best graduate students and delivers a compelling and high-quality graduate experience that prepares them to create new ideas and knowledge, to educate others, to make positive impacts on society, and to lead innovation.

## GRADUATE COUNCIL

The Graduate Council formulates the basic policy, procedures, and requirements for all graduate work at OSU, within the general authority granted by the State Board of Higher Education. The council establishes admission standards, basic degree requirements, and general policies; approves all graduate faculty members, new programs, and courses; and periodically reviews all existing graduate programs. Graduate Council members are appointed by the Executive Committee of the Faculty Senate, with each academic college having one representative. Major actions of the Graduate Council are referred to the Faculty Senate for review and approval.
Current and past Graduate Council membership and information can be found at: http://senate.oregonstate.edu/ graduate-council

## GRADUATE FACULTY

Graduate faculty members are chosen from the university faculty based on their academic training, experience, demonstrated potential for scholarship, and evidence of their ability and competency to direct and supervise graduate students in the pursuit of advanced knowledge.

Each graduate faculty member is authorized to perform specific activities within a particular graduate program. The head and academic dean of each unit are responsible for nominating faculty members for these activities, subject to review and approval by the Graduate Council.

## ACADEMIC UNITS

An academic unit is the administrative unit responsible for directing and managing a graduate major or minor field of study. An academic unit may be an academic program, department, school, or college, or composite of these. The chief administrative officer of the academic unit is responsible for managing the graduate programs in that unit and is responsible to the dean of the Graduate School for all graduate work performed by the unit.
Academic units have a major role in the success of graduate education. Within the general rules of the Graduate School, the academic units establish and teach courses, maintain a graduate faculty to teach and supervise research, establish their own admission standards and specific graduate certificate and degree requirements, make graduate student appointments, and provide advice and supervision for their graduate students.

## EQUAL OPPORTUNITY

Oregon State University, in compliance with state and federal laws and regulations, does not discriminate on the basis of age, color, disability, gender identity or expression, national origin, race, religion, sex, sexual orientation, or veteran status in any of its policies, procedures, or practices. This nondiscrimination policy covers admission and access to, and treatment and employment in, university programs and activities, including but not limited to academic admissions, financial aid, educational services, and employment. Inquiries regarding the university's equal opportunity policies may be directed to the Office of Equal Opportunity and Access, 541-737-3556 or visit http://eoa.oregonstate.edu/.

## GRADUATE ADMISSIONS

## REQUIREMENTS

Oregon State University offers admission to applicants whose records demonstrate the highest potential for graduate study and promise for substantial contribution to both their academic professions and to a diverse, global society. The university fosters an environment that welcomes inclusiveness.

Admission decisions are based on many factors, such as the quality of the applicant's prior academic degree and record of accomplishment, statement of purpose, letters of recommendation from professors or others familiar with the applicant's academic work, performance in aptitude and achievement tests, relevant work experience, preparation in the proposed field of study, and the connection of the applicant's academic goals with the faculty's research interests.

## Requirements

The following minimum entrance requirements guide the university and its graduate programs in the consideration of applicants for graduate admission:

- A four-year baccalaureate degree (or international equivalent), a professional degree (such as BPharm, BVsc, MBBS, MD, DVM, DPharm, etc.), or an appropriate U.S./Canadian alternative degree, from a regionally accredited (US) or recognized (International) college or university, with
- A cumulative B average (equivalent 3.00 on a U.S. 4.00 grading scale) on the most recent baccalaureate degree or equivalent or any subsequent graduate degree from a regionally accredited (US) or recognized (International) college or university, plus all work completed thereafter.

The graduate program may choose to calculate the GPA on the last 90 quarter credits ( 60 semester credits [last two years on an international record]) of graded undergraduate work on the most recent baccalaureate degree, plus all work completed thereafter, as the basis for admission.

Minimum GPA for admission to only graduate certificate programs is set by the departments that supervise the certificates. Applicants requesting admission to only graduate certificate programs should contact their academic program to learn about minimum GPA and other admission requirements.

## OR:

- A four-year baccalaureate degree (or international equivalent), a professional degree, or an appropriate U.S./Canadian alternative degree, from an regionally accredited (US) or recognized (International) college or university, and
- A 45 -quarter credit equivalent graduate degree from a regionally accredited (US) or recognized (International) college or university, with
- A cumulative B average (equivalent 3.00 on a U.S. 4.00 grading scale) on the most recent graduate degree. If the applicant has completed his or her baccalaureate degree in a country that is a signatory of the Bologna Declaration, then:
- A Bologna compliant baccalaureate degree of at least three years duration from a recognized college or university, with
- A cumulative B average (equivalent 3.00 on a U.S. 4.00 grading scale) on the degree, plus all subsequent graded course work.
OR (Other three-year bachelor


## degree holders):

- A non-Bologna compliant baccalaureate degree of at least three years duration from a recognized college or university, and
- A 45 -quarter credit equivalent graduate degree from a recognized college or university, with
- A cumulative GPA of at least 3.00 on the most recent graduate degree.


## INTERNATIONAL

REQUIREMENTS
All international graduate applicants must meet the following additional requirements:

- Documentation of sufficient financial resources to attend Oregon State University as a graduate student. AND:
- Documentation of English language proficiency

| Graduate Applicants |  |  |
| :---: | :---: | :---: |
|  | Regular Admission | Transitional <br> Admission-TAP <br> (formerly <br> Conditional <br> Admission-CAP) |
| TOEFL <br> Paper based | 550 | 500-547 |
| Internet (iBT) TOEFL | $80$ <br> Minimum score of 18 on each section | 60-79 <br> Or any sub-score less than 18 |
| Internet (iBT) TOEFL Applicants awarded GTA | 80 <br> Minimum score of 22 on Speaking subscore and Minimum score of 18 on all other sections |  |
| IELTS | 6.5 | 6.0 |

Please note: OSU requires graduate applicants to meet or exceed all five iBT scores to be eligible for full admission. Scores must be no more than two years old at the time of the applicant's first term of registration.

## Waived from English Language Testing:

The English language proficiency requirement is waived for applicants who have demonstrated success by achieving an overall GPA greater than 3.0 on a 4.0 scale for two or more semesters/quarters in a rigorous undergraduate or postgraduate program in the U.S. or from one of the following English speaking countries**: Australia, Canada, New Zealand, and United Kingdom.
** Waivers for applicants in other countries are considered on a case-bycase basis if the medium of instruction is English. The individual program must petition the Graduate School for a waiver. Not all programs will request a waiver. Please contact your proposed graduate program to inquire about their policy.

## English Language Exceptions:

Individual programs may request exceptions to the minimum English language proficiency requirements. Exceptions to the minimum TOEFL score/sub-score requirements will be considered by the Graduate School Dean on request if:

- Applicant's GRE Verbal score is greater than 500 (153 - revised GRE) OR
- The chair of the Graduate Program (or designated faculty member)
- Has personally interviewed the applicant and established a plan for language support for the applicant, if needed, which may include additional English


## Language Training, OR

- The Graduate Program arranges for the applicant to complete language training at INTO OSU equivalent to the admission status as designated by the Transitional Admission Program-TAP


## TRANSITIONAL ENGLISH ADMISSION

Transitional admission based on English language proficiency may be granted to applicants seeking admission to a graduate degree program. University transitional admission of international applicants may be granted only if the applicant is otherwise fully admissible.
Transitional admission for degreeseeking applicants requires:

- On-campus testing of English language proficiency prior to enrollment, and
- Compliance with the subsequently specified plan for English and academic course work during each quarter until such time as the applicant qualifies for regular admission.
- Individual graduate programs may require additional documents such as GRE and GMAT test results or set higher English and academic standards. For detailed information, refer to the website for Graduate Admissions and individual graduate program websites.
Transitional admission based on English language proficiency may not be granted to applicants seeking admission to only a graduate certificate program.
All international applicants seeking graduate teaching assistantships should refer to the International Graduate Teaching Assistant English Language Requirement section of this catalog for more details.


## ADMISSION REQUIREMENTS CONTINUED

Applicants not meeting minimum academic requirements still may be considered for admission with the support of their academic program, plus review and approval by the University Graduate Admissions Committee. For these applicants, decisions may rely more heavily on noncognitive criteria. However, the university encourages those applicants whose overall cumulative undergraduate GPA is less than an equivalent 3.00 on a U.S. 4.00 grading scale to take the GRE.

Applicants whose baccalaureate degrees are awarded by an institution that issues non-graded transcripts will be considered for admission with the support of the program's written evaluation of the quality of the applicant's transcript
record.
Satisfaction of minimum entrance requirements does not guarantee admission, since the number of qualified applicants far exceeds the number of places available. As a consequence, many well-qualified applicants may not be accommodated.

Please note that academic performance is not the sole criterion for admission to the university. The university may evaluate a person's behavior and background to determine their ability to maintain the standards of academic and professional conduct expected at the university. An evaluation may take into consideration current behavior and performance as well as past experiences and actions.

## POLICY REGARDING STUDENTS' ELIGIBILITY TO RETURN TO PRIOR COLLEGE

Applicants who disclose that they are ineligible to re-enroll at any college or university that they attended within the last seven years for student conduct reasons will be automatically declined admission to OSU. Applicants who disclose that the reason for their ineligibility is for academic reasons will be admitted only if they meet OSU's minimum academic requirements.
All applicants who are denied admission for conduct reasons have the right to appeal that decision, and appeals will be reviewed on a case-by-case basis.

## APPLICATION PROCESS

Application forms required for admission to the Graduate School are available electronically at https://oregonstate.Force. com/AppLogin.
The applicant's proposed academic program will examine material submitted to determine the adequacy of scholastic background and to decide whether departmental facilities are adequate for the expressed aims of the applicant. Upon the positive recommendation of the academic program, the Graduate School will determine whether minimum university requirements for admission have been met and, subsequently, will provide to the applicant formal notification as to the action taken.
Applicants must upload application materials, unless a program specifies differently. Applicants should contact their academic program(s) of interest to determine whether additional admission materials are required beyond those listed below. Applicants seeking admission to only a graduate certificate program must provide items a., b., and c. below and contact their academic programs to determine what other program-specific materials may be required for admission to the graduate certificate program. a. One electronic version of the graduate application for each
major to which the applicant seeks admission.
b. $\$ 75$ nonrefundable application fee (domestic students); \$85 nonrefundable fee (international students). Applying online requires payment by credit card.
c. Transcripts/Academic Records* of all previous academic work, undergraduate and graduate. International applicants must provide a certified English translation of academic records in addition to original language records.
*Unofficial records but not grade slips/reports, computer printouts, or internal transcripts may be submitted for evaluation and admission purposes.

If admitted, before registering for courses:

1. Applicants from U.S. schools must provide official transcripts from all colleges attended, including final transcripts showing degrees awarded and dates earned.
2. International applicants must provide equivalent documentation from all colleges attended, including final academic records showing degrees awarded and dates earned in the original language plus certified English translations.
d. Three letters of professional reference are required of most applicants applying for admission to a graduate degree program.

If you have a master's degree, please include a letter from your major professor. Applicants applying only to graduate certificate programs are encouraged to consult with their academic program to determine whether this or other materials are required.
e. Certain graduate programs require the GRE of all applicants. Address inquiries regarding GRE requirements to your proposed academic program. See specific Program Information, http://gradschool.oregonstate.edu/ programs.
International applicants must also upload the following documents with their application materials:
a. One photocopy of TOEFL or IELTS scores. If admitted, official test scores must be received by the Graduate School prior to the start of the applicant's first term of enrollment.
b. Certification of Finances form with supporting documentation, demonstrating sufficient financial resources for the desired academic program.

Financial documentation is not required at the time of application. If the application is accepted, the Graduate School will contact the applicant via email to request the financial materials.

Note: If you will be taking courses as a distance student through OSU Extended Campus and not entering the U.S., we ask that you complete a special certification form. Proof of funding is not required. Please contact graduate admissions to request the form.

## APPLICATION DEADLINES

## Department Deadlines

Academic programs establish their own application deadlines, which are often substantially earlier than the general university deadlines described below. In such cases, program deadlines supersede the more general university deadline. Some academic programs also admit applicants for specific terms only (e.g., fall term). Applicants should contact the proposed graduate program for deadlines and any other restrictions. See specific program information, http://gradschool. oregonstate.edu/programs.

In the absence of earlier program deadlines, the following university deadlines exist:

## U.S. CITIZENS AND PERMANENT

 RESIDENTSAbsolutely no later than 30 days prior to the first day of classes.

## INTERNATIONAL APPLICANTS

To allow adequate time for students to obtain visas and make travel arrangements, the following deadlines have been established for international applicants:

|  | General <br> University <br> Deadline <br> International <br> Intudents <br> Stud <br> Applying from <br> Outside the U.S. <br> *Program <br> deadlines <br> supersede this <br> deadline. Please <br> contact program <br> directly for specific <br> program deadline. | General University <br> Deadline* for <br> International <br> Students <br> Applying from <br> Within the U.S. <br> *Program deadlines <br> supersede this <br> deadline. Please <br> contact program <br> directly for specific <br> program deadline. |
| :--- | :--- | :--- |
| Fall | April 1 | June 1 |
| Winter | July 1 | September 1 |
| Spring | October 1 | December 1 |
| Summer | January 1 | March 1 |

SUMMER SESSION ADMISSION
See Summer Session, http://summer.
oregonstate.edu/.

## ADMISSION STATUS

Students may be admitted to the Graduate School under the following categories.

## ADVANCED-DEGREE STUDENTS

## 1. Regularly Admitted Graduate

Students. These students have been accepted by the university and by a major program to work toward an advanced degree.
2. Conditionally Admitted Graduate Students. Students who have not met the formal admission requirements but whose accomplishments have convinced the University Graduate Admissions Committee and their major program that they have potential for success as advanced degree candidates may be conditionally admitted as follows:

1. Students from nonaccredited institutions must complete at least one term of satisfactory work at Oregon State, after which they may be admitted with full standing in the Graduate School.
2. Students whose preparation does not warrant full admission to the Graduate School but who may prove acceptable later must satisfactorily complete specified conditions to demonstrate their ability to carry out graduate-level work.
3. Transitionally Admitted Graduate Students. International students who lack minimum English language proficiencies but otherwise meet all other formal admission requirements may be transitionally admitted under the following:
4. TOEFL total score is in the range of 61 to 79 (iBT).
5. IELTS total score is 6.0. Students who score below the minimum on one or more iBT subtests but meet the minimum overall iBT score requirement may be considered for transitional admission. Transitional admission based on English language proficiency may not be granted to students seeking admission to only a graduate certificate program.
6. Provisionally Admitted

Graduate Students. Students who have met all of the university standards for formal admission but whose academic program or major department may have placed additional restrictions upon their admission may be provisionally admitted. These restrictions may include certain prerequisite courses that must be completed, completion of the GRE or GMAT, submission of additional reference letters or scores, etc.

Conditionally and transitionally admitted students cannot schedule and hold preliminary oral exams or final oral exams for their degree until they have satisfied the requirements of their admission and have been reclassified as regular graduate students.

Provisionally admitted students cannot take the final exam for their degree until they have satisfied their provisions and have been reclassified as regular graduate students.
Credit for graduate courses that students have completed acceptably while registered as conditional, transitional or provisional students may count toward the residence requirement for advanced degrees.
If students fail to satisfactorily complete their conditions or provisions, they will be dismissed from the Graduate School.

## GRADUATE CERTIFICATE STUDENTS

Students admitted to only a graduate certificate program may be considered for reclassification as degree-seeking graduate students by following the procedure in the section below regarding reclassification.

## NONDEGREE-SEEKING <br> GRADUATE STUDENTS

The nondegree-seeking graduate student category may be used by holders of a baccalaureate degree who do not wish to pursue an advanced degree at Oregon State University. Those nondegreeseeking graduate students who wish to be reclassified as degree-seeking graduate students must follow the procedure in the next section.
International students who are currently in the U.S. on visas such as an F-1, F-2, B-2, J-1, etc. should consult with OSU's Office of International Services (OIS) (email: isas.advisor@oregonstate. edu) before submitting the OSU nondegree application for admission. Only certain visa types allow an individual to pursue part-time or non-degree-seeking course work and still maintain one's visa status.

Graduate international students who wish to enroll as nondegree students with OSU for one or more terms, but who will not participate in an established exchange program, should contact the OIS Office isas.advisor@oregonstate.edu for further information before applying.

International students who plan to enroll with OSU as nondegree exchange students should use the application form that is made available at each partner institution. For a list of exchange partner institutions, go to http://international. oregonstate.edu/sites/international.or-egonstate.edu/files/atosu/osu-exchange-partner-institutions.pdf.

## RECLASSIFICATION OF POSTBACCALAUREATE STUDENTS, NONDEGREESEEKING STUDENTS, AND GRADUATE CERTIFICATE STUDENTS

A postbaccalaureate, nondegree-seeking graduate, or graduate certificate student may be considered for status as a regular degree-seeking graduate student under one of the following provisions, depending upon prior academic records:

If the student would have been eligible for graduate admission at the time of entering as a postbaccalaureate, nonde-gree-seeking graduate, or graduate certificate student, the student is eligible for admission consideration at any time but must submit an application for admission to the appropriate level to begin the process.

If the student, prior to entering as a postbaccalaureate, nondegree-seeking graduate, or graduate certificate student had been denied graduate admission or would have been ineligible for graduate admission, as determined a posteriori by the University Graduate Admissions Committee, the postbaccalaureate, nondegree-seeking graduate, or graduate certificate student must complete option $\mathrm{A}, \mathrm{B}$, or C below and reapply or reactivate an application for admission to graduatelevel study:
a. complete 24 credits of courses each with a grade of B (3.00) or better, or
b. complete 15 credits of graduate course work involving lecture and textbook instruction, each eligible to transfer into the degree program and with a grade of B (3.00) or better, or
c. complete sufficient credits to bring the cumulative grade-point average (that for the last 90 credits of undergraduate work plus that for courses taken as part of the 24 -credit rule) to 3.00 or better before being eligible to apply for graduate admission.
These courses will normally be regular graduate courses relevant to the specific field, except that seminars and other blanket number graduate courses may not be used. Upper-division undergraduate courses are acceptable, provided that they eliminate specific deficiencies in requirements for entry into an identified graduate program. Lower-division undergraduate courses may not be used. All courses should be carefully selected in consultation with an academic advisor from the graduate field into which the student desires admission.

Completion of either 2(a) or 2(b) above does not guarantee graduate admission. Reclassification decisions employ the same procedures and requirements as those for admission. Postbaccalaureate, nondegree-seeking graduate, and graduate certificate students who
seek reclassification must be acceptable to the program in which they plan to major. The university does not have the capacity to accommodate all who meet the minimum requirements for regular graduate student status; when selecting among students who meet minimum requirements, the university treats students requesting reclassification the same as those applying for admission as regular graduate students.

A postbaccalaureate or nondegreeseeking graduate student may use graduate credit earned in this status toward an advanced degree or graduate certificate if the student is later reclassified as a regular graduate student. This credit cannot be used to satisfy residence requirements for an advanced degree. A graduate certificate student may use graduate credit earned in this status toward an advanced degree if the student is later reclassified as a regular graduate student. In either case, the amount of usable credit will depend on the size of the individual student's program (e.g., a maximum of 15 graduate credits could be used on a 45 -credit master's program or a maximum of 6 graduate credits may be applied toward an 18 -credit graduate certificate.) See section entitled "Transfer Credit" for complete details.
Students should initiate all requests for reclassification at the Graduate School.

## SECOND OSU MASTER'S DEGREE

A candidate for a second master's degree from Oregon State University may request the application of up to 15 credits, appropriate to both programs, from the first master's degree program to another, subject to the following three requirements:

1. Credits used to satisfy the residency requirements of one master's degree may not be used to satisfy the residency requirements of another master's degree.
2. Students who earn two master's degrees at Oregon State University must complete all degree
requirements for each degree. This requires filing separate programs of study forms for each degree, filing separate commencement applications for each degree, completing separate projects or theses for each degree, scheduling separate final oral examinations for each degree, and passing final oral examinations for each degree.
3. Such credit will be granted only for graded course work earned at Oregon State University and completed with a grade of B or higher.

## PURSUIT OF THE SECOND PhD

The doctor of philosophy degree is the highest academic degree granted by North American universities. It is a
research degree designed to prepare a student to become a scholar; that is, to discover, integrate, and apply knowledge, as well as communicate and disseminate it. The doctor of philosophy degree is to be distinguished from other doctorates such as the MD, JD, or EdD degrees, which are designed for professional training or which focus on applied rather than basic research.

Students may enroll for a second PhD degree if they have previously obtained a PhD from OSU or elsewhere. Concurrent pursuit of dual PhD degrees is not allowed. In the case of a student pursuing a second PhD degree, requirements for the second PhD must be met without overlap with the first PhD degree including, but not limited to: successful completion of a second preliminary exam, a separate thesis with no overlap with the first PhD thesis, a final defense exam for the second PhD , a different major advisor from the first PhD , a thesis committee of different faculty than the first PhD degree (although some, but not complete, overlap between committee members would be acceptable in the case of two PhD degrees from OSU), and all other requirements for the second PhD degree program. Courses from the first PhD degree relevant to the second degree may be allowed to transfer between the two degrees. However, the student's program of study committee must approve all course transfers, should pay particular attention to the relevancy, overlap, and currency of any courses to be transferred from one PhD degree to another, and are advised to proceed conservatively when approving course transfers from a first PhD to a second PhD degree.

## RE-ENROLLMENT

All credential-seeking graduate students will be subject to the continuous enrollment policy. Continuous graduate enrollment refers to the policy of requiring continuous registration of graduate students from original matriculation until all graduate degree requirements are met. Please refer to Registration Requirements under Policies Governing All Graduate Programs for complete details.

A graduate student who takes an unauthorized break in registration by failing to maintain continuous enrollment or by failing to obtain regular or planned leave of absence will relinquish his/her graduate standing in the university. Students who wish to have their graduate standing reinstated will be required to file an Application for Graduate Readmission and pay the readmission fee. Readmission is not guaranteed even if the student left in good standing.

International students who wish to re-enroll after an absence should contact the Office of International Services (OIS) to make sure they have the required documents to return to the US.

## GRADUATE TUITION AND FEES

The official Graduate Tuition and Fee Schedule can be found on the OSU Business Affairs website: http:// fa.oregonstate.edu/business-affairs/ tuition-and-fee-information.

Tuition and fees for the next year are usually finalized during the month of July prior to the academic year start.

For information about residency status, visit http://admissions.oregonstate. edu/residency.

## POLICIES GOVERNING ALL GRADUATE PROGRAMS

## GRADUATE MAJOR

A graduate major is the area of academic specialization in which the student chooses to qualify for a graduate degree. Upon completion of a graduate degree, the degree awarded and the graduate major are listed on the student's transcript.

## GRADUATE OPTION

Options are for students of a specific major. An option is one of several distinct variants of course aggregations within a major that focus on an area of study designed to provide a student with specialized knowledge, competence, and skills while sharing a minimum core of courses.

A graduate option consists of a minimum of 12 designated quarter credits of related course work (excluding thesis credits), comprised of course work offered by the sponsoring unit as well as by other academic units. The option may be comprised of specific courses, completion of a designated number of credits from a longer list of alternative courses, or a combination of specific and alternative course lists. Approved options may be added to a graduate program of study, and approved by the faculty advisor(s) and the director of the sponsoring unit. On the program of study, there should be no overlap in course credits between options (the same course cannot be used to satisfy credit requirements in multiple options). When the unit submits the final examination card to validate awarding of the major to the Graduate School, the unit will also validate that the requirements of the option have been completed.

## GRADUATE AREA OF CONCENTRATION

A graduate area of concentration is a subdivision of a major or minor in which a strong graduate program is available. Areas of concentration may be referenced on the student's program of study, but they are not listed on the student's transcript.

## GRADUATE MINOR

A graduate minor is an academic area that clearly supports the major. Master's program minors must include a minimum of 15 quarter credits of graduate course work; doctoral minors require a minimum of 18 credits. On a master's or doctoral program, a minor may be:

1. an academic area available only as a minor,
2. a different major,
3. the same major with a different area of concentration, or
4. an integrated minor.

An integrated minor consists of a series of cognate courses from two or more areas. These courses must be outside the major area of concentration, with most of the courses being outside the major department. The graduate faculty member representing the integrated minor must be from outside the major department. Graduate minors are listed on the student's transcript.

## CONCURRENT MASTER'S

 DEGREESStudents who earn two master's degrees at Oregon State University must complete all degree requirements for each degree. This requires filing separate programs of study forms for each degree, filing separate commencement applications for each degree, completing separate projects or theses for each degree, scheduling separate final oral examinations for each degree, and passing final oral examinations for each degree. For additional information, please refer to the Transfer Credit section of this catalog.

## DUAL MAJORS

For the MA, MS, EdM, MF, or PhD degree, a student may select two graduate major areas to pursue instead of the traditional single major. Only one degree is awarded, and the student basically must satisfy all degree requirements for majors in both areas. For more details, contact the Graduate School.

## GRADUATE CERTIFICATE

A graduate certificate program is a structured progression of graduate-level courses that constitute a coherent body of study with a specific defined focus within a single discipline or a logical combination of disciplines. It is designed for a student who has completed a baccalaureate degree and is in pursuit of advanced-level learning. Graduate certificates reflect the educational mission of the university.

## TRANSFER CREDIT

Students may only transfer course credits from regionally accredited institutions (or equivalently recognized institutions outside the U.S.). Students who wish
to transfer graduate credits from other schools must provide transcripts for courses already completed to the Graduate School prior to the submission of a study program. Undergraduate students at OSU may receive credit for graduate courses ( 500 and 600 level) in excess of the requirements for a baccalaureate degree. Graduate courses taken at OSU while the student was a non-degree graduate student, a post-baccalaureate student, a professional degree-seeking student (PharmD or DVM), or an undergraduate student, are considered transfer courses.
Courses to be transferred must be graduate level. It is the responsibility of the student wishing to transfer the course to provide the necessary documentation to satisfy the OSU guidelines.
All courses on a program of study require final approval by the student's program of study committee and the Graduate School. Committees are free to deny inclusion of any course if they believe that the earned grade is not sufficient; the course is not appropriate, sufficiently current, sufficiently rigorous based on syllabus content; or for any other reason. To be considered for inclusion on a graduate program of study, OSU courses whether taken as either an enrolled graduate student or pre-graduate admission, must have an earned grade of C or better. To be considered for inclusion on a graduate program of study, courses from another institution (transfer courses) must have an earned grade of B minus or better.
If the transfer credit is from a foreign university, the student must provide copies of the original transcript and an English translation of the transcript, with the courses to be transferred clearly indicated. Grades and credits for the courses must be clearly identified. In some countries, the first university degree, which OSU considers to be equivalent to a baccalaureate degree, may take five years or more to complete. All of the course work toward such a degree is considered a requirement for the first university degree, and hence none of it can be transferred to a graduate certificate or graduate degree at OSU.
Students may not transfer courses graded on a nonstandard basis (e.g., Pass/ No Pass, Credit/No Credit, Satisfactory/ Unsatisfactory) to their graduate certificate or degree programs unless it can be verified from the registrar of the university offering the course that the grade is equivalent to a $\mathrm{B}(3.00)$ or better.

Graduate courses to be transferred from another institution to an OSU master's degree must not have been used to satisfy the requirements for a bachelor's degree, master's degree (or equivalent) or a doctoral degree.

Graduate courses to be transferred from an OSU master's degree to a second OSU master's degree must meet the following three requirements:

1. Credits used to satisfy the residency requirements of one master's degree may not be used to satisfy the residency requirements of another master's degree.
2. Students who earn two master's degrees at Oregon State University must complete all degree requirements for each degree. This requires filing separate programs of study forms for each degree, filing separate commencement applications for each degree, completing separate projects or theses for each degree, scheduling separate final oral examinations for each degree, and passing final oral examinations for each degree.
3. Such credit will be granted only for graded course work earned at Oregon State University and completed with a grade of B or higher.
Up to 15 graduate credits may be transferred toward a 45 -credit master's degree. Up to 6 graduate credits may be transferred toward an 18-credit graduate certificate.
Graduate courses to be transferred to a doctoral degree program can be courses that were used to satisfy the graduate course requirements for a graduate certificate or a master's degree (or equivalent). Selected 700 -level courses that have been deemed equivalent to graduatelevel learning may be used on doctoral programs of study upon approval of the student's graduate committee. There is no limit on transfer credit toward the doctoral degree as long as the doctoral residence requirement is satisfied.

Credits earned in fulfillment of a graduate certificate program may be applied to a graduate degree, so long as they meet the appropriate standards for use in the degree and the criteria to transfer credit as defined herein. Courses completed for a degree program may likewise be applied toward a certificate program.

## PREPARATION REQUIRED FOR GRADUATE MAJOR

Preparation for a graduate major is ordinarily an undergraduate major in the same subject, or a fair equivalent. Preparation for a graduate minor is ordinarily at least one year of upper-division work in addition to foundation courses in the subject.

Academic performance is not the sole criterion for admission to and continuation in certain courses and programs at the university, such as practicum courses and internships. The university may find it necessary to evaluate a person's background to determine his or her likeli-
hood of maintaining standards of professional conduct necessary in the academic discipline or profession. An evaluation may consider current performance as well as past experiences and actions that could affect a student's ability to perform in the particular course or program.

Qualifying Examinations. Some departments and programs require graduate students working for advanced degrees to take oral and/or written examinations in their major and minor fields to determine overall preparation and background. The examination serves as a guidance examination, the results of which are used in setting up the graduate study program. A poor showing in any area may result in a student's taking undergraduate courses without graduate credit to gain the necessary background to proceed with the graduate program. The examination usually is taken during the first quarter of graduate enrollment.

In lieu of their own qualifying examination, departments and programs may accept a satisfactory showing in the Graduate Record Examination (GRE), or some other standard test. Check with the anticipated major department or program to find out which exams are appropriate.

## REGISTRATION REQUIREMENTS

## Introduction

Full-time status as a graduate student is defined by Oregon State University as enrollment in 9 credits per term. The maximum load for a full-time graduate student is 16 credits. A student may exceed this limit only with the approval of the Graduate School. Students receiving approval to exceed 16 credits will be assessed a per-credit overload fee.

Full-time status (i.e., a minimum of 9 credits per term) may be sufficient to qualify for purposes of veterans' benefits, visa requirements, external fellowships, and federal financial aid.

To assure full compliance with visa regulations, international students must consult with the Office of International Services (OIS) for additional information about registration requirements.

## CONTINUOUS ENROLLMENT

## I. Minimum Registration

Unless on approved leave of absence (see Section II), all graduate students in graduate degree programs must register continuously for a minimum of 3 graduate credits until their degree is granted or until their status as a credential-seeking graduate student is terminated. This includes students who are taking only preliminary comprehensive or final examinations or presenting terminal projects. Students must register for a minimum of 3 credits and pay fees if they will be using university resources (e.g.,
facilities, equipment, computing and library services, or faculty or staff time) during any given term, regardless of the student's location. If degree requirements are completed between terms, the student must have been registered during the preceding term.

Graduate students who have successfully completed all course and noncourse requirements in accordance with diploma deadlines (see the Graduate School website) are not required to register during the subsequent term.

Nonthesis master's degree students who complete all degree requirements during a term for which they are registered will not be required to register for the subsequent term.
Doctoral and thesis master's students who fail to meet all deadlines and complete all course and noncourse requirements during the term will be required to register for a minimum of 3 graduate credits during the subsequent term. However, only if library copies of the thesis have been submitted to the Graduate School within the first two weeks of the subsequent term and the thesis is the only outstanding requirement remaining for certification of the student's graduate degree may an exception to this rule be considered.

Graduate students who use facilities or faculty/staff time during summer session to engage in academic or research activities in support of their thesis/ pursuit of degree are required to register for a minimum of 3 credits during the summer session. Graduate students who use facilities or faculty staff time during summer session purely in service to the university and not to engage in academic or research activities in support of their thesis/pursuit of degree are not required to register during the summer session.

Graduate students do not need to submit a Leave of Absence/Intent to Resume Graduate Study form if they do not enroll in summer term.

It should be noted that graduate assistantship eligibility requires enrollment levels that supersede those contained in this continuous enrollment policy. Various agencies and offices maintain their own registration requirements that also may exceed those specified by this continuous enrollment policy (e.g., those of the Veterans Administration, Immigration and Naturalization Service for international students, and those required for federal financial aid programs.) Therefore, it is the student's responsibility to register for the appropriate number of credits that may be required for funding eligibility and/or compliance as outlined by specific agency regulations under which they are governed.

## II. Leave of Absence

On-leave status is available to students
who need to suspend their program of study for good cause. Students who desire a leave of absence will work with their major professor, program administrator, and the Graduate School to arrange authorized leave. Students understand that while on leave they will not use university resources. Graduate faculty members are students' most important resource at the university and will work closely with graduate students to ensure timely completion of academic goals, understanding of the continuous graduate enrollment policy, and that graduate students enroll each term other than when they are on authorized leave. The Graduate School will assist graduate students and graduate faculty members with administrative procedures related to the continuous graduate enrollment policy. The Graduate School recognizes the diverse circumstances and unpredictability of graduate students' lives and will work in partnership with the graduate community in arranging leaves and responding to unanticipated situations.
A graduate student intending to resume active graduate student status following interruption of his or her study program for one or more terms, excluding summer session, must apply for leave of absence to maintain graduate student standing in his or her degree program. (See Section IV below). Leave of Absence/ Intent to Resume Graduate Study Forms must be received by the Graduate School at least 15 working days prior to the first day of the term involved. The time the student spends in approved on-leave status will be included in any time limits relevant to the degree (See Sections C.1. and C.2. below). Students in on-leave status may not a) use any university facilities, b) make demands upon faculty time, c) receive a fellowship or financial aid, or d) take course work of any kind at Oregon State University.

## A. Eligibility

Only graduate students in good standing are eligible for leave of absence.

## B. Leave of Absence Categories

1. Regular. Regular leave of absence is granted on a term-by-term basis in cases where the student demonstrates good cause (e.g., illness, temporary departure from the university for employment, family issues, financial need, personal circumstances). Students who request a leave of absence must:
2. be in good standing,
3. submit the Leave of Absence/ Intent to Resume Graduate Status form indicating each term for which leave is requested, and
4. complete all degree requirements within the time limits established in this catalog.
5. Family and Medical Leave. This leave is different from regular leave in that it is for 12 continuous weeks that may span multiple terms and must meet FMLA leave requirements as determined by the Office of Human Resources. See policy at http://gradschool.oregonstate.edu/ sites/gradschool.oregonstate.edu/ files/imce/progress/graduate-student-family-and-medical-leave-policy.pdf.

## C. Limits

1. Regular Leave of Absence is granted for a specified time period that may not exceed three terms, excluding summer session.
2. Time spent in on-leave status will be included in all time limits pertaining to the student's degree program.
3. Students who matriculate fall term 2016 or later may use unlimited leaves as long as time to degree constraints are met (7 years for master's degrees and graduate certificates; 9 years for doctoral degrees). Leaves of absence may be approved for up to three terms at a time, but must be renewed to retain student status. Failure to renew the leave of absence or register will result in the loss of student status.
4. Family and Medical Leave is available for 12 continuous weeks that may span multiple terms and must meet FMLA leave requirements as determined by the Office of Human Resources. These absences will not be included in all time limits pertaining to the student's degree program. Contact the Graduate School for additional details.

## D. Approval

Approval of the major professor, department/program chair, and graduate dean are required.

## III. Student Fees

Students with approved on-leave status are not required to pay tuition or fees. However, students who must register as per section I, "Minimum Registration," must pay both tuition and student fees.

## IV. Unauthorized Break in Registration

A graduate student who takes an unauthorized break in registration by failing to maintain continuous enrollment or by failing to obtain regular or planned leave of absence will relinquish his or her graduate standing in the university. Students who wish to have their graduate standing reinstated will be required to file an Application for Graduate Readmission and pay the readmission fee. The readmission application must be approved by the student's major professor, department/school/program chair, and graduate dean. Acceptance back into a graduate program is not guaranteed
even if the student departed in good standing. The petitioner for readmission will be required to meet university and departmental admission requirements and degree completion requirements that are in effect on the date of readmission. Review of the Application for Graduate Readmission may also result in a change of residency status from resident to nonresident.
V. Appeal

In the case of extraordinarily extenuating circumstances, students may appeal the provisions of the continuous graduate enrollment policy by submitting a detailed request in writing to the dean of the Graduate School.

## IMPLEMENTATION OF CONTINUOUS ENROLLMENT POLICY

All graduate students, excluding cer-tificate-only students, including those enrolled prior to fall 2002, are subject to this policy.
All graduate students should be enrolled for a reasonable number of credits sufficient to represent their use of university space, facilities or faculty time.

## REGISTRATION REQUIREMENTS FOR GRADUATE ASSISTANTS

In addition to the above registration requirements, the following requirements apply to graduate teaching assistants (GTA) and graduate research assistants (GRA).

As a condition of their academic appointments, graduate teaching and research assistants are required to register for 3 credits above the minimum fulltime load (i.e., a minimum of 12 credits) each term of the appointment during the academic year (fall, winter, and spring.) During summer session, a minimum registration of 3 credits is required for graduate assistants. Audit registrations, course withdrawals, and enrollment in INTO OSU courses may not be used to satisfy enrollment requirements for graduate assistant salary/stipend, tuition remission, salary supplement or health insurance benefits. Tuition charges associated with INTO OSU enrollment are not covered under graduate assistant tuition remission.

## GRADE REQUIREMENT

A grade-point average of 3.00 (a B average) is required: 1 ) for all courses taken as a degree-seeking graduate student, and 2) for courses included in the graduate degree or graduate certificate program of study. Grades below C (2.00) cannot be used on a graduate program of study. A grade-point average of 3.00 is required before the final oral or written exam may be undertaken. Enforced graduate-level prerequisite courses must be completed with a minimum grade of $C$.

## COURSE NUMBERS

## Graduate Courses

All graduate courses will be designed around well-defined objectives or student learning outcomes, and instructional opportunities should be designed to help students achieve these outcomes. Student learning outcomes encompass the range of student attributes and abilities that students should be able to demonstrate after successful completion of the course.

## 500-Level Courses

These courses are graduate courses offered primarily in support of graduate certificate or master's degree programs but which are also available for use on doctoral level degree programs.

Undergraduates of superior scholastic achievement may be admitted to these courses on the approval of the instructor, and they may, if admitted, under some conditions, use a limited number of these courses toward a graduate certificate or a graduate degree program. These courses have one or more of the following characteristics:

1. They require upper-division prerequisites in the discipline.
2. They require an extensive theoretical base in the discipline.
3. They increase or re-examine the existing knowledge or database of the discipline.
4. They present core components or important peripheral components of the discipline at an advanced level.

## 600-Level Courses

These are graduate courses offered principally in support of doctoral level instructional programs but also are available for use on graduate certificate or master's level degree programs. In addition to exhibiting the characteristics of 500-level courses, these courses typically require 500 -level prerequisites and they build on and increase the information presented in 500 -level courses.

## OTHER COURSES:

## 700-Level Courses

These are advanced professional or technical courses that may be applied toward a first professional degree (e.g., DVM, PharmD). They make up the bulk of the course work for these professional degree programs. In general, these courses are not considered graduate-level courses, and may not be applied toward graduate certificate, master's level or doctoral level (PhD or EdD) degree programs. However, selected 700-level courses that have been deemed equivalent to graduatelevel learning may be used on doctoral programs of study upon approval of the student's graduate committee.

## 800-Level Courses

These courses are in-service courses aimed at practicing professionals in the
discipline. These courses have an inservice or retraining focus, and provide the professionals new ways to examine existing situations or new tools to treat existing problems. These courses generally have none of the characteristics of $500-$ level courses. They are not graduatelevel courses, and they may not be applied to graduate certificate or graduate degree programs nor to professional degree programs.

## BLANKET-NUMBERED COURSES

Blanket-numbered courses have a zero middle digit. Those that carry graduate credit may be repeated up to the maximum totals indicated below.

- Research (501 or 601) is for research that is not part of the thesis. Data obtained from such research should not be incorporated into the thesis.
- Thesis (503 or 603 ) covers the thesis research and writing. A student may register for thesis credit each term.
- Reading and Conference (505 or 605 ) and Projects (506 or 606) are used for special work not given under a formal course number.
- Seminar (507 or 607) is used both for departmental seminars and for special group work not given in a formal course.
- Workshop (508 or 608) is usually a special, short-term course covering a variety of topics.
- Practicum (509) is used for courses whose emphasis is the application of academic theory to the work environment.
No more than 9 credits of blanketnumbered courses, other than thesis (or research-in-lieu-of-thesis for nonthesis programs), may be applied toward the minimum 45 -credit master's degree. While internship credit (510) is not considered a blanket-numbered course, no more than 6 credits of internship may be applied toward a 45 -credit master's degree. The internship credit limit is in addition to the 9 -credit blanket-hour limit.

No more than 15 blanket-numbered credits may be applied toward the minimum 108-credit doctoral program.

No more than 3 credits of blanketnumbered courses in each field of study may be used in the MAIS program; thesis credits or research paper credits are exempt from this limitation.

Blanket-numbered transfer courses will count toward the maximum totals specified above.

## COURSES GRADED ON NONSTANDARD BASIS

Graduate students may elect to take courses on an $\mathrm{S} / \mathrm{U}$ basis only if those courses are not in their graduate certificate or graduate degree program or are
not required for the removal of deficiencies. Graduate students may use courses taken at OSU on a P/N basis in their graduate certificate or graduate degree programs.

## 4XX/5XX COURSES

No more than $50 \%$ of courses used for a graduate program of study may be the 500-level component of a dual-listed course. Courses bearing dual-listed numbers (400/500) must provide students who are enrolled for 500 -level credit with graduate-level learning.

Expectations for learning outcomes in the graduate component of dual listed (400/500 level) courses are the same as for stand-alone 500-level courses. A distinction should be made between learning outcomes for students taking the course for undergraduate credit (400 level) and those taking the course for graduate credit ( 500 level). In most cases this distinction should include emphasis on developing skills in analysis, synthesis, and/or evaluation for the 500 -level credit. The different student learning outcomes should be accompanied by appropriate differences in instructional opportunities and evaluation procedures.

## Repeating 4xx/5xx Courses

A graduate student who has taken a 4 xx course may not normally include the corresponding 5xx course on his or her graduate program.

## REMOTE ACCESS FOR GRADUATE COMMITTEE <br> MEETINGS

It is generally expected that all members of graduate committees should be physically present at all required graduate committee meetings (i.e., program meetings, preliminary examinations, and final examinations). However, it is permissible for the student, and/or committee members to participate from a remote location provided the conditions listed below are met:
a. Advance agreement of the student and all committee members has been obtained;
b. All participants join in with two-way audio and video connections; audioonly connections must be approved by the major professor if the video connection is not possible. When the student is the remote participant, his or her connection must be an audio and video connection;
c. Any visual aids or other materials have been distributed in advance to the remote participants;
d. The committee members participate in the complete meeting, discussion, presentation, and evaluation; and
e. The student is responsible for making arrangements.

## PETITIONS

A student wishing to deviate from normal Graduate School regulations and procedures may submit a request and the reasons for it to the Graduate School in a letter signed by the student and his or her major professor. In reaching a decision, the Graduate School may seek advice from the Graduate Council. The student will be advised of the decision when it has been made. Action taken on a petition will not be considered precedent for future action.

## DIPLOMA APPLICATION

Graduate students wishing a printed diploma must complete a Diploma Application form. This form should be submitted prior to taking the final examination, indicating the term the student intends to graduate. Participation in Commencement ceremonies requires earlier submission of this form.

## INSTITUTIONAL REVIEW BOARD APPROVAL OF HUMAN SUBJECTS RESEARCH

It is Oregon State University policy that the OSU Institutional Review Board (IRB) must review all research that involves human subjects. The results from studies conducted without obtaining IRB review and approval may not be published or widely distributed, nor can such data be used to satisfy master's thesis or doctoral dissertation requirements.

The requirements for IRB review of research involving human subjects is based upon research ethics and federal law, and the implications of conducting human subjects research without IRB approval are significant. Failure to follow this policy places both the individual and the institution at risk: the individual may be subject to university sanctions and/or incur personal liability for negligence and harm; the university could lose access to federal funding or be forced to cease all human subjects research. For more information, please send an email to irb@oregonstate.edu or visit the IRB website at http://research.oregonstate. edu/irb/.

## INSTITUTIONAL ANIMAL CARE AND USE COMMITTEE IACUC

The Oregon State University Institutional Animal Care and Use Committee (IACUC) requires prior review and approval for all live vertebrate animal use in research, teaching, testing, per the IACUC Scope of Work Policy. An eligible principal investigator must be identified in order to submit an ACUP to the committee, per PI Eligibility Policy. Review leading to approval is accomplished via submission of an Animal Care and Use Protocol form (ACUP) to the IACUC.
The requirements for IACUC review are based on the ethics of animal use,
and our assurances to agencies that provide federal oversight, funding, and program accreditation. Implications regarding conduct of animal research without IACUC approval and oversight are significant. Failure to secure and maintain approval can result in the student's inability to continue research or publish data. In addition, OSU could lose accreditation, lose access to funding and/ or be required to pay significant fines. Please contact IACUC@oregonstate.edu for more information.

## OSU SCIENTIFIC DIVING AND SCIENTIFIC BOATING

## Scientific Diving

OSU personnel (graduate or undergraduate students, faculty, staff, approved volunteers) who work underwater as a part of their research must have their diving activity pre-approved by the OSU Diving and Small Boat Safety Officer (DBSO) and the OSU Diving Control Board. OSU is an organizational member of the American Academy of Underwater Sciences (AAUS) and all OSU scientific diving is conducted in accordance with AAUS standards. For more information visit http://research.oregonstate.edu/diving/ or contact the Diving and Small Boat Safety Office (diving.safety@oregonstate.edu).

## Scientific Boating

OSU personnel (graduate or undergraduate students, faculty, staff, approved volunteers) who operate vessels (motorboats, personal watercraft, and non-motorized craft) as a part of their research must conduct their activities in accordance with OSU scientific boating standards. For more information visit http:// research.oregonstate.edu/boating/ and contact the Diving and Small Boat Safety Office (diving.safety@oregonstate.edu) to ensure that your planned research boating activities are in compliance with OSU standards. OSU is a member of the Scientific Boating Safety Association (SBSA).

## GRADUATE WORK BY FACULTY MEMBERS

The Faculty as Student policy specifies that one may not simultaneously be an Oregon State University faculty member and an OSU graduate student. This policy pertains to all OSU faculty members (both ranked and professional), is consistent with practices at most universities, and is in keeping with recognized appropriate graduate education practice.

Although faculty members are eligible to enroll for courses at staff fee rates, such course work may not be applied to a graduate certificate or graduate degree without prior approval from the graduate dean.

## GRADUATE STUDENT TEACHING

## Appointment as Instructor of

Record. For a graduate student to be appointed as the Instructor of Record for a graduate course (including the 500-level component of a slash course):

- The unit/program of employment must be separate and distinct from the unit/program of enrollment.
- The instructor must be appointed to the graduate faculty based on their academic/professional qualification by the unit/program of employment.
- In the event that graduate students from the instructor's unit/program of enrollment are enrolled in the course, alternative arrangements must be made for evaluating the work of those graduate students.
Appointment as Teaching As-
sistant. For a graduate student to be appointed as the Teaching Assistant for a graduate course (including the 500-level component of a slash course), the Director of the Graduate Program must ensure that potential conflicts of interest are avoided to the maximum extent possible. This may include:
- Making alternative arrangements to evaluate the work of graduate students from the same unit/program as the Teaching Assistant, OR
- Ensuring that the Teaching Assistant has advanced to candidacy status (after prelims) and all graduate students in the class have not advanced to candidacy
If neither of these criteria are met, the program must have a conflict of interest plan approved by the Graduate School.


## GRADUATE APPOINTMENTS

Graduate assistants are represented by the Coalition of Graduate Employees, American Federation of Teachers Local 6069 (CGE). Terms and conditions of employment for service not performed as a requirement for their degrees are prescribed in the collective bargaining agreement between OSU, OUS, and CGE. The CGE contract can be found on the OHR website at http://hr.oregonstate. edu/ercc/gradstud.
Persons interested in assistantships should write directly to the department program concerned.

To qualify for appointment as a graduate assistant the student must:

1. Be a regularly admitted, conditionally admitted, or provisionally admitted graduate student at Oregon State University (i.e., not a graduate nondegree-seeking, postbaccalaureate student, or PharmD or DVM student).
2. Be enrolled as a full-time degreeseeking graduate student at Oregon State University, completing a minimum of 12 credits of instruction each term ( 9 credits during summer
session). Audit registrations, course withdrawals, and enrollment in INTO OSU may not be used to satisfy these minimum enrollment requirements.
3. Be making satisfactory progress toward an advanced degree.
Graduate assistants may be appointed on an academic term basis, an academicyear basis (nine months) or a full-year basis (12 months). No appointment can be for less than . 30 FTE or more than .49 FTE per term. A graduate assistant on less than . 49 FTE may take on extra duties; however, the total stipend plus salary from all sources at Oregon State University may not exceed the equivalent of . 49 FTE for any term.

All graduate assistants are required to provide duties to OSU to justify their stipends. Teaching assistants are expected to provide duties related to the university's instructional program (e.g., teaching laboratories or discussion sections, grading papers, advising). Research assistants provide duties related to the research function of the university. Whatever the type of appointment, the graduate assistant should be regarded as a student providing service as part of a learning experience rather than as an employee whose education is secondary.

The work schedule and the duties to be performed by the graduate assistant shall be established by the department or program sponsoring the assistantship.

Graduate assistants must register for and complete a minimum of 12 credits of instruction each term except during summer session, when a minimum of 9 credits is required. Audit registrations, course withdrawals, and enrollment in INTO OSU courses may not be used to satisfy these minimum enrollment requirements. (See section on 'Registration Requirements for Graduate Assistants' for complete details.)
Persons interested in assistantships should write directly to the department or program concerned.

## INTERNATIONAL GRADUATE TEACHING ASSISTANT ENGLISH LANGUAGE REQUIREMENT

 If the Graduate School determines that an applicant or current student's native language is not English, the proposed IGTA is required to take the Internet Based TOEFL (iBT) test before being appointed as a graduate teaching assistant.Potential IGTAs scoring below 22 on the speaking section of the iBT can be appointed, but will be required to undertake further English language training.

If a department wishes to offer a student with an iBT speaking score of 18 to 21 an assistantship, the unit must:
a. Affirm that the graduate student will be enrolled in IEPA 098NC
Communication for IGTAs (with the
unit paying the cost of this training).
b. If at all possible, assign the graduate student assignments (such as paper grading, reagent preparation, etc.) that do not require personal contact with undergraduate students.
c. If (b) above is not possible, and if possible, pair the IGTA in the laboratory or classroom with another TA who is a native speaker of English.
d. Monitor the quality of IGTA performance using student evaluations and the evaluations of the supervising professors. The unit will document for each student the results of their evaluation of the student's performance as a GTA.
If the unit agrees to meet these conditions, the IGTA appointment can be made.

The scheduling of IEPA 098NC will be coordinated with the units so that students can attend the course and conduct teaching assistantship duties. Please check the OSU online schedule of classes for confirmation of the time and date: http://catalog.oregonstate.edu/CourseDetail.aspx?subjectcode=IEPA\&coursenumb er=098NC

Students with an iBT speaking score of less than 18 cannot be assigned teaching assistantships.

## DISMISSAL FROM GRADUATE SCHOOL

Advanced-degree students (regularly, conditionally, and provisionally admitted) are expected to make satisfactory progress toward a specific academic degree. This includes maintaining a GPA of 3.00 or better for all courses taken as a graduate student and for courses included in the graduate program, meeting departmental or program requirements, and participating in a creative activity such as a thesis.

If a student is failing to make satisfactory progress toward an academic degree, as determined by the major department/ program or the Graduate School, the student may be dismissed from the Graduate School.

Any doctoral student who fails the preliminary oral examination with a committee recommendation that the student's work toward this degree be terminated may be dismissed from the Graduate School.

Any student who fails a final oral examination may be dismissed from the Graduate School.
Academic dishonesty and other violations of the Student Conduct Code may serve as grounds for dismissal from the Graduate School.

## STUDENT CONDUCT REGULATIONS

Graduate students enrolled at Oregon State University are expected to conform
to basic regulations and policies developed to govern the behavior of students as members of the university community. The regulations have been formulated by the Student Conduct Committee, the Student Activities Committee, the university administration, and the State Board of Higher Education. Violations of the regulations subject a student to appropriate disciplinary or judicial action. The regulations and the procedures for disciplinary action and appeal are available via the Office of Student Conduct and Community Standards website at http://studentlife.oregonstate.edu/ studentconduct/.

## GRIEVANCE PROCEDURE

All students desiring to appeal matters relating to their graduate education should request a copy of Grievance Procedures for Graduate Students at Oregon State University from the Graduate School. These procedures are also available on the Web at http://gradschool.oregon-state.edu/progress/grievance-procedures. Graduate assistants whose terms and conditions of employment are prescribed by the collective bargaining agreement between OSU and the Coalition of Graduate Employees, American Federation of Teachers Local 6069 should also refer to that document.

## POLICIES GOVERNING

GRADUATE CEBTIFICATE
PROCRAM
GENERAL REQUIREMENTS
The Graduate Certificate Program at Oregon State University is a structured progression of graduate-level courses that constitute a coherent body of study with a defined focus within a single discipline or a logical combination of disciplines. It is designed for a student who has completed a baccalaureate degree and is in pursuit of advanced-level learning. Graduate certificates reflect the educational mission of the university. Students desiring a graduate certificate must be admitted to the university as a credential-seeking graduate student, but are not required to be on track for a specific degree. There is no formal committee requirement for graduate certificates. Certificate students are subject to all general policies governing the courses for the master's degree, unless specified within the Graduate Catalog.

## GRADUATE CERTIFICATE STUDY PROGRAM

The graduate certificate curriculum consists of a minimum of 18 graduate credits, and may include a final project, portfolio, or report for integration of the sequence of course materials. All graduate student programs of study submitted
to the Graduate School must consist of, at a minimum, 50 percent graduate stand-alone credits. The remaining credits may be the 500 component of 400/500 slash courses. No final examination is required.

## TIME LIMITS

Courses completed no more than seven years prior to the graduate certificate award may be used to satisfy certificate requirements. Students enrolled in certificates without concurrent enrollment in a graduate degree program are not subject to the continuous enrollment policy during the time allowed for certificate completion.

## FINANCIAL AID ELIGIBILITY

Students enrolled in only graduate certificate programs may qualify for federal loan and work-study financial aid. Students must complete the federal FAFSA form to begin the financial aid application process.

## POLICIES GOVERNING MASTER'S DEGREE <br> PROGRAMS

## GENERAL REQUIREMENTS

All master's degree programs require a minimum of 45 graduate credits including thesis ( 6 to 12 credits), research-in-lieu-of-thesis (3 to 6 credits), or an integrative capstone experience (3 to 6 credits). Exceptions to this capstone requirement are specified under the degree descriptions that follow these universal master's degree requirements. Effective fall 2005, all graduate student programs of study submitted to the Graduate School must consist of, at a minimum, 50 percent graduate stand-alone courses. The remaining credits may be the 500 component of 400/500 slash courses. General regulations for all master's programs are cited here, with certain exceptions provided for master's degrees in the professional areas listed on the following pages.

All master's students must:
a. Conduct research, produce some other form of creative work, or participate in an integrative capstone experience; and
b. Demonstrate mastery of subject material; and
c. Be able to conduct scholarly or professional activities in an ethical manner
The assessment of these outcomes and the specification of learning objectives related to these outcomes are to be carried out at the program level.

## RESIDENCE REQUIREMENTS

The residence requirement for the master's degree is 30 graduate Oregon State

University credits after admission as a degree-seeking graduate student. These 30 graduate credits must appear on the master's degree program. (This does not include graduate credits taken as a postbaccalaureate or graduate nondegreeseeking student, nor transfer courses.) Deviation from the residence requirement requires a petition to the Graduate School.

## LANGUAGE REQUIREMENTS

For the master of arts degree, the student must show foreign language proficiency (including American Sign Language) equivalent to that attained at the end of a second-year university course in that language with a grade of "C" (2.00) or better. English is not considered a foreign language for purposes of this requirement. There is no language requirement for the Master of Arts in Interdisciplinary Studies degree. For other master's degrees, there is no foreign language requirement unless a language is required in the individual student's program. A student must be enrolled to complete their foreign language requirement before they take the final oral examination for the degree.

GRADUATE PROGRAM OF STUDY A regular master's degree student must complete a program of study in consultation with an advisor/advisory committee before completing 18 graduate credits. This includes credits earned as a postbaccalaureate, graduate nondegree-seeking student, or graduate student.
Students who wish to transfer credit must submit a Transfer Credit Request form before the end of their first year of study.

The final program of study must be submitted to the Graduate School at least 15 weeks prior to the date of the student's final examination.

Effective fall 2005, all graduate student programs of study submitted to the Graduate School must consist of, at a minimum, 50 percent graduate standalone courses. The remaining credits may be the 500 component of $400 / 500$ slash courses.

If a minor is declared, approximately two-thirds of the work (30 graduate credits) should be listed in the major field and one-third ( 15 graduate credits) in the minor field. In such cases, the student's advisory committee must include a member from the minor department.

The program is developed under the guidance of the major professor, and minor professor when a minor is included, and signed by those professors and the chair of the academic unit before filing in the Graduate School. Each candidate's program should include substantial work with at least three faculty members offering graduate instruction. Changes in
the program may be made by submitting a Petition for Change in Program form, available in the Graduate School.

## TIME LIMIT

All work toward a master's degree, including transferred credits, course work, thesis (if required), and all examinations, must be completed within seven years. Time in which the student is on a leave of absence is included in the seven year limit.

## THESIS

When scheduling their final oral examinations, thesis option master's students are required to submit the pretext pages of their thesis to the Graduate School at least two weeks prior to the final oral examination. Pretext pages include the abstract, copyright, title page, approval page, acknowledgment page, contribution of authors, table of contents, list of figures, tables, appendices, dedication (optional), and preface (optional). It is expected that students will distribute examination copies to all their committee members, including the Graduate Council representative, sufficiently early to permit thorough review of the thesis prior to the student's final oral examination.
Within six weeks after the final oral examination or before the first day of the following term, whichever comes first, students must upload one PDF copy of the thesis, without signatures, electronically to ScholarsArchive and submit the signed ETD submission approval form with a copy of the title page to the Graduate School. If final submission requirements are after the initial sixweek period, the student may be subject to re-examination. Please refer to the Graduate School's website for complete details (http://gradschool.oregonstate. edu/progress/thesis-guide).
Signatures on the ETD submission approval form can be electronic, signed, scanned and emailed or faxed. The thesis will not be accepted for graduate requirements until it has received approval by the graduate dean, which the thesis editor will obtain.

Full information concerning the prescribed style for theses is given in the booklet, Thesis Guide: Preparing a Thesis or Dissertation at OSU, available on the Web at http://gradschool.oregonstate. edu/progress/thesis-guide.

The results from studies conducted using human subjects without obtaining Institutional Review Board approval shall not be used to satisfy master's thesis or doctoral dissertation requirements. For more information, please send an email to irb@oregonstate.edu or visit the IRB website at http://research.oregonstate. edu/irb/.

The credit allowed for the thesis, including research and preparation of the manuscript, varies from 6 to 12 credits. In certain departments and programs, the MS or MA thesis is optional, to be determined in each case by the department/school/program and the major professor. See departmental descriptions.

## FINAL EXAMINATION

Successful completion of a final oral examination is required for all master's degrees with the exception of the following graduate programs:

- EdM students who complete the nonthesis option must take a final written examination;
- MBA students submit capstone projects that are assessed at the curricular core and graduate option levels, in addition to being assessed upon their fulfillment of graduate learning outcomes;
- MCoun students admitted to the degree program prior to June 2017 must successfully pass a written project portfolio that demonstrates mastery of the MCoun learning outcomes;
- MCoun students admitted to the program beginning June 2017 must successfully pass a nationally administered exam determined by program faculty.
Some departments also require the student to pass a written exam prior to the oral exam.

The final oral examination for master's candidates may, at the discretion of the graduate program, consist of a public thesis defense followed by a closed session of the examining committee with the candidate. Under normal circumstances, the final oral examination should be scheduled for two hours.

For master's candidates whose programs require a thesis, not more than half of the examination period should be devoted to the presentation and defense of the thesis; the remaining time can be spent on questions relating to the student's knowledge of the major field, and minor field if a minor is included in the program of study. Graduate faculty serving on thesis-oriented master's degree programs may contribute to the direction of the student's thesis, will assess the student's thesis and his or her defense of it in the final oral examination, will vote to pass or fail the student, and may sign the thesis when it is in acceptable final form. The examining committee consists of at least four members of the graduate fac-ulty-two in the major field, one in the minor field if a minor is included, and a Graduate Council representative. When a minor is not included, the fourth member may be from the graduate faculty at large. All members of the student's graduate committee must approve the schedul-
ing of the final examination.
Students writing a thesis must have a Graduate Council representative on their committee. It is the student's responsibility to obtain his or her own Graduate Council representative from a list provided by the Graduate School. This must be done prior to scheduling the final exam.

When no thesis is involved, not more than half of the examination period should be devoted to the presentation of the research project; the remaining time can be spent on questions relating to the student's knowledge of the major field, and minor field if one is included in the program. For nonthesis master's degree programs, the major professor is responsible for directing and assigning a final grade for the research or culminating project. Other members of the nonthesis committee will assess the student's defense of the project in the final oral examination, as well as the student's knowledge of his or her field, and vote to pass or fail the student. No more than two re-examinations are permitted by the Graduate School, although academic units may permit fewer re-examinations. The examining committee consists of three members of the graduate facultytwo in the major field and one in the minor field if a minor is included. When a minor is not included, the third member may be from the graduate faculty at large.

## MASTER OF ARTS IN INTERDISCIPLINARY STUDIES

The Master of Arts in Interdisciplinary Studies (MAIS) degree is granted for attainment of broad, advanced knowledge and achievement integrated from three fields of study. Most graduate majors or minors may serve as a field for this degree. The current list of approved majors is at http://catalog.oregonstate. edu/MajorDetail.aspx?id=333. Two of the three fields may be from one department if the areas of concentration within these two fields are different. A minimum of 9 credits in each of the three fields of study is required. The degree requires a minimum of 49 credits, including 4 credits of course work on interdisciplinary research methods.

No more than 21 credits (excluding thesis or research paper credit) may be taken in any field unless the total program exceeds 49 credits. There is no foreign language requirement. No more than 3 credits of blanket-numbered courses in each field of study may be used in the program; thesis credits (Option A) or research paper credits (Option B) are exempt from this limitation. The student's committee consists of four members of the graduate faculty-one from each of the three fields-and a Graduate Council representative. A formal program meeting must be held prior
to the completion of 18 graduate credits. A final oral examination is required.
Two options under the program:
Option A: Thesis option. The thesis must coordinate work in the three fields. The requirement is 6 to 9 credits of Thesis 503. The thesis advisor must be a member of the graduate faculty authorized to direct theses.

Option B: Research paper option. The research paper must integrate work from at least two of the three fields. The requirement is 4 to 7 credits, registered as Research 501, Reading and Conference 505, or Projects 506.

## MASTER OF ARTS IN TEACHING (MAT)

The Master of Arts in Teaching is an intensive professional degree program intended to prepare teachers for careers in public school education. Students who successfully complete the MAT can be recommended for the Oregon basic teaching license upon the positive evaluations of the university and public school supervisors.
The professional program in teacher education is full-time and one calendar year in length. Students will enroll with their subject area cohort group and complete the program in one year. Teacher licensure is offered in the following areas:

- Advanced Mathematics Education
- Agricultural Education
- Biology Education
- Chemistry Education
- Elementary Education
- Family and Consumer Sciences Education
- Integrated Science Education
- Language Arts Education (English) Cascades Campus only
- Music Education
- Physics Education
- Spanish Education

The professional teacher education program begins with a 15 -credit professional education core that is foundational to and a prerequisite for the 48 -credit Master of Arts in Teaching degree. The 48-credit MAT includes a professional education concentration (3 credits), professional course work in the teaching specialty ( 18 to 21 credits), a public school professional internship ( 15 to 18 credits), and a minimum of 9 graduate credits in the subject matter specialization (mathematics, physics, literature, etc.). Because the professional teacher education program is a two-part program, including the professional core and the MAT, future students may plan their programs as either five-year (with a nine-month MAT) or as fifth year programs (with 12 months of graduate study including both the professional core and the MAT).
The MAT degree requires successful completion of a final oral examination.

MASTER OF ATHLETIC TRAINING The Master of Athletic Training (MATRN) degree program consists of a combination of didactic, laboratory and clinical education experiences, from which students in athletic training attain the entry-level educational competencies stipulated by the national accrediting agency for the athletic training profession, the Commission on the Accreditation of Athletic Training Education (CAATE). Graduates are expected to take and pass the certification examination offered by the Board of Certification and embark on careers as Certified Athletic Trainers.

## MASTER OF BUSINESS

## ADMINISTRATION

The MBA program represents a broad, yet responsive general management education with an entrepreneurial focus that crosses the functional disciplines of business. Its advanced management emphasis and entrepreneurial focus creates practical value-added content for all students, both business and nonbusiness undergraduates, enabling them to solve complex business problems and successfully compete in the business marketplace.
The MBA program is concentrated in length-three academic terms for fulltime students with a BA/BS in business or who have completed the foundation courses. Full-time students with no previous business or business-related course work can complete the program in as few as six terms. The MBA degree requires no thesis. MBA students submit capstone projects that are assessed at the curricular core and graduate option levels, in addition to being assessed upon their fulfillment of graduate learning outcomes.

## MASTER OF BUSINESS ADMINISTRATION AND ACCOUNTANCY

The Master of Business Administration and Accountancy is a one-year master's program for students with an undergraduate degree in accounting. It allows accounting students to receive an undergraduate degree and a master's degree during their five years of university study required to become a CPA. As an integrated program, the MBAA is designed to allow students the opportunity to plan early enough in their accounting education program to enable them to receive both an undergraduate degree and a graduate degree. The MBAA is also designed to accommodate postbaccalaureate students wishing to prepare for accounting careers.

## MASTER OF COUNSELING <br> (MCoun) <br> Students admitted to the MCoun degree program prior to June <br> 2017 must successfully pass a writ-

ten project portfolio that demonstrates mastery of the MCoun learning outcomes. Students will specifically address graduate learning outcomes (G.L.O.'s) by describing how they have and/or how they would utilize research/evidencebased counseling practice in their clinical work. Students will be required to describe an ethical dilemma they have faced in their clinical practice to date and include an ethical decision model when describing their ethical decision-making processes. The written project portfolio will assess the 8 CACREP areas, in which the MCoun learning outcome objectives are based. A student shall receive a Pass when the grading committee unanimously grades the portfolio as a Pass.

Students admitted to the MCoun degree program beginning June 2017 must successfully pass a nationally administered exam determined by program faculty. The written exam will evaluate all three graduate learning outcomes (G.LO.'s). Successful completion of the national exam will evidence the candidate's mastery of MCoun subject material covered in the program and assess the candidate's ability to apply research and ethical proficiencies on the exam. The exam will assess the 8 CACREP areas, in which the MCoun learning outcome objectives are based.

The minimum passing score for the national exam is defined as one standard deviation below the national mean at the time of administration. Candidates who do not pass the national exam are allowed to take re-examination, but not before the end of the term in which the exam was administered. No more than two re-exams are permitted.

Please contact the College of Education for additional information regarding additional MCoun examination requirements, graduate learning outcomes, and the CACREP national examination.

## MASTER OF EDUCATION

The Master of Education (EdM) is a professional degree requiring a minimum of 45 credits in graduate courses (including a maximum of blanket-numbered courses); additional credits may be required in some areas of concentration. A minimum of 9 additional credits in graduate courses is required for the master's degree in College Student Services Administration (CSSA).
The EdM degree requires successful completion of a final written examination.
A candidate for the EdM degree qualifies for the degree under one of these options:

1. The student submits a thesis that meets all standards for a master's thesis on some applied or professional aspect of education. For the thesis the student receives

6 credits. He or she must complete a major of 24 credits (which may include the 6 thesis credits) and 21 elective credits determined under the direction of an advisor.
2. For adult education, the student completes 30 credits in the major and at least 15 credits in the minor. The minor may be completed either inside education or from approved minors outside education and serves students focusing on training and development and developmental education.
3. The student completes 45 credits with 24 credits in specific courses for the major. No minor is identified. The remaining 21 credits are elective under the direction of an advisor. No thesis or field studies are required. This option is designed primarily for in-service teachers working on standard licensure.
4. The student majors in College Student Services Administration and completes at least 39 credits in the major and 15 credits in a minor for a minimum of 54 credits.

## MASTER OF ENGINEERING

The Master of Engineering (MEng) degree is designed to provide students the opportunity to pursue advancedlevel study in a field of engineering. The degree is concerned with application of specialized, graduate-level engineering and managerial knowledge to specific engineering disciplines. The degree is a course work-only degree, with the option of substituting research or internship credits for a few courses. No thesis or project is required.
The MEng program requires a minimum of 45 credits. The examining committee consists of a minimum of three members of the graduate faculty in the engineering specialization. A final oral examination is required.

## MASTER OF FINE ARTS

The Master of Fine Arts is an appropriate terminal degree for those who wish to teach in creative, performing, and studio arts in higher education. The MFA in Creative Writing is a program that helps students define and advance their literary ambitions and develop their skills as artists and teachers. Students will be introduced to three broad areas of knowledge within the field of creative writing that they need in order to become successful writers, editors, or teachers. These areas involve writing, reading, and marketing skills within contemporary literary fiction, poetry, and nonfiction. The degree requires a minimum of 60 credits comprised of 24 credits in creative writing workshops, 24 credits in literature and/or composition and rhetoric and one course emphasizing literary roots, and 12 credits
in thesis and/or writing and conference. All MFA candidates are required to complete a thesis, which is to be a sustained piece of imaginative writing of literary merit. A final oral examination is required.

## MASTER OF FORESTRY

The professional Master of Forestry degree is intended for potential administrators and professional forestry specialists in public and private organizations where persons of broad ability are demanded and a broad technical education is needed. The degree requires a minimum of 45 credits. At least 21 credits are to be selected from a series of designated courses within the College of Forestry. As many as 24 credits may be elected from other courses offered by the college or university according to guidelines set forth in the program descriptions prepared by each department. The electives must contribute to a unified program that will meet the objectives of the student. A thesis is not required, but a technical report on an approved topic, correlated with courses in the major field, must be submitted. A final oral examination is required.

## MASTER OF HEALTH PHYSICS

The Master of Health Physics degree is designed to be a professional, advanced graduate degree that emphasizes fundamental learning and professional development for those wishing the master's credential, but not requiring a research focus for their planned profession. The degree directs students toward professional licensing as a certified health physicist in the field of radiation protection. The program will consist of a minimum of 45 graduate credits, with 30 graduate credits in the major, and 15 elective graduate credits. A final oral examination is required.

## MASTER OF MEDICAL PHYSICS

The Master of Medical Physics (MMP) degree prepares the graduate for a professional career in applied medical physics, focused on practical hands-on experience. The MMP program is designed as a clinical specialization for individuals with an undergraduate degree in science or engineering, offering areas of concentration in therapeutic radiologic physics or medical health physics. The degree requires a minimum of 45 graduate credits, including 30 graduate credits within the major and 15 elective graduate credits. The program does not require a thesis, however, candidates are required to pass a final oral examination.

## MASTER OF NATURAL RESOURCES

The Master of Natural Resources (MNR) degree is designed to engage university scientists and world-wide natural resource professionals in a process that integrates diverse perspectives to address natural resource challenges at the state, regional, national, and international levels. The program is intended for individuals with at least two years of experience in natural resource disciplines who seek an advanced degree in natural resource management. The MNR curriculum, consisting of 45 credits, is organized into three sections: core ( 18 credits), area of emphasis ( 18 credits), and capstone project ( 9 credits). It is taught as a distance, online curriculum, although it may be possible for some students to work toward the MNR degree while in residence at Oregon State University. The MNR degree is offered as a non-thesis option only. A final oral examination is required.

## MASTER OF PUBLIC HEALTH

The Master of Public Health (MPH) degree program combines broad training in public health with specific training in one of the specialty options.

The MPH program is designed for persons who already have a bachelor's degree and who wish to obtain further formal education in the field of public health. Persons with experience in the health field or who have training in a specialized area of health may increase their knowledge regarding populationbased health to prepare them for expanded administrative and service careers. Persons who do not have prior experience in health fields may prepare themselves for a broad variety of careers depending upon their choice of specialty option.
The Master of Public Health degree is offered by Oregon State University with graduate options in biostatistics; environmental and occupational health; epidemiology; global health; health management and policy; health promotion and health behavior.

The MPH program consists of 17 credits of core courses, plus additional units of required and elective courses, an internship, and a thesis or nonthesis project depending upon the specific track. Programs are approximately 60 credits in length. All students will be required to take a final oral examination as determined by their specific option.

## MASTER OF PUBLIC POLICY

The Master of Public Policy is a professional degree intended to prepare students for careers in the public, nonprofit, and international sectors and offer training for in-service students desiring professional growth and advancement. The degree is designed to be a generalist program, with an emphasis on analytic skills and policy knowledge. The degree requires a minimum of 62 graduate credits, 44 of which are in the required core. The core curriculum provides an important foundation in statistics, research methods, computer applications, public policy analysis, public administration and ethics, and economics. The remaining 18 credits support the student's preferred area of concentration, consisting of environmental policy, international policy, rural policy, science policy, or social policy. Students with little work experience in public service, the nonprofit sector, or the international context will be required to engage in a supervised internship that will allow them to work closely with experienced mentors who will help them integrate theory with practice and introduce them to a professional network. Students with relevant work experience will substitute course work for internship credits. A final oral examination is required.

## PROFESSIONAL SCIENCE MASTER'S DEGREE (PSM)

The Professional Science Master's (PSM) allows students to pursue advanced training in science while simultaneously developing workplace skills highly valued by employers. PSM programs consist of two years of academic training in an emerging or interdisciplinary area in science, along with a professional component that includes internships and "cross-training" in workplace skills, such as business, communications, and regulatory affairs. All have been developed in concert with employers and are designed to dovetail into present and future professional career opportunities.

The Professional Science Master's Degree (PSM) is offered with five graduate majors:

1. Applied Biotechnology [To be terminated, pending approval]
2. Applied Physics [To be terminated, pending approval]
3. Applied Systematics in Botany [To be terminated, pending submission and approval of a proposal.]
4. Environmental Sciences
5. Fisheries and Wildlife Administration

For further information on Environ-
mental Sciences, email: carolyn.fonyo@ oregonstate.edu.

For further information on Fisheries and Wildlife, email: fw.gradadvising@ oregonstate.edu.

## POLICIES GOVERNING <br> DOCTORAL DECREE <br> PROCRAMS

## GENERAL REQUIREMENTS

The doctor of philosophy degree is granted primarily for creative attainments. There is no rigid credit requirement; however, the equivalent of at least three years of full-time graduate work beyond the bachelor's degree (at least 108 graduate credits) is required. Effective fall 2005, all graduate student programs of study submitted to the Graduate School must consist of, at a minimum, 50 percent graduate stand-alone courses. The remaining credits may be the 500 component of 400/500 slash courses.

After admission into the doctoral program, a minimum of one full-time academic year (at least 36 graduate credits) should be devoted to the preparation of the thesis. A minimum of 27 regular non-blanket credits must be included on a doctoral program.

By completing the requirements necessary for the PhD, students shall: (a) produce and defend an original significant contribution to knowledge; (b) demonstrate mastery of subject material; and (c) be able to conduct scholarly activities in an ethical manner. Additional program specific learning outcomes, the assessment of all outcomes and the specification of learning objectives related to these outcomes are to be carried out at the program level.

GRADUATE PROGRAM OF STUDY
The student's doctoral program of study is formulated and approved subject to departmental policies at a formal meeting of his or her doctoral committee. The committee is comprised of a minimum of five members of the graduate faculty, including two from the major department and a representative of the Graduate Council. If a minor is declared, it must consist of at least 18 credits (15 credits for an integrated minor) and the committee must include a member from the minor department. All committee members must be on the graduate faculty with appropriate authorization to serve on the student's committee.

Doctoral students must complete the program of study in consultation with their advisory committee. This signed plan must be submitted to the Graduate School by the end of the fifth term of study.

The student must be registered for a minimum of 3 credits for the term in which the program meeting is held. When the program is approved by the doctoral committee, the departmental chair, and the dean of the Graduate School, it becomes the obligation of the student to complete the requirements as
formulated. Changes in the program may be made by submitting a Petition for Change of Program form available in the Graduate School.

Selected 700-level courses that have been deemed equivalent to graduatelevel learning may be used on doctoral programs of study upon approval of the student's graduate committee.

No more than 15 credits of blanketnumbered courses, other than thesis, may be included in the minimum 108-credit program.

Students who wish to transfer credit must submit a Transfer Credit Request form before the end of their first year of study.

## TIME LIMIT

Effective beginning with students matriculating fall term 2016, all work toward a doctoral degree, including course work, thesis (if required), and all examinations, must be completed within nine years of the indicated start term on the Departmental Action Form. Extensions of this time limit may be requested by submitting a petition to the Graduate School.

## RESIDENCE

For the doctoral degree, the residence requirement consists of two parts:

1. a minimum of 36 graduate Oregon Administration
2. State University credits must be completed; and
3. the student must spend at least three terms of full-time graduate academic work (at least 9 credits per term) on campus or at an off-campus site approved by the Graduate School. The latter requirement of three terms of full-time enrollment does not have to take place in consecutive terms.
Adequate fulfillment of the residence requirement shall be determined by the Graduate School.

## LANGUAGE REQUIREMENTS

The foreign language requirement is determined by the student's doctoral committee, subject to the same approval required for the graduate study program, and is so designated in the official doctoral program. Foreign language requirements must be completed before the oral preliminary examination.

## PRELIMINARY EXAMINATIONS

The student working toward a doctoral degree must pass a comprehensive preliminary examination. The purpose of this exam is to determine the student's understanding of his or her major and minor fields and also to assess the student's capability for research. Students must enroll for a minimum of 3 credits during terms in which they undertake departmental written or oral preliminary examinations.

## Written Comprehensive Examination

Most programs require a written comprehensive examination to be taken before the oral preliminary examination. If a written examination is required, it must be completed prior to the oral preliminary examination. The content, length, timing, passing standard, and repeatability of this examination are at the discretion of the major department. The general rules and structure of this examination, however, must be provided in writing to all candidates for this examination and a current copy of these guidelines must be on file with the Graduate School. Copies of the written examination (questions and student's answers) must be available to all members of the student's doctoral committee at least one week prior to the oral preliminary examination.

## Oral Preliminary Examination

The oral preliminary examination is taken near the completion of the student's course work. The oral examination is conducted by the student's doctoral committee, and should cover the student's knowledge in his or her major and minor subjects. The exam may cover the student's proposed research topic, although no more than one-half the time should be devoted to specific aspects of the proposal. The examination should be scheduled for at least two hours, and the exam date must be scheduled in the Graduate School at least two weeks in advance. If more than one negative vote is recorded by the examining committee, the candidate will have failed the oral examination. No more than two re-examinations are permitted by the Graduate School, although academic units may allow fewer re-examinations.

At least one complete academic term must elapse between the time of the preliminary oral examination and the final oral examination. If more than five years elapse between these two examinations, the candidate will be required to take another preliminary oral examination.

## THESIS

Each candidate for the PhD degree must submit a thesis embodying the results of research and giving evidence of originality and ability in independent investigation. The thesis must be a real contribution to knowledge, based on the candidate's own investigation. It must show a mastery of the literature of the subject and be written in creditable literary form. The preparation of an acceptable thesis will require at least one fulltime academic year. The booklet, Thesis Guide: Preparing a Thesis or Dissertation at OSU, is available electronically on the Web at http://gradschool.oregonstate. edu/progress/thesis-guide.

The results from studies conducted using human subjects without obtaining Institutional Review Board approval shall not be used to satisfy master's thesis or doctoral dissertation requirements. For more information, please send an email to irb@oregonstate.edu or visit the IRB website at http://research.oregonstate. edu/irb/.
A formal thesis proposal meeting is recommended but not required by the Graduate School; however, it is required for some majors. This meeting should be held with the student's doctoral committee prior to the start of any substantial doctoral thesis research.
When scheduling their final oral examinations, doctoral students are required to submit the pretext pages of their dissertations to the Graduate School at least two weeks prior to the final oral examination. Pretext pages include the abstract, copyright (optional), title page, approval page, acknowledgment page, contribution of authors, table of contents, list of figures, tables, appendices, dedication (optional), and preface (optional). It is expected that students will distribute examination copies of their thesis to all committee members, including the Graduate Council representative, sufficiently early to permit thorough review of the thesis prior to the student's final oral examination.
Within six weeks after the final oral examination or before the first day of the following term, whichever comes first, upload one PDF copy of your thesis, without signatures, electronically to ScholarsArchive and submit the signed ETD submission approval form with a copy of the title page to the Graduate School. If final submission requirements are after the initial six-week period, the student may be subject to re-examination. Please refer to the Graduate School's website for complete details (http:// gradschool.oregonstate.edu/progress/ thesis-guide).

Signatures on the ETD submission approval form can be electronic, signed, scanned and emailed or faxed. The thesis will not be accepted for graduate requirements until it has received approval by the graduate dean, which the thesis editor will obtain.

## FINAL EXAMINATION

After completion of or while concurrently registered for all work required by the program, the student must pass a final doctoral examination that may be written in part but must include an oral examination. The final oral examination must be scheduled in the Graduate School office at least two weeks prior to the date of the examination. All incomplete course work appearing on the program of study must be completed prior to scheduling the final oral examination.

The final oral examination consists of a public thesis defense followed by a closed session of the examining committee with the candidate. Under normal circumstances, the final oral examination should be scheduled for two hours.
All members of the student's graduate committee must approve the scheduling of the final examination.

It is expected that the thesis defense portion of the final oral exam be open to all interested persons and should be limited to one hour. After the open portion of the exam, the examining committee should exclude all other persons and continue with the examination of the candidate's knowledge of his or her field and the evaluation of the candidate's performance.

If the department favors a more elaborate presentation, it should be scheduled as a separate seminar. In any case, the time involved for the open presentation may not impinge upon time required for the examining committee to conduct appropriate, iterative oral inquiry with the candidate, to evaluate the candidate's performance, and to deliberate fully within the time constraints of the scheduled oral examination.

The examining committee consists of the student's doctoral committee and any additional members, including professors from other institutions, whom the major department may recommend. In the oral examination, the candidate is expected to defend the thesis and show a satisfactory knowledge of his or her field. If more than one negative vote is recorded by the examining committee, the candidate will have failed the examination. No more than two re-examinations are permitted by the Graduate School, although academic units may permit fewer re-examinations.

The final oral examination must be taken within five years after the oral preliminary examination. If more than five years elapse, the candidate will be required to take another oral preliminary examination.

## DOCTOR OF EDUCATION REQUIREMENTS

The EdD program is a degree program with a major in education. It is intended for the educational professional whose career path is that of educational or teaching specialist, administrator, or other practitioner in the public schools, postsecondary institutions of higher education, or in business and industry. Its focus is on the application of knowledge to learning and teaching environments in public and private settings. The EdD program is designed to prepare educational leaders in community college education, middle-level education, or related educational settings.

A masters' degree in education or a
related field, or equivalent to a master's degree in postbaccalaureate course work is required for admission. In addition, the College of Education requires the following:

1. minimum professional experience as defined by each program,
2. letter or statement of professional objectives for doctoral study and area of specialization within education,
3. three letters of recommendation, and
4. either the Graduate Record Examination or the Miller Analogies Test.
Applicants to the EdD program must have significant experience in an education or education-related setting such as teaching, school administration, curriculum specialist, instructional specialist, child/youth counselor, supervisor; or in a setting where the primary function is education.

In general, the following requirements are in effect for the EdD:

1. A minimum of 108 credits beyond the baccalaureate degree.
2. Effective fall 2005, all graduate student programs of study submitted to the Graduate School must consist of, at a minimum, 50 percent graduate stand-alone courses. The remaining credits may be the 500 component of 400/500 slash courses.
3. Completion of the same residence requirements as listed for the PhD degree.
4. A dissertation of no less than 24 credits.
5. A mentored internship in an appropriate work setting for a minimum of 12 credits.
6. A minimum of 48 graduate credits in an area of specialty in education.
7. Completion of 24 credits of core seminars.
8. Completion of the core courses in research.
Procedures and requirements for preliminary and final examinations and thesis are the same as those for the doctor of philosophy degree.

## GRADUATE FELLOWSHIPS, SCHOLARSHIPS, AND FINANCIAL AID

Graduate Fellowships and Scholarships
A number of Oregon State University fellowships and scholarships sponsored by industry, foundations and government agencies are available to superior students for graduate study in various graduate programs at OSU. For a listing of many these fellowships and scholarships, visit the Scholarship Management System database at https://scholarship. ucsadm.oregonstate.edu/prod/search_ schol.php.

For more information about scholarships and fellowships in the database above, including application instructions, as well as additional opportunities in individual programs, contact the individual program of interest.

Students interested in general information regarding graduate student funding opportunities are encouraged to explore Financing Your Education on the Graduate School's website: http://gradschool. oregonstate.edu/finance.

## GRADUATE STUDENT EMPLOYMENT

Each year, OSU receives grants from federal and state agencies, public and private foundations, and business and industry to support institutional and individual projects. Funding is awarded to the various departments in most academic colleges and to other research organizations on campus, including experiment stations, centers and institutes. Many of these grants include financial support for graduate students. Interested students should direct inquiries and applications to the department concerned.
Graduate students may be employed as Graduate Teaching or Graduate Research assistants by departments on campus. In addition to monthly stipends, graduate assistants appointed at .20 FTE or above are eligible for a tuition and fee subsidy.

In addition to graduate assistantships, graduate students may be appointed to student hourly positions on campus. These appointments are not eligible for a tuition or fee subsidy.
The maximum combined appointment FTE for all jobs on campus is 49 FTE.

For more information on student employment, contact the department of interest or the Office of Human Resources.

## FINANCIAL AID

FOR GRADUATE STUDENTS
The OSU Office of Financial Aid and Scholarships administers federal financial aid programs to assist graduate students with meeting the cost of higher education. To determine eligibility for specific federal aid programs at OSU, graduate students are required to complete the Free Application for Federal Student Aid (FAFSA) each year. Graduate students must be degree-seeking or in an approved certificate program and enrolled at least half-time (5 credits) to qualify for financial aid. Graduate students are not eligible for federal Title IV grants or subsidized loans. Students in graduate certificate programs are only eligible for aid for courses required for their certificate program.
For additional information about Financial Aid for graduate students, visit http://financialaid.oregonstate.edu, http://financialaid.oregonstate.edu/sites/ financialaid.oregonstate.edu/files/grad_
students_.pdf, or contact the OSU Office of Financial Aid and Scholarships.

## GRADUATE RESEARCH SUPPORTING SERVICES

For information on Graduate Student Success, please see the Graduate School's Graduate Student Success Guide http://gradschool.oregonstate.edu/ graduate-student-success.

## INFORMATION SERVICES, COMPUTERS, AND <br> ACADEMIC TECHNOLOGIES

Information Services supports OSU students by providing accounts, technologies, equipment checkout, printing, computing networks and computing labs. The OSU Computer Helpdesk provides students with technical support for laptops, mobile devices, and campus systems like Canvas. If you need inperson support, please visit the Walkup Helpdesk in the Valley Library.
Student employment opportunities are available from a variety of units within IS, including the OSU Computer Helpdesk and Academic Technology, with the greatest opportunities announced just prior to each new term.

## Accounts and Passwords

http://is.oregonstate.edu/ accounts-support

- Accounts \& Technologies Guide for New Students: This guide is for new OSU students who need to get connected to OSU systems such as email and Canvas. Even if you are already connected to one or more OSU systems, we recommend you go through this guide, just to be sure you've covered the bases and know where to get computing help.
- ONID: ONID stands for OSU Network ID. It's a universal computer account available to all OSU students, employees and associates. You use your ONID username and password to access Online Services, Canvas, email, the wireless network and many other university computing services.
- Google Apps for OSU: ONID email is accessed via Google Apps for OSU. All OSU students, instructors, and employees may access all the supported core apps: Drive, Mail, Calendar, Site and Groups.
- Office365 for OSU: All OSU students, instructors and employees may collaborate using native Microsoft Office tools: Word, Excel, PowerPoint and OneNote.


## Learning Technologies

http://is.oregonstate.edu/
learning-technologies

- Canvas, OSU's Learning Management

System used by both off-campus and on-campus students for classwork.

- Classroom Technology Services
- Event Support
- Technology Consulting
- Computing Labs
- Equipment Loan and Rental
- Standard Printing
- Media Creation
- Virtual Computing Lab


## Software

http://is.oregonstate.edu/
accounts-support/software

- Many software packages are available to students.


## Technical Support

- OSU Computer Help Documents, http://oregonstate.edu/helpdocs, 24/7 help guides and FAQs
- OSU Service Desk, http:// is.oregonstate.edu/service-desk, Monday-Friday support via phone, 541-737-3474, and webform
- Walkup Helpdesk, in-person support at the Valley Library, Sunday-Friday


## Student Employment

(Opportunities subject to availability)
Student workers provide program-
ming, development, and support services for the OSU community. Potential employment is contingent upon eligibility per university policy on student employment.

- OSU Service Desk
- Technical support, programmers
- Central Web Services
- Web app and mobile app developers
- Customer service and support, system maintenance


## OREGON STATE UNTVERSTTY LIBRARIES AND PRESS

121 The Valley Library
Corvallis, OR 97331-4501
541-737-3331
Faye A. Chadwell, Donald and Delpha Campbell University Librarian and OSU Press Director
541-737-7300
Oregon State University Libraries and Press cultivate superior scholarship and creativity, empowers discovery, and preserves and disseminates knowledge. We develop user-focused services, share our expertise through teaching and research, and build gateways to unique resources to further the growth of the OSU community, the people of Oregon, and the global scholarly community. OSU Libraries supports the instructional and research needs of OSU students, faculty, and staff through both traditional and innovative services and collections. We advance OSU's land grant mission, contributing to learner success, scholarly excellence, and community engagement.

## RESOURCES

The Oregon State University Libraries is the second largest research library in Oregon with three locations: The Valley Library at the main campus in Corvallis, The Marilyn Potts Guin Library at the Mark O. Hatfield Marine Science Center in Newport, and The OSU Cascades Library co-located at Central Oregon Community College in Bend.

The Valley Library collection includes materials in all subject areas, containing nearly 2 million printed volumes; subscriptions to more than 74,000 journal titles, most of which are available online; 500,000 maps and government documents; and hundreds of video and DVD recordings. As of 2014, more than 100,000 electronic books were available via the OSU Libraries' catalog. In addition to the primary research collection, a robust resource sharing program ensures access to information for research and pedagogical needs. OSU Libraries has digitized thousands of documents, photographs, and maps to make them more widely accessible for researchers, students, and the general public. Additionally, a notable collection of contemporary Northwest artwork is on display throughout The Valley Library with over 80 different artists represented.

The Valley Library provides a flexible learning environment that supports community and engaged learning. Two of its learning spaces are the Learning Commons and the Collaborative Learning Center (CLC). The Learning Commons offers a variety of spaces for groups to collaborate, as well as 118 computers (both Windows PCs and iMacs) that give students access to a wide variety of software. The CLC offers a variety of academic and student support services. Peer tutors and graduate teaching assistants from the College of Science, the Academic Success Center, and the Writing Center are available to assist students during scheduled hours in the CLC.

Partnering with Academic Technologies gives students access to video editing and multimedia production software, large format printing, along with hardware including video cameras, microphones and audio recording equipment. In addition, The Valley Library has 31 three-hour group study rooms, 37 90-day research rooms, six long-term research rooms, one media preview room and three designated floors for quiet study. A drop-in daycare facility is available on the third floor. Laptop computers and tablets are available to OSU students, staff and faculty for six-hour checkout and can be used with the wireless network anywhere in the library.

OSU Libraries supports faculty and student research not only through the purchased collection, but also through unique and rare materials held by the Li-
braries' Special Collections and Archives Research Center. Content in signature collecting areas is made freely accessible on the web to facilitate use by students, faculty, and other researchers. This includes extensive documents from the Ava Helen and Linus Pauling Papers, the History of Science Collections, the Oregon Multicultural Archives, the Natural Resources Collections, the Oregon Hops and Brewing Archives, and the University Archives.

OSU Libraries also manages the ScholarsArchive@OSU institutional repository. This database makes a wide variety of information resources produced at OSU freely available on the web. Examples include faculty articles, OSU theses and dissertations, and all experiment and extension publications. ScholarsArchive@ OSU is consistently ranked among the top ten institutional repositories in the United States, according to Webometrics.

OSU Libraries extends services and resources to the campus and off-campus community in a variety of ways. The collections can be accessed both online and through mobile devices. Hours at The Valley Library have been extended to 24 hours, five days a week (24/5), allowing OSU students and faculty access to collections as well as computers. The Valley Library has wireless throughout the building. Reference assistance is available in person and by phone, by e-mail, by text message, and by instant message during most hours when The Valley Library is open. Subject specialists are available by appointment for individual research consultation.
The Autzen Electronic Classroom in The Valley Library is an enhanced electronic classroom for library-related instruction. It provides a hands-on setting with 24-networked Mac mini dualboot student workstations, white boards, 6 large-format projectors and screens, and built-in sound. Additional furniture provides seating for classes up to 50 students, clickers, and white boards.

OSUL\&P teaching librarians provide workshops, tutorials and digital learning objects to help students develop their research skills. In partnership with faculty, they provide targeted learning experiences in classes and lend their expertise to assignment design and assessment project. Over 7,200 students participate in more than 400 library classes and workshops each year. Teaching librarians also provide individual, in-depth consultations for over 300 students each year in addition to consultations with OSU faculty, staff, and community members.
OSU Libraries has two off-site branches. The Guin Library houses the research and teaching collection of Oregon State University's Hatfield Marine Science Center. The library's collection of more than 35,000 books and journals covers
a broad range of marine-related topics including fisheries, aquaculture, oceanography, geology, environmental studies, and biology. Particular attention is paid to collecting material on marine fisheries, marine mammals, and information specific to the Northeast Pacific Ocean.

The Cascades Library in Bend, housed in the Barber Library of Central Oregon Community College, supports OSU-Cascades upper-division programs, including tourism and outdoor leadership and graduate programs in education. This is a relatively new branch campus that relies on the Cascades Library sharing the space and collections of the Central Oregon Community College Library to deliver services.

One on-campus branch facility is located in the College of Veterinary Medicine on campus. Open 24/7 to the college's academic community, the library has one full-time staff member, along with student employees paid by the college. OSU Libraries handles acquisitions and cataloging for the veterinary medicine collection, while the Veterinary Medicine Library fills interlibrary loan requests for items in the OSU Libraries' collection.

Since 2007, OSU Press has been a department of the OSU Libraries. OSU Press supports the university's strategic plan through its publication of scholarly and general interest books in forestry, natural resources management, and natural history as well as the cultural and social history of Oregon and the Pacific Northwest. The Press and Libraries collaborate on several projects including an open textbook initiative that supports the development of free online textbooks by OSU faculty.

## COLLABORATION

As libraries move away from ownership to access, consortial memberships give OSU faculty and students a wide variety of information in a timely and efficient manner.

- OSU Libraries is a member of the Orbis Cascade Alliance which includes 37 Washington, Idaho, and Oregon universities, colleges, and community colleges with total holdings of 28.7 million titles.
- Membership in the Greater Western Library Alliance (GWLA) enables the Libraries to increase its digital presence through such sites as the Western Waters Digital Library. GWLA is a consortium of 33 research libraries from 17 Midwestern and Western states.
- OSU Libraries is a founding member and active contributor to the Archives West, a consortium of 43 archives and special collections in Oregon, Washington, Idaho, Montana, and Alaska. NWDA
provides enhanced access to archival and manuscript collections across the northwest through a union database of Encoded Archival Description (EAD) finding aids.
- OSU Libraries participates in the Oregon Statewide Database Licensing Program that provides a suite of 22 general periodicals and reference database products from Gale/Cengage Learning, the database vendor that was awarded the state contract in 2013.
- As a member of the Center for Research Libraries, the OSU Libraries can provide unlimited access to all CRL resources - approximately five million publications, archives, and collections to supplement our holdings, especially in the areas of humanities and social science. OSU faculty can borrow CRL materials for extended loan periods.
- OSU Libraries is a member of the Western Regional Storage Trust (WEST), a distributed retrospective print journal repository program serving research libraries, college and university libraries, and library consortia in the Western Region of the United States.
- OSU Libraries is a member of the Coalition for Network Information, the Council on Library and Information Resources, OCLC (the world's largest library cooperative), the Library Publishing Coalition, and the Scholarly Publishing and Academic Resources Coalition."
OSU Libraries also collaborates with the University of Oregon Libraries on making joint decisions on collections, expanding access to each library's collections, sharing software, providing joint faculty/ staff development opportunities, and, in general, viewing the two libraries as a single library with shared purposes. This collaboration is especially visible in "Oregon Digital" (https://oregondigital. org/catalog/), which provides integrated online access to digitized materials from both libraries.
OSU Libraries partners with the Institute for Natural Resources on the Oregon Explorer, a comprehensive, natural resources digital library designed to provide easy and rapid access to reliable, up-to-date information about the state's natural resources.
The most notable addition to the library's instruction program since 2010 has been the implementation of a library course designator that will allow OSU Libraries and Press to develop and offer a for-credit library sciences curriculum to partner with other academic departments to enhance student success in learning and development of critical thinking and life-long learning.


## ENVIRONMENTAL SCIENCES

Carolyn Fonyo Boggess, Interim
Program Director
Environmental Sciences
Graduate Program
104 Wilkinson Hall
Oregon State University
Corvallis, OR 97331
541-737-5095
Website: http://envsci.science. oregonstate.edu/

## Graduate Major

Environmental Sciences (MA, MS, PhD, PSM)

## Graduate Minor

Environmental Sciences

Environmental sciences consists of curricula that foster interdisciplinary education for students seeking to better understand earth systems. The undergraduate curriculum leads to the BS degree in Environmental Sciences and requires students to complete courses that develop a broad base of knowledge in basic science disciplines, social sciences, and an area of specialization. A minor in environmental sciences is also available for those undergraduate students completing their degrees in other fields. The theme of the Environmental Sciences Program is central to the mission of OSU and reflects the strengths of OSU and other agencies and institutions in Corvallis and throughout the state of Oregon. The BS degree in Environmental Sciences provides excellent training for careers with agencies responsible for environmental protection and natural resource use, consulting firms, and those seeking opportunities for graduate studies.

## ENVIRONMENTAL SCIENCES (MA, MS, PhD, PSM)

## Graduate Areas of Concentration

 Biogeochemistry, ecology, environmental education, natural resources, quantitative analysis, social science, water resources
## Also available via Ecampus (PSM degree only).

The Environmental Sciences Graduate Program provides curricula leading to MA, MS and PhD degrees in Environmental Science. The curriculum integrates thinking across disciplines, especially life, physical, and social sciences. Environmental science explores natural processes on earth and their alteration by human activity. OSU has exceptional strength in many of the disciplines, including science, agriculture, forestry, engineering, public health, liberal arts, social science, and oceanography and atmospheric science. Strength in these disciplines allows the ES Graduate Pro-
gram to provide high-quality interdisciplinary education for environmental scientists and continuing postgraduate educational opportunities to scientists who are already active in the field. The degrees administered by the program are OSU's contribution to the Joint-Campus Graduate Program in Environmental Sciences, Studies, and Policy, which links environmental graduate programs among the major research universities in Oregon.
The ES Graduate Program develops scientists who will be able to analyze and understand environmental systems, predict environmental change, and participate in the management of the environment. Each student completing a major in the ES Graduate Program will perform research and complete a thesis, dissertation, or research project. Each student will complete a core of ES graduate courses that will integrate concepts across the physical sciences, life sciences, and social sciences. Each student will also develop depth in a carefully designed, interdisciplinary area of concentration or track. Tracks that are currently available include ecology, biogeochemistry, social science, quantitative analysis, water resources, and environmental education. Methods and numerical skill courses, electives, and thesis make up the remainder of a student's program.
Students in the ES Graduate Program may choose advisors from faculty members already appointed at OSU, as well as other scientists who apply and are accepted in the environmental sciences graduate faculty. The Environmental Sciences Graduate Program fosters interdisciplinary education and seeks connections between institutions.
For more information, contact Carolyn Fonyo Boggess, Interim Director, Environmental Sciences Graduate Program, Oregon State University, Corvallis, OR 97331-2904, or email: esgp@oregonstate. edu.

## Degree Requirements

## MA and MS Degrees (45 credits)

Environmental science core courses (9)
Methods and numerical skills courses (6)
ES area of concentration (Track) (15)
Elective courses (3-9)
Thesis (6-12)
Note: The MA degree requires proficiency in a foreign language.

## PhD Degree (108 credits)

Environmental sciences core courses (10)
Methods and numerical skills courses (9)
ES area of concentration (Track) (30)
Elective courses (3-23)
Thesis (36-56)
Major Code: 6420

## PROFESSIONAL SCIENCE MASTER'S DEGREE IN ENVIRONIMENTAL SCIENCE

## Also available via Ecampus.

Carolyn Fonyo Boggess, Interim Director
Environmental Sciences Graduate
Program;
Professional Science Master's in
Environmental Sciences Program Advisor 104 Wilkinson Hall
Corvallis, OR 97331
Email: carolyn.fonyo@oregonstate.edu
Website: http://psm.science.oregonstate. edu/environmental-sciences
The Professional Science Master's degree in Environmental Sciences (PSM@ENSC) provides advanced training for early- and mid-career professionals with a need for expertise in environmental sciences. Preferably applicants would have at least two years of experience working in the environmental field, but this is not mandatory for admission. The PSM@ ENSC degree is offered as a non-thesis program only. Students have an advisor and graduate committee to review their program of study, provide career and internship advice, and evaluate a final report based on the internship or project experience.

## PSM Degrees Requirements

## (45 credits)

Environmental Sciences core courses (9 credits)
Numerical skills (6-8 credits)
Environmental Sciences track electives
(8-10 credits)
Professional core courses (8 credits)
Professional electives ( 6 credits)
Internship or project (6 credits)
For general information about the PSM@ENSC degree option, visit the website: http://psm.science.oregonstate.edu/ environmental-sciences or contact the Interim Director of Environmental Sciences, Carolyn Fonyo Boggess at carolyn. fonyo@oregonstate.edu or 541-760-4196.

Course substitutions must be approved by the program advisor. Many of our courses are offered through Ecampus, but some may be offered through Corvallis, Cascades or Hatfield Marine Science Center. Please check course offerings through the online catalog or consult with the program advisor.

## Major Code: 6420

## ENVIRONMENTAL SCIENCES GRADUATE MINOR

For more details, see the departmental advisor.

## Minor Code: 6421

■ ENVIRONMENTAL SCIENCES COURSES
ENSC 101. ENVIRONMENTAL SCIENCES
ORIENTATION (1). Introduction to the
Environmental Sciences Program and related
professional and educational opportunities. Recommended for all freshman and first-year transfer environmental sciences majors, but open to all students interested in learning about career options in the environmental sciences. Graded P/N.
ENSC 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ENSC 401. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 24 credits. PREREQS: Instructor and departmental approval required.
ENSC 402. INDEPENDENT STUDIES (1-16).
This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.
ENSC 403. THESIS (1-16). This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.

ENSC 405. READING AND CONFERENCE (1-12). This course is repeatable for a maximum of 16 credits. PREREQS: Instructor and departmental approval required.
ENSC 406. PROJECTS (1-16). This course is repeatable for a maximum of 24 credits. PREREQS: Departmental approval required.
ENSC 407. SEMINAR (1-16). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.
ENSC 407H. SEMINAR (1-16). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required. Honors College approval required.
ENSC 408. WORKSHOP (1-16). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.

## ENSC 410. ENVIRONMENTAL SCIENCE

INTERNSHIP (1-12). Supervised practical
experience working with professionals at selected cooperating institutions, agencies, laboratories, or companies. Graded P/N. This course is repeatable for a maximum of 48 credits. PREREQS: Instructor and departmental approval required
ENSC 479. *^ENVIRONMENTAL CASE
STUDIES (3). Improves students' ability to ask questions, gather and synthesize information, and communicate ideas on environmental topics. Instruction and information necessary for the course is entirely Web based. (Bacc Core Course) (Writing Intensive Course) PREREQS: One year of college biology or chemistry and junior standing required.

ENSC 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

ENSC 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENSC 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
ENSC 505. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ENSC 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
ENSC 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENSC 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
ENSC 510. INTERNSHIP (1-12). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.
ENSC 515. ENVIRONMENTAL PERSPECTIVES AND METHODS (3). Unique perspective or
method each quarter. Possibilities include: remote sensing, modeling over a range of scales in time, space, and levels of system organization; and risk analysis.
ENSC 520. ENVIRONMENTAL ANALYSIS (3).
Develop analytical thinking, explore analytical approaches, enhance writing skills, and gain experience in oral communication about environmental issues.

ENSC 530. RESEARCH PROFILES (1-2) Faculty and graduate student environmental research presentations.
ENSC 599. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ENSC 601. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENSC 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
ENSC 605. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENSC 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENSC 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENSC 630. RESEARCH PROFILES (1-2).
Faculty and graduate student environmental research presentations.

ENSC 699. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## MTEBDISCIPLINARY

## STUDIES

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Email: david.bernell@oregonstate.edu
Also email: graduate.school@oregonstate. edu
Website: http://oregonstate.edu/dept/ grad_school/interdisciplinary.php

## Graduate Major

Master of Arts Interdisciplinary Studies (MAIS)
Graduate Areas of Concentration
Selected from three fields offering graduate majors and minors

The Master of Arts in Interdisciplinary Studies (MAIS) degree program is designed to permit students to formulate programs that integrate work from three separate disciplines. Breadth of study is important in designing the program. A research paper or thesis offers the opportunity to integrate the three disciplines.
Any graduate major or minor may serve as a discipline or field for this degree. Two of the three fields may be from one department if the areas of concentra-
tion within these two fields are different. Program participation varies

## from year to year.

Graduate programs that are participating in this degree are listed in the Graduate School website at http://gradschool. oregonstate.edu/programs.

## ADMISSION

The applicant must satisfy university admission requirements at the graduate level and must gain acceptance at the point of admission by the departments offering the fields that will make up the program.

## ADMINISTRATION

The Graduate School will handle general administration and recordkeeping. Students with general questions about the MAIS degree are encouraged to confer with the director of the MAIS graduate program.

The student should select a committee in consultation with the department/ school chair of the emphasized field or with his or her designated representative. With the advice of the committee chair, the student will select a committee member from each of the remaining two fields. The student will select the fourth committee member, a Graduate Council representative, from a list of names to be obtained in the Graduate School office. All members of the committee must be on the graduate faculty.

Before the completion of 18 credits of graduate course work, the student must file the official program form, approved by the committee. Program planning meetings are required, and the student has the responsibility for arranging the committee meetings necessary in the planning of the program. In the event that the student subsequently desires to change one or more disciplines on his or her program, the student must file a change in degree program with the Graduate School and schedule another program meeting in order to gain committee approval.

## PROGRAM REQUIREMENTS

The Master of Arts in Interdisciplinary Studies (MAIS) degree is granted for attainment of broad, advanced knowledge and achievement integrated from three fields of study. Any graduate major or minor may serve as a field for this degree. Two of the three fields may be from one department if the areas of concentration within these two fields are different. A minimum of 9 credits in each of the three fields of study is required. The degree requires a minimum of 49 credits, including 4 credits of course work on interdisciplinary research methods.

No more than 21 credits (excluding thesis or research paper credit) may be taken in any field unless the total pro-
gram exceeds 49 credits. There is no foreign language requirement. No more than 3 credits of blanket-numbered courses in each field of study may be used in the program; thesis credits (Option A) or research paper credits (Option B) are exempt from this limitation. The student's committee consists of four members of the graduate faculty-one from each of the three fields-and a Graduate Council representative. A formal program meeting must be held prior to the completion of 18 graduate credits. A final oral examination is required.

## There are two options under the program:

Option A: Thesis option. The thesis must coordinate work in the three fields. The requirement is 6 to 9 credits of Thesis 503. The thesis advisor must be a member of the graduate faculty authorized to direct theses.

Option B: Research paper option. The research paper must integrate work from at least two of the three fields. The requirement is 4 to 7 credits, registered as Research 501, Reading and Conference 505, or Projects 506.

## Major Code: 9900 <br> ■ INTERDISCIPLINARY <br> PROGRAMS COURSES

IST 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.
IST 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
IST 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
IST 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

## IST 511. INTRODUCTION TO

## INTERDISCIPLINARY GRADUATE STUDIES

(1). First term graduate seminar for master's students in interdisciplinary studies to design their program of study; discover and access library and other university resources related to their fields of study; and practice synthesizing aspects of three differing fields.
IST 512. APPLYING AN INTERDISCIPLINARY PERSPECTIVE (3). Students will develop knowledge and skills in theory, research methods, and practice of approaching problems, issues, or events from an interdisciplinary perspective. PREREQS: IST 511
IST 513. INTERDISCIPLINARY RESEARCH COLLOQUIUM (1). Supports MAIS students as they conduct research for their thesis, research paper, or project, further their understanding how to synthesize multiple fields of study into a research project, and effectively employ this knowledge in preparation of the thesis/paper/ project itself. Graded P/N.

## MOLECULAR AND CELLULAR BIOLOCY

## Dee Denver, Director

Molecular and Cellular Biology
3021 Agricultural and Life Sciences
Building
Oregon State University
Corvallis, OR 97331
541-737-3799
Email: denvedee@cgrb.oregonstate.edu and millimag@cgrb.oregonstate.edu Website: http://www.mcb.oregonstate.edu

## AFFILIATE FACULTY

Over ninety faculty members drawn from 20 departments in seven colleges participate in the MCB program.

## Graduate Majors

Applied Biotechnology (PSM)
[To be terminated.]
Molecular and Cellular Biology (MS, PhD)
Graduate Areas of Concentration
Bioinformatics
Biotechnology
Cell Biology
Developmental Biology
Genome Biology
Molecular Biology
Molecular Pathogenesis
Molecular Virology
Plant Molecular Biology
Structural Biology

## Graduate Minor <br> Molecular and Cellular Biology

The Molecular and Cellular Biology Program provides students with comprehensive interdisciplinary training in molecular and cellular biology while reserving sufficient flexibility for students to specialize in their areas of interest. The elements of the core curriculum include courses in molecular genetics and cell structure and function, bioinformatics and genomics, scientific skills and ethics, along with research rotations with individual faculty members. Additional course work is custom-tailored to the individual student's interests and needs. Each program requires 36 units of grad-uate-level course work, participation in seminar programs, two quarters of supervised teaching experience, written and oral preliminary examinations, supervision by an individual committee of five faculty members, and presentation of a thesis containing the results of publishable original research.
The program also offers access to all of the participating faculty as potential research advisors. Students do three research rotations in the first year and select their advisor from over 90 faculty members in the 20 participating departments in seven colleges. Therefore, the

MCB Program lowers interdisciplinary barriers and allows the students to select the advisors that most closely match their interests after they have been on campus for one or more terms.

## GRADUATE MAJORS

## APPLIED BIOTECHNOLOGY (PSM)

## Program to be terminated upon

 approval of proposal \#93584.The worlds of science and business are increasingly interconnected - creating strong demand for individuals who can bridge these two disciplines. Biomedical industries and start-up companies need employees who can combine their scientific and technical knowledge with good business management and communication skills. The Professional Science Master's (PSM) in Applied Biotechnology at OSU is the first program of its kind in the Pacific Northwest and was created with the help of professional affiliates employed in leadership roles in the biotech industry. The objective of this degree is to train students to be able to function effectively in industrial environments. Special training in business management, communications, and ethics complement core science curriculum, and students are required to complete an internship in lieu of thesis research.
The PSM program can usually be completed in two years, based on full-time study and at least 54 credit hours. Core lecture courses provide the conceptual framework necessary in the biotechnology sector. Microbial genetics, structure and function of eukaryotic cells, eukaryotic molecular genetics, and cell signaling and development are some of the topics that are covered (MCB 554, MCB 555, МСВ 556, and MCB 575). An intensive laboratory experience (MCB 525) is a 2-week summer course that has attracted students from around the country for 8 years to learn molecular biology theory and practice. Bioinformatics training is also an option. Approved electives in an Area of Concentration give focus and identity to each student's curriculum and allow for flexibility in response to changing employment demands. Current Areas of Concentration include Bioinformatics, Biotechnology, Cell Biology, Developmental Biology, Genome Biology, Molecular Biology, Molecular Pathogenesis, Molecular Virology, Plant Molecular Biology and Structural Biology. Professional courses are required in communication, research ethics, and business management (PSM 513, PSM 565, PSM 566, PSM 567, COMM 550 and PHL 547). These courses are designed to be taken in sequence during the first academic year. Students are required to complete a 3 - to 6 -month internship ( $6-12$ credits) in lieu
of thesis research (MCB 510).
For general information about PSM programs, contact the PSM Director, Dee Denver, 3021 Agricultural and Life Sciences Building, 541-737-3799, denvedee@cgrb.oregonstate.edu and millimag@ cgrb.oregonstate.edu.

## Degree Requirements (54 credits) <br> Core science courses (19)

Approved electives (11)
Professional courses (18)
Internship (6)
Major Code: 4502
MOLECULAR AND CELLULAR BIOLOGY (MS, PhD)

Graduate Areas of Concentration
Bioinformatics, biotechnology, cell biology, developmental biology, genome biology, molecular biology, molecular pathogenesis, molecular virology, plant molecular biology, structural biology
MCB doctoral students do research rotations in three laboratories during the first year, and then carry out their thesis research in subsequent years under the direction of a member of the MCB faculty. The MCB Program lowers interdisciplinary barriers and allows each individual the opportunity to select the most suitable advisor and committee.

## Major Code: 9950

## MOLECULAR AND CELLULAR BIOLOGY GRADUATE MINOR

Graduate Areas of Concentration
Bioinformatics, biotechnology, cell biology, developmental biology, genome biology, molecular biology, molecular pathogenesis, molecular virology, plant molecular biology, structural biology
For more information and application forms, contact:

## Minor Code: 9950

## I MOLECULAR AND CELLULAR

## BIOLOGY COURSES

MCB 501. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 99 credits.
MCB 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
MCB 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 99 credits.
MCB 507. SEMINAR (1-16). This course is repeatable for a maximum of 99 credits.
MCB 508. WORKSHOP (1-16). This course is repeatable for a maximum of 99 credits.
MCB 509. PRACTICUM (1-16). This course is repeatable for a maximum of 99 credits.

MCB 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 99 credits.

MCB 511. RESEARCH PERSPECTIVES IN MOLECULAR AND CELLULAR BIOLOGY (3). Provides graduate students with an in-depth exposure to faculty members at OSU involved in molecular and cellular biology and their specific fields of research.
MCB 524. MOLECULAR AND CELLULAR BIOLOGY TECHNIQUES (1). Modern methods
for manipulation of cellular macromolecules Recombinant DNA technology and protein chemistry methods will be covered. Includes daily lectures over a two-week period. Lec/lab. Graded P/N. PREREQS: BB 451 or equivalent. May not be taken concurrently with MCB 525.
MCB 525. TECHNIQUES IN MOLECULAR AND CELLULAR BIOLOGY (3). An intensive laboratory course introducing modern methods for the manipulation of cellular macromolecules. Recombinant DNA technology, protein chemistry, and in situ hybridization methods presented in a format that emphasizes experimental continuity. The course requires two weeks of intensive full-time involvement. PREREQS: Departmental approval required.
MCB 530. INTRODUCTION TO POPULATION GENETICS (3). Genetic polymorphisms, inbreeding, genetic drift, population subdivision and gene flow, mutation and selection. Emphasis on applied rather than theoretical questions. Offered alternate years. PREREQS: BI 311 and ST 351 and ST 352
MCB 535. GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK (3). A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. Lec/rec. CROSSLISTED as BI 435/BI 535, BI 435H, FES 435/FES 535, TOX 435/ TOX 535, TOX 435H. PREREQS: One quarter each of biology and chemistry helpful but not essential.

MCB 541. PLANT TISSUE CULTURE (4).
Principles, methods, and applications of plant tissue culture. Laboratory is important part of course. Topics include callus culture, regeneration, somaclonal variation, micropropagation, anther culture, somatic hybridization, and transformation. CROSSLISTED as PBG 441/PBG 541. PREREQS: (BI 311 and BOT 331) or PBG 430
MCB 554. GENOME ORGANIZATION, STRUCTURE, AND MAINTENANCE (4). How diverse organisms store their individual sets of genetic information (genomes). Evolution of genomes and gene families. Structures of DNA and chromatin. Biochemical and regulatory pathways that protect cellular genomes against environmental and endogenous damage and ensure transmission of faithful copies to progeny. Remodeling of genomes by recombination and transposition. CROSSLISTED as TOX 554. PREREQS: BI 311 (genetics or equivalent) and (BB 450 and BB 451 and BB 452) or (BB 490 and BB 491 and BB 492) or equivalent.

MCB 555. GENOME EXPRESSION AND REGULATION (4). Prokaryotic and eukaryotic systems will be used to describe recent advances in understanding transcriptional and posttranscriptional control mechanisms. Topics include: microbial, yeast and mouse model systems; transcriptional control mechanisms; RNA processing, silencing and microRNAs; protein synthesis and posttranslational modification; microarray- and mass spectrometry-based expression genomics. PREREQS: BB 451 or equivalent.

MCB 556. CELL AND DEVELOPMENTAL
BIOLOGY (4). Examination of molecular and structural elements in eukaryotic cells and their relationship to function and development. Topics include nuclear organization, membranes, organelles, intracellular sorting, cell energetics, cell signaling, cell motility, cell division cycle, and developmental processes of selected model organisms. Critical reading and writing skills will be emphasized. PREREQS: BB 450 and BB 451 (biochemistry) or equivalent; BI 311 (genetics) or equivalent. Recommended: BI 460 (cell biology) or equivalent; MCB 554 and MCB 555.
MCB 557. SCIENTIFIC SKILLS AND ETHICS
(3). Offers instruction, guest lectures and case-study based discussions of ethical issues
relevant to scientists on topics such as mentoring, best practices of conducting research, research misconduct and compliance, intellectual property, peer review, ethical use of animal and human subjects and managing conflicts of interest. Training in the preparation and presentation of scientific seminars and grant writing. PREREQS: Graduate standing.
MCB 563. CANCER AND CHEMOPREVENTION (2). A summary of mechanisms of cancer progression, how cancer is detected, and introduction to chemoprevention using targeted therapy and alternative medicine. PREREQS: BB 451 and BI 314 and BI 460 or equivalent courses.

MCB 575. COMPARATIVE GENOMICS (4). Principles of comparative genomics. Methods for genome assembly and annotation. Genomic approaches for the study of structural change, whole genome duplication, gene family evolution, gene networks, gene regulation and epigenetics. Lab topics include the analysis of next generation sequencing data and conducting comparative genome analyses. Lec/lab. CROSSLISTED as BOT 575. PREREQS: Students will require a basic working knowledge of cell and molecular biology and genetics. BI 314 and (BI 311 or CSS 430)
MCB 576. INTRODUCTION TO COMPUTING IN THE LIFE SCIENCES (3). Introduction to management of large datasets (e.g., nucleic acids, protein), computer programming languages application of basic mathematical functions, and assembly of computational pipelines pertinent to life sciences. CROSSLISTED as BOT 476/BOT 576. PREREQS: Cell and molecular biology or genetics, or by approval of instructor. Familiarity with text editing software and unix/linux operating system is advantageous.

MCB 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

MCB 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

MCB 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

MCB 605. READING AND CONFERENCE (1-16)
This course is repeatable for a maximum of 16 credits.
MCB 609. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.
MCB 610. INTERNSHIP (1-9). Laboratory rotation. This course is repeatable for a maximum of 16 credits. PREREQS: MCB graduate students only.
MCB 620. DNA FINGERPRINTING (1). Principles
and methods for producing and analyzing
DNA fingerprints. Offered alternate years.
CROSSLISTED as PBG 620. PREREQS: BI 311 or CSS 430 or CSS 530 or PBG 430 or PBG 530 or HORT 430 or HORT 530 or equivalent.
MCB 621. GENETIC MAPPING (1). Principles and methods for constructing genetic maps comprised of molecular and other genetic markers. Offered alternate years. CROSSLISTED as PBG 621. PREREQS: BI 311 or CSS 430 or CSS 530 or PBG 430 or PBG 530 or HORT 430 or HORT 530 or equivalent.
MCB 622. MAPPING QUANTITATIVE TRAIT LOCI (1). Principles and methods for mapping genes underlying phenotypically complex traits. Offered alternate years. CROSSLISTED as PBG 622. PREREQS: CSS 590 or ST 513 or equivalent.
MCB 637. MOLECULAR HOST-MICROBE
INTERACTIONS (3). Lecture and discussionbased presentation of the molecular bases for interactions between organisms. Addresses bacterial, algal, and fungal symbionts of eukaryotes and considers pathogenesis, commensalism, and mutualism. A focus on the evolution of host-microbe interactions is included.

MCB 651. MOLECULAR BASIS OF PLANT PATHOGENESIS (3). Analysis of current concepts in the physiology, biochemistry, and genetics of host-parasite interactions. Topics covered include specificity, recognition, penetration, toxin production, altered plant metabolism during disease, resistance mechanisms and regulatory aspects of gene expression during host-parasite interactions. Offered alternate years. CROSSLISTED as BOT 651. PREREQS: BOT 550

MCB 662. HORMONE ACTION (3). Mechanisms of action of peptide and steroid hormones and related compounds at the cellular level. CROSSLISTED as ANS 662, BB 662. PREREQS: BB 451 [C] or BB 551 [C] or BB 492 [C] or BB 592 [C]
MCB 671. MOLECULAR TOOLS (3). Intended for personnel with some scientific background who are seeking basic- and advanced-level molecular biology knowledge and who wish to become involved with molecular biology-related and biotechnological research. CROSSLISTED as VMB 671. PREREQS: Graduate standing or advanced undergraduate standing in science or engineering, with permission of instructor.

MCB 699. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

## WATER RESOURCES <br> ENGINEERING PROCRAMS

## Mary Santelmann, Director

Water Resources Graduate Program 116 Gilmore Hall
Oregon State University
Corvallis, OR 97331
541-737-1215
Email: santelmm@oregonstate.edu Website: http://oregonstate.edu/ gradwater/

## Graduate Majors

Water Resources Engineering (MS, PhD)
Graduate Areas of Concentration
Groundwater Engineering
Surface Water Engineering
Watershed Engineering
Water Resources Policy and Management (MS)
Graduate Area of Concentration Water Resources Policy and Management
Water Resources Science (MS, PhD)
Graduate Area of Concentration Water Resources Science

## Graduate Minors

Water Resources Engineering
Graduate Areas of Concentration
Hydrology, water quality, water resources planning and management
Water Resources Policy and Management
Graduate Areas of Concentration
Water Resources Policy and Management

## Water Resources

Graduate Areas of Concentration
Hydrology, Water Quality, Water
Resources Planning and Management
Water Resources Science

Graduate Areas of Concentration
Water resources science

## GRADUATE MAJORS

## WATER RESOURCES

## ENGINEERING (MS, PhD)

Graduate Areas of Concentration
Groundwater engineering, surface water engineering, watershed engineering

## Core Courses ( $\mathbf{6}$ credits)

WRP/WRS 507. Seminar: Water Resources (1) WRP/WRE/WRS 505. Reading and
Conference: Water Resources Journal Club (1)

WRP/WRE/WRS 507. Seminar: Water Resources Seminar and Journal Club (1)
WRP 524. Socio-technological Aspects of Water Resources (3)

## Groundwater Engineering

BEE 512. Physical Hydrology (3)
BEE 529. Biosystems Modeling Techniques (3)

BEE 533. Irrigation System Design (4)
BEE 542. Vadose Zone Transport (4)
CE/GEO 514. Groundwater Hydraulics (3)
ENVE 554. Groundwater Remediation (4)
GPH 665. Geophysical Field Techniques (3)

## Surface Water Engineering

BEE 512. Physical Hydrology (3)
BEE 529. Biosystems Modeling Techniques (3)

BEE 533. Irrigation System Design (4)
BEE 544. Open Channel Hydraulics (4)
BEE 546. River Engineering (4)
CE 518. Groundwater Modeling (4)
CE 543. Applied Hydrology (4)
FE 536. Forest Erosion Processes (3)
FE 537. Hillslope Hydrology (1-16)

## Watershed Engineering

ATS 564. Interactions of Vegetation and Atmosphere (3)
BEE 512. Physical Hydrology (3)
BEE 525. Stochastic Hydrology (3)
BEE 529. Biosystems Modeling Techniques (3)

BEE 548. Nonpoint Source Pollution Assessment and Control (3)
BEE 549. Regional Hydrologic Modeling (3)
CE 517. Hydraulic Engineering Design (4)
CE 547. Water Resources Engineering I:
Principles of Fluid Mechanics (4)
CE 548. Water Quality Dynamics (3)
ENVE 521. Water and Wastewater Characterization (4)
ENVE 531. Transport and Fate of Organic Chemicals in Environmental Systems (4)
ENVE 532. Aqueous Environmental
Chemistry (4)
FE 530. Watershed Processes (4)
FE 532. Forest Hydrology (4)
FE 535. Water Quality and Forest Land Use (3)

Major Code: 3100

## WATER RESOURCES POLICY AND MANAGEMENT (MS)

Graduate Areas of Concentration
Water resources policy and management

## Core Courses ( 6 credits)

WRP/WRS 507. Seminar: Water Resources (1)

WRP/WRE/WRS 505. Reading and Conference: Water Resources Journal Club (1)

WRP/WRE/WRS 507. Seminar: Water Resources Seminar and Journal Club (1)
WRP 524. Socio-technological Aspects of Water Resources (3)

## Methods and Numerical Skills

Select 9 credits from below:
CS 540. Database Management Systems (4)
GEO 541. Spatio-Temporal Variation
in Ecological and Earth Science (4)
[Terminated fall 2016]
or GEOG 565. Spatio-Temporal Variation in Ecology and Earth Science (4)
GEO 553. Research Evaluation Methods/
EIS (3)
GEO 565. Geographical Information
Systems (3)
or GEOG 560. GIScience I: Introduction
to Geographic Information Science (4)
ST 511. Methods of Data Analysis (4)
ST 512. Methods of Data Analysis (4)
ST 513. Methods of Data Analysis (4)
ST 531. Sampling Methods (3)
ST 573. Environmental Sampling (3)
SOC 519. Applied Research Methods (4)

## Basic Water Science

## Select 6 credits from below:

ATS 520. Principles of Atmospheric Science (4)

BEE 512. Physical Hydrology (3)
CE/GEO 514. Groundwater Hydraulics (3)
FE 530. Watershed Processes (4)
GEO 530. Geochemistry (4)
GEO 531. Applied Climatology (3)
GEO 532. Applied Geomorphology (3)
GEOG 596. Field Research in
Geomorphology and Landscape Ecology (3)

SOIL 535. Physics of Soil Ecosystems (3)

## Policy and Management

Select 15 credits from below:
AEC 505. Reading and Conference: Resource Economics (3)
or AEC 507. Seminar: Resource Economics (3)

AEC 512. Microeconomic Theory I (4)
AEC 523. Preliminaries for Quantitative Methods (4)
AEC 525. Applied Econometrics (4)
AEC 534. Environmental and Resource Economics (3)
AEC 543. International Trade (4)
AEC 550. Environmental and Natural Resource Economics (3)
AEC 551. Applications of Environmental and Natural Resource Economics (4)
ANS/FES/FW/SOC 585. Consensus and Natural Resources (3)
ANTH 576. Community Impact
Anthropology (3)
ANTH 577. Cultural Ecology (3)
ANTH 585. Uses of Anthropology (3)

ANTH 591. Ethnographic Methods (4)
COMM 540. Theories of Conflict and Conflict Management (3)
COMM 546. Communication in International Conflict and Disputes (3)
FOR 562. Natural Resource Policy and Law Interactions (3)
FOR 563. Environmental Policy and Law Interactions (3)
GEO 520/GEOG 530. Resilience-Based Natural Resource Management (3) GEO 524/GEOG 541. International Water Resources Management (3)
GEO 525/GEOG 540. Water Resources
Management in the U.S. (3)
GEO 532. Applied Geomorphology (3)
PS 571. Public Policy Theory (4)
PS 572. Public Administration (4)
PS 575. Environmental Politics and Policy (4)
PS 576. Science and Politics (4)
PS 577. International Environmental
Politics and Policy (4)
SOC 556. Science and Technology in Social Context (4)
SOC 581. Society and Natural Resources (4)

## Major Code: 0990

WATER RESOURCES SCIENCE (MS, PhD)

## Graduate Areas of Concentration

Water resources science

## Core Courses ( 6 credits)

WRP/WRS 507. Seminar: Water Resources (1) WRP/WRE/WRS 505. Reading and Conference: Water Resources Journal Club (1)

WRP/WRE/WRS 507. Seminar: Water Resources Seminar and Journal Club (1)
WRP 524. Socio-technological Aspects of Water Resources (3)
Water Resources Science Courses
Select 12 credits for the MS or 15 credits for the PhD from below:
ATS 520. Principles of Atmospheric Science (4)

ATS 564. Interaction of Vegetation and Atmosphere (3)
BEE 512. Physical Hydrology (3)
BEE 525. Stochastic Hydrology (3)
BEE 533. Drainage (Irrigation) System Design (4)
BEE 542. Vadose Zone Transport (4)
BEE 544. Open Channel Hydraulics (4)
BEE 546. River Engineering (4)
BEE 549. Regional Hydrologic Modeling (3)
CE 517. Hydraulic Engineering Design (4)
CE 518. Groundwater Modeling (4)
CE 543. Applied Hydrology (4)
CE 548. Water Quality Dynamics (3)
ENVE 521. Water and Wastewater
Characterization (4)
ENVE 554. Groundwater Remediation (4)
FE 530. Watershed Processes (4)
FE 532. Forest Hydrology (4)
FE 537. Hillslope Hydrology (4)
FW 556. Limnology (5)
FW 579. Wetlands and Riparian Ecology (3)
FW 580. Stream Ecology (3)
GEO 530. Geochemistry (4)
GEO 531. Applied Climatology (3)
GEO 532. Applied Geomorphology (3)

GEO 544. Remote Sensing (3)
or GEOG 580. Remote Sensing I:
Principles and Applications (4)
GEO 691. Mass and Heat Transport in the Environment (4)
GEOG 596. Field Research in
Geomorphology and Landscape Ecology (3)

GPH 665. Geophysical Field Techniques (3)
MB 548. Microbial Ecology (3)
OC 670. Geophysical Fluid Dynamics (4)
RNG 555. Riparian Ecohydrology and
Management (4)
SOIL 523. Principles of Stable Isotopes (3)
SOIL 535. Physics of Soil Ecosystems (3)
SOIL 536. Vadose Zone Hydrology Lab (1)
SOIL 545. Geochemistry of Soil Ecosystems (4)

SOIL 555. Biology of Soil Ecosystems (4)

## Total=18-21

Major Code: 3530

## GRADUATE MINORS

## WATER RESOURCES GRADUATE MINOR

## Graduate Areas of Concentration

Hydrology, water quality, water resources planning and management
A Water Resources graduate minor for the master of science, master of arts, and doctor of philosophy degree programs is offered with specialization in hydrology, water quality, or water resources planning and management. The first two options are technically oriented while the third gives added socioeconomic emphasis. Seminars, readings, and conferences are offered by Water Resources Graduate Program.

The graduate minor options are structured around core groups of courses and complementary courses designed to broaden the student's education. University departments and schools that offer courses related to water resources include the departments of Applied Economics; Anthropology; Biochemistry and Biophysics; Biological and Ecological Engineering; Botany and Plant Pathology; Business Administration; Chemistry; Crop and Soil Science; Entomology; Fisheries and Wildlife; Forest Engineering; Forest Resources; Mathematics; Microbiology; Public Health; Rangeland Ecology and Management; Statistics; and Zoology; the School of Chemical, Biological, and Environmental Engineering; the School of Civil and Construction Engineering; the School of Mechanical, Industrial, and Mechanical Engineering; School of Public Policy; and the College of Earth, Ocean, and Atmospheric Sciences. About 20 departments conduct teaching or research programs in water resources.

For more information, contact gradwater_director@oregonstate.edu or visit http://oregonstate.edu/gradwater/.

## WATER RESOURCES ENGINEERING GRADUATE MINOR

Graduate Areas of Concentration
Groundwater engineering, surface water engineering, watershed engineering
A graduate minor in Water Resources Engineering for the master of science, master of arts, and doctor of philosophy degree programs is offered with specialization in groundwater engineering, surface water engineering, or watershed engineering. Seminars, courses, and reading and conference courses in water resources engineering are offered by Water Resources Graduate Program.
The graduate minor options are structured around courses designed to broaden the student's education in one of the above areas of concentration. University departments and schools that offer courses related to water resources engineering include the departments of Biochemistry and Biophysics; Biological and Ecological Engineering; Botany and Plant Pathology; Chemistry; Crop and Soil Science; Geosciences; Mathematics; Rangeland Ecology and Management; Statistics; the School of Forest Engineering, Resources and Management; the School of Biological and Population Health Sciences; the School of Chemical, Biological, and Environmental Engineering; the School of Civil and Construction Engineering; the School of Mechanical, Industrial, and Mechanical Engineering; and the College of Earth, Ocean, and Atmospheric Sciences. About 20 departments conduct teaching or research programs in water resources.

For more information, contact gradwater_director@oregonstate.edu or visit http://oregonstate.edu/gradwater/.

## Minor Code: 3100

## WATER RESOURCES POLICY AND MANAGEMENT GRADUATE MINOR

## Graduate Areas of Concentration

Water resources policy and management
A graduate minor in Water Resources Policy and Management for the master of science, master of arts, and doctor of philosophy degree programs is offered with specialization in the human dimensions of water resources policy and management. Seminars, readings, and conferences in water resources policy and management are offered by Water Resources Graduate Program and several affiliated departments.
The graduate minor options are structured around courses designed to broaden the student's education in water resources policy and management. University departments that offer courses related to water resources policy and management include the departments of Applied Economics; Anthropology;

Fisheries and Wildlife; Geosciences; Rangeland Ecology and Management; Statistics; and Zoology; the School of Public Policy; the School of Forest Engineering, Resources and Management; the School of Biological and Population Health Sciences; the College of Business Administration, and the College of Earth, Ocean, and Atmospheric Sciences.

For more information, contact gradwater_director@oregonstate.edu or visit http://oregonstate.edu/gradwater/.

## Minor Code: 0990

## WATER RESOURCES SCIENCE GRADUATE MIINOR

## Graduate Areas of Concentration Water resources science

A graduate minor in Water Resources Science for master of science, master of arts, and doctor of philosophy degree programs is offered with specialization in hydrology or geochemistry. Seminars, readings, and conferences are offered by Water Resources Graduate Program.
The graduate minor options are structured around courses designed to broaden the student's education in water resources science, specifically in hydrology or geochemistry. University departments and schools that offer courses related to water resources science include the departments of Biochemistry and Biophysics; Biological and Ecological Engineering; Botany and Plant Pathology; Chemistry; Crop and Soil Science; Entomology; Fisheries and Wildlife; Geosciences; Mathematics; Microbiology; Rangeland Ecology and Management; Statistics; and Zoology; and the School of Forest Engineering, Resources and Management; the School of Biological and Population Health Sciences; the School of Chemical, Biological, and Environmental Engineering; the School of Civil and Construction Engineering; the School of Mechanical, Industrial, and Mechanical Engineering; the School of Public Policy; and the College of Earth, Ocean, and Atmospheric Sciences. About 20 departments conduct teaching or research programs in water resources.
For more information, contact gradwater_director@oregonstate.edu or visit http://oregonstate.edu/gradwater/.

## Minor Code: 3530 <br> ■ WATER RESOURCES ENGINEERING COURSES

WRE 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
WRE 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
WRE 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

WRE 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
WRE 507. SEMINAR (1-16). This course is
repeatable for a maximum of 16 credits.
WRE 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
WRE 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.

WRE 599. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

WRE 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

WRE 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

WRE 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
WRE 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

WRE 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
WRE 610. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.
WRE 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## I WATER RESOURCES POLICY COURSES

WRP 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
WRP 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
WRP 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

WRP 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

WRP 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

WRP 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

WRP 509. PRACTICUM (1-16). This nontraditional class explores tools, models and concepts in the collaborative decision-making process in water resources. Emphasis is on group projects and self-directed practical application of community-based natural resources. This course is repeatable for a maximum of 16 credits.

WRP 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.

WRP 517. WRITING IN WATER RESOURCES
(4). An intensive summer course to develop proficiency in writing at a graduate level for the wide range of writing tasks common to water resource professionals. Students will complete individual in-class writing assignments and collaborate on a draft of a technical report. While it is designed for students in the Water Cooperation and Peace joint degree program (many of whom will be international students) the course will also be useful for other students. Lec/rec.

WRP 521. WATER CONFLICT MANAGEMENT
AND TRANSFORMATION (3). Examines ways to work effectively in contentious water situations. Explores conflict tolerance, prevention, management, and transformation through collaborative structures as well as through models of negotiation and dialogue.
WRP 523. ENVIRONMENTAL WATER
TRANSACTIONS (3). Covers the theory and practice of using water rights transactions to reallocate water rights to environmental purposes. Different transactional techniques and contexts appropriate to their use are presented through case studies primarily from the western United States, with some reference to the use transactions in other countries such as Australia. PREREQS: Graduate standing.

WRP 524. SOCIOTECHNOLOGICAL ASPECTS OF WATER RESOURCES (3). Core curriculum, graduate-level course in the Water Resources Graduate Program focusing on an interdisciplinary approach to water resources research that integrates the human and the technological dimensions of water resource issues. It is comprised of lecture and discussion sessions with guest lectures by visiting seminar speakers. PREREQS: Graduate student standing.
WRP 548. CONDUCTING COLLABORATIVE PROJECTS (3). Focuses on development of the abilities needed to complete a directed waterrelated collaborative project, delivered through experiential learning. The course specifically addresses development of collaborative skills needed to work in interdisciplinary teams. The course activities are centered around a collaborative project on which students will be conducting research, collecting data synthesizing information; and providing classmates with constructive peer-review. Lec/rec.
WRP 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
WRP 808. WORKSHOP (1-4). This course is repeatable for a maximum of 4 credits.

## - WATER RESOURCES SCIENCE COURSES

WRS 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

WRS 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

WRS 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
WRS 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
WRS 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
WRS 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
WRS 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.
WRS 532. APPLIED FIELD PROBLEMS (3). Introduces graduate students to real-world water resources problems and approaches to solving them. Students will assess and analyze the various constraints and limitations to integrated water management that often cannot be adequately simulated in classroom exercises. They will acquire the practical tools necessary to become effective water resources professionals in a rapidly changing world.

WRS 536. FUNDAMENTALS OF HYDROLOGY (3). Teaches students from a non-technical background in the Water Cooperation and Peace program the fundamentals of hydrology. Students will be introduced to hydrology and the hydrological cycle at the graduate level with a focus on key concepts. Students will apply these concepts to understanding of real world problems in the associated course, WRS 532, Applied Field Problems. Lec/lab.
WRS 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

WRS 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

WRS 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

WRS 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

WRS 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
WRS 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

WRS 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

WRS 610. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.

WRS 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## OTHER DECREES $\boldsymbol{E}_{2}$ <br> PROCRAMS WHTHIN THE CRADUATE SCHOOL

## COMPARATIVE HEALTH

 SCIENCES (MS, PhD)The Comparative Health Sciences graduate major is an interdisciplinary program administered by the Graduate School. Participating colleges include Veterinary Medicine, Public Health and Human Sciences, Pharmacy, and the Graduate School.

For further information about the graduate major, see the proposal at https://secure.oregonstate.edu/ap/cps/ proposals/view/84096 and contact the Graduate School and College of Veterinary Medicine.

MS degree students complete a total of 45 graduate credits, including 12 thesis credits.
PhD degree students complete a total of 108 graduate credits beyond the bachelor's or professional (DVM, MD) degree, including at least 36 credits of non-blanket course work.

All students complete the core curriculum and at least two electives for a total of 12 credits. Students must also complete the Biomedical Sciences option.

## Required Core

Research Perspectives Lab Rotations (3) (PhD only)
ST 511. Methods of Data Analysis (4)
Biomedical Ethics (1)
Grant Application Preparation (1)
Seminar (1)

## Electives

BB 550. General Biochemistry (3)
MCB 524. Molecular and Cellular Biology Techniques (1)
(New course) Introduction to
Bioinformatics
(New course) Introduction to Epidemiology
(New course) Introduction to Genomics
(New course) Introduction to Immunology
Major Code: 9300

## OPTIONS

BIOMEDICAL SCIENCES OPTION
Students must also complete the Biomedical Sciences option:

## MS Students

VMB 521. Animal Models (3)
VMC/VMB 501. Research (5)
VMC/VMB 503. Thesis (12)
VMC/VMB 507/607. Seminar (1)
Electives (24)
PhD Students:
VMB 521. Animal Models (3)

VMB 603. Thesis (36)
VMB 671. Molecular Tools (3)
VMB 607. Seminar: Dissertation Defense (1) Electives (53)
Option Code: 9305

## CLINICAL SCIENCES OPTION

The College of Veterinary Medicine, in collaboration with partners in the Division of Health Sciences, has established a new interdisciplinary graduate program in Comparative Health Sciences. This program offers both MS and PhD degrees and focuses on health sciences graduate education and research at the whole animal level, but will be complementary to and supportive of existing programs at the molecular and cellular level. Students are encouraged to study topics that bridge two distinct areas of study in order to benefit from the interdisciplinary structure of the program. Administered by the Graduate School, this interdisciplinary program provides an opportunity for all units within the College of Veterinary Medicine to participate in graduate education and encourages the integration of several related areas of emphasis currently existing in other units. Students are required to complete a program core curriculum as well as an option-specific curriculum. The program's other transcript-visible option, Biomedical Sciences, is intended to accommodate students with advisors in the College of Veterinary Medicine.

The Clinical Sciences graduate option will reflect the unique program of dual clinical residents/graduate students. The purpose of this option is to educate veterinarians in the conduct of research in a specialty clinical environment, consistent with the overall goals of comparative veterinary medicine.
This option is available only to dual clinical residents/graduate students of the College of Veterinary Medicine, in conjunction with 2 -, 3 - or 4 -year residencies in a veterinary specialty.

## Select 6 credits of one of the <br> following courses:

VMC 682. Topics in Internal Medicine (2-4)
VMC 684. Topics in Surgery (2-4) or other
clinical specialty

## Select 6 credits of one of the

following courses:
VMC 632. Postgraduate Medicine (3-7)
VMC 634. Postgraduate Surgery (3-7) or other clinical specialty

## Option Code: 9306

## GRADUATE MINORS

## BIOLOGICAL DATA SCIENCES GRADUATE MINOR

The graduate minor in Biological Data Sciences will familiarize MS and PhD graduate students in the life sciences with research concepts and methodolo-
gies in quantitative sciences, and those in the quantitative sciences with research concepts and methodologies in life sciences. The disciplinary learning goals of the minor are by nature foundational. Thus, for example, students with advanced expertise in life sciences would receive foundational training in computer science, statistics and/or mathematics. Students with advanced expertise in computer science would receive foundational training in life science, statistics and, if needed, mathematics. A capstone collaborative problem-solving course will be required by all students. Students may complete all the course work in a single year (encouraged), or may choose spread the courses out over several years. With approval by the director of the minor, students may receive credit for courses taken for their major.

The minor is open to both MS and PhD students. PhD students must complete at least 18 credits for the minor and MS students must complete 15 credits.

Students must select courses from at least two disciplinary focal areas outside their undergraduate and graduate majors. For example a life sciences student might take courses in mathematics and computer science, while a statistics student might take courses in computer science and life sciences. In each focal area, PhD students must take at least 5 credits and MS students at least 3 credits. Some courses span more than one focal area; these courses may not be counted towards two focal areas simultaneously.

Some courses that are electives in an MS or PhD major may also be counted towards the BLDS minor. For example, a PhD student in Molecular and Cellular Biology (MCB) may select "MCB 576 Introduction to Computing in the Life Sciences" as an elective for their MCB requirements, and also as computer science credit for the BLDS minor.

## Required by All Students:

BOT 599. Special Topics [Collaborative
Problem-Solving in Biological Data Science] (3)

Students who do not complete an ethics and professionalism class as part of their PhD major must take MCB 557, Scientific Skills and Ethics (3), or an equivalent course.
Students are recommended to choose their courses from the following lists, depending on their prior preparation as an undergraduate. Equivalent or more advanced courses may be substituted after consultation with the BLDS director Some courses require prerequisites. Some courses span more than one focal area; such courses can be counted towards one or other of those focal areas, but not both.

## Life Sciences Focal Area

BB 585. Applied Bioinformatics (3)§

BI 592. Theoretical Ecology (4) $\dagger$
BOT 599. Special Topics [Introduction to Genome Biology] (3) $\dagger$
BOT/MCB 575. Comparative Genomics (4)
MB 668. Microbial Bioinformatics and Genome Evolution (4) $\dagger$
MTH 527. Introduction to Mathematical Biology (3)
MTH 528. Stochastic Elements in Mathematical Biology (3)
VMB 631. Mathematical Modeling of Biological Systems (3) $\dagger$
VMB 670. Introduction to Systems Biology (2) $\dagger$

Z 594. Community Ecology (5) $\dagger$
Mathematics Focal Area
MTH 527. Introduction to Mathematical Biology (3)
MTH 528. Stochastic Elements in
Mathematical Biology (3)
MTH 563. Probability I (3)§
or ST 521. Introduction to Mathematical Statistics (4) $\ddagger$
MTH 564. Probability II (3)§
or ST 522. Introduction to Mathematical Statistics (4) $\ddagger$
VMB 631. Mathematical Modeling of Biological Systems (3) $\dagger$
$\ddagger$ The following sequences qualify for Mathematics Focal Area credit: MTH 563MTH 564, MTH 564-ST 521, ST 521-MTH 564. ST 521-ST 522 does not qualify. Only one pair of courses can be claimed for credit.

## Statistics Focal Area

H 524. Introduction to Biostatistics (4) $\dagger$
H 566. Data Mining in Public Health (3)§
H 580. Linear Regression and Analysis of Time to Event Data (4)
H 581. Generalized Linear Models and Categorical Data Analysis (4)
MCB 599. Special Topics [Data
Programming in R I and II] (2) $\dagger$
MTH 563. Probability I (3)§ $\ddagger$
or ST 521. Introduction to Mathematical Statistics (4)\#
MTH 564. Probability II (3)§ $\ddagger$
or ST 522. Introduction to Mathematical Statistics (4)\#
or ST 511-ST 513. Methods of Data Analysis (4,4,4) \#
ST 537. Data Visualization (3) Via Ecampus only
ST 592. Statistical Methods for Genomics Research (3) §
ST 599. Special Topics [Introduction to Quantitative Genomics] (3) $\dagger$
\# The following sequences qualify for
Statistics Focal Area credit: ST 511-ST
513, MTH 563-MTH 564, MTH 564-ST
521, ST 521-MTH 564, or ST 521-ST
522. Only one of these sequences can be claimed for Statistics focal area credit.

## Computer Science Focal Area

BB 585. Applied Bioinformatics (3)§
CS 519. Selected Topics/Computer Sci [Algorithms for Computational Biology] (3)§
or BB 599. Special Topics [Algorithms for Computational Biology] (3)§
CS 534. Machine Learning (4) $\dagger$
CS 546. Networks in Computational Biology (3)§

ECE 560. Stochastic Signals and Systems (4)
ECE 564. Digital Signal Processing (4)
FW 599. Special Topics in Fisheries and
Wildlife [Machine Learning Topics in
Species Distribution Modeling] (3)
MCB 599. Special Topics [Introduction to Linux and the Command Line] (2) $\dagger$
MCB 599. Special Topics [Introduction to
Python I and II] (2)§
MCB 599. Special Topics [Data
Programming in $R$ I and II] (2)§
MCB 599. Special Topics [Simulating
Natural Systems] (1)§
MCB/BOT 576. Introduction to Computing
in the Life Sciences (3)§
VMB 670. Introduction to Systems Biology (2) $\dagger$

## Footnotes:

$\dagger$ No prerequisites
§ Recommended prerequisites may be waived with instructor approval
Note: All of the 599 classes here represent classes that are in transition to becoming regular offerings.

## Minor Code: 1375

## COMPARATIVE HEALTH

## SCIENCES GRADUATE MINOR

For more details, see the departmental advisor.

## Minor Code: 9310

## COLLEGE AND UNIVERSITY TEACHING GRADUATE CERTIFICATE

## Also available via Ecampus.

The 18 -credit graduate certificate in College and University Teaching is designed to provide advanced course work and experiential learning opportunities to current graduate students who plan to pursue careers in teaching and instruction in higher education settings or who plan to pursue careers that require similar skill sets in facilitation.

Core courses focus on educational/ learning theory and instructional strategies for working with adult learners. The specialized course work includes student-selected course work, workshops, and/or other approved experiences appropriate to the student's field of study. The supervised teaching internship will allow students to engage in supervised field experiences to practice and refine instructional skills. The capstone teaching portfolio will provide a culminating professional development experience for students.
For further information, Jessica Beck, Assistant Dean of Graduate Student Development, 413 Learning Innovation Center, 541-737-8576, jessica.beck@oregonstate.edu; website: http://gradschool. oregonstate.edu/graduate-certificate-college-and-university-teaching.
The general structure of the certificate is:

- Core course work (6 credits; fulfilled by GRAD 560 (3) and GRAD 561 (3))
- Supervised teaching internship (3
credits; fulfilled by GRAD 610 (3))
- Capstone teaching portfolio (3 credits; fulfilled by GRAD 607 (3))
Specialized course work and experiences ( 6 credits; fulfilled by any of the courses listed below)
AED 553. Applied Instructional Strategies (3)

BI 507. Seminar (1)
CH 584. Instruments and Online
Interactions in the Sciences (3)
ED 562. Introduction to Educational
Research (3)
ED 596. Technology for Educators (3)
ENGR 555. Foundation of Engineering
Education Research and Practice (3)
ES 599. Special Topics (3)
GRAD 505. Reading and Conference (2)
GRAD 512. Current Issues in Higher
Education (3)
GRAD 520. Responsible Conduct of
Research (1)
GRAD/WGSS 542. The Inclusive Classroom:
Difference, Power \& Discrimination (3)
GRAD 550. Introduction to Online Course
Development and Facilitation (2)
GRAD 599. Special Topics (1-3)
LEAD 543. Leadership Through
Conversations (3)
PSY 599. Special Topics (4)
SED 596. Methods of College Teaching in
Mathematics and Science (3)
SED 599. Topics in Science Education (3) TOX 507/607. Seminar (1)
WGSS 535. Feminist Teaching and Learning (4)

WLC 599. Special Topics (1-3)
WR 520. Studies in Writing (4)

## Major Code: CG11 <br> - GRADUATE EDUCATION COURSES

GRAD 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits.
GRAD 420. GRADUATE SCHOOL
PREPARATION (1). Applying for graduate or professional school can be a daunting task. How and where to apply, how to choose an advisor, what to look for in a school, and how to obtain funding are hurdles to overcome during the application process. Supplemental materials will be provided as part of the course materials.

GRAD 430. INTRODUCTION TO SCIENTIFIC DIVING (4). Incorporates academic, confined water and open water training to prepare the student to manage the task loading associated with performing scientific tasks underwater. Introduces the diver to basic techniques and equipment used in underwater data collection. Qualifies the student for acceptance into the OSU Scientific Diving Program as a Scientific Diver-in-Training, at the discretion of the DSO and OSU Diving Control Board. Includes field trips. PREREQS: Minimum Course Prerequisites* Submission of an AAUS/OSU Scientific Diving Application and Diving Medical History to the OSU DSO* Submission of an AAUS/OSU Medical Evaluation of Fitness for Scuba Diving to the OSU DSO showing no contraindications for diving* Ability to complete the OSU scientific diver swim evaluation* Advanced Open Water certification from a recognized training agency (Rescue Diver strongly preferred). Experience in lieu of training may be recognized by the DSO* Current certifications in CPR, First Aid, AED, and Emergency Oxygen Administration* Proof of diving accident insurance (Divers Alert Network or equivalent)* Student must provide basic snorkeling
gear, exposure protection, suitable cutting tool, light, slate, and underwater timing device

GRAD 499. SPECIAL TOPICS (4). Graduate school preparation. PREREQS: Junior or senior standing, preferably with GPA greater than 3.0.
GRAD 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits.
GRAD 505. READING AND CONFERENCE
(1-16). Reading and discussions on special
topics. Graded P/N. This course is repeatable for a maximum of 16 credits.
GRAD 506. PROJECTS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
GRAD 509. PRACTICUM (1-16). Graded P/N.
This course is repeatable for a maximum of 16 credits.

GRAD 511. DESIGNING A PATH FOR SUCCESS
(1). Graduate student learners will be oriented onto paths that will help lead them toward degree completion and success. Students will receive foundational knowledge about graduate school requirements, effective mentor/mentee relationships, financing their education, research integrity and professional conduct, innovation and commercialization, and other soft skills essential for their progress through their graduate program. PREREQS: Graduate student standing only.

GRAD 512. CURRENT ISSUES IN HIGHER
EDUCATION (3). Explores current, work-relevant issues in higher education nationally. Development of plan to stay current with important issues. PREREQS: Graduate standing only
GRAD 520. RESPONSIBLE CONDUCT OF RESEARCH (1). Covers 10 topics in responsible conduct of research: ethical decision making; human subjects; animal welfare; data acquisition; sharing and ownership; research misconduct; conflicts of interest; authorship; peer review; mentor/trainee responsibilities; and collaborative science. Useful to all students who conduct scholarly activity. Graded P/N. PREREQS: Graduate standing.

## GRAD 521. RESEARCH DATA MANAGEMENT

(2). Careful examination of all aspects of research data management best practices. Designed to prepare students to exceed funder mandates for performance in data planning, documentation, preservation and sharing in an increasingly complex digital research environment. Open to students of all disciplines.
GRAD 522. PREPARING AN IRB SUBMISSION (1). Workshop-style course resulting in applications that are ready for IRB review. Ethical issues in research will be discussed. Students will draft all submission materials outside of class and participate in the critique of each other's protocols and consent forms. IRB approval will not be granted as part of this class. Graded P/N. PREREQS: (a) CITI Course - Curriculum 1 Human Subjects Protection (Group 1 Social/ Behavioral Research Investigators and Key Personnel OR Group 2 Biomedical Researchers) Register at https://www.citiprogram.org/ and affiliate with OSU.(b) Students must have prior sign-off from their mentor/major professor indicating that their research topic has been approved and that the student has successfully completed the basic research methods requirements in their program. Level Limitations: +02 (Graduate)
GRAD 530. INTRODUCTION TO SCIENTIFIC DIVING (4). Incorporates academic, confined water and open water training to prepare the student to manage the task loading associated with performing scientific tasks underwater. Introduces the diver to basic techniques and equipment used in underwater data collection. Qualifies the student for acceptance into the OSU Scientific Diving Program as a Scientific Diver-in-Training, at the discretion of the DSO and OSU Diving Control Board. Includes field trips. PREREQS: Minimum Course Prerequisites*

Submission of an AAUS/OSU Scientific Diving Application and Diving Medical History to the OSU DSO* Submission of an AAUS/OSU Medical Evaluation of Fitness for Scuba Diving to the OSU DSO showing no contraindications for diving* Ability to complete the OSU scientific diver swim evaluation* Advanced Open Water certification from a recognized training agency (Rescue Diver strongly preferred). Experience in lieu of training may be recognized by the DSO* Current certifications in CPR, First Aid, AED, and Emergency Oxygen Administration* Proof of diving accident insurance (Divers Alert Network or equivalent)* Student must provide basic snorkeling gear, exposure protection, suitable cutting tool, light, slate, and underwater timing device
GRAD 540. INTERVENING THE ISMS:
DIVERSITY AWARENESS (3). Students will be afforded an opportunity to explore the ISMS within individual, societal, cultural and institutional contexts. Students will examine, document and analyze the influence of ISMS in their own lives--in their personal, community, social and professional relationships.

GRAD 542. THE INCLUSIVE CLASSROOM: DIFFERENCE, POWER AND DISCRIMINATION
(3). An examination of multidisciplinary scholarship on difference, power, and discrimination; critical pedagogies; and curriculum transformation. Discussions of theory and research are coupled with practical hands-on opportunities for students to develop and hone their teaching and course development skills. CROSSLISTED as WGSS 542. PREREQS: Graduate level standing.

GRAD 550. INTRODUCTION TO ONLINE COURSE DEVELOPMENT AND FACILITATION (2). Prepares students to develop and teach distance courses. Students explore practical aspects of course development and facilitation: a brief history of distance education and pedagogical theory; course design principles; engagement of adult learners; active learning; and investigation of how online instruction, in addition to offering flexibility and convenience, also offers distinct pedagogical benefits. Open to students in all disciplines. PREREQS: Graduate standing.
GRAD 560. THEORIES OF TEACHING AND LEARNING IN HIGHER EDUCATION (3). Examination and analysis of theories and research related to teaching and learning in higher education contexts with emphasis on theoretical applications for GTAs, instructors, and other who teach in the college and university classroom. PREREQS: Graduate level standing.
GRAD 561. COURSE DESIGN AND METHODS FOR COLLEGE \& UNIVERSITY TEACHING
(3). Exploration of research and research-based practices related to teaching and learning in higher education contexts with emphasis on course design, facilitation, and other instructional techniques for GTAs, instructors, and others who teach in the college and university classroom. PREREQS: GRAD 560 [C] and graduate level standing.
GRAD 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 99 credits.

GRAD 605. READING AND CONFERENCE
(1-16). Reading and discussions on special topics. Graded P/N. This course is repeatable for a maximum of 16 credits.
GRAD 606. PROJECTS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
GRAD 607. CAPSTONE SEMINAR (3). Provides a culminating experience required for all graduate students pursuing the Graduate Certificate in College and University Teaching and for other graduate students seeking a structured opportunity to develop their teaching portfolio. PREREQS: GRAD 560 [C] and GRAD 561 [C]
GRAD 609. PRACTICUM (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

GRAD 610. INTERNSHIP (3). Provides a
framework for the in-depth internship experiences
required of all graduate students pursuing the
Graduate Certificate in College and University
Teaching and for other graduate students seeking
a structured opportunity to reflect on and improve their teaching. PREREQS: GRAD 560 [C] and
GRAD 561 [C] and graduate level standing.
n an increasingly complex world, solutions to issues of emerging societal importance often require crossing traditional boundaries. Recognizing that students will need information from many available sources, Oregon State University offers a variety of undergraduate and graduate opportunities for interdisciplinary exploration and enrichment.

Interdisciplinary programs depend fundamentally upon the existence of strong disciplinary programs and place signifi-
cant responsibility upon students to integrate and synthesize information.
Because there are so many choices of subjects and so many ways to approach a given interest, it is crucial that students obtain guidance in order to understand the advantages and the limitations of particular disciplinary and interdisciplinary alternatives. Students are encouraged to contact the individuals identified at the beginning of each certificate, department, and degree listing for more information and advice.

| UNDERGRADUATE PROGRAMS | LOCATION IN CATALOG/ADMINISTRATIVE UNIT |
| :--- | :--- |
| American Studies Major | College of Liberal Arts (OSU Cascades Campus only) |
| Applied Ethics Certificate | College of Liberal Arts, School of History, Philosophy, and <br> Religion |
| Bioenergy Minor | College of Agricultural Sciences |
| Bioresource Research Major | College of Agricultural Sciences |
| Environmental Sciences Major | College of Earth, Ocean, and Atmospheric Sciences |
| Forest Engineering - Civil Engineering Major | College of Forestry, Dept. of Forest Engineering, Resources and <br> Management |
| Gerontology Certificate | College of Public Health and Human Sciences, School of Social <br> and Behavioral Health Sciences |
| International Studies Major | All colleges with undergraduate programs offer this major ad- <br> ministered through International Programs. |
| Latin American Affairs Certificate | College of Liberal Arts, School of Language, Culture, and <br> Society |
| Liberal Studies Major | College of Liberal Arts, Dept. of Liberal Studies |
| Multimedia Minors | College of Liberal Arts, School of Arts and Communication |
| Medical Humanities Certificate | College of Liberal Arts, School of History, Philosophy, and <br> Religion |
| Natural Resource and Environmental Law and Policy Minor | College of Agricultural Sciences, Dept. of Agricultural and Re- <br> source Economics |
| Natural Resources Major and Minor | College of Forestry, Dept. of Forest Ecosystems and Society |
| Peace Studies Certificate | College of Liberal Arts, School of History, Philosophy, and <br> Religion |
| Religion and Culture Certificate | College of Liberal Arts, School of History, Philosophy, and <br> Religion |
| Russian Studies Certificate [Suspended] | College of Liberal Arts, School of Language, Culture, and <br> Society |
| Sustainability Major | All colleges with undergraduate programs offer this major <br> administered through College of Forestry, Dept. of Forest Eco- <br> systems and Society. |
| Twentieth Century Studies Certificate [Suspended] | College of Liberal Arts |
| Women, Gender, and Sexuality Studies Minor and Certificate | College of Liberal Arts, School of Language, Culture, and <br> Society |


| GRADUATE PROGRAMS | LOCATION IN CATALOG/ADMINISTRATIVE UNIT |
| :--- | :--- |
| Comparative Health Sciences (MS, PhD) | Graduate School |
| Environmental Sciences (MA, MS, PhD, PSM) | Graduate School |
| Gerontology Minor | College of Public Health and Human Sciences, School of Social <br> and Behavioral Health Sciences |
| Interdisciplinary Studies (MAIS) | Graduate School |
| Marine Resource Management (MA, MS) | College of Earth, Ocean, and Atmospheric Sciences |
| Materials Science (MS, PhD) | College of Engineering, School of Mechanical, Industrial, and <br> Manufacturing Engineering |
| Molecular and Cellular Biology (MS, PhD) | Graduate School |
| Natural Resources (MNR) | College of Forestry, Dept. of Forest Ecosystems and Society |
| Public Policy (MPP, PhD) | College of Liberal Arts, School of Public Policy |
| Toxicology (MS, PhD) | College of Agricultural Sciences, Dept. of Environmental and Mo- <br> lecular Toxicology |
| Water Resources Graduate Program Majors (MS, PhD) and Minors | Graduate School |

## INTERNATIONAL PROGRAMS

The Division of International Programs plays a leadership and collaborative role in the university's comprehensive internationalization strategy by advancing international education for U.S. and international students, scholars and faculty; furthering the integration of global learning in OSU's teaching, research and outreach; and promoting OSU as a premier international research university through partnerships and regional initiatives. The division is led by the vice provost for International Programs, and includes the Office of International Services (OIS), International Degree (ID), OSU Global Opportunities (OSU GO), and International Scholar and Faculty Services (ISFS).

The division works collaboratively with INTO Oregon State University, the university center that offers a range of English language programs including preparatory programs for international students aiming to enter OSU at both graduate and undergraduate levels via pathway programs, rather than via direct admission. As part of this collaboration, the vice provost has oversight responsibilities for INTO OSU Academic Programs and International Admissions.

## OSU OFFICE OF GLOBAL OPPORTUNITIES (OSU GO)

Caine Francis, Interim Director
University Plaza
1600 SW Western Blvd., Suite 290
Oregon State University
Corvallis, Oregon 97333
541-737-6434
Website: http://international.oregonstate. edu/osugo
OSU Office of Global Opportunities (OSU GO) is the centralized hub for supporting students and faculty who wish to explore, travel, study, and go global: whether studying abroad in diverse countries, participating in specialized international internships, joining service-learning and experiential programs that delve into unique projects and communities, and/or conducting comprehensive and rigorous international research. OSU GO is committed to supporting the university's goal of tripling student study abroad participation over the next 3 to 5 years.

## Overseas Study, Exchange, and Internship Programs

OSU students may broaden their education by taking part in one or a number of OSU GO's international study programs. Many of the programs allow qualified students from a wide variety of disciplines to earn academic credit from Oregon State University while pursuing their studies internationally. For academic programs approved for OSU credit, financial aid may apply to help cover the costs. $\mathrm{IE}_{3}$ Global is the programmatic
development unit within OSU GO to support the strategic mission of study abroad.
$\mathrm{IE}_{3}$ Global offers wide and diverse program options for OSU students: direct exchange, study abroad, faculty-led, international internships and research, and supports faculty sabbatical opportunities. Furthermore, $\mathrm{IE}_{3}$ Global supports OSU GO working with colleges and departments on new program opportunities, development, and implementation that aligns with OSU's strategic internationalization goals and evolving international curriculum.

More information about OSU GO programs can be obtained by writing to caine.francis@oregonstate.edu or calling 541-737-6434.

## OFFICE OF INTERNATIONAL SERVICES (OIS)

## Grace Atebe, Director

University Plaza
1600 SW Western Blvd., Suite 130
Oregon State University
Corvallis, Oregon 97333
541-737-6310
grace.atebe@oregonstate.edu
Website: http://international.oregonstate edu/ois/

The Office of International Services (formerly International Student Advising and Services, and International Scholar and Faculty Services) collaborates with campus and community partners to support the success and retention of all OSU international visitors from approximately 100 different countries. This includes over 500 international faculty and staff, and over 4,000 students in degree, exchange and INTO OSU (English Language and academic preparation (Pathway) programs). OIS is responsible for all international student and scholar immigration related advising, orientation, cultural, financial, scholarships, travel, employment, personal or academic related challenges. OIS manages select merit and need based financial scholarships for international students including the International Cultural Service Program (ICSP).
OIS also maintains the regulatory compliance and integrity of OSU's international student and international employee visa programs. Through trainings, workshops and consultation, the unit serves as a liaison and resource to OSU colleges and departments, as well as community groups to enhance understanding of student and scholar immigration regulations and cross cultural competency.

General inquiries can also be directed to:

- Student Services - isas.advisor@ oregonstate.edu
- Scholar Services - isfs.advisor@ oregonstate.edu


## INTERNATIONAL DEGREE

Kerry Thomas, Academic Advisor, International Degree
International Degree and Education Abroad
University Plaza
1600 SW Western Blvd., Suite 130
Oregon State University
Corvallis, Oregon 97333
541-737-5223
Website: http://international.oregonstate. edu/id

## Undergraduate Major <br> International Studies (BA, HBA) <br> (Major code 910)

The International Degree is Oregon State University's unique double-degree program. It allows any interested undergraduate student the opportunity to explore the international dimensions of any primary major. International Degree students complete Advanced Proficiency in a Second Language, Four additional Baccalaureate Core Courses in International Studies, an International Experience, and a Senior Thesis.
As an International Degree participant, you will earn two degrees. The first degree, the primary degree, will be your chosen major in any department on campus. The International Degree, or concurrent degree, will be in International Studies in your primary degree department.
For example, if your primary degree is a BS in Environmental Sciences, then the International Degree would be a BA in International Studies in Environmental Sciences.

## Admission Requirements to the International Degree Program

1. A minimum 2.75 cumulative GPA after completing at least 32 credits of college-level courses and good standing within your department, college and the university. The dean of your college may give you special consideration if you fall below this minimum. See the International Degree office for more information about this process.
2. Proficiency in a foreign language equivalent to that attained by the end of a second-year language sequence at OSU*. This may be met in one of the following ways:
3. Successful completion of four or more years of consecutive study of the same foreign language at the high school level preceding admission to Oregon State University;
4. Completion of the AP College Board test in a foreign language with a score of 4 or 5 ;
5. Completion of the third term of
a second-year foreign language sequence at OSU or another accredited university with a GPA of 3.0 or better. This course must constitute a minimum of 4 quarter or 3 semester credits.
6. Completion of one term of a third-year foreign language course (i.e., any course designated 311,312 or 313 ) at OSU or another accredited university with a GPA of 3.0 or better. This course must constitute a minimum of 3 quarter or 2 semester credits.
7. An international student whose native language is not English who wishes to use English to satisfy the foreign language entrance requirement will have satisfied the requirement upon admission to OSU.
8. Meet any additional requirements established by your major department or college.

## SPECIAL NOTES ABOUT <br> ADMISSION

If you change majors after admission to the International Degree Program, you will have to reapply for admission to the International Degree Program in your new department.

If you are pursuing two degrees besides the International Degree, you only need to apply for the International Degree in one department. The choice of departments is up to you, but you should consult your advisors before determining where to apply.
*You may be admitted to the program as a pre-International Degree student if you meet all the requirements listed above except for the two-year language requirement.

## GENERAL INTERNATIONAL DEGREE REQUIREMENTS

1. You must successfully complete all departmental, college, and institutional requirements for your primary degree.
2. You must also complete a minimum of 32 credits in residence beyond the minimum 180 to 204 credits required for most primary degrees. Courses taken through an OSU-sponsored program abroad are considered inresidence credits. Depending on the level of previous foreign language study and experience abroad, you could take anywhere from a minimum of 32 additional credits to a maximum range of 70-plus additional credits to complete the degree.
3. Additional International Degree requirements may be established for your primary degree, so check with your major advisor or the

International Degree contact in your department to make sure that you know what they are and that you are able to complete them. When you meet with your advisor, have a transcript in hand.
4. As is currently true for all degrees, your academic dean will verify that you have completed the International Degree requirements. The graduation audit will be done along with and in the same fashion as for your primary degree by your major department. Confirmation of the International Degree will be appropriately noted on your transcripts, and you will receive separate diplomas.

## SPECIFIC INTERNATIONAL DEGREE REQUIREMENTS

1. You must demonstrate advanced level achievement or proficiency in a foreign language in one of the approved ways. Typically, this requirement is met by completing the third term of a fourth-year language sequence at OSU. Students must take language courses for letter grades and earn a cumulative GPA of 3.0. Exceptions may be considered only by petition (see International Degree office for details). To find out about additional ways to demonstrate advanced proficiency, contact the International Degree office.
2. You must successfully complete a minimum of four courses selected from the baccalaureate core curriculum, with the approval of your departmental International Degree advisor. These courses are in addition to the university's baccalaureate core requirements. The International Degree course requirements from the baccalaureate core are as follows:

- One course selected from the Western Culture category (3-4 credits);
- Two courses selected from the Cultural Diversity category (6-8 credits);
- One course selected from the Western Culture, Cultural Diversity, or Contemporary Global issues categories (3-4 credits). Note: Not all four courses may focus on the same culture or language. For example, you cannot take all four of the additional baccalaureate core courses focusing on Spanish speaking countries/peoples.
- To see the entire baccalaureate core list go to http://catalog. oregonstate.edu/BCC.aspx.

3. The third requirement of the degree is to spend a minimum of

10 weeks in a country where your International Degree language is spoken and be engaged in a study abroad program, an international internship or an international research project.
4. The final requirement for the degree is to prepare a rigorous and integrative senior thesis, which demonstrates a fundamental and comprehensive understanding of global issues and of the international dimensions of your primary degree. Requirements for the senior thesis include successful completion of INTL 407, Seminar: International Issues: Introduction to Thesis for 1 credit, and 3 to 6 credits of 403 (Thesis) in your department.

## GRADUATION LANGUAGE

## REQUIREMENTS

Students must demonstrate advanced level achievement or proficiency in a single foreign language in one of the following ways:

- Completion of a fourth-year foreign language sequence (designated 411 , 412,413 ) at OSU with a minimum 3.00 GPA cumulative in all foreign language courses. Courses must be taken for a letter grade and may not be graded S/U.
- Completion of a fourth-year foreign language sequence at another accredited university with a minimum 3.00 GPA , in a program in which the combined third-year and fourth-year language courses constitute a minimum of 18 quarter or 12 semester credits.
- Completion of a minimum of 9 quarter ( 6 semester) credits with a minimum 3.00 GPA, at Oregon State University or another accredited university, of any 400-level course work (in any discipline) taught in a foreign language, if approved by the student's primary degree department or school.
- Demonstration of end of fourthyear level proficiency in a foreign language by successful completion of an achievement test administered by the School of Language, Culture, and Society at OSU.
- Demonstration of fourth-year level proficiency in a foreign language as evidenced by an oral proficiency test administered by a certified foreign language proficiency tester that is approved by the OSU School of Language, Culture, and Society.
- For languages not offered at OSU, the requirement may also be completed by a minimum of nine-month residency (study, research, work), after fulfilling the foreign language entrance requirement, in a country in which the language is spoken.
- Completion of a minimum of one term international internship using the target language after completion of a third-year language sequence $(311,312,313)$ at OSU with a cumulative GPA of 3.0 or above.


## EXPERIENCE ABROAD

Students must spend a minimum of 10 weeks in another country where the language used to meet the International Degree requirement is spoken and be engaged in one of the following:

- A study abroad program offered by OSU, another university, or a program designed by the student. Programs administered by other universities or those designed by students must be approved by the International Degree Program and the student's primary department. Currently OSU has universitysponsored programs in over 70 countries.
- An international internship or work program that receives academic credit, such as the $\mathrm{IE}_{3}$ Global Internship Program offered by OSU.
- A pre-approved research project abroad.
- Previous international experience, such as the Peace Corps, approved by the primary academic department and the International Degree Program.


## SENIOR THESIS

The final requirement for the degree is to prepare a rigorous and integrative senior thesis that demonstrates a fundamental and comprehensive understanding of global issues and of the international dimensions of your primary degree. This thesis places your academic discipline in an international context, often in a comparative fashion. Because it fulfills the writing intensive course requirement for the International Degree, it will involve multiple drafts and revisions. The final product will represent polished, formal writing, in a format appropriate to your academic field.

## DUAL THESIS REQUIREMENTS:

You may write one thesis to meet the International Degree requirement and the thesis requirement in your department. If you will complete a senior thesis to meet another academic requirement in your primary degree, it is important to consult with academic advisors in your major as well as in the International Degree office.

- Example: If you are in the University Honors College, you will work with both the Honors College and the International Degree office to ensure that you fulfill both sets of requirements.
Thesis proposal: A copy of the thesis proposal form will be on file in the

International Degree Program office. The topic will evolve as you work, and may change substantially, but identifying an appropriate advisor and developing a proposal form are crucial steps in your progress toward completion of the thesis requirement of the International Degree. If your thesis ideas change significantly, it is important to file a revised proposal with the International Degree Program office.

Thesis credit: Before graduating, you will spend two to three terms working on the thesis and will receive credits through your major department. You will register for a minimum of 3 thesis credits under the department prefix appropriate to your major (403), with your thesis advisor as the professor of record. These credits may be distributed over multiple terms, and you may receive an incomplete for the credits taken during the earlier term(s) until you have finished your thesis work. You will register for these credits during the year you plan to complete your thesis work, as incomplete grades should be removed within 12 months. Please note that credits for which you receive an incomplete do not count toward credits satisfactorily completed during that term. If you receive financial aid, you should plan ahead to ensure that this does not affect your aid eligibility.

- Example: If you are a sociology major, you would register for a minimum of 3 credits of SOC 403. If you are a mathematics major, you would register for MTH 403. Some departments already have a thesis course listed in the schedule of classes, but other departments may ask the registration schedule desk to set up a CRN for that course number during the term(s) for which you wish to register for thesis credit.
These credits may be graded or pass/ no pass. If you and your advisor agree that the scope of your thesis warrants additional credit, and your college and department's policies allow it, you may register for additional credits. The suggested maximum is 6 credits.

Colleges, departments, or advisors may elect to set different requirements for thesis credits that meet the needs of their programs. In this case, the requirements or preferences of the college/department take precedence over general International Degree requirements.

## REQUIREMENTS FOR THE SENIOR THESIS INCLUDE:

Thesis class: As a part of your program, you will enroll in the 1-credit class INTL 407, Seminar: International Issues: Introduction to Thesis, offered on a pass/no pass grading basis. The course is offered twice a year during fall and winter terms. It is designed to help you define and
focus your areas of interest, get an overview of research methods, develop your thesis ideas, identify a suitable advisor in your major department who will assist you throughout the process, complete a thesis proposal form, and develop a realistic and effective timetable for completion. During this course, you will receive a copy of the guide, Preparing a Senior Thesis. Note: If you are also a student in the University Honors College, you may enroll in either the UHC thesis class or the International Degree Program's thesis class.

Final thesis: This represents polished, formal writing. Theses average 30 to 50 pages, but to ensure fulfillment of the WIC requirement, even a thesis with a nonverbal component such as art, music, or photography must include a minimum of 8 to 10 pages of formal writing and place the thesis in the appropriate historical/cultural context by incorporating and documenting outside sources.

- Example: A graphic arts student who interned in Russia compared contemporary posters in the U.S. and Russia, and displayed examples. He also wrote an analysis of his findings.
Presentation: When your thesis is complete, you will make a public presentation of your work. The format may vary depending on your topic and your own preferences, but you will present your thesis to a group including your advisor, other interested faculty in your department, representatives of the International Degree program, and other guests whom you may want to invite.

Final copies of the log and thesis must be turned in to your major department and the International Degree office two weeks prior to the date that grades are due for graduating seniors for the term you plan to graduate. This is usually a week before finals week.

## ADDITIONAL COLLEGE

## AND DEPARTMENTAL

 REQUIREMENTS
## Foreign Language Majors

To earn the International Degree you must complete the second foreign language required of a language major through the fourth-year level. You must also spend two 10-week periods abroad, one in each of the countries where the two languages you are studying are spoken. For example, if you are a German major and have decided to take Russian as your second foreign language, you must complete the 400 -level Russian course and study abroad in both Germany and Russia.

Additionally, you may not complete major/minor requirements without taking upper-division courses in the OSU School of Language, Culture, and Society
even if you complete the hour requirements abroad.

## College of Forestry Majors

As part of the four additional baccalaureate core courses required for the International Degree, you must take FE/FOR 456, *International Forestry (3).

## SCHOLARSHIPS

In support of the overseas learning experience, the International Degree Program has funds available to assist students traveling abroad and to assist with costs associated with research for your thesis. These are awarded on a competitive basis. Please talk to the International Degree office for more information.

The College of Liberal Arts offers major programs in the arts, humanities, and social sciences that comprise the core of human knowledge. Students can earn degrees and minors in the college's many disciplines and interdisciplinary programs, as well as certificates of specialized training in seven other fields. Qualified students can also participate in a joint program with the College of Law at Willamette University, in which they can earn their bachelor's and law degrees in six years.

$\square$uccess follows opportunity. In the College of Liberal Arts opportunities for academic success and enhanced professionalism are provided to all. Students gain the skills and knowledge required to integrate creative problem-solving with a sense of social responsibility and involvement in activities that enrich the cultural life of the university, Corvallis, the state of Oregon and the entire world.
Students in the College of Liberal Arts receive individual attention in student learning communities and have the opportunity to interact in small groups with their professors, many of whom are also their academic advisors. This more personal environment and interaction results in the possibility of going beyond surface knowledge to a deeper understanding of the discipline being studied and how it impacts human knowledge, commerce, art and science.
The qualifications and accomplishments of the faculty members in the College of Liberal Arts are truly impressive. A strong commitment to teaching by a faculty of great personal achievement and learning ensures that students will receive an excellent education by enrolling in one of the majors offered in the College of Liberal Arts...where successful futures begin.

## MAJORS

The College of Liberal Arts offers major programs leading to the bachelor of arts (BA) or bachelor of science (BS) degree in the following:
American Studies (OSU-Cascades Campus only)
Anthropology
Options: Archaeology, Biocultural Option, Cultural/Linguistic, General Anthropology
Art
Options: Art History, Photography and Digital Studio, Photography and Digital BFA, Studio Art, Studio Art BFA
Digital Communication Arts
Economics
Options: Law, Economics and Policy; Managerial Economics; Mathematical Economics
English
Ethnic Studies
French
German
Graphic Design
History
Liberal Studies
Option: Pre-Education
Music
Options: Instrumental Performance, Music Education, Music Production, Piano
Performance, Vocal Performance

## Philosophy

Political Science
Options: Environmental and Energy
Politics, International Affairs, Law and Politics
Psychology
Religious Studies

Sociology
Options: Crime and Justice, Environmental and Natural Resource Sociology
Social Science (OSU-Cascades Campus only)
Option: Community Development and Leadership
Spanish
Speech Communication
Options: Communication, Theatre Arts
Women, Gender, and Sexuality Studies

Graduate Majors
Applied Anthropology (MA, PhD, MAIS)
Applied Ethics (MA, MAIS)
College Student Services Administration (EdM, MS)
Contemporary Hispanic Studies (MA)
Creative Writing (MFA)
English (MA, MAIS)
Environmental Arts and Humanities (MA)
History of Science (MA, MS, PhD, MAIS)
Psychology (MS, PhD, MAIS)
Public Policy (MPP, PhD)
Women, Gender, and Sexuality Studies (MA, PhD, MAIS)

Graduate Minors
Anthropology
Applied Anthropology
Applied Ethics
Art
Contemporary Hispanic Studies
Creative Writing
English
Environmental Arts and Humanities
Ethnic Studies
Food in Culture and Social Justice
Foreign Languages and Literatures
History
History of Science
Music
Philosophy
Political Science
Psychology
Queer Studies
Sociology
Speech Communication
Women, Gender, and Sexuality Studies
Undergraduate Certificates
Applied Ethics
Food in Culture and Social Justice
Language in Culture
Latin American Affairs
Medical Humanities
Peace Studies
Religion and Culture
Women, Gender, and Sexuality Studies

## DOUBLE DEGREES

Undergraduates with majors in the College of Liberal Arts can earn a second degree in education, innovation management, international studies, or sustainability. See the College of Education, College of Business, International Programs or Department of Forest Ecosystems and

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97331-6202
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liberalarts.
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## Administration

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## Tristen Shay,

Associate Director of Student Services, 541-737-2656, tristen. shay@oregonstate. edu

Society sections of this catalog for more information.

## MINORS

Students throughout the university may elect to pursue the following undergraduate minors: Anthropology; Art History; Asian Languages and Cultures; Asian Studies; Communication; Economics; English; Ethnic Studies; Film Studies; French; German; History; Multimedia; Music; Music Performance; New Media Communications; Philosophy; Photography; Political Science; Popular Music Studies; Psychology; Queer Studies, Religious Studies; Russian (suspended); Social Justice; Sociology; Spanish; Theatre Arts; Visual Arts; Women, Gender, and Sexuality Studies; and Writing.

The College of Liberal Arts also offers many courses in the arts, humanities, and social sciences that are of value to all students and are basic to a liberal education. Such courses help students in their personal development and enrichment through a deeper understanding of themselves and appreciation of human cultural development.

## TEACHER EDUCATION

The College of Liberal Arts offers excellent undergraduate preparation for elementary, middle or high school teachers. The Liberal Studies pre-education program is ideal for elementary school teachers.

Students wanting to teach at the high school level may major in English, French, German, history/social studies, music or Spanish.

## CERTIFICATE PROGRAMS

Certificate programs in Applied Ethics; Food in Culture and Social Justice; Language in Culture; Latin American Affairs; Medical Humanities; Peace Studies; Religion and Culture; Russian Studies (suspended); and Women, Gender, and Sexuality Studies are offered to all students and may be taken concurrently with any major degree program.

## PRE-LAW PREPARATION

OSU provides opportunities for a complete and rigorous preparation for students interested in attending law school. Our accomplished graduates attend some of the finest schools in the nation.

Law school is one of the few professional schools that do not require a particular set of courses as a prerequisite for admission. Students may major in any subject. Students should choose a major that engages and challenges them, a course of study where they can excel. They are advised to supplement their major courses with a diverse selection of classes that offer depth, rigor, and skill in three areas: written and oral communication, deductive reasoning and logic, and
a general knowledge of the institutions and values of our society.

The College of Liberal Arts offers many effective and engaging ways to prepare for law school, rather than one single pre-law program. Students interested in law school may contact Professor Jason Tanenbaum in the School of Public Policy. Call 541-737-3663 for his office hours. Students also may call the CLA Student Services Office, 541-737-0561. Students should also obtain the College of Liberal Arts pre-law advising brochure, which is available online at http:// liberalarts.oregonstate.edu/content/ pre-law-program.

## ACCELERATED BA/BS AND LAW (JD) PROGRAM WITH WILLAMETTE UNIVERSITY COLLEGE OF LAW AND LEWIS AND CLARK COLLEGE LAW SCHOOL

This program enables OSU students to earn a BA or BS degree and a law degree in a total of six years, three years at OSU and three at either the Willamette University College of Law or the Lewis and Clark College Law School.
Students may be admitted to the program any time during their first two years of undergraduate study provided they have a 3.5 high school GPA and a minimum combined SAT score of 1950 or composite ACT score of 29 . Students will complete all but 45 credits of upperdivision electives for a BA or BS degree in defined majors ${ }^{1}$ in the College of Liberal Arts. For admission to law school, students must have earned a cumulative GPA of 3.4 or higher and a Law School Admission Test (LSAT) score no lower than the median LSAT for the prior year's entering class.
At Willamette University and at Lewis and Clark College, the students' firstyear law courses will satisfy the 45 -credit upper-division elective requirements for their OSU degree. After completing the additional two years at Willamette or at Lewis and Clark, students will have completed both the bachelors and JD degrees in six years.
Note: OSU Honors College students are currently not eligible for this program due to the senior year thesis requirement.

## Footnote:

${ }^{1}$ American Studies (OSU-Cascades Branch Campus in Bend); Anthropology; Economics; English; Ethnic Studies; French; German; History; Philosophy; Political Science; Sociology; Spanish; Speech Communication; Women, Gender, and Sexuality Studies.

## ACADEMIC ADVISING

Mission Statement: The College of Liberal Arts academic advising is a teaching and learning process dedicated to student success. Academic advising engages students in developing a plan to realize their educational, career and life goals.

Values Statement: The values associated with advising in the College of Liberal Arts are closely aligned with the stated values of the university.

## - Accountability: We are

 committed to providing timely, accurate and intentional advising.- Diversity: We honor the unique nature and interests of each student. Advising services and delivery methods will be shaped to fit the diverse needs of our campus populations.
- Respect: We seek to establish a reciprocal relationship with students based on an ethic of care and shared responsibility.
- Social Responsibility: We foster a culture of independent thinking and global awareness so that students make informed, socially responsible choices consistent with their academic, career and life goals.
- Integrity: We seek to engage students in a fair and professional process of meaningful self-reflection and authentic inquiry.


## COLLEGE OF LIBERAL ARTS REQUIREMENTS

A liberal arts education involves exploration and broad study beyond one's major field. Students are encouraged to understand other cultures, other ways of knowing, and other fields of study. Students are also encouraged to take more courses in areas outside their major field to enhance their experience.

Liberal Arts students are required to satisfy four sets of requirements:

- Oregon State University Baccalaureate Core
- College of Liberal Arts Core
- BA or BS requirements
- Major program requirements

The University Baccalaureate Core course requirements are explained in a separate section, "Earning a Degree at Oregon State." The College of Liberal Arts Core and the BA and BS requirements are explained below. The major program requirements are explained in the appropriate section in the pages that follow. If you want to add a minor program, you will also need to complete the requirements for that minor. Specific requirements for interdisciplinary minors are listed in the Interdisciplinary Programs section of this catalog. Specific requirements for disciplinary minors are usually given in the appropriate school or departmental section; for example see the School of Public Policy section for requirements for the Economics minor.

You may not use a single course to satisfy more than one of these requirements. In addition, you may not use courses within your major field to satisfy either baccalaureate core or liberal arts core requirements. (However, courses
taken to satisfy the baccalaureate core requirements or the liberal arts core may also be used to satisfy requirements for a minor.)

## LIBERAL ARTS CORE

The liberal arts core consists of five courses (at least 15 credits) as follows:

- Humanities (3): Critical examination of influential traditions and ideas as defined by major scholarly works (includes English literature; ethnic studies; film studies; foreign language and literatures, including culture; history; and philosophy).
- Fine Arts (3): Participation in or appreciation of different forms (includes art, music, theater, and creative writing in poetry, fiction, or drama).
- Social Science (3): Scientific investigation and theory pertaining to human individuals, social groups, institutions, and ideologies (includes anthropology; economics; political science; psychology; sociology; women, gender, and sexuality studies; and selected geography courses).
- Nonwestern Culture (3): Study in any of the following areas focusing outside of Western culture-Africa, Asia, Russia, South America, Central America, Caribbean, Middle East, the Pacific, or Native North Americans.
- One additional course from one of the preceding four areas (3).
For a list of specific courses that satisfy the liberal arts core requirements, use the Schedule of Classes Searcher website and scroll down to the CLA Liberal Arts Core Courses search feature: http://catalog. oregonstate.edu/SOCSearcher.aspx.


## BA/BS REQUIREMENTS

Nearly all liberal arts students graduate with either a bachelor of arts or bachelor of science degree.

- BA Requirement: Second-year proficiency in a second language, including ASL, at the college level with at least a C-.
- BS Requirement: A minimum 15 -credit block of science, computer science, and quantitative studies as follows:

1. Any computer science (CS) course approved by the student's major school or department (3-4), and
2. Any course from the College of Science approved by the student's major school or department except math (MTH) or statistics (ST) courses (3-4), and
3. One of the following ( $8-12$ ):

- ST 351 and ST $352(4,4)$.
- MTH 111 and MTH 245 $(4,4)$.
- Any 8 credits of MTH
courses at the 200 level or above (not including MTH 211 and MTH 212).
- MTH 211, MTH 212, and MTH 390 (4,4,4). Preelementary education majors only.
- MTH 241, MTH 245 or MTH 251, and ST 351 $(4,4,4)$.
Many schools or departments require specific courses to satisfy the BS degree requirements; students should consult their academic advisors for details. Courses used to satisfy the BS degree requirements may not also be used to satisfy baccalaureate core requirements.

Bachelor of Fine Arts (BFA) degrees in Applied Visual Arts, Digital Communication Arts, and Graphic Design are offered by the School of Arts and Communication. BFA degree requirements differ from those in other College of Liberal Arts programs. Students in the BFA degree program must complete the baccalaureate core and a minimum of 105 credits in art or digital communication arts.

## AMERICAN STUDIES

Neil Browne, Director
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541-322-3129
Email: neil.browne@osucascades.edu Website: http://osucascades.edu/ academics/american-studies

## Undergraduate Major

American Studies (BA, BS, CRED)
American Studies is only offered on the OSU-Cascades Campus in Bend, Oregon. Honors degrees are not available on the OSU-Cascades Campus.

## AMERICAN STUDIES (BA, BS, CRED, HBA, HBS) Offered only on the OSU-Cascades Campus.

An interdisciplinary major that engages American culture in its historical, contemporary, and global contexts. Examines American culture through a variety of media including film, music, literature, history, politics, and art. Teaching faculty members are from several different disciplines and students approach course objectives from many scholarly vantage points.

## Lower Division (20 credits)

## Required Courses:

ENG 253. *Survey of American Literature: Colonial to 1900 (4)
ENG 254. *Survey of American Literature: 1900 to Present (4)

## Choose 2 below:

HST 201. *History of the United States (4)

HST 202. *History of the United States (4)
HST 203. *History of the United States (4)

## Choose 1 AMS Elective from the

## following list:

ANTH 210. *Comparative Cultures (3)
ANTH 251. *Language in the USA (4)
ENG 260. *Literature of American
Minorities (4)
HST 101. *History of Western Civilization (4)
HST 102. *History of Western Civilization (4)
HST 103. *History of Western Civilization (4)
HST 106. *World History III: The Modern and Contemporary World (3)
PS 201. *Introduction to United States
Government and Politics (4)
SOC 204. *Introduction to Sociology (3)
Upper Division (33 Credits)

## Required Courses:

AMS 311. Topics in American Studies (4)
(this course is repeatable with different topics)
AMS 350. *American Culture and the
Vietnam Experience (4)
AMS 406. Projects [American Studies
Portfolio] (1)
ART/ENG 386. American Art and Literature: Part 1 (4)
ART/ENG 387. American Art and Literature: Part 2 (4)
ART/ENG 388. American Art and Literature (4)

## AMS Upper-Division Electives:

Select 12 credits from the following list:
ANTH 311. *Peoples of the World-North America (3)
ANTH 350. Language, Culture and Society (4)
ANTH 352. *Anthropology, Health, and Environment (3)
ART 462. Directions and issues in Contemporary Art (3)
COMM 326. Intercultural Communication (3)

COMM 412. Topics in Speech
Communication (3)
COMM 416. Ethnography of Communication (3)
COMM 427. Cultural Codes of Communication (3)
ENG 317. *The American Novel: Beginnings to Chopin (4)
ENG 318. *The American Novel: Modernist Period (4)
ENG 319. *The American Novel: Post-World War II (4)
ENG 360. *Native American Literature (4)
ENG 362. *American Women Writers (4)
ENG 470. ^Studies in Poetry (4)
ENG 482. Studies in American Literature, Culture, and Environment (4)
ENG 485. ^Studies in American Literature (4)
PS 363. *Gender and Race in American
Political Thought (4)
PS 370. *Science, Religion, and Politics (4)
PS 375. *The Civil Rights Movement and Policies (4)
PS 475. Environmental Politics and Policy (4)
SOC 381. Social Dimensions of
Sustainability (4)
SOC 426. *Social Inequality (4)
SOC 430. Gender and Society (4)
SOC 475. Rural Sociology (4)
SOC 480. *Environmental Sociology (4)

## Required:

AMS 406. Projects (1)
American Studies Final Portfolio (Must be submitted during the student's final term)

1. Pick three essays you wrote during the course of your program in American Studies that you feel are representative of your most meaningful work. These may be your best essays, but they may be essays in which you struggled with difficult material in an attempt to better understand it. In other words, which essays are most meaningful to you in your experience earning an American Studies degree at OSU Casacades?
2. Incorporating at least one of the American Studies Outcomes, write a three-page cover letter explaining why you chose these essays and how they reflect what you have learned and experienced in the process of earning your degree in American Studies at OSU-Cascades.

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: $\mathbf{8 6 5}$

## ■ AMERICAN STUDIES <br> PROGRAM COURSES

AMS 311. TOPICS IN AMERICAN STUDIES (4).
Selected topics, changed annually, that investigate
American ideas, regions, events, or periods. Fulfills the requirement for an integrated course in the major. May be repeated as topics vary. Open to nonmajors. This course is repeatable for a maximum of 99 credits.
AMS 350. *AMERICAN CULTURE AND THE VIETNAM EXPERIENCE (4). Examines through literature, film, and popular media the effects of the Vietnam War on American culture. Taught at OSU-Cascades only. (Bacc Core Course) PREREQS: Sophomore standing.

AMS 405. READING AND CONFERENCE (1-16). Independent, individual studies supervised by the director, members of the American Studies Board, or assigned professors, as arranged by the student and the director. This course is repeatable for a maximum of 16 credits.

AMS 406. PROJECTS (1-16). Studies of American culture and society centered around topical events or cultural programs of current interest in American studies. This course is repeatable for a maximum of 16 credits. PREREQS: Sophomore standing and departmental approval.

AMS 407. ${ }^{\wedge}$ SEMINAR (1-16). May be repeated for credit as topics vary. (Writing Intensive Course) CROSSLISTED as ENG 407/ENG 507. This course is repeatable for a maximum of 16 credits.
AMS 410. AMERICAN STUDIES INTERNSHIP
(1-16). Supervised and evaluated work in a variety of professional fields to enhance students' career preparation; arranged at the initiative of the student one semester in advance. This course is repeatable for a maximum of 16 credits. PREREQS: Sophomore standing
AMS 507. SEMINAR (1-16). May be repeated for credit as topics vary. CROSSLISTED as ENG 407/ENG 507. This course is repeatable for a maximum of 16 credits.

## LIBEBAL STUDIES

Louie Bottaro, Director-Student Services
214 Bexell Hall
Oregon State University
Corvallis, OR 97331-6202
541-737-0561
Email: louie.bottaro@oregonstate.edu Website: http://liberalarts.oregonstate. edu/advising/liberal-studies

## Undergraduate Major

Liberal Studies (BA, BS, HBA, HBS)
Option
Pre-Education

## LIBERAL STUDIES (BA, BS, CRED, HBA, HBS)

## Also available via Ecampus.

A BA or BS degree in Liberal Studies is available for students whose academic and career interests suggest greater curricular breadth and flexibility than is available in other major programs.
Candidates for the Liberal Studies major must complete the following:

- Oregon State University Baccalaureate Core
- College of Liberal Arts Core requirements
- A program consisting of 45 or more credits that are thematic in nature and include at least 27 upper-division credits developed from the course offerings of two or more departments within the College of Liberal Arts. The plan of study and statement of justification must be approved in advance by the head advisor or designee.
- At least one Writing Intensive Course (WIC) with a grade of C or better.
- Maintain a 2.0 or better university GPA.
- Maintain a 2.3 or better major GPA.

The typical program is designed to meet the needs and interests of the particular student and is unique in content. In some cases, a prestructured program may provide a suitable match.

## Major Code: 920

## PRE-EDUCATION OPTION

The BA or BS degree in Liberal Studies may be used to prepare for a teacher licensure program.
Pre-Education Option Core (94-105)
(This fulfills the baccalaureate core.) Computer Science (4)
Contemporary Global Issues (3)
Cultural Diversity (3)
Difference, Power, and Discrimination (3) Education (3)
HDFS 311. Infant and Child Development (4)
HDFS 313. Adolescent Development (4)
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC course (1-2)

GEOG 105. *Geography of the Non-Western World (3)
and GEOG 106. *Geography of the
Western World (3)
Literature (9)
MTH 211, MTH 212, MTH 390.
*Foundations of Elementary Mathematics $(4,4,4)$
PSY 201, PSY 202. *General Psychology $(3,3)$
Science (Bacc core plus two additional from approved list) (18-20)
Science, Technology and Society (3)
Spanish: strongly recommended
Speech, Writing I, II (9)
Select one of three U.S. history courses below for 4 credits:
HST 201. *History of the United States (4)
HST 202. *History of the United States (4)
HST 203. *History of the United States (4)
Plus 6 additional history credits (6)
College of Liberal Arts Core (12)
One Specialization (45)
Select one from six distinct interdisciplinary specializations listed below. Contact Tristen Shay at 541-737-0561 for detailed specifications.

## Specializations (select one):

Behavioral Science
Fine Arts
Language Arts
Russian Language and Culture Social Studies
Spanish Language and Latino(a) Studies

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)


## Option Code: 922

I LIBERAL STUDIES COURSES
LS 199. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.
LS 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits.
LS 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
LS 405. READING AND CONFERENCE (1-3).
This course is repeatable for a maximum of 16 credits.

LS 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

LS 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

LS 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

LS 409. PRACTICUM (1-3). This course is repeatable for a maximum of 16 credits.

LS 410. INTERNSHIP (1-12). Restricted to students enrolled in off-campus programs.
Not available to students in residence on the Corvallis campus. Maximum of 12 credits. This course is repeatable for a maximum of 12 credits. PREREQS: Junior or senior standing, and 15 credits of OSU residence work completed.
LS 428. ^INTERSECTIONS (3). An examination of liberal arts disciplines and their interrelations with emphasis on critical thinking and library skills. Includes attention to uses of a liberal arts degree. (Writing Intensive Course) This course is repeatable for a maximum of 6 credits.

LS 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## SCHOOL OF ARTS AID <br> COMMUNCATION

Lee Ann Garrison, Director
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541-737-5090
Email: LeeAnn.Garrison@oregonstate.edu
Julie Green, Art Area Coordinator
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Email: music@oregonstate.edu Website: http://liberalarts.oregonstate. edu/school-arts-and-communication/ music/
William Loges, New Media
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Elizabeth Helman, Theatre Arts Area Coordinator
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Corvallis, OR 97331
541-737-4627
Email: theatre@oregonstate.edu Website: http://liberalarts.oregonstate. edu/school-arts-and-communication/ theatre/

## FACULTY

Professors Campbell, M. Carlson, Goodnow, Green, Hiratsuka, Jordon, McCabe, Moore, Sayre, Walker, Zielke Associate Professors Brooke, Brudvig, Bull, Dollar, Iltis, Loges, Peltomaki, Poppino, Porrovecchio, Rossi
Assistant Professors Bradshaw, Chapman, Faltesek, E. Gallagher, Hesse, Root, Silveira, Xue
Senior Instructors A. Carlson,

Kesterson
Instructors Beauregard, Bushnell, Ferguson, Gamble, Helman, Myers, Sanders, Trail, Wright
Assistant to the Director Chandler
Academic Advisor Oliveros
Senior Research Assistant Russell
Faculty Research Assistant Jeffers
Emeriti Bennett, Bowker, Caldwell, Chesley, Coolen, George, Headrick, Mason, Weinman

## Undergraduate Majors

Applied Visual Arts (BFA, HBFA) [To be suspended/terminated summer 2017] Art (BA, BS, HBA, HBS)

## Options

Art History (BA, HBA)
Photography and Digital Studio (BA, BS, HBA, HBS)
Photography and Digital Studio BFA (BFA, HBFA)
Studio Art (BA, BS, HBA, HBS)
Studio Art BFA (BFA, HBFA)
Digital Communication Arts (BA, BS, BFA, HBA, HBS, HBFA)
Graphic Design (BFA, HBFA)
Music (BA, BS, HBA, HBS)

## Options

Instrumental Performance
Music Education
Music Production
Piano Performance
Popular Music Studies
Vocal Performance
Speech Communication (BA, BS, HBA, HBS)
Options
Communication
Theatre Arts

## Minors

Art History
Communication
Multimedia
Music (for nonmajors)
Music Performance
New Media Communications
Photography
Popular Music Studies
Studio Art
Theatre Arts
Undergraduate Certificate
Scientific, Technical, and Professional Communication

Graduate Minors
Art
Graduate Areas of Concentration
Art History
Fine Arts
Photography
Music
Graduate Areas of Concentration
Composition

## Conducting

Music Education
Performance
Speech Communication
Graduate Areas of Concentration
Interpersonal and group communication
Rhetoric and social influence
Theatre arts costume and scene design
Theatre arts directing, performance, and management
Theatre arts history, criticism/literature, and playwriting

## ART

The Art Area of the School of Arts and Communication offers Bachelor of Fine Arts (BFA), Bachelor of Arts (BA), and Bachelor of Science (BS) degrees through extensive course work in fine arts, graphic design, photography, and art history.

The curriculum provides an awareness and understanding of the historical and contemporary significance of art as a unique feature of society. Major programs offer the opportunity for professional artistic development while incorporating subjects that lead to a liberal education. These programs prepare the student for a range of professional opportunities or later graduate study in photography, fine art, and art history, as well as many related fields. As a cultural enrichment for our students, the Art Area sponsors exhibitions, lectures, workshops, and other events related to the visual arts.
Candidates for the BFA degree may select an option in fine arts or photography. Candidates for the BS degree may select the fine arts or photography option. Candidates for the BA degree may select an option in fine arts, art history, or photography. The BFA is a pre-professional degree. The College of Liberal Arts requirements for the BFA differ from other degree programs. (See BFA/Applied Visual Arts.) Admission into either the Fine Arts or Photography option is selective and competitive. See program requirements for specific details.

The Art History minor combines an introduction to art history with an opportunity to explore advanced topics. The Visual Arts minor is a studio concentration in either fine arts or photography. The Art Area also participates in the New Media Communications minors and Digital Communication Arts major, as well as the Master of Arts in Interdisciplinary Studies (MAIS).

## Monthly Art Exhibitions

The Art Area of the School of Arts and Communication, based in Fairbanks Hall, features monthly exhibitions by nationally and internationally recognized artists in the Fairbanks Gallery. The school is also the sponsor of the Visiting Artists and Scholars Lecture Series, which has brought in renowned artists including

Philip Pearlstein, Ann Hamilton, Marina Abromovíc, Bill Viola, and Do Ho Suh. In 1995, the school created the JumpstART Precollege Visual and Performing Arts Workshop held each summer for talented high school students in art, music and theater.

## MUSIC

The Music Area of the School of Arts and Communication offers programs leading to the Bachelor of Arts (BA) or Bachelor of Science (BS) degree, a variety of baccalaureate core courses for students with little or no background in music, and opportunities for qualified students to perform in bands, choirs, and the symphony orchestra. Students wishing a greater curricular choice may wish to combine music study with courses in another school or department in the College of Liberal Arts for a liberal studies major. The Music Area also offers minors in Music and Popular Music Studies.

The Music Area also teaches graduate courses in music education, literature and history, conducting, performance and special projects. Graduate students may pursue the Master of Arts in Teaching: Music Education (MAT) degree or the Master of Arts in Interdisciplinary Studies (MAIS) degree in a broad range of fields. OSU's graduate programs in music have been approved by Oregon's Teacher Standards and Practices Commission and the National Council for Accreditation of Teacher Education. Programs are available for individuals seeking both the initial and/or continuing license in music at all levels of authorization.

Performance instruction at the intermediate and advanced levels is available with instructor consent. Students should contact the school office for application procedures and fee schedules.

The Music Area proudly presents upwards of 200 musical events of all types throughout the academic year and summer. Choral, instrumental, orchestral ensembles of all sizes and types provide students from across campus the chance to participate in and/or simply enjoy listening to music. Many ensembles and events include the chance to work with and learn from professional musicians and nationally and internationally-recognized music educators.

## Scholarships are available for

 music majors and for outstanding performers. Auditions and interviews take place in February and March each year. Selection is based on musical and academic achievement.The Sound Design Lab in Benton Hall includes state-of-the-art digital recording and editing hardware and software and is open to all OSU students. Work-study students are available to help students learn how to use the facilities.

Career possibilities in music include
teaching in the schools, private instruction, performing in orchestras or ensembles, music librarianship, arts management, music business, and recording engineering.

## NEW MEDIA COMMUNICATIONS

The New Media Communications (NMC) Area of the School of Arts and Communication offers Bachelor of Fine Arts (BFA), Bachelor of Arts (BA), and Bachelor of Science (BS) degrees in Digital Communication Arts. There is also a minor in New Media Communications. Course work explores the storytelling capacity of contemporary media and technologies. When pursuing an NMC degree students acquire the skills they need to use today's media effectively in sharing knowledge, imagination, and information. Students also learn to anticipate how future changes in the media are likely to influence their lives. In NMC courses, students explore how to make abstract concepts or hidden processes visible, how to anticipate people's reactions to innovation, how to write professionally, how to recognize the influence of media, how to produce creative content in a variety of media formats, and much more. A New Media Communications major prepares students for a lifetime of change and involvement in the digital world.
NMC courses are taught in multiple venues on campus including the MotionCapture and Gaming labs, both currently located on the fourth floor of Strand Ag Hall.

Each year numerous New Media students participate in internships with on-campus organizations and off campus with local and regional companies. Selected students participate in the National Association of Broadcasters annual convention and other regional and national organizations and events.

## SPEECH COMMUNICATION

The Communication Area of the School of Arts and Communication offers a major program leading to a Bachelor of Arts (BA) or Bachelor of Science (BS) degree. The degree examines both theoretical and practical aspects of human communication as a liberal art, as a social science, as background for further study, or as pre-professional experience. All students initially pursuing a Speech Communication major with an option in Communication take basic courses in public speaking, argumentation, and interpersonal communication. Further studies focus on areas such as rhetorical and communication theory, methods of criticism and research, and history. Students pursuing an option in Communication enhance the skills inherent in all human interactions, preparing themselves for a range of potential vocational pursuits, avocations, and graduate study.

The area also offers a Communication minor.

The Communication Area is located in cottage-esque Shepard Hall on Campus Way. Communication Area students are active in Lambda Pi Eta, the National Communication Association's honor society for four-year colleges and universities. Students from across the university also compete on the nationally-recognized OSU Forensics Team in individual events and debate. Faculty and graduate students participate regularly in national and regional conferences as well as areasponsored colloquia on campus.

The Communication Area also takes part in the Master of Arts in Interdisciplinary Studies (MAIS), with many master's students pursuing two areas of concentration within the area's graduate curriculum.

## THEATRE ARTS

The Theatre Arts Area offers a Bachelor of Arts (BA) or Bachelor of Science (BS) degree option in theatre within the Speech Communication major. The Theatre Arts option emphasizes a liberal arts approach to theatre history, practice, and production. All students pursuing the degree complete a core of classes designed to introduce them to fundamental elements of the art. The large remaining portion of the option is split between courses in history/theory/literature and those focusing on design/technical/performance matters. Students select specific classes within each disciplinary area to match their interests (performance, design, literature, etc.) while meeting key degree requirements. The result is a theatre education grounded in a liberal arts perspective and emphasizing a basic knowledge of all theatre elements. The area offers a similarly structured minor in Theatre Arts.

The Theatre Arts Area facilities are located in Withycombe Hall. The Main Stage Theatre seats approximately 350 in a modified-proscenium arrangement while the flexible Laboratory Theatre seats around 100 . Both spaces function as classrooms as well as performance venues.
The University Theatre (UT) is the producing arm of the Theatre Arts Area. Students from across campus collaborate with UT faculty, staff, and guest artists to create theatre productions throughout the academic year and summer. Students from all colleges and departments across campus are encouraged and welcome to participate.

The Theatre Arts Area also participates in the Master of Arts in Interdisciplinary Studies (MAIS) degree program.

## UNDERGRADUATE MAJORS WITH OPTIONS

## APPLIED VISUAL ARTS (BFA,

 CRED, HBFA)Major to be suspended/terminated pending approval of https://secure.oregonstate.edu/ap/cps/proposals/view/100538.

## The Applied Visual Arts (BFA) is

 also available on the OSU-Cascades campus.We offer two options in Applied Visual Arts:

1. Fine Arts BFA [Terminated summer 2017. Replaced by 'Studio Arts BFA' under Art major]
2. Photography BFA [Terminated summer 2017. Replaced by 'Photography and Digital Art BFA' under Art major]
The Applied Visual Arts program is an interdisciplinary curriculum that enables students to gain a deeper understanding of their own ideas and how they relate to larger historical and cultural contexts. Courses at the 100 level stress fundamental aspects of visual literacy. Courses numbered 200 through 499 offer increasingly intensive study in art history, painting, printmaking, photography, sculpture, expanded media, and drawing.

Completion of an option is required to earn a degree in Applied Visual Arts.

## Requirements for BFA studio

 options in Applied Visual Arts:Applied Visual Arts majors may not take required Art courses on an $\mathrm{S} / \mathrm{U}$ graded basis. Students may not use courses in which they have earned less than a C- to satisfy BFA requirements. A minimum 3.00 grade-point average must be maintained in all art courses used to meet BFA requirements.
The core curriculum studio courses must be completed before taking upperdivision studio courses for a major program. Applied Visual Arts majors are required to see the Art advisor on an annual basis.

## Art Core Curriculum (33)

ART 100. Art Orientation (1)
ART 101. *Introduction to the Visual Arts (4)
ART 115. Foundations: 2-D (4)
ART 117. Foundations: 3-D (4)
ART 121. Foundations: Computers in Visual Arts (4)
ART 131. Foundations: Drawing I (4)
ART 204, ART 205, ART 206. *Introduction
to Art History-Western $(3,3,3)$
ART 263. Digital Photography (4)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Major Code: $\mathbf{8 5 9}$

ART (BA, BFA, BS, CRED, HBA, HBFA, HBS)
Available on Corvallis and OSUCascades campuses.
We offer three options of study for a BA/ BS in Art:

1. Art History
2. Studio Art
3. Photography and Digital Studio

We offer two options of study for a BFA in Art:

1. Studio Art BFA
2. Photography and Digital Studio BFA

The Art program is an interdisciplinary curriculum that enables students to gain a deeper understanding of their own ideas and how they relate to larger historical and cultural contexts. Courses at the 100 level stress fundamental aspects of visual literacy. Courses numbered 200 through 499 offer increasingly intensive study in art history, painting, printmaking, photography, digital studio, sculpture, expanded media, and drawing.

## Requirements for BA/BS and BFA

 Options in Art:Art majors may not take required art courses on an $\mathrm{S} / \mathrm{U}$ graded basis.
The Art Major core curriculum courses must be completed before taking upperdivision studio courses.

## Art Major Core (12)

ART 101. *Introduction to the Visual Arts (4) ART 115. Foundations: 2-D (4)
ART 131. Foundations: Drawing I (4)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: $\mathbf{8 8 0}$

## OPTIONS

## ART HISTORY OPTION

To be revised pending approval of proposal 100536, https://secure.oregonstate. edu/ap/cps/proposals/view/100536.

## Lower Division (27)

ART 101. *Introduction to the Visual Arts (4)
ART 115. Foundations: 2-D (4)
ART 131. Foundations: Drawing I (4)
ART 204, ART 205, ART 206. *Art History-
Western (3,3,3)
ART 208. *Introduction to Asian Art (3)
Art studio electives (3)

## Upper Division (30)

ART 469. ${ }^{\wedge}$ Method and Theories of Art History (3)
Art History (300 level) (18)
Art History (400 level) (9)
Upper-division courses must include at least 3 credits of contemporary art history, 3 credits of global art history, and 3 credits of ancient, Medieval, Renaissance, or Baroque art history.

## Total=57

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)


## Option Code: 881

## PHOTOGRAPHY AND DIGITAL

 STUDIO OPTIONFormerly Photography option (884).
The Photography and Digital Studio option concentrates on digital and traditional photographic processes and approaches as situated in contemporary art but also on related technological arts such as video, sound, installation, and computer-based arts; preparing students for careers in the creative arts.

Art (BA/BS) majors taking the Photography and Digital Studio option may not take required art courses on an $\mathrm{S} / \mathrm{U}$ graded basis.

The studio courses ART 101, ART 115, ART 117, ART 121, and ART 131 must be completed before taking upper-division studio courses for the major program. All students seeking a major or a minor must see a departmental advisor on a yearly basis.

## Art Major Core (10)

## Required Studio Art Core

## Curriculum (7)

ART 100. Art Orientation (1) and ART 199
Special Topics [Studio for ART 100] (1)
ART 117. Foundations: 3-D (4)
ART 121. Foundations: Computers in Visual Arts (4)
Required Photography and Digital Studio Courses (26)
ART 222. Introduction to Time-based Art (4)
ART 263. Digital Photography (4)
ART 264. *Photography: History,
Technology, Culture, and Art (3)
ART 340. Darkroom Photography I (4)
ART 345. Intermediate Photography (4)
ART 347. Photograph: Studio Lighting (4)
ART 368. ^History of Photography (3)
or ART 411. ${ }^{\wedge}$ Contemporary Issues in Art (3)

## Photography and Digital Studio

 Electives (11)Select 3 courses from the following (at least 2 courses must be at the 400 level) (11 credits):
ART 339. Professional Practices in
Photography (3)
ART 341. Darkroom Photography II (4)
ART 346. Photo Illustration I (3)
ART 348. Concepts in Digital Imaging (4)
ART/NMC 349. Video Art (4) Repeatable to 8 credits
ART 350. Photography on Assignment (4)
ART 354. Alternative Processes in
Photography (4)
ART 359. *Photography: Activism and Social Change (3)
ART 409. Practicum Student Media (1)
Repeatable to 4 credits
ART 422. New Media: Interactive (4)
ART 432. *Gender, Sexuality, and the
Photographic Image (3)
ART 441. Photography III (4)
ART 443. Combined Media: Photo
Installation (4)
ART 444. The Constructed Image (4)

ART 446. Documentary Photography (4)
ART 447. Advanced Studio Lighting (4)
ART 454. Alternative Processes in Photography II (4)
ART 456. Portfolio-Photography/Video Art
(4) Repeatable to 8 credits

NMC 383. Field Production (4)
Lower-Division Art Electives (10)
Choose one studio art elective at the 200 level (4)
Choose two art history electives at the 200 level (6)

## Upper-Division Art History <br> Electives (6)

Choose either ART 366. Art since 1945
(3) or ART 462. Directions and Issues in Contemporary Art (3)
Choose one additional 300- or 400-level Art History elective (3)

## Total=74-75

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Option Code: 829

## PHOTOGRAPHY AND DIGITAL

 STUDIO BFA OPTIONFormerly Photography BFA option (892).
The Photography and Digital Studio BFA option concentrates on digital and traditional photographic processes and approaches to making contemporary art but also on related technological arts such as video, sound, installation, and computer-based arts. The primary objective of offering the BFA is to provide professional education in visual art at the undergraduate level and to enable graduates to enter professional, studiobased careers and within the creative industries.

Art (BFA) majors taking the Photography and Digital Studio BFA option may not take required art courses on an S/U graded basis. Students may not use courses in which they have earned less than a C- to satisfy BFA requirements. A minimum 3.00 grade-point average must be maintained in all art courses used to meet BFA requirements.

The core curriculum studio courses must be completed before taking upperdivision studio courses for a major program. All students seeking a major or a minor must see a departmental advisor on a yearly basis.

## Studio Art Core Curriculum (9)

ART 100. Art Orientation (1)
ART 117. Foundations: 3-D (4)
ART 121. Foundations: Computers in Visual Arts (4)

## Lower-Division Art Electives (10)

Choose one studio art electives at the 200 level (4)
Choose two art history electives at the 200 level (6)

## Photography and Digital Studio BFA Requirements

## Required Photography and Digital

Studio BFA Courses (24)
ART 222. Introduction to Time-Based Art (4)
ART 263. Digital Photography (4)
ART 340. Darkroom Photography I (4)
ART 345. Intermediate Photography (4)
ART 347. Photograph: Studio Lighting (4)
ART 456. Portfolio-Photography/Video Art
(4) To be taken in Winter term in the senior year. Repeatable to 8 credits.

## Photography and Digital Studio <br> BFA Electives:

Select 8 courses from the following (at least 2 courses must be at the 400 level) (32):
ART 339. Professional Practices in Photography (3)
ART 341. Darkroom Photography II (4)
ART 346. Photo Illustration I (3)
ART 348. Concepts in Digital Imaging (4)
ART/NMC 349. Video Art (4)
ART 350. Photography on Assignment (4)
ART 354. Alternative Processes in
Photography (4)
ART 359. *Photography: Activism and Social Change (3)
ART 409. Practicum Student Media (1) Repeatable to 4 credits
ART 422. New Media: Interactive (4)
ART/QS/WGSS 432. *Gender, Sexuality, and
the Photographic Image (3)
ART 441. Photography III (4)
ART 443. Combined Media: Photo Installation (4)
ART 444. The Constructed Image (4)
ART 446. Documentary Photography (4)
ART 447. Advanced Studio Lighting (4)
ART 454. Alternative Processes in Photography II (4)
ART 456. Portfolio-Photography/Video Art
(4) Repeatable to 8 credits

NMC 383. Field Production (4)

## Required Art History Courses (12)

ART 264. *Photography: History,
Technology, Culture, and Art (3)
ART 366. Art Since 1945 (3)
ART 368. ^History of Photography (3)
or ART 411. ${ }^{\wedge}$ Contemporary Issues in Art (3)
ART 462. Directions and Issues in Contemporary Art (3)

## Additional 300/400 Art electives

 (21)Art electives may be any combination of Art History or Studio Art courses. One class may be at the 200 level. At least two classes must be at the 400 level.

## Note: Total Art credits must equal 120 credits

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Option Code: 831


## STUDIO ART OPTION

Formerly Fine Arts option (879).
Art (BA/BS) majors taking the Studio Art option may not take required art courses on an $\mathrm{S} / \mathrm{U}$ graded basis.

The core curriculum studio courses
ART 101, ART 115, ART 117, ART 121,
and ART 131 must be completed before taking upper-division studio courses for the major program. All students seeking a major or a minor must see a departmental advisor on a yearly basis.

## Lower Division (42)

Art Major Core (12)
Art Core Curriculum (10)
ART 100. Art Orientation (1)
ART 199. Special Topics [Studio for Art 100] (1)

ART 117. Foundations: 3-D (4)
ART 121. Foundations: Computers in Visual Arts (4)
Lower-Division Art Electives (21)
Choose three studio art electives at the 200 level from the following list (12 credits):
ART 215. Color in the Visual Arts (4)
ART 222. Introduction to Time-Based Art (4)
ART 234. Drawing II/Figure (4)
ART 263. Digital Photography (4)
ART 271. Printmaking I (4)
ART 281. Painting I (4)
ART 291. Sculpture I (4)
Choose three art history electives at the 200 level from the following list (9 credits):
ART 204. *Introduction to Art History Western (3)
ART 205. *Introduction to Art History Western (3)
ART 206. *Introduction to Art History Western (3)
ART 208. *Introduction to Asian Art (3)
ART 210. *History of Western Architecture (3)

ART 264. *Photography: History, Technology, Culture and Art (3)

## Upper Division (32)

ART 366. Art since 1945 (3)
ART 411. ${ }^{\wedge}$ Contemporary Issues in Art (3)
Choose five studio art electives
(300/400 level) (At least 8 units must be at the 400 level) (20 credits):
ART 331. Drawing Concepts (4)
ART 334. Drawing III: Figure (4)
ART 340. Darkroom Photography I (4)
ART 341. Darkroom Photography II (4)
ART 345. Intermediate Photography (4)
ART 347. Photograph: Studio Lighting (4)
ART 348. Concepts In Digital Imaging (4)
ART/NMC 349. Video Art (4)
ART 351. Installation (4)
ART 354. Alternative Processes in
Photography (4)
ART 375. Printmaking: Relief (4)
ART 376. Printmaking: Intaglio (4)
ART 377. Printmaking: Lithography (4)
ART 378. Printmaking: Monotype (4)
ART 379. Printmaking: Screen Printing (4)
ART 381. Painting the Figure (4)
ART 382. Painting II: Concepts (4)
ART 383. Painting II: Abstract And Multimedia (4)
ART 384. Painting II: New Genre (4)
ART 391. Sculpture II (4)
ART 422. New Media: Interactive (4)
ART 431. Drawing IV (3-5)
ART 434. Drawing IV/Figure (3-5)

ART 441. Photography III (4)
ART 443. Combined Media: Photo Installation (4)
ART 444. The Constructed Image (4)
ART 446. Documentary Photography (4)
ART 447. Advanced Studio Lighting (4)
ART 454. Alternative Processes In Photography II (4)
ART 475. Printmaking Studio (3-5)
ART 479. Printmaking: Advanced Screen Printing (4)
ART 481. Painting III (3-5)
Choose three art history electives at the (300/400 level) (At least one course must be at the 400 level) (6 credits):
ART 310. Early Chinese Art and
Archaeology (3)
ART 311. Late Chinese Art and Culture (3)
ART 312. Contemporary Chinese Art (3)
ART 313. Art of Japan (3)
ART 320. Ancient Greek Art (3)
ART 321. Ancient Roman Art and Architecture (3)
ART 322. Medieval Art and Architecture (3)
ART 323. Italian Renaissance Art and Architecture (3)
ART 360. History of Art (3)
ART 361. History of Art (3)
ART 363. History of Art (3)
ART 364. *Nineteenth-Century Art (3)
ART 365. *History of Modern Art 19001945 (3)
ART 366. Art Since 1945 (3)
ART 367. *History of Design (3)
ART 368. ^History of Photography (3)
ART 460. History of American Art (3)
ART 461. History of American Art (3)
ART 462. Directions and Issues in
Contemporary Art (3)
ART 463. Topics in Renaissance and Baroque Art (3)
ART 464. Cultural Studies of the Museum (3)
ART 468. History of Printmaking (3)
ART 469. ${ }^{\wedge}$ Methods and Theory of Art History (3)

## Total Credits=74-75

Note: Studio Art electives include studio courses in painting, printmaking, sculpture, drawing, photography and digital studio, or related media.

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 828


## STUDIO ART BFA OPTION

Formerly Fine Arts BFA option (887).
The Studio Art BFA option offers concentrations in painting, drawing, sculpture, installation-arts, printmaking, and expanded media. The primary objective of offering the BFA is to provide professional education in visual art at the undergraduate level and to enable graduates to enter studio-based careers within the creative industries.

Art (BFA) majors taking the Studio Art BFA option may not take required art courses on an S/U graded basis. Students may not use courses in which
they have earned less than a C- to sat-
isfy BFA requirements. A minimum 3.00 grade-point average must be maintained in all art courses used to meet BFA requirements.
The core curriculum studio courses (ART 100, ART 101, ART 115, ART 117, ART 121, ART 131) must be completed before taking upper-division studio courses for a major program. All students seeking a major or a minor must see a departmental advisor on a yearly basis.

## Lower-Division Courses (42)

Art Major Core (12)
Studio Art Core (10)
ART 100. Art Orientation (1) and ART 199.
Special Topics [Studio for Art 100] (1)
ART 117. Foundations: 3-D (4)
ART 121. Foundations: Computers in Visual Arts (4)
Lower-Division Art Electives (21)
Choose three studio art electives at the 200 level (12)
ART 215. Color In The Visual Arts (4)
ART 222. Introduction To Time-Based Art (4)
ART 234. Drawing II/Figure (4)
ART 263. Digital Photography (4)
ART 271. Printmaking I (4)
ART 281. Painting I (4)
ART 291. Sculpture I (4)
Choose three art history electives at the 200 level (9)
ART 204. *Introduction To Art History Western (3)
ART 205. *Introduction To Art History Western (3)
ART 206. *Introduction To Art History -
Western (3)
ART 208. *Introduction To Asian Art (3)
ART 210. *History Of Western Architecture
(3)

ART 264. *Photography: History,
Technology, Culture And Art (3)

## Upper-Division Courses (78)

Required Courses (12)
ART 339. Professional Practices in
Photography (3)
ART 366. Art Since 1945 (3)
ART 411. ${ }^{\wedge}$ Contemporary Issues in Art (3)
ART 462. Directions and Issues in Contemporary Art (3)

## Electives (66)

Studio Art electives 300/400 level (4 credits may be at the 200 level; at least 20 credits must be at the $\mathbf{4 0 0}$ level) (45)
ART 331. Drawing Concepts (4)
ART 334. Drawing III: Figure (4)
ART 340. Darkroom Photography I (4)
ART 341. Darkroom Photography II (4)
ART 345. Intermediate Photography (4)
ART 347. Photograph: Studio Lighting (4)
ART 348. Concepts In Digital Imaging (4)
ART/NMC 349. Video ART (4)
ART 351. Installation (4)
ART 354. Alternative Processes In
Photography (4)
ART 375. Printmaking: Relief (4)
ART 376. Printmaking: Intaglio (4)
ART 377. Printmaking: Lithography (4)

ART 378. Printmaking: Monotype (4)
ART 379. Printmaking: Screen Printing (4)
ART 381. Painting The Figure (4)
ART 382. Painting II: Concepts (4)
ART 383. Painting II: Abstract And
Multimedia (4)
ART 384. Painting II: New Genre (4)
ART 391. Sculpture II (4)
ART 422. New Media: Interactive (4)
ART 431. Drawing IV (3-5)
ART 434. Drawing IV/Figure (3-5)
ART 441. Photography III (4)
ART 443. Combined Media: Photo Installation (4)
ART 444. The Constructed Image (4)
ART 446. Documentary Photography (4)
ART 447. Advanced Studio Lighting (4)
ART 454. Alternative Processes In
Photography II (4)
ART 475. Printmaking Studio (3-5)
ART 479. Printmaking: Advanced Screen Printing (4)
ART 481. Painting III (3-5)
Art History electives (300/400 level) ( 3 credits may be at the 200 level; one course must be at the 400 level) (9)

ART 310. *Early Chinese Art And
Archaeology (3)
ART 311. *Late Chinese Art And Culture (3)
ART 312. *Contemporary Chinese Art (3)
ART 313. *Art Of Japan (3)
ART 320. *Ancient Greek Art (3)
ART 321. *Ancient Roman Art And Architecture (3)
ART 322. *Medieval Art And Architecture (3)
ART 323. *Italian Renaissance Art And Architecture (3)
ART 360. History Of Art (3)
ART 361. History Of Art (3)
ART 363. History Of Art (3)
ART 364. *Nineteenth-Century Art (3)
ART 365. *History Of Modern Art 1900-
1945 (3)
ART 366. Art Since 1945 (3)
ART 367. *History Of Design (3)
ART 368. ^History Of Photography (3)
ART 460. History Of American Art (3)
ART 461. History Of American Art (3)
ART 462. Directions And Issues In
Contemporary Art (3)
ART 463. Topics In Renaissance And
Baroque Art (3)
ART 464. Cultural Studies Of The Museum (3)

ART 468. History Of Printmaking (3)
ART 469. $\wedge$ Methods And Theory Of Art History (3)

## Additional Electives

Any Studio Art, Photography and Digital Studio, or Art History electives 300/400 level (12)

## Total=120

Note: The 400-level studio block may be any combination of painting, printmaking, sculpture, photography, or drawing courses.

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: $\mathbf{8 3 0}$


## DIGITAL COMMUNICATION ARTS (BA, BFA, BS, CRED, HBA, HBFA, HBS)

Students have the opportunity to focus their studies on a particular part of the discipline of New Media Communications.

## BA/BS/HBA/HBS

The BA/BS/HBA/HBS of Digital Communication Arts studies the intersection of media and social life. Throughout history, new media have produced profound changes in human interaction. Family life, politics, commerce, religion, and the distribution of privileges have all been subject to fundamental revision in the wake of new technologies for communication. This provides students with a theoretical and practical understanding of the nature of these changes and prepares them to anticipate and manage inevitable future changes as the media landscape continues to evolve. This is particularly appropriate for students who seek careers in media research and criticism, graduate studies in media, work in media policy, and gain skills needed to manage media communications enterprises. A BA/BS/HBA/HBS of Digital Communication Arts can be earned by completing the core requirements as well as the intermediate and advanced levels of study.

## BFA

The BFA in Digital Communication Arts focuses on media production. The BFA is designed to provide a foundation in media aesthetics, story conceptualization and preproduction planning for linear and nonlinear/interactive projects, video production, sound design and 3D modeling and animation. Students are encouraged to explore their own creativity within a carefully constructed curriculum that serves as a basis for independent work and portfolio development. Faculty members include artists, videographers, editors and composers from professional production environments. A BFA can be earned by completing the Core Requirements, Foundation Course Work and the Production Specialty Requirements.

## BA/BS Additional Requirements

All students receiving a BA degree shall have proficiency in a second language, including American Sign Language (ASL), equivalent to that attained at the end of the second year sequence with a grade of C- or better as certified by the School of Language, Culture, and Society.
The BS degree is conferred for focused curricula that emphasize scientific ways of knowing and quantitative approaches to understanding in the sciences and the social sciences and for curricula in professional fields. Students satisfying BS degree requirements shall have completed additional math, science and computer science courses beyond the University

Baccalaureate Core.
Both the BA and BS degrees require completion of the College of Liberal Arts Core.

The BFA degree does not require the College of Liberal Arts Core or the college's BA/BS requirements. The requirements within the major exceed those of the CLA Core, making it redundant.
The Digital Communication Arts major requires a 2.0 GPA for admittance and a 2.3 GPA for graduation. Students must receive a C - or better in all degree course work. Classes for the major must be A-F grading and not $\mathrm{S} / \mathrm{U}$.

## BA/BS/HBA/HBS in Digital

Communication Arts (45-49):
Core Requirements (15)
ART 121. Foundations: Computers in Visual arts (4)
NMC 100. New Media and Culture (3)
NMC 101. Introduction to New Media Communications (3)
NMC 260. New Media Futures (3)
NMC 301. ${ }^{\wedge}$ Writing for the Media Professional (3)

## Intermediate Level (18-21):

- Only three of six courses can come from non-NMC courses.
- Both NMC and non-NMC courses may have prerequisities in the department offered. See Online Course Catalog.
COMM 324. Communication in Organizations (3)
COMM 368. Propaganda and Social Control (3)

COMM 372. Visual Rhetoric (3)
COMM 385. Communication and Culture in Cyberspace (3)
NMC 240. Survey of Social Media (3)
NMC 255. Introduction of Sound Design (3)
NMC 320. History of Telecommunications (3)

NMC 321. History of Broadcasting (3)
NMC 322. Landmarks in Media Content (3)
NMC 330. The Meaning of Video Games (3)
NMC 340. Social Media Strategy (3)
NMC/ART 349. Video Art (4)
NMC 351. New Media Visualization (3)
NMC 355. Applied Sound Design (3)
NMC 380. Pre-Production (3)
NMC 383. Field Production (4)
NMC/COMM 388. Social Media and
Interpersonal Relationships (3)
NMC 399. Special Topics (1-16)
PS 315. *Politics of Media (4)

## Advanced Level (12-13):

- Only one of four courses can come from non-NMC courses.
- Both NMC and non-NMC courses may have prerequisities in the department offered. See Online Course Catalog.
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 476. Issues in the Freedom of Speech (3)
COMM 484. Media Criticism (3)
NMC 409. Practicum (1-3)
or NMC 410. Internship (1-3) (Taken as three 1-credit courses or two 1-credit and one 2-credit courses or one 3-credit course. Must equal a minimum total of 3 credits to count as one course in this level. Can combine NMC 409 and NMC 410 credits to equal three.)
NMC 421. Diffusion of Innovations (3)
NMC 427. *Digital Pornography (3)
NMC 430. Media Theory (3)
NMC 435. Media Effects (3)
NMC 437. New Media and Society (3)
NMC 490. Media Ethics (3)
NMC 498. Advanced Collaborative
Experience (3-4)
NMC 499. Special Topics (1-16)
Students will complete a total of 45-49
credits in the BA/BS degree in Digital Communication Arts.


## BFA/HBFA in Digital

Communication Arts (Production)

## (91-98):

## Core Requirements (15)

ART 121. Foundations: Computers in Visual Arts (4)
NMC 100. New Media and Culture (3)
NMC 101. Introduction to New Media
Communications (3)
NMC 260. New Media Futures (3)
NMC 301. ${ }^{\wedge}$ Writing for the Media Professional (3)

## Foundation Course Work (39-40)

## Complete all of the following:

ART 101. *Introduction to the Visual Arts (4)
ART 115. Foundations: 2-D (4)
ART 131. Foundations: Drawing I (4)
ART 263. Digital Photography (4)
NMC 322. Landmarks in Media Content (3)
NMC 351. New Media Visualization (3)
TA 242. Visual Principles of Theatre (3)
TA 346. Scene and Stage Design (3)
WR 407. Seminar: Screenwriting (4)

## One of the following:

ART 206. *Introduction to Art HistoryWestern (3)
FILM 125. *Introduction to Film Studies: 1945-Present (3)
FILM 245. *The New American Cinema (4)
FILM 265. *Films for the Future (4)

## NMC Electives (6)

Complete two of the following:
NMC 240. Survey of Social Media (3)
NMC 320. History of Telecommunications (3)
NMC 321. History of Broadcasting (3)
NMC 330. The Meaning of Video Games (3)
NMC 340. Social Media Strategy (3)
NMC/COMM 388. Social Media and
Interpersonal Relationships (3)
NMC 399. Special Topics (1-16)
NMC 421. Diffusion of Innovations (3)
NMC 427. *Digital Pornography (3)
NMC 430. Media Theory (3)
NMC 435. Media Effects (3)
NMC 437. New Media and Society (3)
NMC 490. Media Ethics (3)
NMC 499. Special Topics (1-16)
Production Course Work (31-37)
Select 10 courses from the following:
MUS 493. Basic Recording Techniques (3)
MUS 494. Intermediate Recording

Techniques (3)
MUS 495. Advanced Recording Techniques (3)

MUS 496. Surround Sound Recording and Mastering (2)
NMC 255. Introduction to Sound Design (3)
NMC/ART 349. Video Art (4)
NMC 355. Applied Sound Design (3)
NMC 380. Pre-Production (3)
NMC 383. Field Production (4)
NMC 409. Practicum (1-3)
or NMC 410. Internship (1-3) (Taken as three 1-credit courses or two 1-credit and one 2 -credit courses or one 3 -credit course. Must equal a minimum total of 3 credits to count as one course in this level. Can combine NMC 409 and NMC 410 credits to equal three.)
NMC 481. Post Production (4)
NMC 482. Documentary (4)
NMC 483. New Media 3-D (4)
NMC 484. New Media Animation (4)
NMC 498. Advanced Collaborative
Experience (3-4)
Students pursuing the BFA in Digital Communication Arts, Production will take a total of approximately 91-98 total credits from the course work listed above to complete the major.

## Total $=45-49$ credits for the BA/BS degrees <br> Total= 91-98 credits for the BFA <br> degree <br> Footnotes: <br> * Baccalaureate Core Course (BCC) <br> ${ }^{\wedge}$ Writing Intensive Course (WIC)

## Major Code: 473

## GRAPHIC DESIGN (BFA, CRED, HBFA)

The Bachelor of Fine Arts degree in Graphic Design (GD) is an exciting and rigorous program at OSU. The disciplinary foundations of graphic design are rooted in visual problem solving, design theory and history, as well as professional practices that tie into business and marketing for specific audiences. Examples of the work graphic designers engage in include both print and digital media such as the design of:

- branding and visual identities
- publication design (magazines,
newspapers, catalogs)
- information design
- package design
- exhibition design
- interactive design (Web, video)

The discipline of graphic design is constantly changing due to new technologies, broader target audiences, and softer boundaries between disciplines. Students learn to be adaptable, flexible and collaborative in how they work. Graphic designers are creative thinkers and makers and may have strengths and interests in drawing, printmaking and photography.

The Graphic Design major is a professional program. Entering students are
designated as Pre-Graphic Design majors (major code 479).

The pre-professional Graphic Design program typically takes one year to complete. After completing the pre-professional program requirements, students may apply to the professional Graphic Design program. Students will not be permitted to take professional Graphic Design course work without acceptance into the professional Graphic Design program. If admitted into the professional Graphic Design program, it will take students three additional years to complete the professional program regardless of transfer credit standing.

Admission into the professional Graphic Design program is subject to a competitive application process. To apply and be considered for admission, all pre-professional students must meet the following requirements:

- Be declared as a Pre-Graphic Design major.
- Have completed and received a C- or better in ALL courses within the PreGraphic Design major by the end of spring term before applying.
Criteria for acceptance. Students will be evaluated on the following:
- Completion and grade in GD 126.
- Completion and grades in GD Foundation courses: ART 101, ART 115, ART 121, and ART 131.
- Competion and grades in Bacc Core First-Year Skills Requirements: WR 121, Speech course (choose one: COMM 111, COMM 114, or COMM 218) and College Level Math course: MATH 105 or higher.
- Overall GPA.

Baccalaureate Core (48-49)
Pre-Graphic Design Core (17)
ART 101. Introduction to the Visual Arts (3)
ART 115. Foundations: 2-D (4)
ART 121. Foundations: Computers in the Visual Arts (4)
ART 131. Foundations: Drawing I (4)
GD 126. Graphic Design Pro Application (2)
Lower-Division Graphic Design

## Professional Core (32)

ART 204. *Introduction to Art History-
Western (3)
or ART 205. *Introduction to Art History-
Western (3)
or ART 206. *Introduction to Art History-
Western (3)
or ART 208. Introduction to Asian Art (3)
or ART 264. Photography: History,
Technology, Culture and Art (3)
ART 263. Digital Photography (4)
GD 200. Graphic Design Technology and
Production 1 (4) (Pending Approval)
GD 220. Graphic Design Technology and
Production 2 (4) (Pending Approval)
GD 224. Interactive Design 1 (4)
GD 226. Typography 1 (4)
GD 228. Process: Making and Meaning (4)
GD 230. Graphic Design Professional
Development (2) (Pending Approval)

GD 269. Graphic Design History (3)
Upper-Division Graphic Design
Professional Core (39)
ART 367. *History of Design (3)
GD 312. ${ }^{\wedge}$ Contemporary Issues in Design
(3)

GD 325. Graphic Design: Collaborative Processes (4)
GD 326. Typography 2 (4)
GD 327. Typography 3 (4)
GD 328. Interactive 2 (4)
GD 419. Portfolio Review (3) (Pending approval)
GD 420. Professional Practices (3)
GD 424. Brand Identity Systems (4)
GD 426. Graphic Design Capstone 1 (3)
GD 427. Capstone 2 (4)

## Electives:

100/200 Lower-Division Electives from ART,
GD, or NMC (12)
300/400 Upper-Division Electives from ART,
GD, or NMC (20)
Credits in Major=120
Bacc Core Credits=48-49
General Electives=11
Upper-Division credits required: $\mathbf{6 0}$
Credits needed to graduate with a BFA in

## Graphic Design=180

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
+ Courses cannot be counted twice to fulfill
requirements of the major


## SAMPLE FOUR-YEAR PLAN:

## GRAPHIC DESIGN

## Year 1

Fall
ART 115. Foundations: 2-D (4)
ART 121. Foundations: Computers in Visual Arts (4)
COMM 111. *Public Speaking (3)
COMM 114. *Argument and Critical
Discourse (3)
COMM 218. *Interpersonal
Communication (3)
Bacc Core (DPD) (3)
General Elective (1)

## Winter

ART 101. *Introduction to the Visual Arts (4)
ART 131. Foundations: Drawing I (4)
WR 121. *English Composition (3)
GD Lower-Division Elective (4)

## Spring

ART 206. *Introduction to Art History -
Western (3)
or Lower-Division Art History (3)
GD 126. Graphic Design Pro Application (2)
MTH 111. (4)
Bacc Core (SPI) (3)
GD Lower-Division Elective (4)

## Year 2

Fall
GD 200. Graphic Design Technology and Production 1 (4)
GD 226. Typography 1 (4)
GD 2xx (2)
Bacc Core (Physical Lab Science) (4)

## Winter

ART 263. Digital Photography (4)
GD 224. Interactive Design 1 (4)
GD 269. Graphic Design History (3)
Bacc Core (Biological Lab Science) (4)

## Spring

GD 220. Graphic Design Technology and Production 2 (4)
GD 228. Process: Making and Meaning (4)
GD Lower-Division Elective (4)
Bacc Core (Lab Science) (4)

## Year 3

Fall
GD 326. Typography 2 (4)
GD 328. Interactive 2 (4)
GD Upper-Division Elective (4)
Bacc Core (WR II) (3)

## Winter

GD 325. Graphic Design: Collaborative Processes (4)
GD Upper-Division Elective (4)
GD Upper-Division Elective (4)
Bacc Core (Literature and Arts) (3)

## Spring

ART 367. *History of Design (3)
GD 312. Contemporary Issues in Design (3)
GD 327. Typography 3 (4)
HHS 231. *Lifetime Fitness for Health (2)
PAC Course (1)
General Elective (2)

## Year 4

Fall
GD 420. Professional Practices (3)
GD 424. Brand Identity Systems (4)
Bacc Core (Cultural Diversity) (3)
General Elective (5)

## Winter

GD 419. Portfolio Review (3)
GD 426. Graphic Design Capstone 1 (3)
GD Upper-Division Elective (4)
Bacc Core (Upper-division CGI) (3)
General Elective (2)

## Spring

GD 427. Capstone 2 (4)
GD Upper-Division Elective (4)
Bacc Core (Upper-division STS) (3)
Bacc Core (Western Culture) (3)
General Elective (2)

## Total=180

Pre-Graphic Design major code 479

## Major Code: 779

MUSIC (BA, BS, CRED, HBA, HBS)
Departmental degree requirements are 47 credits, of which 24 must be upper division. Note: College of Liberal Arts allows only 12 credits of MUP courses to be applied toward a degree.

A grade of C - or better is required for all courses used to complete music major requirements. These courses cannot be taken with $\mathrm{S} / \mathrm{U}$ grading.

Transfer students must demonstrate competency in the areas of music history, music theory, aural skills, and piano skills. Placement examinations in each of these areas must be completed by

Wednesday of the first week of classes. Required Core Classes for ALL options/ emphases:
MUS 177. Group Lessons, Piano (1)
MUS 121, MUS 122, MUS 123. Literature and Materials of Music I $(3,3,3)$
MUS 125, MUS 126. Literature and
Materials of Music Lab I, II (1,1)
MUS 135, MUS 136. Aural Skills I $(1,1)$
MUS 221, MUS 222, MUS 223. Literature and Materials of Music $(3,3,3)$
MUS 315. Introduction to Conducting (2)
MUS 321. Literature and Materials of Music III (3)
MUS 324. History of Western Music (3)
MUS 325. *History of Western Music (3)
MUS 326. History of Western Music (3)
Upper-division Electives (10)

## Total=47

## Footnote:

* Baccalaureate Core Course (BCC)


## Major Code: 950

## OPTIONS

## INSTRUMENTAL PERFORMANCE OPTION

Application may be made upon acceptance to 300 -level individual lessons and with permission of the faculty program director.
MUP 390-MUP 395. Individual Lessons
(1-2) Take 6 credits
MUP 490-MUP 495. Individual Lessons
(1-2) Take 6 credits
MUS 183. Group Lessons: Piano (1)
[Terminated fall 2017]
MUS 234, MUS 235, MUS 236. Aural Skills II (1,1,1)
MUS 340-MUS 369. Performance
Organizations (6)
Upper-division Music Technology (9)
Upper-division Electives (6)
Junior Recital (0)
Senior Recital (0)

## Total=37

Option Code: 901

## MUSIC EDUCATION OPTION

## Choral Emphasis

Application may be made upon acceptance to 300-level individual lessons, completion of MUED 353 and with permission of the faculty program director.
MUED 353. Music Education in Public Schools (3)
MUED 471. Fundamentals of Music for Elementary Classroom Teachers (3)
MUED 477. Classroom Instrumental Techniques (2)
MUED 478. Techniques for the Vocal Instructor (2)
MUP 391-MUP 491. Individual Lessons
(1-2) Take 5 credits
MUS 140-147. Choral Ensembles (3)
MUS 183. Group Lessons: Piano (1)
[Terminated fall 2017]
MUS 234, MUS 235, MUS 236. Aural Skills II $(1,1,1)$

MUS 316, MUS 317. Choral Conducting (2,2)
MUS 340-MUS 347. Choral Ensembles (1-2) Take 3 credits
MUS 399. Special Studies: Choral Conducting Lab (2)
MUS 472. Italian and Latin Diction for Singers (2)
MUS 473. German Diction for Singers (2)
Junior or Senior Recital (0)

## Total=37

## Instrumental Emphasis

Application may be made upon acceptance to 300 -level individual lessons, completion of MUED 353 and permission of faculty program director.
MUED 277 (Sects. 001-008). Instrumental
Techniques (1) Take 8 credits
MUED 353. Music Education in Public Schools (3)
MUED 471. Fundamentals of Music for
Elementary Classroom Teachers (3)
MUED 478. Techniques for the Vocal Instructor (2)
MUP 390-MUP 496. Individual Lessons
(1-2) Take 5 credits
MUS 183. Group Lessons: Piano (1)

## [Terminated fall 2017]

MUS 234, MUS 235, MUS 236. Aural Skills II $(1,1,1)$
MUS 318, MUS 319. Instrumental
Conducting (2,2)
MUS 350-MUS 360. Instrumental
Ensembles (1) Take 6 credits

## Junior or Senior Recital (0)

## Total=35

## General Emphasis

Application may be made after successful completion of MUED 353 and permission of faculty program director.
MUED 277 (Sects. 001-008). Instrumental Techniques (1) Take 4 credits
MUED 353. Music Education in Public Schools (3)
MUED 478. Techniques for the Vocal Instructor (2)
MUP 190. Individual Lessons: Keyboard (1-2)
MUP 191. Individual Lessons: Voice (1-2)
MUP 192. Individual Lessons: Strings
(Guitar) (1-2) Take 4 credits
MUS 140-147. Choral Ensembles (3)
or MUS 150-157. Instrumental Ensembles (3)

MUS 234, MUS 235, MUS 236. Aural Skills II (1,1,1)
MUS 315. Introduction to Conducting (2)
MUS 316, 317. Choral Conducting (2,2) or MUS 318, MUS 319. Instrumental Conducting (2,2)
MUS 340-MUS 347. Choral Ensembles (1-2) Take 3 credits
or MUS 350-MUS 360. Instrumental Ensembles (3) Take 3 credits
MUS 399. Special Studies: Choral
Conducting Lab (2)
MUS 472. Italian and Latin Diction for Singers (2)
Junior or Senior Recital (0)
Total=38-40
Option Code: 944

## MUSIC PRODUCTION OPTION

Application may be made after successful completion of MUS 223 and with permission of the faculty program director.

## Upper-division Requirements

MUS 340-MUS 369. Performance
Organizations (3)
MUS 403. Thesis (3)
MUS 443. Theory and Composition Studies $(3,3,3)$
MUS 493. Basic Recording Techniques (3)
MUS 494. Intermediate Recording
Techniques (3)
MUS 495. Advanced Recording Techniques (3)

Total=24
Option Code: 937
PIANO PERFORMANCE OPTION
Application may be made with permission from the piano program director.
MUP 190, MUP 290. Individual Lessons: Keyboard (1-2) Take 6 credits
MUP 390, MUP 490. Individual Lessons:
Keyboard (1-2) Take 6 credits
MUS 163. Accompanying (1) Take 6 credits
MUS 183. Group Lessons: Piano (1)
[Terminated fall 2017]
MUS 199. Special Studies: Pedagogy (3)
MUS 234, MUS 235, MUS 236. Aural Skills II $(1,1,1)$
MUS 363. Accompanying (1) Take 6 credits
MUS 399. Special Studies (3)
MUS 442. Genre Studies: Piano Repertory (3)

## Junior Recital (0)

Senior Recital (0)

## Total=37

## Option Code: 951

## VOCAL PERFORMANCE OPTION

Application may be made upon acceptance to 300 -level individual lessons and with permission of the faculty program director.
MUED 478. Techniques for the Vocal
Instructor (2)
MUP 391 Individual Lessons: Voice (1-2)
Take 6 credits
MUP 491. Individual Lessons: Voice (1-2)
Take 6 credits
MUS 183. Group Lessons: Piano (1)
[Terminated fall 2017]
MUS 234, MUS 235, MUS 236. Aural Skills II ( $1,1,1$ )
MUS 340-MUS 347. Choral Ensembles (1-2)

## Take 6 credits

MUS 369. Opera Workshop (1-2) Take 4 credits
MUS 442. Genre Studies: Song and Oratorio (3)

MUS 442. Genre Studies: Opera Literature (3)
MUS 472. Italian and Latin Diction for Singers (2)
MUS 473. German Diction for Singers (2)
MUS 474. French Diction for Singers (2)
Junior Recital (0)
Senior Recital (0)
Total=40
Option Code: 954

## SPEECH COMMUNICATION (BA

 BS, CRED, HBA, HBS)Students majoring in Speech Communication must choose between a Communication option and a Theatre Arts option. Both options function as standalone majors.

## The Communication option

consists of 48 credits of course work. Students who choose the Communication option will be required to satisfactorily complete an undergraduate prerequisite core before applying (through the School of Arts and Communication) to the major. Students who are working on completing the prerequisite core are placed in pre-communication.

The Theatre Arts option consists of 51 credits of course work. Students in theatre arts do not need to complete the undergraduate prerequisite core required in the Communication option. The course requirements for students pursuing a Theatre Arts option are held to a minimum with the intention of allowing the student and his or her faculty advisor to devise a program most suited to the student's specific needs and objectives.
Students pursuing the Bachelor's degree in Speech Communication must successfully complete the requirements of either the Communication option (48 credits) or Theatre Arts option ( 51 credits); the requirements of the Liberal Arts Core ( 15 cr.); the Oregon State Baccalaureate Core ( 48 credits); and the requirements for the BA or BS.

## Major Code: 985

## OPTIONS

## COMMUNICATION OPTION

The Communication option in the School of Arts and Communication consists of 48 credits. The undergraduate prerequisite core must be successfully completed before the student applies to the major through the School of Arts and Communication. Students completing the prerequisite core are placed in precommunication until then.

## Prerequisite Core:

COMM 111. *Public Speaking (3)
COMM 114. *Argument and Critical
Discourse (3)
COMM 218. *Interpersonal
Communication (3)
Completion of the Writing I and Writing II requirements of the baccalaureate core.
A cumulative GPA of 2.00 or better

## Communication Option:

COMM 320. Introduction to Rhetorical Theory (3)
COMM 321. Introduction to
Communication Theory (3)
Choose one Communication Theory course (3):
COMM 418. ${ }^{\wedge}$ Interpersonal
Communication Theory and Research (3)
COMM 422. ${ }^{\wedge}$ Small-Group Communication

Theory and Research (3)
COMM 426. Intercultural Communication:
Theories and Issues (3)
COMM 430. Theoretical Issues in Communication Theory (3)
COMM 440. Theories of Conflict and Conflict Management (3)
Choose one Rhetorical Theory course (3):

COMM 454. Advanced Argumentation (3)
COMM 456. ^Rhetoric: 500 BC to 500 AD (3)
COMM 458. $\wedge$ Rhetoric: 500 AD to 1900 (3)
COMM 459. ${ }^{\wedge}$ Contemporary Theories of Rhetoric (3)
COMM 466. Ethics of Rhetoric (3)
Choose one Methods course (3):
COMM 414. Communication Research Methods (3)
COMM 416. Ethnography of
Communication (3)
COMM 464. Rhetorical Criticism (3) or another methods course outside the Dept. of Speech Communication as approved by advisor.

- Electives: 24 credits of electives are required in the Communication option with the following stipulations.
- A minimum of 2.0 GPA in course work used for the option is required (including the prerequisite core).
- One Writing Intensive Course (WIC) in the major is required.
- Six (6) elective credits must be taken at the 400 level. Variable credit courses cannot be used for this requirement.
- Limitations: Only 3 credits maximum of lower-division courses will be allowed for the elective portion of this option.
- Only 6 credits maximum of variable credit course work will apply to this option.


## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Option Code: 983

## THEATER ARTS OPTION

Through the Degree Partnership Program (dual admission/enrollment) with LinnBenton Community College, the Theatre Arts program at Oregon State University is building closer ties with LBCC's drama program. As this innovative program grows, theatre students from both schools will have more performance and production opportunities with greater access to a variety of performance venues and theatre faculty.
TA 147. *Introduction to the Theatre (3)
TA 244. Scenecrafts (3)
TA 247. Stage Makeup (3)
TA 248. Fundamentals of Acting (3)
TA 344. Playscript Analysis (3)
History/Theory/Criticism courses (15)
Performance studies courses (21)
In addition to course work, all majors must work on a production crew, act in a
production, and serve in a front-of-house position.
Footnote:

* Baccalaureate Core Course (BCC)

Option Code: 987

## UNDERGRADUATE MINORS

## ART HISTORY MINOR

Art minors may not elect to take required art courses on an S/U graded basis.
ART 101. *Introduction to the Visual Arts (4) ART 204, ART 205, ART 206. *Introduction
to Art History-Western $(3,3,3)$
ART 208. *Introduction to Asian Art (3)
Upper-division art history courses including at least 3 credits at the 400 level (15)
Total=31
Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 881

## COMMUNICATION MINOR

Communication minors must complete 27 credits, 18 of which must be upper division.

## Requirements

COMM 111. *Public Speaking (3)
COMM 114. *Argument and Critical Discourse (3)
COMM 218. *Interpersonal
Communication (3)
COMM 320. Introduction to Rhetorical
Theory (3)
or COMM 321. Introduction to
Communication Theory (3)
One 400-level course in COMM (3)
Additional 12 credits of upper-division COMM courses (12)
Students may not use any variable credit courses toward their minor. Minors must take courses used to fulfill the requirements for a letter grade. A minimum GPA of 2.00 must be earned in communication course work.

## Footnote:

* Baccalaureate Core Course (BCC)

Minor Code: 983

## MULTIMEDIA MINOR

New Media Communications
541-737-1492
Email: NewMedia@oregonstate.edu Website: http://liberalarts.oregonstate. edu/school-arts-and-communication/ new-media-communications

## Offered on Corvallis campus and

 via Ecampus.The Multimedia minor is designed to prepare students for a variety of careers in media and allied fields in which knowledge of and skills in mediated communications are an integral part of professional activity. A Multimedia minor will allow students from across campus to complement their chosen field of study with an understanding of multiple disciplines from a new media perspective. It
is possible for students to complete the minor entirely through Ecampus or at the Corvallis campus.
For students majoring in any subject offered at OSU, the minor must include 20 credits not used as part of the student's major program and all courses for the Multimedia minor must be taken for graded credit.
A total of 32-36 credits is required for the minor, with 12 of these at the upperdivision level (300-400).
BA 260 can only be added during Phase II of the registration process for non-Business majors.

## Multimedia Core (20)

BA 260. Introduction to Entrepreneurship (4) CS 195. Website Design (4)
NMC 101. Introduction to New Media Communications (3)
NMC 240. Survey of Social Media (3)
NMC 255. Introduction to Sound Design (3) WR 201. *Writing for Media (3)

## Electives (12-16)

Choose four of the following:
ART 263. Digital Photography (4)
BA 351. Managing Organizations (4)
COMM 385. Communication and Culture
in Cyberspace (3)
FILM 245. *The New American Cinema (4)
MUS 493. Basic Recordings Technique (3)
NMC 279. Media Literacy (3)
NMC 280. Global Media (3)
NMC 306. Art and Culture Content Creation (3)
NMC 409. Practicum (1-3)**
NMC 427. *Digital Pornography (3)
PS 315. *The Politics of Media (4)
WGSS 320. *Gender and Technology (3)

## Total=32-36

Footnote:

* Baccalaureate Core Course (BCC)
** NMC 409, Practicum, can be taken for a total of three credits over two-to-three terms. Typically one credit is accomplished per term.


## Minor Code: 314

## MUSIC MINOR

Students majoring in other disciplines may elect the Music minor.
MUS 121, MUS 122, MUS 123. Literature and Materials of Music I $(3,3,3)$
Electives in music (6)
Upper-division electives in music
from the following (12):
CS 395. Website Multimedia (4)
MUED 477. Classroom Instrumental
Techniques (2)
MUED 478. Techniques for the Vocal Instructor (2)
MUP 390-MUS 596.
MUS 340. OSU Chamber Choir (1-2)
MUS 350. Symphonic Band (1)
MUS 357. Small Jazz Ensemble (1)
MUS 360. University Symphony Orchestra (1)

MUS 363. Accompanying ( 6 credits max.)
MUS 324, MUS 325, MUS 326. History of
Western Music $(3,3,3)$
MUS 442. Genre Studies (3)

MUS 443. Theory and Composition Studies (3)

MUS 493. Basic Recording Techniques (3)
MUS 494. Intermediate Recording
Techniques (3)
MUS 495. Advanced Recording Techniques (3)

MUS 496. Surround Sound Recording and Mastering (2)
PH 331. *Sound, Hearing, and Music (3)
Total=27
Footnote:

* Baccalaureate Core Course (BCC)

Minor Code: 950
MUSIC PERFORMANCE MINOR
The Music Performance minor focuses attention on the development of performance skills in studio lessons and ensembles that contribute to aptitudes and proficiencies necessary for a lifetime participation in the arts.

## Lower-Division Credits From the

## Following (15):

100- and 200-level MUP Studio Lessons
(1-2) (MUP credits cannot exceed 12.)

## 100-level ensemble courses:

MUS 140. OSU Chamber Choir (1-2)
MUS 146. Women's Choir (1-2)
MUS 147. Men's Choir (1-2)
MUS 150. Symphonic Band (1)
MUS 151. Concert Band (1)
MUS 152. Rhythm and Beavs Pep Band (1)
MUS 153. Marching Band (1-2)
MUS 154. Basketball Band (1)
MUS 156. Indoor Drum Line (1-2)
MUS 157. Small Jazz Ensemble (1)
MUS 158. Large Jazz Ensemble (1)
MUS 160. University Symphony Orchestra
(1)

MUS 164/165/166/167/168. Chamber
Ensembles (1,1,1,1,1)
MUS 169. Opera Workshop (1-2)
MUS 163. Accompanying (1)
MUS 177. Group Lessons: Piano (1)
MUS 199. Special Studies (1-3)
Upper-Division Credits From the Following (12):
300- and 400-level MUP Studio Lessons
(1-2) (MUP credits cannot exceed 12.)
300-level ensemble courses:
MUS 340. OSU Chamber Choir (1-2)
MUS 346. Women's Choir(1-2)
MUS 347. Men's Choir(1-2)
MUS 350. Symphonic Band (1)
MUS 351. Concert Band (1)
MUS 352. Rhythm and Beavs Pep Band (1)
MUS 353. Marching Band (1-2)
MUS 354. Basketball Band (1)
MUS 356. Indoor Drum Line (1-2)
MUS 357. Small Jazz Ensemble (1)
MUS 358. Large Jazz Ensemble (1)
MUS 360. University Symphony Orchestra (1)

MUS 364/365/366/367/368. Chamber
Ensembles (1,1,1,1,1)
MUS 369. Opera Workshop (1-2)
MUS 363. Accompanying (1)
MUS 399. Special Studies: Introduction to Alexander Technique for Musicians (1-3)

MUS 399. Special Studies (1-2)
MUS 444. Foundations of Piano Pedagogy (3)

MUS 451. Introduction to Arts
Entrepreneurship (3)

## Total=27

Minor Code: 936

## NEW MEDIA COMMUNICATIONS

 MINOR
## New Media Communications

## Program

541-737-4580
Email: newmedia@oregonstate.edu Website: http://liberalarts.oregonstate. edu/school-arts-and-communication/ new-media-communications
New Media Communications (NMC) minor focuses on mediated storytelling and the new media technology that makes it possible. This focus within the broader discipline of mediated communications capitalizes on the historic strengths of Oregon State University.
NMC takes an innovative approach to the study of mediated communications. New Media Communications is devoted to the study of mediated communications and its impact on culture, technology and society.
Courses in the New Media Communications minor are designed to prepare students for a variety of careers in media and allied fields in which knowledge of and skills in mediated communications are an integral part of professional activity. NMC offers students the opportunity to pursue a range of theoretical and practical courses in media.

An NMC minor will allow students from across campus to complement their chosen field of study with an understanding of mediated communications from a new media perspective. Students will better understand how to process the information they receive about their chosen field and how to distribute information about their own work effectively in society. The minor in New Media Communications will assist students in attaining the background necessary for leadership roles in their chosen fields.
All courses for the New Media Communications minor must be taken for graded credit.

A total of 27-29 credits is required for the minor, at least 15 of which must be upper division (300-400).

## Core Requirements (9)

NMC 101. Introduction to New Media Communications (3)
NMC 260. New Media Futures (3)
NMC 301. ${ }^{\wedge}$ Writing for the Media
Professional (3)
Electives (18-21)
Students must select 18-21 credits, about 6 courses, from the following list of electives:

NMC 240. Survey of Social Media (3)
NMC 255. Introduction to Sound Design (3)
NMC 320. History of Telecommunications (3)

NMC 321. History of Broadcasting (3)
NMC 322. Landmarks in Media Content (3)
NMC 340. Social Media Strategy (3)
NMC 351. New Media Visualization (3)
NMC 355. Applied Sound Design (3)
NMC 380. Pre-Production (3)
NMC 383. Field Production (4)
NMC 399. Special Topics (1-16) (Can be
taken for up to 6 credits)
NMC 409. Practicum ( $1,1,1$ )
NMC 410. Internship (3-6) (Can be taken
for up to 6 credits)
NMC 419. Reefer Madness in the Media (3);
NMC 421. *Diffusion of Innovations (3)
NMC 427. *Digital Pornography (3)
NMC 430. Media Theory (3)
NMC 483. New Media 3-D (4)
NMC 484. New Media Animation (4)

## Total Requirements=27-29

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Minor Code: 619


## PHOTOGRAPHY MINOR

The Photography minor creates an opportunity for non-Photography majors to study and practice photography, digital imaging and collaborative digital arts practices. Through the study of a diverse range of photographic genres and techniques, students actively practice photography, develop critical-thinking skills, study the histories of photography and key photographic practitioners, have the option to experience other time-based media genres, and further their photography skills by creating professional-level projects.
The role of photography to improve creative thinking skills is invaluable for students studying in other fields where the role of creativity as an aspect of inventiveness and independent project generation is encouraged. Furthermore, a photography minor is an ideal companion to students majoring in the design fields or in Digital Communication Arts students in these areas already share several courses in common with art/photography students.

To qualify as a Photography minor, students must declare the minor when filing the application for graduation, and must have 27 credits in photography and art history, at least 12 of which must be upper division. For further information, please contact the academic advisor.
Required Photography Courses (16 credits)
ART 263. Digital Photography (4)
ART 340. Darkroom Photography I (4)
ART 345. Intermediate Photography (4)
ART 347. Photography: Studio Lighting (4)

Photography Electives ( 11 credits)
Choose 11 credits from the following:
ART 222. Introduction to Time-Based Art (4)
ART 264. *Photography: History,
Technology, Culture, and Art (3)
ART 339. Professional Practices in Photography (3)
ART 341. Darkroom Photography II (4)
ART 346. Photo Illustration I (3)
ART 348. Concepts in Digital Imaging (4)
ART/NMC 349. Video Art (4)
ART 350. Photography on Assignment (4)
ART 354. Alternative Processes in
Photography (4)
ART 359. *Photography: Activism and
Social Change (3)
ART 368. ^History of Photography (3)
ART 409. Practicum Student Media (1) Repeatable to 4 credits
ART 422. New Media: Interactive (4)
ART 432. *Gender, Sexuality, and the
Photographic Image (3)
ART 441. Photography III (4)
ART 443. Combined Media: Photo
Installation (4)
ART 444. The Constructed Image (4)
ART 446. Documentary Photography (4)
ART 447. Advanced Studio Lighting (4)
ART 454. Alternative Processes in Photography II (4)
ART 456. Portfolio-Photography/Video Art
(4) Repeatable to 8 credits

NMC 383. Field Production (4)
Total=27
Footnote:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Minor Code: 893
POPULAR MUSIC STUDIES MINOR


## Also available via Ecampus.

The online Popular Music Studies minor, offered only via Ecampus, creates an opportunity for students to examine popular music as a cultural and social practice. The minor provides students with literacy in several popular music genres of their choice, including rock $n^{\prime}$ roll, hip hop, film music, reggae, Broadway music, music technology and jazz. Through the study of a diverse range of genres, stylistic practices, performance media, and music as a commercial enterprise, students will develop analytical and critical skills to examine musical meaning through the lens of community, music production, and identity.

This minor does not require an audition or ability to read music.
Choose 12 Lower-Division credits from below:
MUS 102. *Music Appreciation II: Periods and Genres: Hip Hop. Theory and Practice (3)

MUS 102. *Music Appreciation II: Periods and Genres: Film Music. Theory and Practice (3)
MUS 102. *Music Appreciation II: Periods and Genres: Musical Theater (3)
MUS 102. *Music Appreciation II: Periods
and Genres: Rock and Roll (3)
MUS 102. *Music Appreciation II: Periods and Genres: Jazz (3)
MUS 102. *Music Appreciation II: Periods and Genres: Reggae (3)
MUS 102. *Music Appreciation II: Periods and Genres: Introduction to Popular Music Theory and Practice (3)
MUS 103. *Music Appreciation III: Great Composers: The Beatles (3)
MUS 103. *Music Appreciation III: Great Composers: Bob Marley (Reggae) (3)
MUS 103. *Music Appreciation III: Great Composers: Bob Dylan (Folk) (3)
MUS 103. *Music Appreciation III: Great Composers: Madonna and Video Culture (3)

MUS 108. *Music Cultures of the World (3)
Choose 15 Upper-Division credits from below:
MUS 402. Independent Study: Capstone Project (3)
MUS 410. Internship (3)
MUS 442. Genre Studies: Advanced Studies in Popular Music Theory and Practice (3)
MUS 442. Genre Studies: Women in Popular Music (3)
MUS 442. Genre Studies: Advanced Studies in Hip Hop (3)
MUS 442. Genre Studies: Regional Studies in World Popular Music (India, Indonesia, Africa, Latin America) (3)
MUS 442. Genre Studies: Advanced Studies in Rock and Roll (3)
MUS 442. Genre Studies: The Blues and African American Music (3)
MUS 442. Genre Studies: Music Video, MTV and American Culture (3)
MUS 443. Theory and Composition Studies: Advanced Studies in Film and Gaming Music (3)
MUS 493. Basic Recording Techniques (3)

## Footnote:

* Baccalaureate Core Course


## Minor Code: 253

## STUDIO ART MINOR

Art minors may not elect to take required art courses on an S/U graded basis.
ART 115. Foundation: 2-D (4)
ART 117. Foundation: 3-D (4)
ART 131. Foundations: Drawing I (4)
Studio Art courses in an approved program that includes at least 12 credits of upper-division courses from the following list ( 15 credits). Studio Art can be any combination of courses in drawing, painting, printmaking, sculpture, expanded media, photography, and digital studio. Note: A relevant 200-level studio art class is a prerequisite for many of these upper-division courses.
ART 215. Color In The Visual Arts (4)
ART 222. Introduction To Time-Based Art (4)
ART 234. Drawing II/Figure (4)
ART 263. Digital Photography (4)
ART 271. Printmaking I (4)
ART 281. Painting I (4)
ART 291. Sculpture I (4)
ART 331. Drawing Concepts (4)
ART 334. Drawing III: Figure (4)

ART 340. Darkroom Photography I (4)
ART 341. Darkroom Photography II (4)
ART 345. Intermediate Photography (4)
ART 347. Photograph: Studio Lighting (4)
ART 348. Concepts In Digital Imaging (4)
ART/NMC 349. Video ART (4)
ART 351. Installation (4)
ART 354. Alternative Processes In
Photography (4)
ART 375. Printmaking: Relief (4)
ART 376. Printmaking: Intaglio (4)
ART 377. Printmaking: Lithography (4)
ART 378. Printmaking: Monotype (4)
ART 379. Printmaking: Screen Printing (4)
ART 381. Painting The Figure (4)
ART 382. Painting II: Concepts (4)
ART 383. Painting II: Abstract And
Multimedia (4)
ART 384. Painting II: New Genre (4)
ART 391. Sculpture II (4)
ART 422. New Media: Interactive (4)
ART 431. Drawing IV (3-5)
ART 434. Drawing IV/Figure (3-5)
ART 441. Photography III (4)
ART 443. Combined Media: Photo Installation (4)
ART 444. The Constructed Image (4)
ART 446. Documentary Photography (4)
ART 447. Advanced Studio Lighting (4)
ART 454. Alternative Processes In
Photography II (4)
ART 475. Printmaking Studio (3-5)
ART 479. Printmaking: Advanced Screen
Printing (4)
ART 481. Painting III (3-5)

## Total=27

Minor Code: 748

## THEATER ARTS MINOR

## Required

TA 144. Playreading (1) (May be repeated
once for a total of 2 credits)
TA 147. *Introduction to the Theatre (3)

## TA 244. Scenecrafts (3)

TA 248. Fundamentals of Acting (3)
TA 344. Playscript Analysis (3)
In addition, students choose 15 additional credits, 12 of which must be at the upper-division level.

Activity credits (TA 250-TA 350) may not be counted toward the minor.

Minors are strongly encouraged to participate fully backstage, on stage, and front-of-house.

## Total=28

Footnote:

* Baccalaureate Core Course (BCC)


## Minor Code: 987

## GRADUATE MINORS

## ART GRADUATE MINOR

Graduate Areas of Concentration Art history, fine arts, photography
The School of Arts and Communication offers graduate work leading to the Master of Arts in Interdisciplinary Studies (MAIS) and toward minors in other advanced degree programs. Emphasis may
be in fine arts, art history, or photography. These fields offer sufficient depth to provide a strong minor.

## Minor Code: $\mathbf{8 8 0 0}$

## MUSIC GRADUATE MINOR

Graduate Areas of Concentration
Composition, conducting, music
education, performance
The School of Arts and Communication participates in the Master of Arts in Interdisciplinary Studies degree and Master of Arts in Teaching degree. Contact the school for entrance requirements for the MAT degree. Areas of specialization include performance, conducting, composition, music history, and music education.

## Music Education

Through the School of Arts and Communication, graduate students may participate in the following programs: Professional Music Teacher Education, the Master of Arts in Teaching (MAT), the Master of Arts in Interdisciplinary Studies (MAIS), and the Master of Education (EdM) with a focus in music education. The school offers graduate courses in music, music education, and music performance. OSU's music education program is approved by the state of Oregon Teachers Standards and Practices Commission (TSPC) and the National Council for Accreditation of Teacher Education (NCATE). With careful planning, students may complete both the initial and continuing teaching licensure requirements, as well as a master's degree. For more information, contact the Music Education Coordinator, Oregon State University, 101 Benton Hall, Corvallis, OR 97331.

## Minor Code: 9500

## SPEECH COMMUNICATION

## GRADUATE MINOR

Graduate Areas of Concentration
Interpersonal and group communication; rhetoric and social influence; theatre arts costume and scene design; theatre arts directing, performance, and management; theatre arts history, criticism/literature, and playwriting

## Minor Code: 9850

## SCIENTIFIC, TECHNICAL,

AND PROFESSIONAL

## COMMUNICATION CERTIFICATE

## Also available via Ecampus.

The undergraduate certificate in Scientific, Technical, and Professional Communication is an interdisciplinary program offered by the School of Writing, Literature and Film and the School of Arts and Communication.

The core will consist of courses in writing, communications, and new media arts. These courses are production-orient-
ed and focused on writing and communication skills that students will transfer into other work. Electives are divided between course work in these and other fields, including one course from the Writing Intensive Curriculum (WIC) and up to six credits in upper-division courses in writing and communication. The program is capped by a one-credit course (face-to-face and Ecampus) focused on the creation of a portfolio of technical and scientific communication materials that will be valuable for students as they begin their careers.

## Required Courses ( 6 credits)

WR 327. *Technical Writing (3)
WR 362. *Science Writing (3)

## Core Courses (12 credits)

Select at least 12 credits from below:
COMM 218. *Interpersonal
Communication (3)
COMM 316. Advanced Persuasion (3)
COMM 322. Small-Group Problem Solving (3)

COMM 324. Communication in Organizations (3)
COMM 326. Intercultural Communication (3)

NMC 240. Survey of Social Media (3)
NMC 260. New Media Futures (3)
WR 201. *Writing for Media (3)
WR 214. *Writing in Business (3)
WR 303. *Writing for the Web (3)
WR 330. *Understanding Grammar (3)

## Writing Intensive Course (3-4 cr)

Complete one WIC course of 3 to 4
credits, preferably from the primary discipline and major program of study.

## Electives (Up to $\mathbf{8}$ credits)

Select up to 8 credits from below:
AG 351. *Communicating Agriculture to
the Public (3)
COMM 402. Independent Study (1-2)
COMM 414. Communication Research
Methods (3)
COMM 416. Ethnography of
Communication (3)
COMM 426. Intercultural Communication:
Theories and Issues (3)
COMM 437. Health Communication (3)
COMM 454. Advanced Argumentation (3)
COMM 464. Rhetorical Criticism (3)
FES 493. Environmental Interpretation (4)
WR 402. Independent Study (1-2)
WR 414. Advertising and Public Relations Writing (4)
WR 448. Magazine Article Writing (4)
WR 462. Environmental Writing (4)
WR 466. Professional Writing (4)
WR 493. ^The Rhetorical Tradition and the Teaching of Writing (4)
WR 495. ^Introduction to Literacy Studies (4)

WR 497. Digital Literacy and Culture (4)

## Capstone Portfolio (1 credit)

COMM 435. Scientific, Technical \&
Professional Communication Capstone (1)
WR 435 Scientific, Technical \& Professional Communication Capstone (1) Ecampus

## Total=30-31 credits

Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course (WIC)


## Major Code: C750

- ART COURSES

ART 100. ART ORIENTATION (1). Introduction to the study of art and career options in fine arts, graphic design, photography, and art history.
ART 101. *INTRODUCTION TO THE VISUAL ARTS (4). An introductory lecture course using visual materials with emphasis on methods and motivations that generate the visual experience, both past and present. (FA) (Bacc Core Course)
ART 115. FOUNDATIONS: 2-D (4). Studio course that introduces the visual language, the elements of design, and the principles of organization. Emphasizes skills, concepts, and problem solving in the areas of two-dimensional design and color. (FA)
ART 117. FOUNDATIONS: 3-D (4). Studio course examining three-dimensional design elements and their spatial organization. Emphasizes innovative problem solving and exposure to varied media. Gives students a sound conceptual basis to apply to more advanced media-oriented courses. PREREQS: ART 115 [D-]
ART 121. FOUNDATIONS: COMPUTERS IN
VISUAL ARTS (4). An introductory studio art class using computers in the visual arts. Projectbased exploration of digital imaging, layout, 3-D rendering, and video. Examination of the impact of digital technology on the visual arts from contemporary and historical perspectives.

ART 131. FOUNDATIONS: DRAWING I (4).
Introductory studio course in drawing techniques with emphasis on developing skills in perception and visual organization. (FA)
ART 199. SPECIAL STUDIES (0-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ART 204. *INTRODUCTION TO ART HISTORY WESTERN (3). A historical survey of architecture, painting, sculpture, and crafts, from prehistory to the present, with emphasis on the development of Western art. Recommended that sequence be taken in order. (H) (Bacc Core Course)
ART 205. *INTRODUCTION TO ART HISTORY WESTERN (3). A historical survey of architecture, painting, sculpture, and crafts, from prehistory to the present, with emphasis on the development of Western art. Recommended that sequence be taken in order. (H) (Bacc Core Course)
ART 206. *INTRODUCTION TO ART HISTORY WESTERN (3). A historical survey of architecture, painting, sculpture, and crafts, from prehistory to the present, with emphasis on the development of Western art. Recommended that the sequence be taken in order. (H) (Bacc Core Course)
ART 208. *INTRODUCTION TO ASIAN ART (3). Introduces the distinctive, yet related, aesthetic traditions of South and Southeast Asia, Inner Asia, and East Asia. It focuses on architectural sites, sculptures, and paintings from prehistory to the present. (Bacc Core Course)

## ART 210. *HISTORY OF WESTERN

ARCHITECTURE (3). A survey of buildings and architectural thought in the West from antiquity to the twentieth century; focuses on major periods and movements of architectural history by examining building types, patrons, materials, building traditions, structural innovations and other critical aspects inherent to architecture. (Bacc Core Course)
ART 211. WOODTURNING WITH SCIENCE I (4). An introduction to scientific woodturning. Students will get a grounding in tools, lathes, sharpening, and set-up, and then will transition into turning basic forms (spindle and bowl). Particular relevance will be placed upon grain orientation, wood moisture content, wood anatomy, wood
chemistry, wood species and extractive effects and how all of these attributed affect both form and function. Class instruction will be entirely studio based. CROSSLISTED as WSE 211. This course is repeatable for a maximum of 8 credits. PREREQS: WSE 210 [D-]
ART 215. COLOR IN THE VISUAL ARTS (4). Studio course following ART 115 and ART 117 that examines the properties of colors and their interaction. Emphasizes problem solving and the experimental use of color. PREREQS: ART 115 [D-]
ART 222. INTRODUCTION TO TIME-BASED ART
(4). Introduction to time-based media using the computer as a tool. Studio art class developing skills in video art, sound art, performance, and other time-based digital arts. Exploration of sequential, experimental, historical, and contemporary themes and the role of the audience in time-based art. PREREQS: ART 121 [C-]

ART 234. DRAWING II/FIGURE (4). Drawing from the life model with emphasis on skill and conceptual awareness as well as anatomical consideration. PREREQS: ART 131 [D-]
ART 263. DIGITAL PHOTOGRAPHY (4).
Studio course in digital photography. The digital camera. Digital exposure. Digital color. Workflow. Digital output. Location lighting. Students must have the use of a digital single lens reflex camera. PREREQS: ART 115 and ART 120 are recommended.

## ART 264. *PHOTOGRAPHY: HISTORY,

## TECHNOLOGY, CULTURE AND ART (3).

 Introduction to the history of photography through aesthetic, cultural and technical contexts. This course covers the history of photography and its technologies, photography in art, some photographers and their photographs and the purposes of photography. (Bacc Core Course)ART 271. PRINTMAKING I (4). Introduction to the basic processes of printmaking, with options among relief, lithography, intaglio, screen printing and monotype. PREREQS: (ART 115 [D-] and ART 131 [D-])
ART 281. PAINTING I (4). Introductory studio course with emphasis on basic materials and techniques in painting. (FA) This course is repeatable for a maximum of 12 credits. PREREQS: ART 131 [D-]

ART 291. SCULPTURE I (4). Studio course in basic materials and approaches used in sculpture; a foundation for further three-dimensional work. (FA) PREREQS: ART 117 [C-] and Art core strongly recommended.
ART 306. ADVISOR REVIEW (1). A review, conducted by the student's advisor and another faculty member of the student's choosing, of work produced to date in the student's area of concentration. Graded P/N. PREREQS: Placement Test ART1(1) and departmental approval required. For BFA students only.

## ART 310. *EARLY CHINESE ART AND

ARCHAEOLOGY (3). Introduces major forms of Chinese art from the Neolithic period to the Tang dynasty (618-907 CE) and related major archaeological finds. Stresses the materials and processes of making art, development of representational art, and the role of visual arts in an aristocratic and religious culture. (Bacc Core Course)

ART 311. *LATE CHINESE ART AND CULTURE (3). Introduction to the major forms of Chinese art and visual culture from the eleventh century to the early twentieth century. (Bacc Core Course)
ART 312. *CONTEMPORARY CHINESE ART (3). Introduces origins and development of contemporary Chinese art and visual culture in its domestic and global contexts. (Bacc Core Course)

ART 313. *ART OF JAPAN (3). Surveys the arts of Japan from the prehistoric period to the twentieth century. (Bacc Core Course)

ART 320. *ANCIENT GREEK ART (3). Focuses on the major artistic developments in Ancient Greece from the Middle Bronze Age to 31 BCE, and especially on the city-state of Athens during the Fifth Century. (Bacc Core Course)

## ART 321. *ANCIENT ROMAN ART AND

ARCHITECTURE (3). Survey of ancient Roman art and culture between the sixth century BCE and fifth century CE, covering principal media, styles, and subject matter. (Bacc Core Course)

## ART 322. *MEDIEVAL ART AND

ARCHITECTURE (3). Survey of the art and architecture of the major periods and cultures of Europe and the Mediterranean between the fourth and the fourteenth century. Traces salient developments in thought and material culture of western civilization. (Bacc Core Course)
ART 323. *ITALIAN RENAISSANCE ART AND ARCHITECTURE (3). Survey of Italian Renaissance art and culture, covering the principal artists, patrons, media, styles, and subject matter. (Bacc Core Course)

ART 331. DRAWING CONCEPTS (4). Studio course emphasizing drawing composition as an investigative, conceptualizing and communicative nonverbal language. Independent thinking, problem solving, and creative development encouraged. This course is repeatable for a maximum of 12 credits. PREREQS: ((ART 131* [D-] and ART 234* [D-] ))
ART 334. DRAWING III: FIGURE (4). Intermediate study of the human figure utilizing life models, the skeleton, and anatomy texts. Emphasis on gaining greater knowledge of the body's underlying structure and potential for aesthetic expression. This course is repeatable for a maximum of 12 credits. PREREQS: (ART 234 [D-] ) and Art core curriculum.
ART 339. PROFESSIONAL PRACTICES IN PHOTOGRAPHY (3). Professional practices appropriate for photographic-artists and those planning to run a photographic business. Topics include portfolio development, presentation skills, project-planning, contracts, permissions, copyright, promotional campaigns, pricing, grants, exhibition opportunities, business structures, and marketing strategies. This course is repeatable for a maximum of 6 credits. PREREQS: ART 263 [C-] and an additional two photography courses are recommended as prerequisites for this course.
ART 340. DARKROOM PHOTOGRAPHY I (4). Studio course in black-and-white film exposure and development, and printing in the darkroom. The medium of silver-based black-and-white photography is explored as a communication mode and art form. Historical, conceptual, technical and legal aspects of traditional wet processing are surveyed. Access to a single lens reflex (SLR) film camera is required. Course fee. PREREQS: ART 263 Digital Photography is required for Photography majors. No prerequisite or prior darkroom experience is required for nonPhotography majors.
ART 341. DARKROOM PHOTOGRAPHY II (4). Improving silver-gelatin printing and photographic presentation techniques. Emphasis on furthering creative visual language and individual photographic project development. Studio and lecture course. Student must supply a medium format or 35 mm single lens reflex (SLR) film camera. Lec/studio. PREREQS: ART 340 [D-]

ART 345. INTERMEDIATE PHOTOGRAPHY (4). Emphasis is on both technical and aesthetic expression of digital color photography, from initial image capture, color management to finished print along with color symbolism and composition. Exploration of narrative, sequencing and imageseries concepts. Introduction to contemporary color photographers. Studio. PREREQS: ART 263 [C+]
ART 346. PHOTO ILLUSTRATION I (3). Studio lighting. The $4 \times 5$ view camera. Sheet film. Black-and-white and color illustration. PREREQS: ART

262 and Art core curriculum
ART 347. PHOTOGRAPH: STUDIO LIGHTING
(4). Practical studio class surveying the basic principles and application of light in the creation of photographs. The development of craft and technique inside the studio will be emphasized but formal and conceptual considerations related to light and photography will also be explored. PREREQS: ART 263 [C] and ART 345

ART 348. CONCEPTS IN DIGITAL IMAGING (4). Approaches to non-traditional and the manipulated image in digital photography with an emphasis on producing personal imagery. Introduction to the history of the manipulated image in photography and to contemporary approaches to digital photography. PREREQS: ART 263 [D-] and ART 121 are recommended as some prior Photoshop knowledge is required.
ART 349. VIDEO ART (4). Studio course in video art and time-based media projects. Emphasis on experimental approaches to video art in a contemporary art context, linear and nonlinear video production and the projection and screening of video art projects. Introduction to the history of video art as an art form. Lec/studio CROSSLISTED as NMC 349. This course is repeatable for a maximum of 8 credits. PREREQS: ART 122 [C-] and ART 263 [C-]

ART 350. PHOTOGRAPHY ON ASSIGNMENT (4). An introduction to shooting photographs on assignment. Students will create, edit, caption, and submit photographs for print publications, online media, and alternative/independent media venues. Students will experiment with text, audio slideshows, and other creative means of illustrating concepts and ideas. Also covered are history, law, and ethics of photojournalism. PREREQS: ART 263 or active knowledge of camera operations, shooting RAW files and Adobe Lightroom.
ART 351. INSTALLATION (4). Studio/lecture course designed to acquaint the student with the possibilities of using non-traditional means such as site, time, and interaction to communicate deas. PREREQS: (ART 291 [D-] and foundation curriculum.

ART 352. *CREATIVE COLLABORATION: DESIGNING AND BUILDING (3). Working in multi-disciplinary teams, design, implement, and document a piece of public art work or science museum display. Projects may be made of any media, but must demonstrate creativity both in the engineering used to create them and the technology and society message they convey. (Bacc Core Course) CROSSLISTED as ENGR 352.

ART 354. ALTERNATIVE PROCESSES IN PHOTOGRAPHY (4). Historical photographic printing methods in use today e.g., cyanotype, gum bichromate and more. Use of digital and analog negatives, mixing emulsions and coating paper by hand. PREREQS: ART 263 [C-] and ART 345 [C-] and ART 340
ART 359. *PHOTOGRAPHY: ACTIVISM, AND SOCIAL CHANGE (3). Explores photography as an agent of social change through creative projects and topical discussions. Emphasis on the visual language, ethical considerations, and strategies employed by activist photographers that disrupt dominant ideologies and address institutionalized inequality and privilege in the United States. No prior photography experience necessary. (Bacc Core Course) PREREQS: Junior standing
ART 360. HISTORY OF ART (3). Early
Renaissance art. Lecture course on the principal stylistic manifestations of European architecture, painting, and sculpture from the late Middle Ages to 1750. PREREQS: ART 204 and ART 205 and ART 206
ART 361. HISTORY OF ART (3). High
Renaissance art and mannerism. Lecture course on the principal stylistic manifestations of

European architecture, painting, and sculpture from the late Middle Ages to 1750. This course is repeatable for a maximum of 6 credits. PREREQS: ART 204 and ART 205 and ART 206
ART 363. HISTORY OF ART (3). Baroque art. Lecture course on the principal stylistic manifestations of European architecture, painting, and sculpture from the late Middle Ages to 1750. This course is repeatable for a maximum of 6 credits. PREREQS: ART 204 and ART 205 and ART 206
ART 364. *NINETEENTH-CENTURY ART
(3). Lecture course covering the principal movements and trends in late eighteenth-century and nineteenth-century architecture, painting, and sculpture in Europe and America, from Neoclassicism to Symbolism. (Bacc Core Course)
ART 365. *HISTORY OF MODERN ART 1900-
1945 (3). Lecture course covering the principal movements and trends in early twentieth-century Western art, from Expressionism to early American Modernism. (Bacc Core Course)

ART 366. ART SINCE 1945 (3). Lecture course covering the principal movements, theories and ideas in visual art since 1945, including painting, sculpture, photography, installation, performance and participatory art. PREREQS: ART 204 and ART 205 and ART 206
ART 367. *HISTORY OF DESIGN (3). A survey of the impact of technology on the visual qualities of graphic, advertising, fashion, architecture, and industrial design from the Victorian Arts and Crafts Movement to the computer age. (Bacc Core Course)
ART 368. ^HISTORY OF PHOTOGRAPHY (3).
The development of photographic processes and applications. Influential figures. From the early beginnings to contemporary trends. (Writing Intensive Course)
ART 375. PRINTMAKING: RELIEF (4). Studio course in relief printmaking with emphasis on linocut and woodcut; may include other relief processes, i.e. photo polymer plate. Black-andwhite and color. PREREQS: Art core curriculum.

ART 376. PRINTMAKING: INTAGLIO (4). Studio course in intaglio printmaking with emphasis on drypoint, line etching, aquatint, softground and photo process. Black-and-white and possibly color for final project. PREREQS: Art core curriculum.
ART 377. PRINTMAKING: LITHOGRAPHY
(4). Studio course in lithographic printmaking with emphasis on graining the stone, drawing with crayon and tusche, etching and reworking, inking and printing lithographic limestone. Black-and-white and possibly color for final project. PREREQS: Art core curriculum.
ART 378. PRINTMAKING: MONOTYPE (4). Studio course in monotype printmaking with emphasis on drawing/painting with brushes, oil pastels, watercolors, water-based crayons, inking with a lithographic roller and printing with an etching press. Black-and-white and color. PREREQS: Art core curriculum.
ART 379. PRINTMAKING: SCREEN PRINTING (4). Studio course in screen printing with emphasis on paper stencil, drawing fluid and photo emulsion processes. Students are exposed to a range of techniques and concepts are encouraged to investigate personal motivations while making multiple color prints. PREREQS: (ART 115 [C-] and Art core curriculum. ART 100, ART 101, ART 117, ART 131, ART 204, ART 205, ART 206 are recommended. Or instructor approval.
ART 381. PAINTING THE FIGURE (4). Studio course with emphasis on painting from the live model; understanding the figure in terms of color, form and composition, the figure as symbol, implied narrative and vehicle of expression. This course is repeatable for a maximum of 9 credits. PREREQS: (ART 281 [D-] and ART 234 and Art core curriculum.

ART 382. PAINTING II: CONCEPTS (4). Painting with emphasis on experimentation and an exploratory investigation of mixed media, new media, collage, and assemblage, utilizing either representation or abstraction. This course is repeatable for a maximum of 8 credits. PREREQS: (ART 281 [D-] and Art core curriculum.

## ART 383. PAINTING II: ABSTRACT AND

 MULTIMEDIA (4). Intermediate studio course with emphasis on contemporary directions in painting: abstraction and non-literal approaches.This course is repeatable for a maximum of 12 credits. PREREQS: (ART 281 [D-] and Art core curriculum.

ART 384. PAINTING II: NEW GENRE (4). Exploration of current directions in painting using traditional and non-traditional concepts and techniques. This course is repeatable for a maximum of 12 credits. PREREQS: (ART 281 [D-]
ART 385. PAINTING III: ENCAUSTICS (4).
Exploration and application of a variety of traditional and non-traditional techniques using encaustics paint; beeswax and pigment fused to a surface. PREREQS: ART 131 [D-] and ART 281 recommended or instructor approval.
ART 386. A CULTURAL HISTORY OF
AMERICAN ART AND LITERATURE: PART
I (4). The first in an interdisciplinary sequence of courses that examines the development and interrelationships of American art and literature from contact to the present. ART 386, Part I, covers Conquest to Civil War. CROSSLISTED as ENG 386. PREREQS: Sophomore standing.
ART 387. A CULTURAL HISTORY OF AMERICAN ART AND LITERATURE: PART II (4). The second course an interdisciplinary sequence that examines the development and interrelationships of American art and literature from contact to the present. ART 387, Part II, covers Civil War to Harlem Renaissance. CROSSLISTED as ENG 387. PREREQS: Sophomore standing.

## ART 388. A CULTURAL HISTORY OF

AMERICAN ART AND LITERATURE: PART
III (4). The second course an interdisciplinary sequence that examines the development and interrelationships of American art and literature from contact to the present. ART 388, Part III, covers Great Depression to Postmodernity. CROSSLISTED as ENG 388. PREREQS: Sophomore standing.
ART 391. SCULPTURE II (4). Intermediate studio course with emphasis on developing greater skills and technical knowledge in moldmaking, welding, carving, plaster or metal casting. This course is repeatable for a maximum of 12 credits. PREREQS: (ART 291 [D-] and Art core curriculum.
ART 395. SPECIAL TOPICS IN EARLY ART HISTORY (3). This course is repeatable for a maximum of 99 credits.

ART 396. SELECTED TOPICS IN MODERN ART HISTORY (3). This course is repeatable for a maximum of 99 credits.
ART 397. SELECTED TOPICS IN GLOBAL ART HISTORY (3). This course is repeatable for a maximum of 99 credits.
ART 398. SPECIAL TOPICS IN ART HISTORY (3). This course is repeatable for a maximum of 99 credits.
ART 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Junior or senior standing.
ART 400. THE DISCERNING PEN: ART CRITICISM (3). Writing on art history provides students with an opportunity to write about art using three distinct structures and styles while drawing on the student's own ideas and opinions. PREREQS: ((ART 101 [D-] or WR 121 [C-] ) and ART 200 [D-] and ART 206 [D-] )

ART 401. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ART 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ART 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ART 405. READING AND CONFERENCE (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ART 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: departmental approval required.
ART 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: ART 206 and departmental approval required.
ART 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: departmental approval required.
ART 409. PRACTICUM STUDENT MEDIA (1).
Practical workshop class offering experiential learning in student media on the Oregon State University campus. This course is repeatable for a maximum of 12 credits.
ART 410. INTERNSHIP (1-16). A one-quarter residency with an appropriate, approved agency or organization where a student may receive practical experience related to the objectives of the Department of Art. The intern observes and produces; the work is supervised and evaluated, both by the agency and the art faculty. This course is repeatable for a maximum of 16 credits. PREREQS: departmental approval required.
ART 411. ${ }^{\wedge}$ CONTEMPORARY ISSUES IN ART (3). Examination of relevant issues and realities facing working artists today through research projects, writing, gallery visits, guest lectures, videos and panel discussions. (Writing Intensive Core) PREREQS: Placement Test ART1(1) and Art core curriculum plus 12 credits of upperdivision studio credits.

## ART 413. WOODTURNING WITH SCIENCE

II (4). An in-depth look at how character in wood (figure, spalting, knots, etc.) affects machinability and output in both functional and aesthetic turning. Students will work with a wide range of spalted wood types and figure across numerous species while working on advanced turning forms. Particular emphasis will be placed upon how figure affects grain orientation, how spalting affects density and stability, and how the challenges with character wood can be overcome without specialty tools. Class instruction will be entirely studio based. CROSSLISTED as WSE 413. This course is repeatable for a maximum of 8 credits. PREREQS: WSE 210 [C-] and WSE 211 [C-]
ART 415. ART FOR TEACHERS I (4). A
studio course covering basic art materials and techniques. Integrates aesthetics and art criticism, creating art, and the cultural and historical context of works of art for K-12. May be taken in any order. PREREQS: Fine Arts Portfolio Review (ART1) and Graphic Design Portfolio Review (ART2)
ART 416. ART FOR TEACHERS II (4). A
studio course covering basic art materials and techniques. Integrates aesthetics and art criticism, creating art, and the cultural and historical context of works of art for K-12. May be taken in any order
ART 418. PORTFOLIO SEMINAR (2). An
advanced lecture course providing an overview of pertinent issues in creating a professional graphic design portfolio. Graded P/N. PREREQS: Placement Test ART2(1) and Junior block in graphic design.

ART 422. NEW MEDIA: INTERACTIVE (4). An advanced course designing digital experiences with emphasis on innovative navigation, architectural structures, theoretical, and historical issues of new media. PREREQS: Placement Test ART2(1) and junior block in graphic design and CS 295

ART 431. DRAWING IV (3-5). Development of an individual approach to the varied aspects of drawing, emphasis on exploration of traditional and contemporary techniques and styles. Course offered 3 to 5 credits per term. This course is repeatable for a maximum of 15 credits. PREREQS: 9 credits of ART 331.

ART 432. *GENDER, SEXUALITY, AND THE PHOTOGRAPHIC IMAGE (3). A creative and discussion-based course focusing on ways in which photography can and has addressed issues of gender and sexuality. An introduction to key concepts and intersections in Women's, Gender and Sexuality Studies; Queer Studies and photography theory. Students will create written and photographic responses to artworks, texts, personal experience and pop-culture. (Bacc Core Course) CROSSLISTED as QS 432, WGSS 432. PREREQS: Junior or senior standing.
ART 434. DRAWING IV/FIGURE (3-5).
Development of an individual approach to the varied aspect of figure drawing; emphasis on exploration of traditional and contemporary techniques and styles. Course offered 3-5 credits per term; maximum 15 credits. Departmental approval required for 5 credits. This course is repeatable for a maximum of 15 credits. PREREQS: 9 credits of ART 334.
ART 441. PHOTOGRAPHY III (4). Using the camera as a tool to sharpen aesthetic and visual perception. Creation of exhibition-quality silvergelatin prints. Introduction to the view camera. Advanced darkroom techniques. Lec/lab/studio. This course is repeatable for a maximum of 12 credits. PREREQS: ART 341 [D-] and junior or senior standing.

## ART 443. COMBINED MEDIA: PHOTO

INSTALLATION (4). This studio course explores the use the photographic image in conjunction with other studio media to create multi-media works and site-specific installations. Designed to remove and release the photographic image from its ubiquitous tradition, it looks to reassign the association of photography as merely a two dimensional pursuit. Emphasizing the relationship between objects, the course investigates installation art as a contemporary practice and focuses on the roll photography or the photographic image has played in expanding this dialogue. Issues involved with using photography for the purposes of creating multimedia spatial experiences are discussed and compared with ideas related to traditional photographic presentation. This course is repeatable for a maximum of 8 credits. PREREQS: ART 345 [C] and students must understand basic camera functions and be competent using digital printing techniques to fully engage in this class.
ART 444. THE CONSTRUCTED IMAGE (4). An advanced studio photography course that explores directed, manipulated, and constructed photographs. It investigates this rich tradition by looking at both historical and contemporary photography. Issues involved with making clearly artificial photographs are discussed and compared with traditional ideas related to veracity of the photographic image. PREREQS: ART 345 [C] and students need to have a pre-established foundation of technical camera operations and digital printing skills to participate wholly with the required course projects.

## ART 446. DOCUMENTARY PHOTOGRAPHY

 (4). Intensive in-depth documentary photography course designed to develop skill in telling stories with pictures. The course requires pitching a photographic project, reading and writing about documentary photography, and producing asustained photographic essay with a self-selected documentary subject. Expanded documentary mediums and socially concerned photography are also covered. Hybrid Course. This course is repeatable for a maximum of 12 credits. PREREQS: ART 263 [C] and ART 345 [C-]
ART 447. ADVANCED STUDIO LIGHTING (4).
Practical studio course focusing on the advanced applications of studio and location lighting Students will use digital cameras in combination with professional strobe and mixed artificial lighting. Real-world location lighting challenges will be mastered: scouting locations, hauling and setting up gear, working with models and products, and learning to work on-location. This course is repeatable for a maximum of 8 credits.
PREREQS: ART 263 [C] and ART 347 [C]
ART 451. INTRODUCTION TO ARTS ENTREPRENEURSHIP (3). Survey of the business strategies behind a successful career in the arts. Emphasizes the importance of entrepreneurial thinking, engages students with the fundamentals of the arts "business" and explores ways to influence and shape the industry's future. (FA) CROSSLISTED as MUS 451, TA 451. PREREQS: Junior standing and above. For majors.
ART 454. ALTERNATIVE PROCESSES IN PHOTOGRAPHY II (4). Advanced projects using historical photographic processes. This course is repeatable for a maximum of 8 credits. PREREQS: ART 354 [C-]

ART 456. PORTFOLIO-PHOTOGRAPHY/VIDEO
ART (4). Culmination-level course for the creation of an exhibition-level photographic portfolio or other artistic product using lens-based media. Taught using lectures, critiques, readings, writing and self-reflection. This course is repeatable for a maximum of 12 credits. PREREQS: ART 340 [C-] and ART 345 [C-] and ART 347 [C-] and junior or senior standing.
ART 460. HISTORY OF AMERICAN ART (3). Specialized study of the visual arts in the United States focusing on such issues as landscape, mass culture, and American responses to European culture. Art and ideas from the colonial period to 1900. Not offered every year. PREREQS: 9 credits of art history and American literature or American history.
ART 461. HISTORY OF AMERICAN ART (3).
Specialized study of the visual arts in the United States focusing on such issues as landscape, mass culture, and American responses to European culture. American modernism since 1900. Not offered every year. PREREQS: 9 credits of art history and American literature or American history.

ART 462. DIRECTIONS AND ISSUES IN CONTEMPORARY ART (3). Specialized study of current trends, developments, and critical issues, including the study of new media such as video and photography, as they manifest themselves in the contemporary art world. May be repeated with different topics. Not offered every year. This course is repeatable for a maximum of 9 credits. PREREQS: 9 credits of art history or instructor approval required
ART 463. TOPICS IN RENAISSANCE AND
BAROQUE ART (3). Specialized study of selected areas of special interest, including such topics as Michelangelo, Leonardo da Vinci, Bernini, and art in the Medici's Florence. Subject matter may vary year to year. Not offered every year. This course is repeatable for a maximum of 6 credits. PREREQS: 9 credits of art history or instructor approval required.

ART 464. CULTURAL STUDIES OF THE
MUSEUM (3). Overview of the history, visual culture, and cultural significance of the Western museum. Special attention paid to the development of the art museum and artist's projects that pertain to museums. PREREQS: 9 credits of art history or instructor approval
required.
ART 468. HISTORY OF PRINTMAKING (3).
Survey of the social, economic, intellectual, and technical history of printmaking between the early Middle Ages and the twentieth century in Asia, Europe, and the Americas. Treats the major printmaking processes of woodcut, intaglio, lithography, silkscreen, and photography.

ART 469. ^METHODS AND THEORY OF ART
HISTORY (3). Seminar designed to improve writing and library skills, develop interdisciplinary approaches, and explore art historical theory from Plato to the present. PREREQS: 9 credits of art history or instructor approval required.
ART 475. PRINTMAKING STUDIO (3-5). Studio workshop in relief, intaglio, lithographic, and silkscreen media on an individual project basis. Course offered 3-5 credits per term; maximum 15 credits. This course is repeatable for a maximum of 15 credits. PREREQS: 9 credits of 300 -level printmaking.
ART 479. PRINTMAKING: ADVANCED SCREEN PRINTING (4). Studio course in screen printing with an emphasis on photo emulsion processes. Students are encouraged to integrate these processes with other art-making methods in their creative work. This course is repeatable for a maximum of 12 credits. PREREQS: (ART 379 [D-]
ART 481. PAINTING III (3-5). Development of individual interests and directions in painting. Course offered 3-5 credits per term; maximum 15 credits. This course is repeatable for a maximum of 15 credits. PREREQS: 9 credits of 300 -level painting.
ART 491. SCULPTURE III (3-5). Development of individual interests and directions in sculpture. Course offered 3-5 credits per term; maximum 15 credits. This course is repeatable for a maximum of 15 credits. PREREQS: 9 credits of 300 -level sculpture.
ART 492. SPECIAL TOPICS IN ASIAN ART
(3). Specialized study of selected areas of Asian art history such as Chinese calligraphy, Song Dynasty painting, and storytelling in Asian art. May be repeated with different topics. This course is repeatable for a maximum of 99 credits.
ART 494. SPECIAL TOPICS IN EARLY ART HISTORY (3). This course is repeatable for a maximum of 99 credits.
ART 495. EXHIBITION DESIGN (1). Participatory experience in art gallery exhibition design working in Fairbanks Gallery. Includes specialized study in visual design, lighting, and technical installation. Course offered 1 credit per term, maximum 3 credits. This course is repeatable for a maximum of 3 credits.
ART 496. SELECTED TOPICS IN MODERN ART HISTORY (3). This course is repeatable for a maximum of 99 credits.

ART 497. SELECTED TOPICS IN GLOBAL ART HISTORY (3). This course is repeatable for a maximum of 99 credits.

ART 498. SPECIAL TOPICS IN ART HISTORY (3). This course is repeatable for a maximum of 99 credits.
ART 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 99 credits.
ART 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ART 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ART 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
ART 505. READING AND CONFERENCE (1-
16). This course is repeatable for a maximum of

16 credits. PREREQS: Departmental approval required

ART 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ART 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: ART 206 and departmental approval required.
ART 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ART 510. INTERNSHIP (1-12). A one-quarter residency with an appropriate, approved agency or organization where a student may receive practical experience related to the objectives of the Department of Art. The intern observes and produces; the work is supervised and evaluated, both by the agency and the art faculty. This course is repeatable for a maximum of 15 credits. PREREQS: Departmental approval required.
ART 515. ART FOR TEACHERS I (4). A studio course covering basic art materials and techniques. Integrates aesthetics and art criticism, creating art, and the cultural and historical context of works of art for K-12. May be taken in any order.

ART 516. ART FOR TEACHERS II (4). A studio course covering basic art materials and techniques. Integrates aesthetics and art criticism, creating art, and the cultural and historical context of works of art for K-12. May be taken in any order

## ART 532. GENDER, SEXUALITY, AND THE

 PHOTOGRAPHIC IMAGE (3). A creative and discussion-based course focusing on ways in which photography can and has addressed issues of gender and sexuality. An introduction to key concepts and intersections in Women's, Gender and Sexuality Studies; Queer Studies and photography theory. Students will create written and photographic responses to artworks, texts, personal experience and pop-culture. CROSSLISTED as QS 532, WGSS 532.PREREQS: Junior or senior standing.
ART 546. DOCUMENTARY PHOTOGRAPHY
(3). An intensive shooting course in 35 mm photography designed to develop skill in telling stories using pictures. Single picture and multiple picture stories. Lec/lab. This course is repeatable for a maximum of 9 credits. PREREQS: ART 350
ART 556. PORTFOLIO-PHOTOGRAPHY/VIDEO ART (4). Culmination-level course for the creation of an exhibition-level photographic portfolio or other artistic product using lens-based media. Taught using lectures, critiques, readings, writing and self-reflection. This course is repeatable for a maximum of 12 credits. PREREQS: junior or senior standing.

## ART 562. DIRECTIONS AND ISSUES IN

CONTEMPORARY ART (3). Specialized study of current trends, developments, and critical issues, including the study of new media such as video and photography, as they manifest themselves in the contemporary art world. Not offered every year. May be repeated with different topics. This course is repeatable for a maximum of 9 credits. PREREQS: 9 credits of art history or instructor approval required.
ART 564. CULTURAL STUDIES OF THE
MUSEUM (3). Overview of the history, visual culture, and cultural significance of the Western museum. Special attention paid to the development of the art museum and artist's projects that pertain to museums. PREREQS: 9 credits of art history or instructor approval required.
ART 569. METHODS AND THEORY OF ART
HISTORY (3). Seminar designed to improve writing and library skills, develop interdisciplinary approaches, and explore art historical theory from Plato to the present. PREREQS: 9 credits of art history or instructor approval required.

ART 581. PAINTING III (3-5). Development of individual interests and directions in painting. Course offered 3 to 5 credits per term; maximum 15 credits. This course is repeatable for a maximum of 15 credits. PREREQS: 9 credits of 300-level painting.
ART 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 99 credits.

## COMMUNICATION COURSES

COMM 111. *PUBLIC SPEAKING (3). Public communication as it relates to informative and persuasive discourse. The theory and practice of public speaking in informative and persuasive contexts. Lec/rec. (Bacc Core Course)

COMM 111H. *PUBLIC SPEAKING (3). Public communication as it relates to informative and persuasive discourse. The theory and practice of public speaking in informative and persuasive contexts. Lec/rec. (Bacc Core Course) PREREQS: Honors College approval required.

COMM 114. *ARGUMENT AND CRITICAL DISCOURSE (3). Examination of argumentation as a part of human interaction and investigation. The course emphasizes the processes by which people give reasons to gain adherence and to justify beliefs and actions. The course includes readings, writing, and presentations concerned with the nature of arguments, processes of arguing, and argument criticism. Lec/rec. (Bacc Core Course)
COMM 114H. *ARGUMENT AND CRITICAL DISCOURSE (3). Examination of argumentation as a part of human interaction and investigation. The course emphasizes the processes by which people give reasons to gain adherence and to justify beliefs and actions. The course includes readings, writing, and presentations concerned with the nature of arguments, processes of arguing, and argument criticism. Lec/rec. (Bacc Core Course) PREREQS: Honors College approval required.
COMM 180. INTRODUCTION TO THE
RHETORIC OF THE FILM (3). The motion
picture from prephotographic eras to the present; individuals responsible for major advances in theory and technique. The motion picture and social influence. Films viewed for discussion and analysis. Film fee required.
COMM 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits
COMM 211. *COMMUNICATING ONLINE (3). In our increasingly technological world, we use mediated communication to build relationships. Introduces students to the theoretical and practica dimensions on online communication in order to facilitate more informed analysis and performance of online communication as a means of developing both interpersonal and public relationships. (Bacc Core Course)

## COMM 218. *INTERPERSONAL

COMMUNICATION (3). Introduction to dyadic and relational communication. Overview of current research in such areas as verbal and nonverbal messages, self-concept and perception, culture and gender stereotypes and styles, relational development and dissolution, deception, compliance gaining and conflict management. (Bacc Core Course)
COMM 221. FORENSICS (3). Laboratory experience in debate, public speaking, and interpretation of literature. Preparation for intercollegiate debate and forensics participation.

COMM 280. MEDIA COMMUNICATION IN THE INFORMATION AGE (3). A survey of the traditional media of mass communication and the new and emerging media technologies: their development, role in contemporary society and impact upon the public. The influence of mediated communication upon living in the information society. (SS)

COMM 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

COMM 312. ADVANCED PUBLIC SPEAKING
(3). Advanced theory and practice in public speaking. Simulated public speaking situations, audience analysis, and rhetorical strategies will be emphasized. Students will prepare and present a variety of public speeches. PREREQS: (COMM 111 [D-] or COMM 111H [D-] or COMM 114 [D-] or COMM 114H [D-] )
COMM 314. ARGUMENTATION (3). Concepts and processes of argumentation, systems of logic, critical analysis of contemporary efforts to influence. Examination of arguing to gain adherence and argumentation as a way of knowing. Development of cases and argument briefs for presentation. (H) PREREQS: (COMM 114 [D-] or COMM 114H [D-] )
COMM 316. ADVANCED PERSUASION (3). Advanced theory and practice in persuasion, with evidence on social and behavioral science research. Examination of the cognitive and affective aspects of persuasion, focusing particularly on the audience. Consideration of persuasion in interpersonal relations, organizations, public advocacy, and public relations. (H) PREREQS: COMM 111

COMM 318. ADVANCED INTERPERSONAL COMMUNICATION (3). Advanced theory and practice in communication in interpersonal relations. (SS) PREREQS: (COMM 218 [D-] or COMM 218H [D-] )
COMM 320. INTRODUCTION TO RHETORICAL
THEORY (3). Introduction to the basic theories of rhetoric, as well as the background of rhetoric as a discipline in speech communication. (H)

## COMM 321. INTRODUCTION TO

COMMUNICATION THEORY (3). Introduction to 20th century models, theories, and empirical research programs in communication. Survey of selected theories and social scientific methods across diverse contexts in communication. (SS)

COMM 322. SMALL-GROUP PROBLEM SOLVING (3). Theory and practice of small-group decision making. Group processes of problem solving and decision by consensus. The history and role of group problem solving in a democratic society. Group power, leadership, and roles. Experience with problems of fact, value, and policy. (SS) PREREQS: COMM 218
COMM 323. COMMUNITY DIALOGUE (4). Examination of the nature and role of community dialogue in formal and informal social scenes in which participants communicate differing perspectives, values and beliefs. Taught at OSUCascades only. PREREQS: Sophomore standing.

## COMM 324. COMMUNICATION IN

 ORGANIZATIONS (3). Examination of the nature and role of communication in formal and informal organizations. Introductory survey of central issues in the study of organizations, including corporate communication, leadership, organizational effectiveness, power, organizational culture, management styles, organizational conflict, and decision making. (SS)COMM 325. COMMUNICATING LEADERSHIP
(4). Theory and practice of communicating eadership. Communication processes of facilitating productive climates, innovative and creative leading, and goal-oriented community leading. Offered at OSU-Cascades only. PREREQS: Sophomore standing.
COMM 326. INTERCULTURAL
COMMUNICATION (3). Perspectives, theories, and experiences of communication in intercultural, cross-cultural, and pan-cultural relations. (SS)

COMM 328. NONVERBAL COMMUNICATION (3). The study of human communication behavior that transcends the spoken and written word; nondiscursive symbolism. The course examines the relationship between nonverbal and verbal communication behavior and
nonverbal communication skill development Topics addressed include space, distance, the environment, touch, gesture, facial expression, and gaze as communication. (SS)
COMM 332. FAMILY COMMUNICATION (3).
How various elements of communication impact familial relationships. Two main discussions: general communication patterns in the family, and various understudied types of family relationships. Provides students with insights into past familial experiences and skills for future family relationships. PREREQS: COMM 218 [D]
COMM 350. DEBATE AND FORENSICS
WORKSHOP (1-3). Laboratory experience in debate, public speaking, and interpretation of literature. Preparation for intercollegiate debate and forensics participation. This course is repeatable for a maximum of 15 credits. PREREQS: Departmental approval required.
COMM 368. PROPAGANDA AND SOCIAL
CONTROL (3). Case studies, examples, and analyses of direct and indirect influences upon thought, belief, and action involving mass media of communication, including film, theatre, radio, television, posters, and art objects. Historical approach using film, tape, and recordings for student analysis and discussion. (SS)

COMM 372. VISUAL RHETORIC (3). The course will survey the major theories of semiotics. Using semiotics as a foundation, students will explore the nature of the rhetoric of the visual image. (H)
COMM 380. IMAGE AND MYTH IN FILM (3).
Film as a medium for creating, reflecting, and defining values, roles, styles, conflicts, problems, strategies, expectations, and institutions in American life. Various methods of analysis and evaluation are applied to film as an agent and artifact. Film images of the frontier, war, women, men, justice, America, progress, and beauty are explored. Film fee required. (H)

COMM 382. TELEMEDIA DESIGN AND
PRODUCTION (4). Study and practice of communication through telemedia (video, audio, computer), and emphasis on the principles of telemedia authorship. The study includes telemedia distribution systems and effects on audiences. Lec/lab.

COMM 385. COMMUNICATION AND CULTURE
IN CYBERSPACE (3). Covers history and
culture of the Internet, as well as social, political, and economic issues of computer-mediated communication. (H)
COMM 388. SOCIAL MEDIA AND
INTERPERSONAL RELATIONSHIPS (3).
Examines how individuals build and maintain close relationships through new media and social networks. Currently, scholars are seeing a shift in how individuals self-report building close relationships, as people use elements of new media more and more frequently. This course is designed to look into the similarities and differences of these relationships as compared to face-to-face relationships. CROSSLISTED as NMC 388.
COMM 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
COMM 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

COMM 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COMM 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COMM 405. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

COMM 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required

COMM 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
COMM 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COMM 410. COMMUNICATION INTERNSHIP (116). An assignment in a private or public business or agency. The student observes or works in one or more departments of the enterprise, perhaps in one area of interest or specialization (e.g. public relations, training, personnel, research and planning). Work is supervised by the agency staff, supervising school faculty members(s) provide academic evaluation. 12 credits maximum. This course is repeatable for a maximum of 12 credits. PREREQS: Major with minimum of 21 credits and school approval required.

## COMM 412. TOPICS IN SPEECH

COMMUNICATION (3). Contemporary issues in speech communication: appraisal and discussion of current theories, trends, research methods, problems, or applications. This course is repeatable for a maximum of 9 credits. PREREQS: 9 credits of speech communication.

## COMM 414. COMMUNICATION RESEARCH

METHODS (3). Communication research and its relationship to theory. Quantitative and qualitative methods of investigation in speech communication. Experimental and non-experimental research design; naturalistic observation; issues of reliability and validity; statistical analysis. Standards and principles of writing and reporting research. PREREQS: COMM 321 [D-] and /or instructor approval required

## COMM 416. ETHNOGRAPHY OF

COMMUNICATION (3). Study and practice of using ethnography of communication as a research method for developing theory in communication studies; topics include data collection, analysis, and writing ethnographic reports. (SS) PREREQS: COMM 321 [D-]

## COMM 418. ^INTERPERSONAL

COMMUNICATION THEORY AND RESEARCH
(3). Current theory, research, and practice in interpersonal communication. Issues addressed may include compliance gaining, nonverbal behavior, family communication, gender issues, impression formation, rules, and human relations. (SS) (Writing Intensive Course) PREREQS: COMM 321 [D-] and /or instructor approval required.

## COMM 422. ^SMALL-GROUP

COMMUNICATION THEORY AND RESEARCH
(3). Current theory, research, and practice in communication and small-group communication Issues addressed may include leadership, decision making, problem solving, training, and human relations. (SS) (Writing Intensive Course) PREREQS: COMM 321 [D-] and /or instructor approval required
COMM 425. COMMUNICATION AND YOUTH
OUTREACH (4). Examines the role of communication outreach when working with youth. Study and examination of applied youth communication theory and research. Topics may include establishing communication boundaries, communicating identity, anti-smoking and antidrug campaigns, social exclusion, effects of media, and pro-social communication. Students are required to volunteer in a youth context coordinated by the instructor. Taught only on the OSU-Cascades Campus.

## COMM 426. INTERCULTURAL

COMMUNICATION: THEORIES AND ISSUES
(3). Advanced study in intercultural communication theoretical developments and research directions. Topics addressed may include intercultural research methods, training, language and culture, acculturation, and intercultural effectiveness. (SS)

PREREQS: (COMM 321 [D-] and COMM 326 [D-] ) and /or instructor approval required

COMM 427. CULTURAL CODES IN
COMMUNICATION (3). Study and examination of the contextualized use of communication within speech communities and cultures; topics include the cultural patterning of communication and cultural communication theory.
COMM 430. THEORETICAL ISSUES IN COMMUNICATION INQUIRY (3). Review of conceptual, philosophical, ontological, epistemological, and methodological issues in the development of theories in human communication application to contemporary, empirical human communication research. (SS) PREREQS: COMM 321 [D-] and /or instructor approval required.

COMM 432. GENDER AND COMMUNICATION
(3). Investigation of impact of sex and gender on communication in conflict, decision-making, leadership, nonverbal messages, language, and interpersonal relationships. Focus on definitions of sex and gender in regard to knowledge, social constructs, and self-development. PREREQS: COMM 321 [D-] and /or instructor approval required.
COMM 435. SCIENTIFIC, TECHNICAL, \& PROFESSIONAL COMMUNICATION CAPSTONE (1). Students complete a portfolio comprised of material generated throughout previous courses in the Certificate in Scientific, Technical, and Professional Communication. CROSSLISTED as WR 435. PREREQS: Completion of 18 credits towards the Certificate in Scientific, Technical, and Professional Communication.

## COMM 437. HEALTH COMMUNICATION

(3). This class is designed to unpack various elements of how communication impacts health, and vice versa. There are three main sections to this course: 1) discussing doctor-patient communication, 2) discussing the effects of health campaigns, and 3) discussing the link between communication and both psychological and physiological health.
COMM 440. THEORIES OF CONFLICT AND CONFLICT MANAGEMENT (3). Conflict on a variety of levels: intrapersonal, interpersonal, group, public, and social. Conflict in a variety of contexts: relationships, family, organizations, community, and society. Constructive and destructive means of confronting and managing conflict; social and psychological aspects of conflict; conflict analysis; causes of conflict; conflict and peace, social order, and social change; case studies of conflict. (SS) PREREQS: COMM 321 or instructor approval required.
COMM 442. BARGAINING AND NEGOTIATION
PROCESSES (3). Theory and practice of bargaining and negotiation as means of settling disputes, with emphasis on the role of communication. Strategies and tactics of distributive and integrative bargaining orientations. Negotiation preparation and experience through case studies and simulations. (SS) PREREQS: COMM 321 or instructor approval required.

## COMM 444. THIRD PARTIES IN DISPUTE

RESOLUTION: MEDIATION AND ARBITRATION (3). Philosophies, strategies, practices, and characteristics of mediation and arbitration processes in the settlement of conflicts and disputes. Study of the role of the third party neutral in the peace making process. Case studies and simulations in mediation and arbitration. (SS) PREREQS: COMM 321 or instructor approval required.
COMM 446. *COMMUNICATION IN
NTERNATIONAL CONFLICT AND DISPUTES
(3). Examination of the nature of international conflicts and disputes and the roles culture and communication play in resolving them constructively. Analysis of negotiation, mediation and international law as approaches to dealing with international political, economic, cultural, and
religious disputes. Scrutiny of contemporary world conflicts. (SS) (Bacc Core Course) PREREQS: COMM 321 or instructor approval required.

COMM 454. ADVANCED ARGUMENTATION (3). Advanced study in classical and current theories of the persuasive and epistemological functions of argumentation. Examination of the dominant contemporary theorists, including Toulmin, Perelman, and Willard. Analysis of research and applied perspectives, including conversational argument, argument fields, the philosophy of argument, argument as rhetoric, and argument in contexts. (H) PREREQS: COMM 320 [D-] and /or instructor approval required.

COMM 456. ^RHETORIC: 500 BC TO 500 AD (3) History and philosophy of rhetorical principles. (H) (Writing Intensive Course) PREREQS: COMM 320 [D-] and /or instructor approval required.
COMM 458. ^RHETORIC: 500 AD TO 1900 (3). History and philosophy of rhetorical principles. (H) (Writing Intensive Course) PREREQS: COMM 320 [D-] and /or instructor approval required.

COMM 459. ^CONTEMPORARY THEORIES
OF RHETORIC (3). A survey of contemporary
rhetorical theories from 1900 to the present. (H) (Writing Intensive Course) PREREQS: COMM 320 [D-] and /or instructor approval required.
COMM 460. RHETORIC OF REVOLUTIONARIES AND REACTIONARIES: 1750 TO 1900 (3).
Speech criticism; great American speakers, relation of their speaking to the history of ideas; rhetoric and political, social, and religious movements. (H) PREREQS: COMM 320 [D-] and/ or instructor approval required.
COMM 462. RHETORIC OF REVOLUTIONARIES AND REACTIONARIES: 1900-PRESENT (3).
Speech criticism; great American speakers; relation of their speaking to the history of ideas; rhetoric and political, social, and religious movements. (H) PREREQS: COMM 320 [D-] and / or instructor approval required.
COMM 464. RHETORICAL CRITICISM (3).
Explores the approaches to the criticism of rhetoric, including aesthetic, social movement, genre, feminist, and other modes of criticism. PREREQS: COMM 320 [D-]
COMM 466. ETHICS OF RHETORIC (3).
Examines the ethical questions raised by the use of persuasive discourse, including the derivation of standards of ethical persuasion and approaches to ethical judgment about persuasion. (H) PREREQS: COMM 320 [D-] and /or instructor approval required.
COMM 470. HISTORY OF SPEECH
COMMUNICATION (3). Examines the theories and practices involved in the development of speech communication as a field and a discipline, with a special emphasis on the central roles played by rhetorical theory and criticism. PREREQS: COMM 320 [D-] and COMM 321 [D-]
COMM 472. THE RHETORIC OF POPULAR CULTURE (3). A survey of theories of popular culture from Arnold to Hall. Students will examine various artifacts of popular culture and the influences they exert. (H)

COMM 476. ISSUES IN THE FREEDOM OF SPEECH (3). Examination of the theories of free expression and case materials related to tests of free speech in key U.S. Supreme Court cases. The course emphasizes the context of social and political movements from which the cases arise. (H) PREREQS: COMM 320 or instructor approval required.
COMM 478. POLITICAL CAMPAIGN RHETORIC (3). Theory, research and methods of political campaign rhetoric. Topics include rhetorical strategies and tactics in advertising, national conventions, broadcast debates, media coverage and public opinion polls. (H) PREREQS: COMM 320 or instructor approval required.

COMM 482. THE MEDIA IN CULTURE AND
SOCIETY (3). The study of the societal-cultura impact on the media, and their effect upon individuals, social, cultural, political, economic, and leisure structures and systems. Special focus on the issues of media in shaping values, molding opinions, and reflecting/projecting attitudes, beliefs, and behaviors, including media's role in racial, gender, and familial relations. (SS) PREREQS: COMM 280
COMM 484. MEDIA CRITICISM (3). A critical examination of the media analysis of content, forms and deployment of media messages and products. A critical study of the structure, functions and economics of media systems. A consideration of media ethics and responsibilities in relation to news and information, entertainment, advertising and marketing, and social-cultural influence. (SS) PREREQS: COMM 280

COMM 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

COMM 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
COMM 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COMM 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.

COMM 505. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COMM 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
COMM 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
COMM 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

COMM 510. COMMUNICATION INTERNSHIP (112). An assignment in a private or public business or agency. The student observes or works in one or more departments of the enterprise, perhaps in one area of interest or specialization (e.g., public relations, training, personnel, research and planning). Work is supervised by the agency staff, supervising school faculty member(s) provide academic evaluation. 12 credits maximum. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 12 credits. PREREQS: Graduate committee approval required.

## COMM 512. TOPICS IN SPEECH

COMMUNICATION (3). Contemporary issues in speech communication: appraisal and discussion of current theories, trends, research methods, problems, or applications. This course is repeatable for a maximum of 9 credits. PREREQS: 9 credits of speech communication.

## COMM 514. COMMUNICATION RESEARCH

 METHODS (3). Communication research and its relationship to theory. Quantitative and qualitative methods of investigation in speech communication. Experimental and non-experimental research design; naturalistic observation; issues of reliability and validity; statistical analysis. Standards and principles of writing and reporting research. PREREQS: COMM 321 or instructor approval required.COMM 516. ETHNOGRAPHY OF
COMMUNICATION (3). Study and practice of using ethnography of communication as a research method for developing theory in communication studies; topics include data collection, analysis, and writing ethnographic reports. PREREQS: COMM 321

COMM 518. INTERPERSONAL
COMMUNICATION THEORY AND RESEARCH
(3). Current theory, research, and practice in interpersonal communication. Issues addressed may include compliance gaining, nonverbal behavior, family communication, gender issues, impression formation, rules, and human relations PREREQS: COMM 321 or instructor approval required.
COMM 520. GRADUATE SEMINAR IN
COMMUNICATION (3). Introductory graduate seminar in the field of communication. Emphasis on the breadth and depth of the discipline, graduate study, and research directions.

COMM 522. SMALL-GROUP COMMUNICATION THEORY AND RESEARCH (3). Current theory, research, and practice in communication and small-group communication. Issues addressed may include leadership, decision making, problem solving, training, and human relations. PREREQS: COMM 321 or instructor approval required.

## COMM 524. COMMUNICATION IN

ORGANIZATIONS: THEORIES AND ISSUES
(3). Analysis of human interaction within the informal and formal systems of organizations. Theory, research, and practice relevant to the analysis of the nature and role of communication within small, mid-range and highly complex organizations. The course addresses structural, functional, and cultural features of communication in organizational environments.
COMM 526. INTERCULTURAL
COMMUNICATION: THEORIES AND ISSUES
(3). Advanced study in intercultural communication theoretical developments and research directions. Topics addressed may include intercultural research methods, training, language and culture, acculturation, and intercultural effectiveness. PREREQS: COMM 321 and COMM 326 or instructor approval required.
COMM 527. CULTURAL CODES IN
COMMUNICATION (3). Study and examination of the contextualized use of communication within speech communities and cultures; topics include the cultural patterning of communication and cultural communication theory.
COMM 530. THEORETICAL ISSUES IN COMMUNICATION INQUIRY (3). Review of conceptual, philosophical, ontological, epistemological, and methodological issues in the development of theories in human communication; application to contemporary, empirical human communication research. PREREQS: COMM 321 or instructor approval required.
COMM 532. GENDER AND COMMUNICATION
(3). Investigation of impact of sex and gender on communication in conflict, decision-making, leadership, nonverbal messages, language, and interpersonal relationships. Focus on definitions of sex and gender in regard to knowledge, social constructs, and self-development. PREREQS: COMM 321 or instructor approval required.
COMM 537. HEALTH COMMUNICATION
(3). This class is designed to unpack various elements of how communication impacts health, and vice versa. There are three main sections to this course: 1) discussing doctor-patient communication, 2) discussing the effects of health campaigns, and 3) discussing the link between communication and both psychological and physiological health.

COMM 540. THEORIES OF CONFLICT AND CONFLICT MANAGEMENT (3). Conflict on a variety of levels: intrapersonal, interpersonal, group, public, and social. Conflict in a variety of contexts: relationships, family, organizations, community, and society. Constructive and destructive means of confronting and managing conflict; social and psychological aspects of conflict; conflict analysis; causes of conflict; conflict and peace, social order, and social change; case studies of conflict. PREREQS: COMM 321 or instructor approval required.

COMM 542. BARGAINING AND NEGOTIATION
PROCESSES (3). Theory and practice of bargaining and negotiation as means of settling disputes, with emphasis on the role of communication. Strategies and tactics of distributive and integrative bargaining orientations. Negotiation preparation and experience through case studies and simulations. PREREQS: COMM 321 or instructor approval required.

## COMM 544. THIRD PARTIES IN DISPUTE

RESOLUTION: MEDIATION/ARBITRATION
(3). Philosophies, strategies, practices, and characteristics of mediation and arbitration processes in the settlement of conflicts and disputes. Study of the role of the third party neutral in the peace making process. Case studies and simulations in mediation and arbitration. PREREQS: COMM 321 or instructor approval required.

COMM 546. COMMUNICATION IN

## NTERNATIONAL CONFLICT AND DISPUTES

(3). Examination of the nature of international conflicts and disputes and the roles culture and communication play in resolving them constructively. Analysis of negotiation, mediation, and international law as approaches to dealing with international political, economic, cultural, and religious disputes. Scrutiny of contemporary world conflicts. PREREQS: COMM 321 or instructor approval required.

COMM 550. COMMUNICATION AND THE PRACTICE OF SCIENCE (3). Communication is central to science-based decision-making, the function of science teams, the reporting and critique of scientific knowledge, and the interface between science and policy making. This seminar emphasizes communication competence in the arena of applied science; that is, science as practiced in government agencies, private corporations, and nonprofit organizations.
COMM 554. ADVANCED ARGUMENTATION (3). Advanced study in classical and current theories of the persuasive and epistemological functions of argumentation. Examination of the dominant contemporary theorists, including Toulmin, Perelman, and Willard. Analysis of research and applied perspectives, including conversational argument, argument fields, the philosophy of argument, argument as rhetoric, and argument in contexts. PREREQS: COMM 320 or instructor approval required.
COMM 556. RHETORIC: 500 BCTO 500 AD (3). History and philosophy of rhetorical principles. PREREQS: COMM 320 or instructor approval required.

COMM 558. RHETORIC: 500 AD TO 1900 (3). History and philosophy of rhetorical principles. PREREQS: COMM 320 or instructor approval required.
COMM 559. CONTEMPORARY THEORIES
OF RHETORIC (3). A survey of contemporary rhetorical theories from 1900 to the present. PREREQS: COMM 320 or instructor approval required.
COMM 560. RHETORIC OF REVOLUTIONARIES AND REACTIONARIES: 1750 TO 1900 (3).
Speech criticism; great American speakers, relation of their speaking to the history of ideas; rhetoric and political, social, and religious movements. PREREQS: COMM 320 or instructor approval required.

COMM 562. RHETORIC OF REVOLUTIONARIES AND REACTIONARIES: 1900-PRESENT (3).
Speech criticism; great American speakers; relation of their speaking to the history of ideas; rhetoric and political, social, and religious movements. PREREQS: COMM 320 or instructor approval required.

COMM 564. RHETORICAL CRITICISM (3). Explores the approaches to the criticism of rhetoric, including aesthetic, social movement, genre, feminist, and other modes of criticism. PREREQS: COMM 320 or instructor approval
required.
COMM 565. RESEARCH METHODS IN
RHETORIC (3). A graduate-level introduction to research methods in rhetorical studies. Topics include rhetorical criticism, discourse analysis, and historiography. Course goals include the ability to understand and critique common methodological approaches in rhetorical studies.

COMM 566. ETHICS OF RHETORIC (3).
Examines the ethical questions raised by the use of persuasive discourse, including the derivation of standards of ethical persuasion and approaches to ethical judgment about persuasion. PREREQS: COMM 320 or instructor approval required.
COMM 572. THE RHETORIC OF POPULAR CULTURE (3). A survey of theories of popular culture from Arnold to Hall. Students will examine various artifacts of popular culture popular culture and the influences they exert.
COMM 576. ISSUES IN THE FREEDOM OF SPEECH (3). Examination of the theories of free expression and case materials related to tests of free speech in key U.S. Supreme Court cases. The course emphasizes the context of social and political movements from which the cases arise. PREREQS: COMM 320 or instructor approval required.
COMM 578. POLITICAL CAMPAIGN RHETORIC
(3). Theory, research and methods of political campaign rhetoric. Topics include rhetorical strategies and tactics in advertising, national conventions, broadcast debates, media coverage and public opinion polls. PREREQS: COMM 320 or instructor approval required.
COMM 582. THE MEDIA IN CULTURE AND SOCIETY (3). The study of the societal-cultural impact on the media, and their effect upon individuals, social, cultural, political, economic, and leisure structures and systems. Special focus on the issues of media in shaping values, molding opinions, and reflecting/projecting attitudes, beliefs, and behaviors, including media's role in racial, gender, and familial relations. PREREQS: COMM 280
COMM 584. MEDIA CRITICISM (3). A critical examination of the media analysis of content, forms and deployment of media messages and products. A critical study of the structure, functions and economics of media systems. A consideration of media ethics and responsibilities in relation to news and information, entertainment, advertising and marketing, and social-cultural influence.
PREREQS: COMM 280
COMM 590. GRADUATE SEMINAR IN
RHETORIC (3). Examines topics dealing with the current state of research in rhetorical studies. This includes discussing a number of approaches to the history, theory, and criticism of rhetoric, as well as to the relationship between rhetoric and related disciplines. Course goals include increased competence in understanding the current state of rhetorical theory and research in the area being explored. This course is repeatable for a maximum of 9 credits.
COMM 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
COMM 808. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

## - GRAPHIC DESIGN COURSES

GD 121. ADOBE SOFTWARE BASICS (3). Instruction in drawing, editing, and layout techniques using Adobe Illustrator, and Photoshop CS6 and CC. PREREQS: Declared pre-graphic design as a major.

GD 126. GRAPHIC DESIGN PRO APPLICATION (1). Required pre-graphic design course. Course will focus on the development of a final portfolio to be reviewed by the graphic design faculty at the end of the spring term. Graded P/N. This course is repeatable for a maximum of 2 credits. PREREQS:

DHE 121 [C-] and DHE 160 [C-] and DHE 161 [C-] and ART 120 and ART 122 and ART 131 and DHE 121

GD 224. INTERACTIVE DESIGN 1 (4).
Introductory class to interactive design principles
in the graphic design professional core.
PREREQS: GD 126 [C-] and GD 226* [C-] and GD 228* [C-]

GD 226. TYPOGRAPHY 1 (4). An introductory course in the discipline, function and tradition of typography as it relates to visual and verbal communication. PREREQS: GD 126 [C-] and acceptance into the Graphic Design professional program.
GD 227X. DRAWING FOR GRAPHIC DESIGN
(4). Focuses exclusively on hand drawing skills with an emphasis on various ways graphic designers use drawing in their creative process. Students develop a working knowledge of various visual methods for communicating design concepts. PREREQS: GD 126 [D-] and students must be accepted into the graphic design professional program cohort.

GD 228. PROCESS: MAKING AND MEANING
(4). Course utilizes creative problem solving techniques, communication theories, combined with media explorations to bring together message, meaning, medium, and form. PREREQS: GD 126 [C-] and acceptance into the Graphic Design professional program.
GD 269. GRAPHIC DESIGN HISTORY (3). A historical and theoretical overview of the evolution and innovations in graphic design. PREREQS: GD 126 [D-] and acceptance into the professional graphic design cohort.

## GD 312. ^CONTEMPORARY ISSUES IN

DESIGN (3). For all graphic design students in the professional graphic design program. The course examines contemporary design issues through reading, research, writing, presentations and discussion. (Writing Intensive Course) PREREQS: GD 126 [D-] and Must have junior standing in the graphic design professional program.
GD 325. GRAPHIC DESIGN: COLLABORATIVE PROCESSES (4). Intermediate course in graphic design. Emphasis on collaborative projects exploring principles of group problem solving in typography. PREREQS: sophomore block in graphic design.

GD 326. TYPOGRAPHY 2 (4). An intermediate course exploring the design of organizational typographic structures and systems. PREREQS: GD 126 [C-] and acceptance into the Graphic Design professional program.
GD 327. TYPOGRAPHY 3 (4). An intermediate course exploring the visual, expressive vocabulary of typography, using innovative experimentation. PREREQS: GD 126 [C-] and acceptance into the Graphic Design professional program.
GD 328. INTERACTIVE 2 (4). An introduction to the contemporary issues of interactive design: experience design, application design, e-publication design, and from a visual communications perspective. PREREQS: GD 126 [C-] and acceptance into the Graphic Design professional program.
GD 369. GRAPHIC DESIGN HISTORY (3). An intermediate lecture course providing a historical and theoretical overview of the evolution and innovation in graphic design. PREREQS: ART 204 and ART 205 and ART 206 and ART 367

GD 412. ^CONTEMPORARY ISSUES IN DESIGN (3). How contemporary culture shapes the practice of graphic design and how design shapes the culture in which we live. Issues examined through lectures, readings, discussion and writing. (Writing Intensive Course)
GD 419. PORTFOLIO REVIEW (2). A course to advise students during their final portfolio preparation. The objective is to complete the portfolio and hone presentation skills and
techniques. Graded P/N. PREREQS: junior block in graphic design.

GD 420. PROFESSIONAL PRACTICES (3). Professional ethics and standards, business practices and tactics, and pre-press production techniques and concerns for graphic designers. PREREQS: GD 126 [D-] and junior standing in graphic design professional program and acceptance into professional graphic design cohort.

## GD 421. INFORMATION AND PUBLICATION

DESIGN (4). Theoretical and historical issues of organizing and visualizing statistics, numbers, and/or complex relationships. Emphasis on conceptualization, visual diagramming, and analysis of subtle visual relationships. PREREQS: junior block in graphic design.
GD 422. NEW MEDIA: INTERACTIVE (4). An advanced course designing digital experiences with emphasis on innovative navigation, architectural structures, theoretical, and historical issues of new media. PREREQS: Junior block in graphic design and CS 295.
GD 423. EXPERIMENTAL TYPOGRAPHY (4). An advanced course in experimental typography focusing on intent, meaning, and method.
PREREQS: junior block in graphic design.
GD 424. BRAND IDENTITY SYSTEMS (4). Studio course that explores both the theory and the practice of brand identity systems, through the creation of a comprehensive visual branding project. This course is repeatable for a maximum of 12 credits. PREREQS: GD 126 [C-] and acceptance into the Graphic Design professional program.
GD 426. GRAPHIC DESIGN CAPSTONE 1 (3). The first in a two-course sequence of senior-level graphic design capstone courses. The focus is on applying more in-depth design research methods to graphic design senior capstone projects. PREREQS: Senior standing in professional graphic design program.

GD 427. CAPSTONE 2 (4). The second in a twocourse sequence of senior-level graphic design capstone courses. The focus is on the design and development of the senior capstone project. PREREQS: (GD 126 [C-] and GD 426 [C-] ) and senior standing in graphic design professional program.

GD 429. GRAPHIC DESIGN STUDIO (4). Provides opportunity for students to work with clients on actual projects in a professional environment. Lec/lab. This course is repeatable for a maximum of 16 credits. PREREQS: junior block in graphic design. Admission through portfolio review.

GD 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## ■ MUSIC EDUCATION COURSES

MUED 277. INSTRUMENTAL TECHNIQUES (1). MUED 277: High Brass; MUED 277: Low Brass; MUED 277: Single Reeds/Flute; MUED 277: Double Reeds/Flute; MUED 277: High Strings; MUED 277: Low Strings; MUED 277: Percussion. Basic instruction for each instrumental family. Emphasis is on techniques for teaching each group of instruments. Includes a survey and evaluation of instrumental methods texts. Emphasis on pedagogical skills as they relate to a beginning instrumentalist rather than upon performance skills. This course is repeatable for a maximum of 7 credits.

MUED 353. MUSIC EDUCATION IN PUBLIC SCHOOLS (3). Examines historical practices, philosophical differences and pedagogical approaches that influence public school music programs. Field experiences provide contextual models with genuine teaching opportunities each week. PREREQS: MUS 121 [D-]

MUED 401. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUED 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 18 credits PREREQS: Departmental approval required.
MUED 405. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.

MUED 406. PROJECT (1). Editing and refining of portfolio materials representing professional growth in teaching throughout the Professiona Teacher and Counselor Education Program. Includes work samples, assessments, reflections, and videotapes. This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUED 408. WORKSHOP (1-16). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required
MUED 413. THEORY AND PRACTICUM: FIELD (1-4). Field experience in music classroom. For pre-MAT students taking 4 credits, the experience is approximately 10 hours per week in elementarylevel classroom.

MUED 460. PSYCHOLOGY OF MUSIC (3).
The study and evaluation of psychological,
physiological, and neurological aspects of musical behavior and experience; including but not limited to acoustics, human hearing, perception and cognition, development and expertise, affective response and preference, unusual abilities, and selected special topics. PREREQS: Junior standing and instructor approval.
MUED 470. METHODS AND MATERIALS FOR
THE PUBLIC SCHOOL WIND BAND (3). Includes examination of method books, instructional materials, and music for middle school and high school band. Class format is lecture, discussions, and microteaching demonstrations. Includes study of past and current methods of improving student musical understanding and performance through band literature and rehearsal techniques. PREREQS: MUS 318 and MUS 319 (Instrumental conducting). Must have senior standing as a music education major.

## MUED 471. INVESTIGATING MUSICAL

CULTURES (3). Immerse yourself in an unfamiliar musical culture and learn how to teach students about it. Become better prepared to work effectively with multicultural materials, and to use culturally appropriate pedagogical approaches. Music will be emphasized as a gateway to cultural understanding, but previous musical experience is not required. PREREQS: Declared major or minor in Music or Education, upper-division status or higher, completed collegiate-level degree in Music or Education, or permission of instructor.

## MUED 473. METHODS FOR TEACHING

ELEMENTARY MUSIC (3). Focuses on
pedagogical content knowledge in music for specialists preparing to teach Kindergarten through grade five. Students will focus on the developmental characteristics of learners, repertoire and instructional techniques appropriate for the elementary music classroom, and lesson planning incorporating state and national standards. Issues related to diverse and special needs populations will be interwoven throughout each segment of the course. PREREQS: MUED 353 [D-] and admission to the Professional Music Teacher Education program or permission of instructor.
MUED 477. CLASSROOM INSTRUMENTAL
TECHNIQUES (2). A brief overview of
fundamental principles and playing techniques of brass, percussion, string, and woodwind instruments designed for the choral music educator who uses instrumental accompaniment or conducts an instrumental ensemble.
PREREQS: MUS 222 and MUS 234 and MUS 319

MUED 478. TECHNIQUES FOR THE VOCAL
INSTRUCTOR (2). Vocal techniques for the public school music teacher. Offered alternate years. PREREQS: MUS 185 or instructor approval required.
MUED 499. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.

MUED 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUED 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 18 credits PREREQS: Departmental approval required.
MUED 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
MUED 505. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUED 506. PROJECTS (1-16). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUED 507. THEORY AND PRACTICUM SEMINAR (1-4). Field experience in music classroom. This course is repeatable for a maximum of 10 credits. PREREQS: Departmental approval required

MUED 508. WORKSHOP (1-16). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUED 510. PROFESSIONAL INTERNSHIP
(3-15). A supervised teaching experience at a variety of public school levels. The student works with an experienced mentor teacher, accepting the professional responsibilities of teaching. This course is repeatable for a maximum of 15 credits PREREQS: Departmental approval required.
MUED 521. SPECIAL TOPICS IN MUSIC ED (3). Advanced pedagogy in one particular area within music education, such as jazz band techniques, computer design of marching band drills, advanced technology in music education. Topics will vary. PREREQS: Departmental approval required.
MUED 560. PSYCHOLOGY OF MUSIC (3). The study and evaluation of psychological, physiological, and neurological aspects of musical behavior and experience; including but not limited to acoustics, human hearing, perception and cognition, development and expertise, affective response and preference, unusual abilities, and selected special topics. PREREQS: Junior standing and instructor approval.

MUED 562. RESEARCH IN MUSIC EDUCATION (3). Introduction to the historical, philosophical, quantitative and qualitative research methodologies in music education. Includes interpretation and application of findings published in major research journals. PREREQS: Admission to the Professional Teacher and Counselor Licensure program or instructor approval required.
MUED 570. METHODS AND MATERIALS FOR THE PUBLIC SCHOOL WIND BAND (3). Includes examination of method books, instructional materials, and music for middle school and high school band. Class format is lecture, discussions, and microteaching demonstrations. Includes study of past and current methods of improving student musical understanding and performance through band literature and rehearsal techniques. PREREQS: Designed for vocal students enrolled in the Professional Music Teacher Education Program. Departmental approval required.

## MUED 571. INVESTIGATING MUSICAL

CULTURES (3). Immerse yourself in an unfamiliar musical culture and learn how to teach students about it. Become better prepared to work
effectively with multicultural materials, and to use culturally appropriate pedagogical approaches. Music will be emphasized as a gateway to cultural understanding, but previous musical experience is not required. PREREQS: Declared major or minor in Music or Education, upper-division status or higher, completed collegiate-level degree in Music or Education, or permission of instructor.

## MUED 573. METHODS FOR TEACHING

 ELEMENTARY MUSIC (3). Focuses on pedagogical content knowledge in music for specialists preparing to teach Kindergarten through grade five. Students will focus on the developmental characteristics of learners, multiple representations of the subject matter, and lesson planning incorporating state and national standards. Issues related to diverse and special needs populations will be interwoven throughout each segment of the course. PREREQS: Admission to the Professional Music Teacher Education program or permission of instructor. MUED 353MUED 574. MIDDLE LEVEL MUSIC EDUCATION (3). This methods course focuses on general music education, grades four through eight. Students explore relationships between teaching and learning in order to effectively plan for instruction. PREREQS: Departmental approval required.
MUED 580. SECONDARY VOCAL MUSIC
EDUCATION (3). This methods course focuses on vocal music education, grades nine through twelve. Students explore relationships between teaching and learning in order to effectively plan for instruction. PREREQS: Departmental approval required.

## MUED 581. SECONDARY INSTRUMENTAL

MUSIC EDUCATION (3). This methods course focuses on instrumental music education, grades nine through twelve. Students explore relationships between teaching and learning in order to effectively plan for instruction. PREREQS: Departmental approval required.

MUED 591. CURRICULUM FOUNDATIONS
N MUSIC EDUCATION (3). Examination of historical, philosophical, and social influences on contemporary music education emphasizing 1950 through the present, culminating in the National
Standards for Arts Education. PREREQS:
Departmental approval required.
MUED 592. FOUNDATIONS OF MUSIC
EDUCATION II: (3). CURRICULUM
IMPLEMENTATION AND EVALUATION Students design and construct a comprehensive music education curriculum grounded in current research, the National Standards for Arts Education and Oregon's Common Curriculum Goals. PREREQS: Departmental approval required.
MUED 593. MUSIC TECHNOLOGY (3). Specific applications for teaching music incorporating appropriate software and hardware for curricular integration and curricular evolution.
MUED 599. SPECIAL STUDIES (1-16). This
course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.

## I MUSIC STUDIO COURSES

MUP 160. INDIVIDUAL LESSONS: BEGINNING PIANO (1-2). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.

MUP 161. INDIVIDUAL LESSONS: BEGINNING STRINGS (1-2). This course is repeatable for a maximum of 12 credits.

MUP 162. INDIVIDUAL LESSONS: BEGINNING BRASS (1-2). This course is repeatable for a maximum of 12 credits.
MUP 163. INDIVIDUAL LESSONS: BEGINNING WOODWINDS (1-2). This course is repeatable for a maximum of 12 credits.

MUP 164. INDIVIDUAL LESSONS: BEGINNING
VOICE (1-2). This course is repeatable for a maximum of 12 credits.

MUP 165. INDIVIDUAL LESSONS: BEGINNING
PERCUSSION (1-2). This course is repeatable for a maximum of 12 credits.
MUP 170. INDIVIDUAL LESSONS:
INTERMEDIATE PIANO (1-2). This course
is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.
MUP 171. INDIVIDUAL LESSONS:
INTERMEDIATE STRINGS (1-2). This course is repeatable for a maximum of 12 credits.

MUP 172. INDIVIDUAL LESSONS:
INTERMEDIATE BRASS (1-2). This course is repeatable for a maximum of 12 credits.

## MUP 173. INDIVIDUAL LESSONS:

INTERMEDIATE WOODWINDS (1-2). This course is repeatable for a maximum of 12 credits.
MUP 174. INDIVIDUAL LESSONS:
INTERMEDIATE VOICE (1-2). This course
is repeatable for a maximum of 12 credits. PREREQS: Simultaneous participation in one OSU choir is required.
MUP 175. INDIVIDUAL LESSONS:
INTERMEDIATE PERCUSSION (1-2). This course is repeatable for a maximum of 12 credits.
MUP 190. INDIVIDUAL LESSONS: KEYBOARD
(1-2). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.

MUP 191. INDIVIDUAL LESSONS: VOICE (1-2). This course is repeatable for a maximum of 12 credits.
MUP 192. INDIVIDUAL LESSONS: STRINGS
(1-2). This course is repeatable for a maximum of 12 credits.
MUP 193. INDIVIDUAL LESSONS: WOODWINDS (1-2). This course is repeatable for a maximum of 12 credits.
MUP 194. INDIVIDUAL LESSONS: BRASS (1-2).
This course is repeatable for a maximum of 12 credits.

MUP 195. INDIVIDUAL LESSONS:
PERCUSSION (1-2). This course is repeatable for a maximum of 12 credits.

MUP 290. INDIVIDUAL LESSONS: KEYBOARD
(1-2). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.
MUP 291. INDIVIDUAL LESSONS: VOICE (1-2).
This course is repeatable for a maximum of 12 credits.
MUP 292. INDIVIDUAL LESSONS: STRINGS
(1-2). This course is repeatable for a maximum of 12 credits.

MUP 293. INDIVIDUAL LESSONS: WOODWINDS
(1-2). This course is repeatable for a maximum of 12 credits.
MUP 294. INDIVIDUAL LESSONS: BRASS (1-2). This course is repeatable for a maximum of 12 credits.
MUP 295. INDIVIDUAL LESSONS:
PERCUSSION (1-2). This course is repeatable for a maximum of 12 credits.

MUP 390. INDIVIDUAL LESSONS: KEYBOARD (1-2). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.
MUP 391. INDIVIDUAL LESSONS: VOICE (1-2). This course is repeatable for a maximum of 12 credits. PREREQS: Simultaneous participation in one OSU choir ensemble is required.
MUP 392. INDIVIDUAL LESSONS: STRINGS (1-2). This course is repeatable for a maximum of 12 credits.

MUP 393. INDIVIDUAL LESSONS: WOODWINDS
(1-2). This course is repeatable for a maximum of 12 credits.

MUP 394. INDIVIDUAL LESSONS: BRASS (1-2).
This course is repeatable for a maximum of 12 credits.
MUP 395. INDIVIDUAL LESSONS:
PERCUSSION (1-2). This course is repeatable for a maximum of 12 credits.
MUP 490. INDIVIDUAL LESSONS: KEYBOARD
(1-2). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.

MUP 491. INDIVIDUAL LESSONS: VOICE (1-2).
This course is repeatable for a maximum of 12 credits. PREREQS: Simultaneous participation in one OSU choir ensemble is required.
MUP 492. INDIVIDUAL LESSONS: STRINGS
(1-2). This course is repeatable for a maximum of 12 credits.
MUP 493. INDIVIDUAL LESSONS: WOODWINDS
(1-2). This course is repeatable for a maximum of 12 credits.

MUP 494. INDIVIDUAL LESSONS: BRASS (1-2).
This course is repeatable for a maximum of 12 credits.
MUP 495. INDIVIDUAL LESSONS:
PERCUSSION (1-2). This course is repeatable for a maximum of 12 credits.
MUP 590. INDIVIDUAL LESSONS: KEYBOARD
(1-2). This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.

MUP 591. INDIVIDUAL LESSONS: VOICE (1-2).
This course is repeatable for a maximum of 12 credits.
MUP 592. INDIVIDUAL LESSONS: STRINGS
(1-2). This course is repeatable for a maximum of 12 credits.
MUP 594. INDIVIDUAL LESSONS: BRASS (1-2). This course is repeatable for a maximum of 12 credits.
MUP 595. INDIVIDUAL LESSONS:
PERCUSSION (1-2). This course is repeatable for a maximum of 12 credits.

## ■ MUSIC COURSES

MUS 101. *MUSIC APPRECIATION I: SURVEY
(3). Dealing primarily with the Western classical tradition, the course focuses on developing perceptive listening skills through the study of musical forms and styles. For non-majors. (FA) (Bacc Core Course)
MUS 101H. *MUSIC APPRECIATION I: SURVEY (3). Dealing primarily with the Western classical tradition, the course focuses on developing perceptive listening skills through the study of musical forms and styles. For non-majors. (FA) (Bacc Core Course) PREREQS: Honors College approval required.
MUS 102. *MUSIC APPRECIATION II: PERIODS AND GENRES (3). A study of the masterworks of a single era (such as Baroque, classic, romantic, twentieth century) or a genre (such as orchestra, chamber, opera, musical theatre). See Schedule of Classes for topic being offered. For non-majors. Need not be taken in order. (FA) (Bacc Core Course) This course is repeatable for a maximum of 12 credits.

MUS 102H. *MUSIC APPRECIATION II: PERIODS AND GENRES (3). A study of the masterworks of a single era (such as Baroque, classic, romantic, twentieth century) or a genre (such as orchestra, chamber, opera, musical theatre). See Schedule of Classes for topic being offered. For non-majors. Need not be taken in order. (FA) (Bacc Core Course) This course is repeatable for a maximum of 12 credits. PREREQS: Honors College approval required.

MUS 103. *MUSIC APPRECIATION III: GREAT COMPOSERS (3). The life and works of one or more significant composers including Bach, Haydn, Mozart, Beethoven, and others. (See Schedule of Classes for composers being offered.) For non-majors. Does not need to be taken in sequence. (FA) (Bacc Core Course) This course is repeatable for a maximum of 18 credits.
MUS 104. SURVEY OF JAZZ (3). Explores the historical, sociological and artistic development of jazz, America's musical art form. A concise review of the first 100 years of the music from its blues-based roots at the turn of the 20th century to its current eclectic state will constitute the main framework of the course. While the focus will be on the important performers and composers of jazz, key historical and social events that contributed to the evolution of the idiom will also be discussed.
MUS 108. *MUSIC CULTURES OF THE WORLD (3). Survey of the world's music with attention to musical styles and cultural contexts. Included are Oceania, Indonesia, Africa, Asia, Latin America. (See Schedule of Classes for subject being offered.) For non-majors. (NC) (Bacc Core Course) This course is repeatable for a maximum of 18 credits.

MUS 108H. *MUSIC CULTURES OF THE WORLD (3). Survey of the world's music with attention to musical styles and cultural contexts. Included are Oceania, Indonesia, Africa, Asia, Latin America. (See Schedule of Classes for subject being offered.) For non-majors. (NC) (Bacc Core Course) This course is repeatable for a maximum of 18 credits. PREREQS: Honors College approval required.
MUS 121. LITERATURE AND MATERIALS OF MUSIC I (3). Covers fundamentals of music theory along with a brief introduction to Western art music. This requires students to learn to read and write all notes in treble and bass clef, and all common scales, intervals, triads and seventh chords, using key signatures. They also learn to recognize basic rhythms and write them down This course is repeatable for a maximum of 6 credits. PREREQS: A grade of $80 \%$ on the final exam is required to move on to MUS 122.
MUS 122. LITERATURE AND MATERIALS OF MUSIC I (3). An integrated, team-taught approach to the study of Western art music, including repertory, melodic, harmonic, and rhythmic components, formal organization, and composition. Recitation included. PREREQS: Placement exam and MUS 121
MUS 123. LITERATURE AND MATERIALS OF MUSIC I (3). An integrated, team-taught approach to the study of Western art music, including repertory, melodic, harmonic, and rhythmic components, formal organization, and composition. Recitation included. Lec/lab/rec. PREREQS: Placement exam and MUS 122
MUS 125. LITERATURE AND MATERIALS LAB I (1). Scales, all major and harmonic form of minor, interval drill. PREREQS: MUS 121. Music majors must take concurrently with MUS 122.
MUS 126. LITERATURE AND MATERIALS LAB II (1). Transpose scores, harmonic idioms, harmonic progressions. Lec/lab. PREREQS: MUS 122 and MUS 125. Music majors must take course concurrently with MUS 123.
MUS 135. AURAL SKILLS II (1). Aural comprehension of the basic melodic, rhythmic, and harmonic elements of music. PREREQS: Students should take concurrently with MUS 122.

MUS 136. AURAL SKILLS I (1). Aural
comprehension of the basic melodic, rhythmic, and harmonic elements of music. PREREQS: MUS 135. Students must take concurrently with MUS 123.
MUS 137. JAZZ IMPROVISATION (1-3).
Instrumental and vocal improvisation including composition and arranging techniques. This course is repeatable for a maximum of 9 credits.

PREREQS: Departmental approval required.
MUS 140. OSU CHAMBER CHOIR (1-2). A select ensemble of approximately 40 mixed voices. Performances each term. Annual tours. (FA) This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.
MUS 146. WOMEN'S CHOIR (1-2). A women's ensemble designed for vocal development and exploration of treble choral literature. Performances each term. This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.
MUS 147. MEN'S CHOIR (1-2). A men's ensemble designed for vocal development and exploration of TTBB choral literature. Performances each term. This course is repeatable for a maximum of 9 credits.

MUS 150. SYMPHONIC BAND (1). A select ensemble of approximately 80 wind and percussion players. Performance each term. (FA) This course is repeatable for a maximum of 9 credits.
MUS 151. CONCERT BAND (1). Wind and percussion ensemble of approximately 70 players. Performance each term. Open to all students. This course is repeatable for a maximum of 9 credits.

MUS 152. RHYTHM AND BEAVS PEP BAND (1). An auditioned group of 12 musicians who perform at university, community, and athletic events throughout the year. This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.

MUS 153. MARCHING BAND (1-2). A marching and playing unit of more than 160 musicians. Performs for home football games. This course is repeatable for a maximum of 6 credits.
MUS 154. BASKETBALL BAND (1). An ensemble of approximately 50 players. Performs for home games. This course is repeatable for a maximum of 3 credits.
MUS 155. COLOR GUARD (1). A derivative of the Marching Band Color Guard, this ensemble performs and competes around the Pacific Northwest during winter term. Audition required. This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.
MUS 156. INDOOR DRUM LINE (1-2). A derivative of the Marching Band Drum Line, this ensemble performs and competes around the Pacific Northwest during winter term. Audition required. This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.
MUS 157. SMALL JAZZ ENSEMBLE (1).
Concentration on current jazz styles. Performance each term. This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.
MUS 158. LARGE JAZZ ENSEMBLE (1). Concentration on current jazz styles. Performance each term. This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.

## MUS 160. UNIVERSITY SYMPHONY

ORCHESTRA (1). An ensemble of 65-80 players.
Performance of orchestral repertoire from the eighteenth, nineteenth, and twentieth centuries. Performance each term. (FA) This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.
MUS 163. ACCOMPANYING (1). Piano accompanying and chamber music skills, studio experience and weekly performance class. This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required. Must enroll concurrently in MUS 190 or MUS 290.

MUS 164. CHAMBER ENSEMBLE: STRINGS (1). This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval
required.
MUS 165. CHAMBER ENSEMBLE:
WOODWINDS (1). This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.

MUS 166. CHAMBER ENSEMBLE: BRASS
(1). This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.
MUS 167. CHAMBER ENSEMBLE:
PERCUSSION (1). This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.

MUS 168. CHAMBER ENSEMBLE:
MISCELLANEOUS (1). This course is repeatable for a maximum of 9 credits. PREREQS:
Departmental approval required.
MUS 169. OPERA WORKSHOP (1-2). See
Schedule of Classes for term offered. This
course is repeatable for a maximum of 3 credits. PREREQS: Departmental approval required.
MUS 171. GROUP LESSONS: PIANO I (1).
Part 1 of the first-year group piano sequence. Group instruction in piano skills and basic theory. See Schedule of Classes for section offered. PREREQS: Departmental approval required.
MUS 172. GROUP PIANO II (1). Part 2 of the first-year group piano sequence. A continuation of MUS 171. See Schedule of Classes for section offered. PREREQS: MUS 171 [C-]

MUS 173. GROUP PIANO III (1). Part 3 of the first-year group piano sequence. A continuation of MUS 172. See Schedule of Classes for section offered. PREREQS: MUS 172 [C-]
MUS 177. GROUP LESSONS: PIANO (1). Beginning Piano I, elementary group instruction in piano skills for non-majors. This course is repeatable for a maximum of 2 credits.

MUS 178. GROUP LESSONS: PIANO (1). Beginning Piano II: Continuation of MUS 177, piano for non-majors. This course is repeatable for a maximum of 2 credits. PREREQS: Departmental approval required.
MUS 180. GROUP LESSONS: PIANO (1). (Basic Levels - A, B, C). Elementary group instruction in piano skills and basic theory. This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.
MUS 182. GROUP LESSONS: PIANO (1). (Intermediate Level II). Group instruction in piano skills. (See Schedule of Classes for section offered.) This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.
MUS 183. GROUP LESSONS: PIANO (1).
(Intermediate Level III.) Group instruction in piano skills. See Schedule of Classes for section offered. This course is repeatable for a maximum of 3 credits. PREREQS: Departmental approval required.

MUS 185. VOICE CLASS (1). Students improve and strengthen the voice as a solo instrument. This course is repeatable for a maximum of 9 credits.
MUS 186. GROUP GUITAR (1). Teaches fundamentals of the guitar in a small-group setting. Emphasis on practical use of the instrument. This course is repeatable for a maximum of 9 credits.

MUS 187. GROUP GUITAR II (1). A continuation of MUS 186, MUS 187 focuses on helping students learn higher functionality in techniques and attain greater ability to perform solo or in ensemble. This course is repeatable for a maximum of 9 credits. PREREQS: MUS 186 [D-]
MUS 199. SPECIAL STUDIES (1-3). First-year level. This course is repeatable for a maximum of 18 credits.

MUS 221. LITERATURE AND MATERIALS OF
MUSIC (3). Advanced harmony, techniques of analysis, musical form, composition. Continued study of the repertory of Western music through the mid-twentieth century. PREREQS: MUS 123 or departmental approval required. MUS 221, MUS 222, MUS 223 must be taken in sequence

MUS 222. LITERATURE AND MATERIALS OF MUSIC (3). Advanced harmony, techniques of analysis, musical form, composition. Continued study of the repertory of Western music through the mid-twentieth century. Three lectures weekly. PREREQS: MUS 221 or departmental approval required. MUS 221, MUS 222, MUS 223 must be taken in sequence.
MUS 223. LITERATURE AND MATERIALS OF MUSIC (3). Advanced harmony, techniques of analysis, musical form, composition. Continued study of the repertory of Western music through the mid-twentieth century. Three lectures weekly PREREQS: MUS 222 or departmental approval required. MUS 221, MUS 222, MUS 223 must be taken in sequence.
MUS 234. AURAL SKILLS II (1). Sight-singing; melodic and harmonic dictation. To be taken in sequence. PREREQS: MUS 123 and MUS 136 or departmental approval required.

MUS 235. AURAL SKILLS II (1). Sight-singing; melodic and harmonic dictation. To be taken in sequence. PREREQS: MUS 234 or departmental approval required.
MUS 236. AURAL SKILLS II (1). Sight-singing; melodic and harmonic dictation. To be taken in sequence. PREREQS: MUS 235 or departmental approval required.
MUS 271. GROUP PIANO IV (1). Part of the second-year group piano sequence. Group instruction in piano skills and basic theory. See Schedule of Classes for section offered PREREQS: Departmental approval required.
MUS 272. GROUP PIANO V (1). Part of the second-year group piano sequence. Group instruction in piano skills and basic theory. See Schedule of Classes for section offered PREREQS: MUS 271 [C-]

MUS 273. GROUP PIANO VI (1). Part of the second-year group piano sequence. Group instruction in piano skills and basic theory. See Schedule of Classes for section offered PREREQS: MUS 272 [C-]
MUS 299. SPECIAL STUDIES (1-3). Sophomore level. This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUS 315. INTRODUCTION TO CONDUCTING
(2). Basic terminology, beat patterns, and baton
technique. Introduction to score preparation.
Philosophy and history of conducting are also addressed. PREREQS: MUS 223 and MUS 236 and piano proficiency exam.

MUS 316. CHORAL CONDUCTING (2).
Continuation of MUS 315. Hand gesture
technique, score reading, and score preparation of literature from all major historical periods. Focus upon principles of developing choral excellence. Includes conducting practice with a campus ensemble. To be taken in sequence. PREREQS: MUS 315
MUS 317. CHORAL CONDUCTING (2).
Continuation of MUS 315. Hand gesture
technique, score reading, and score preparation of literature from all major historical periods. Focus upon principles of developing choral excellence. To be taken in sequence. PREREQS: MUS 315

MUS 318. INSTRUMENTAL CONDUCTING
(2). Continuation of MUS 315, including types of instrumental groups, seating arrangements, score preparation, and instrumental transposition and ranges. Advanced baton technique. To be taken in sequence. PREREQS: MUS 315

MUS 319. INSTRUMENTAL CONDUCTING
(2). Continuation of MUS 315, including types of instrumental groups, seating arrangements, score preparation, and instrumental transposition and ranges. Advanced baton technique. To be taken in sequence. PREREQS: MUS 315

MUS 321. LITERATURE AND MATERIALS OF
MUSIC III (3). Twentieth century harmony and counterpoint, including contrapuntal composition Continued study and analysis of repertoire into the 21st century. PREREQS: MUS 223 or departmental approval.
MUS 324. HISTORY OF WESTERN MUSIC
(3). Chronological survey of the Euro-American traditions in music to be taken in sequence PREREQS: MUS 123 [D-] and MUS 223 recommended.
MUS 325. ^HISTORY OF WESTERN MUSIC (3). Traces the development of music history from the early Classic period through the end of the 19th century. Major trends in orchestral, solo, chamber and vocal music are explored through lectures, readings, research, discussion, score studies, and intensive writing assignments. (Writing Intensive Course) PREREQS: MUS 123 [D-] and MUS 223 recommended.
MUS 326. HISTORY OF WESTERN MUSIC
(3). Chronological survey of the Euro-American traditions in music to be taken in sequence. PREREQS: MUS 123 [D-] and MUS 223 recommended.
MUS 330. ALEXANDER TECHNIQUE FOR MUSICIANS (1). A theoretical and practical introduction to the Alexander Technique, a psychophysical reeducation process developed by F.M. Alexander. The course will provide the opportunity for instrumentalists and singers to integrate the Alexander Technique into their practice and performance, enabling more freedom of choice in their approach to music making. This course is repeatable for a maximum of 6 credits. PREREQS: MUS 123 [D-]
MUS 337. JAZZ IMPROVISATION (1-3). Instrumental and vocal improvisation including composition and arranging techniques. This course is repeatable for a maximum of 9 credits. PREREQS: Two years college-level MUS 137 experience or equivalent. Departmental approval required.
MUS 340. OSU CHAMBER CHOIR (1-2). A select ensemble of approximately 40 mixed voices. Performance each term. Annual tours. Students must have two years college-level vocal experience or equivalent. (FA) This course is repeatable for a maximum of 9 credits. PREREQS: Departmental approval required.
MUS 346. WOMEN'S CHOIR (1-2). A women's ensemble designed for vocal development and exploration of treble choral literature. Performances each term. This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years of college-level choral singing or equivalent.
MUS 347. MEN'S CHOIR (1-2). A men's ensemble designed for vocal development and exploration of TTBB choral literature. Performances each term. This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years of college-level choral singing or equivalent.
MUS 350. SYMPHONIC BAND (1). A select ensemble of approximately 80 wind and percussion players. Performance winter and spring terms. (FA) This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years college-level band experience or equivalent.
MUS 351. CONCERT BAND (1). Wind and percussion ensemble of approximately 70 players. Performance each term. Open to all students. This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years college-level band experience or equivalent.

MUS 352. RHYTHM AND BEAVS PEP BAND (1)
An auditioned group of 12 musicians who perform at university, community, and athletic events throughout the year. This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years of college-level band experience or equivalent. Departmental approval required.
MUS 353. MARCHING BAND (1-2). A marching and playing unit of more than 160 musicians. Performs for home football games; one trip each year to an off-campus game. This course is repeatable for a maximum of 6 credits. PREREQS: Students must have two years of college-level band experience or equivalent.
MUS 354. BASKETBALL BAND (1). An ensemble of approximately 50 players. Performs for home games. Students must have two years collegelevel experience. This course is repeatable for a maximum of 3 credits. PREREQS: Students must have two years of college-level band experience or equivalent.
MUS 355. COLOR GUARD (1). A derivative of the Marching Band Color Guard, this ensemble performs and completes around the Pacific Northwest during winter term. Audition required. This course is repeatable for a maximum of 3 credits. PREREQS: Students must have two years of college-level color guard experience or equivalent. Departmental approval required.
MUS 356. INDOOR DRUM LINE (1-2). A derivative of the Marching Band Drum Line, this ensemble performs and competes around the Pacific Northwest during winter term. Audition required. This course is repeatable for a maximum of 3 credits. PREREQS: Departmental approval required.
MUS 357. SMALL JAZZ ENSEMBLE (1).
Concentration on current jazz styles. Performance each term. This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years college-level jazz band experience or equivalent. Departmental approval required.
MUS 358. LARGE JAZZ ENSEMBLE (1). Concentration on current jazz styles. Performance each term. This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years college-level jazz band experience or equivalent. Departmental approval required.

## MUS 360. UNIVERSITY SYMPHONY

ORCHESTRA (1). An ensemble of 65-80 players. Performance of orchestral repertoire from the 18th, 19th, and 20th centuries. Performance each term. (FA) This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years college-level orchestra experience or equivalent. Departmental approval required.
MUS 363. ACCOMPANYING (1). Piano accompanying and chamber music skills, studio experience, and weekly performance class. This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years college-level ensemble or equivalent. Departmental approval required. Students must simultaneously take MUS 390 or MUS 490.

## MUS 364. CHAMBER ENSEMBLE: STRINGS

 (1). This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years college-level ensemble experience or equivalent. Departmental approval required.MUS 365. CHAMBER ENSEMBLE:
WOODWINDS (1). This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years college-level ensemble experience or equivalent. Departmental approval required.

MUS 366. CHAMBER ENSEMBLE: BRASS (1). This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years college-level ensemble experience or equivalent. Departmental approval required.
MUS 367. CHAMBER ENSEMBLE:
PERCUSSION (1). This course is repeatable for a
maximum of 9 credits. PREREQS: Students must have two years college-level ensemble experience or equivalent. Departmental approval required.

## MUS 368. CHAMBER ENSEMBLE:

MISCELLANEOUS (1). This course is repeatable for a maximum of 9 credits. PREREQS: Students must have two years college-level ensemble experience or equivalent. Departmental approval required.

MUS 369. OPERA WORKSHOP (1-2). See
Schedule of Classes for term offered. This course is repeatable for a maximum of 3 credits. PREREQS: Students must have two years college-level vocal performance experience or equivalent. Departmental approval required.

MUS 371. GROUP PIANO VII (1). Part of the thirdyear group piano sequence. Group instruction in piano skills and basic theory. See Schedule of Classes for section offered. PREREQS: Departmental approval required.
MUS 372. GROUP PIANO VIII (1). Part of the third-year group piano sequence. Group instruction in piano skills and basic theory. See Schedule of Classes for section offered PREREQS: MUS 371 [C-]
MUS 373. GROUP PIANO IX (1). Part of the thirdyear group piano sequence. Group instruction in piano skills and basic theory. See Schedule of Classes for section offered. PREREQS: MUS 372 [C-]
MUS 375. INTRODUCTION TO PIANO
TUNING (3). Provides an introduction to the science of piano tuning and general piano maintenance. Students will acquire knowledge of the construction of the modern piano and its predecessors. They will learn about the temperaments and the science of tuning. Finally, through supervised instruction and practice, students will learn the skill of how to tune a modern piano. This course is repeatable for a maximum of 6 credits. PREREQS: Departmental approval required.

MUS 378. MUSICAL WELLNESS FOR PIANISTS
(3). Pianists are offered a body of knowledge that enables them to cultivate mindful, healthful learning and performance processes for themselves and their students. Special focus is given to dealing with fatigue, physical limitations, and injuries. This course is repeatable for a maximum of 6 credits. PREREQS: Departmental approval required.
MUS 399. SPECIAL STUDIES (1-3). Junior level. This course is repeatable for a maximum of 18 credits.
MUS 401. RESEARCH AND SCHOLARSHIP
(1-6). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.

MUS 402. INDEPENDENT STUDY (1-6). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUS 403. THESIS (1-6). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUS 405. READING AND CONFERENCE (1-
6). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.

MUS 406. PROJECTS (1-6). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUS 407. SEMINAR (1-6). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUS 408. WORKSHOP (1-6). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUS 409. PIANO PEDAGOGY PRACTICUM (2). A practical application course offering experiential
earning and supervised teaching experiences to piano pedagogy students. Serves as a practicum co-requisite for the final two terms of Piano Pedagogy (MUS 446 and MUS 447). This course is repeatable for a maximum of 8 credits. PREREQS: Departmental approval required. COREQS: MUS 446, MUS 447

MUS 410. INTERNSHIP (3). Provides experience in field settings, opportunity to develop personal and professional skills. See school for details. This course is repeatable for a maximum of 12 credits. PREREQS: School approval required.
MUS 442. GENRE STUDIES (3). Intensive study of selected genres, such as orchestra, chamber music, keyboard literature, vocal literature, music theatre and opera. See Schedule of Classes for topic. This course is repeatable for a maximum of 18 credits.
MUS 443. THEORY AND COMPOSITION
STUDIES (3). Intensive study of selected subjects, such as analysis, composition, choral arranging, band arranging, and orchestration. See Schedule of Classes for topic. This course is repeatable for a maximum of 18 credits. PREREQS: MUS 223

## MUS 444. FOUNDATIONS OF PIANO

PEDAGOGY (3). Introduction to foundationa principles of piano instruction and addresses topics surrounding methodology, materials, and the techniques of teaching piano. This course is repeatable for a maximum of 6 credits.

## MUS 445. PIANO PEDAGOGY I: BEGINNING

 AND ELEMENTARY STUDENTS (3). Introduces basic foundational ideas of piano instruction at the beginning and elementary levels. Students will engage with topics surrounding methodology, materials, and the techniques of teaching piano to the beginning and elementary student. PREREQS: Departmental approval required.MUS 446. PIANO PEDAGOGY II (3). The second in a three-term sequence. The course reinforces foundational ideas and skills learned in Pedagogy I , and continues on to address methodology, materials, and techniques surrounding group piano teaching, teaching preschoolers, and teaching adults. Students will engage in supervised teaching experiences in class as well as in a corresponding lab practicum course which should be taken in conjunction with Pedagogy II. Students must also register for MUS 409. PREREQS: MUS 445 [D-] and /or departmental approval. COREQS: MUS 409
MUS 447. PIANO PEDAGOGY III (3). The third in a three-term sequence. The course reinforces foundational ideas learned in Pedagogy I and Pedagogy II, and continues with emphasis on special topics and projects preparing students for a professional career as independent piano teachers. Students must also register for MUS 409. PREREQS: MUS 446 [D-] and /or departmental approval. COREQS: MUS 409

## MUS 451. INTRODUCTION TO ARTS

ENTREPRENEURSHIP (3). Survey of the business strategies behind a successful career in the arts. Emphasizes the importance of entrepreneurial thinking, engages students with the fundamentals of the arts "business", and explores ways to influence and shape the industry's future. (FA) CROSSLISTED as ART 451, TA 451. PREREQS: Junior standing and above. For majors.

MUS 472. ITALIAN AND LATIN DICTION FOR
SINGERS (2). Presents the principles of lyric diction in Italian and liturgical Latin and provides practice in the skills needed to sing the languages accurately and expressively.
MUS 473. GERMAN DICTION FOR SINGERS (2). Presents the principles of German lyric diction and provides practice in the skills needed to sing the language accurately and expressively.

MUS 474. FRENCH DICTION FOR SINGERS (2). Presents the principles of French lyric diction and provides practice in the skills needed to sing the
language accurately and expressively.

## MUS 481. PIANO LITERATURE I: 18TH

THROUGH EARLY 19TH CENTURIES (3).
Examines the evolution of piano literature from the Baroque period through the early 19th Century. Examines individual styles and composers' works in the context of the surrounding cultural and social history, beginning with the birth of the piano and continuing with the piano's growing popularity in Western European society. An emphasis will be placed on listening experience and the aural identification of landmark piano works. Students to gain familiarity with a rich body of piano repertoire in the historical and social context in which it was composed. PREREQS: Departmental approval required.
MUS 482. PIANO LITERATURE II: 19TH
AND 20TH CENTURIES (3). Examines the evolution of piano literature in the 19th and 20th centuries. Students will learn about individual styles and composers' works in the context of the surrounding cultural and social history of the piano. An emphasis will be placed on listening experience and the aural identification of landmark piano works. The overall objective of the course is for students to gain familiarity with a rich body of piano repertoire in the historical and social context in which it was composed. PREREQS: Departmental approval required.

## MUS 485. PIANO LITERATURE III:

REPERTOIRE FOR TEACHING THE PIANO
(3). This specialized area of Piano Pedagogy includes repertoire for piano students of varying levels, analytical skills for evaluating repertoire for students, and repertoire requirements for national and international piano teaching organizations. PREREQS: Departmental approval required.

MUS 493. BASIC RECORDING TECHNIQUES
(3). The first of a three-term sequence on analog and digital recording and editing techniques. The first term deals with issues such as signal processing, microphone design and placement, and an introduction to Digidesign Pro-Tools. This course is repeatable for a maximum of 9 credits. PREREQS: MUS 123 and instructor's approval required.
MUS 494. INTERMEDIATE RECORDING TECHNIQUES (3). The second of a three-term sequence on analog and digital recording and editing techniques. The second term deals with multi-track recording, MIDI interfacing and recording, advanced microphone placement, intermediate Pro-tools, and an introduction to E-magic Logic. PREREQS: MUS 493 and instructor's approval required.

MUS 495. ADVANCED RECORDING TECHNIQUES (3). The third of a three-part sequence on analog and digital recording and editing techniques. The third term deals with advanced multi-track recording, sampling MIDI interfacing and recording, mixing and mastering using Waveburner, advanced Pro-Tools, advanced use of E-magic Logic recording and editing and portable ADAT recording and editing. PREREQS: MUS 494 and instructor approval required.
MUS 496. SURROUND SOUND RECORDING AND MASTERING (2). Survey of the concepts, equipment, and standard procedures used in surround sound audio and audio-for-video, including basic equipment and software configuration, surround recording and editing techniques, advanced automation using Pro Tools, and layback/sync to video. PREREQS: MUS 495 [D-] and /or instructor approval.

MUS 499. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUS 501. RESEARCH AND SCHOLARSHIP (1-6). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUS 502. INDEPENDENT STUDY (1-6). This course is repeatable for a maximum of 18 credits.

PREREQS: Departmental approval required.
MUS 503. THESIS (1-6). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.

MUS 505. READING AND CONFERENCE (1-
6). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUS 506. PROJECTS (1-6). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUS 507. SEMINAR (1-6). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.

MUS 508. WORKSHOP (1-6). This course is repeatable for a maximum of 18 credits. PREREQS: Departmental approval required.
MUS 510. INTERNSHIP (3). Provides experience in field settings, opportunity to develop personal and professional skills. See school for details. This course is repeatable for a maximum of 12 credits. PREREQS: School approval required.

MUS 516. ADVANCED CONDUCTING: CHORAL (3). Baton technique, interpretation and the study of major choral scores. PREREQS: MUS 317

MUS 517. ADVANCED CONDUCTING: CHORAL (3). Baton technique, interpretation and the study of major choral scores. PREREQS: MUS 317

## MUS 518. ADVANCED CONDUCTING:

INSTRUMENTAL (3). Baton technique, interpretation and the study of major instrumental scores. PREREQS: MUS 319

MUS 519. ADVANCED CONDUCTING:
INSTRUMENTAL (3). Baton technique, interpretation and the study of major instrumental scores. PREREQS: MUS 319
MUS 540. OSU CHAMBER CHOIR (1-2). A select ensemble of approximately 40 mixed voices. Performance each term. Annual tours. 500 -level credit available only to students who can demonstrate proficiency and experience to perform at the graduate level. This will be evaluated by the instructor through audition. This course is repeatable for a maximum of 6 credits.
MUS 543. THEORY AND COMPOSITION STUDIES (3). Intensive study of selected subjects, such as analysis, composition, choral arranging, band arranging, and orchestration. See Schedule of Classes for topic. This course is repeatable for a maximum of 18 credits. PREREQS: MUS 223
MUS 546. WOMEN'S CHOIR (1-2). A women's ensemble designed for vocal development and exploration of treble choral literature. Performances each term. This course is repeatable for a maximum of 9 credits. PREREQS: Students must be in a graduate-level program of study.
MUS 547. MEN'S CHOIR (1-2). A men's ensemble designed for vocal development and exploration of TTBB choral literature. Performances each term. This course is repeatable for a maximum of 9 credits. PREREQS: Students must be in a graduate-level program of study.
MUS 550. SYMPHONIC BAND (1). A select ensemble of approximately 80 wind and percussion players. Performance winter and spring terms. 500-level credit available only to students who can demonstrate proficiency and experience sufficient to perform at the graduate level. This will be evaluated by the instructor by audition. This course is repeatable for a maximum of 6 credits.
MUS 560. UNIVERSITY SYMPHONY
ORCHESTRA (1). An ensemble of 65-80 players. Performance of orchestral repertoire from the 18th, 19th, and 20th centuries. Performance each term. 500 -level credit available only to students who can demonstrate proficiency and experience to perform at the graduate level. This will be evaluated by the instructor through audition. This
course is repeatable for a maximum of 6 credits.
MUS 563. ACCOMPANYING (1). Piano
accompanying and chamber music skills, studio experience and weekly performance class. 500-level credit available only to students who can demonstrate proficiency and experience sufficient to perform at the graduate level. This will be evaluated by the instructor by audition. This course is repeatable for a maximum of 6 credits PREREQS: Should take MUP 590 concurrently.
MUS 572. ITALIAN AND LATIN DICTION FOR SINGERS (2). Presents the principles of lyric diction in Italian and liturgical Latin and provides practice in the skills needed to sing the languages accurately and expressively.
MUS 573. GERMAN DICTION FOR SINGERS
(2). Presents the principles of German lyric diction and provides practice in the skills needed to sing the language accurately and expressively.
MUS 599. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 6 credits. PREREQS: Departmental approval required.

## ■ NEW MEDIA <br> COMIMUNICATIONS COURSES

NMC 100. *NEW MEDIA AND CULTURE (3).
Provides students with the basic critical skills to analyze the cultural, social, and political impact of new media technologies, new media texts, and new media institutions. Students will be exposed to a variety of social scientific and humanistic conceptual approaches to analyzing new media and culture. Special emphasis will be placed on historical analyses of how new media have shaped culture, as well as how culture has shaped new media. (Bacc Core Course)
NMC 101. INTRODUCTION TO NEW MEDIA COMMUNICATIONS (3). Principles of new media communications. Perspectives on the communications media. How the communications media operate and how they interact with society.

## NMC 183. INTRODUCTION TO MEDIA

PRODUCTION (3). Provides core competency in media production: an introduction to audio and video production, and the elements of the media production and post-production processes.

NMC 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

NMC 240. SURVEY OF SOCIAL MEDIA (3). Social media are curiously positioned as being both emergent media and convergent media--they function because of the coalescence of existing media forms and the creation of new ones. This class will use multiple perspectives to explore the past, present, and future of social media. PREREQS: NMC 101 [C-]

NMC 255. INTRODUCTION TO SOUND DESIGN
(3). The principals and practices of sound design for motion pictures, television and radio. Through reading, viewing, listening and discussion, students will learn the art and science of sound design. Topics include the soundtrack and film narrative--basic terms and concepts; narrative, psychological and emotive functions of sound design; components of the soundtrack--dialogue, music and sound effects; sound design process-recording, editing, mixing and exhibition.

NMC 260. NEW MEDIA FUTURES (3). Historical context and current perspectives on the various aspects of new multimedia communications, including linear and nonlinear or time-based and interactive media. Primary topics include digital cinema (compositing and nonlinear access), visual music, information visualization, interactive narrative, and virtual space. PREREQS: NMC 101 [C-]
NMC 279. MEDIA LITERACY (3). From the days of cave paintings to our current digital world, we have told stories and created mythologies that guided our collective, daily actions. Using a critical approach, we will analyze various different media
to shed light on the underlying structure that shapes our understandings of gender, ethnicity, the self, and our everyday practices as citizens and media consumers.

NMC 280. GLOBAL MEDIA (3). Explores theoretical and practical concepts of global media. Both historical and contemporary perspectives on the topic are addressed, particularly as they relate to cultural autonomy, political rights, social justice, communication flow debates, media systems of different world regions, global representations in U.S. media, and developments in global technology and economic media developments.

NMC 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

NMC 301. ${ }^{\wedge}$ WRITING FOR THE MEDIA
PROFESSIONAL (3). Fundamentals of gathering information, evaluating information, writing information of the media and editing media content in written form. (Writing Intensive Course) PREREQS: NMC 101
NMC 302. REPORTING (3). An introduction to the practices, procedures, techniques, and organizational structures of basic news gathering and writing. PREREQS: WR 201
NMC 305. COPYEDITING (3). Copyreading, headline writing, newspaper layout and design.
NMC 306. ART AND CULTURE CONTENT CREATION (3). Explores various forms of the arts and culture using criticism/reviewing/feature writing's forms, principles and ethics. Encourages students to be artful in response, given certain time and space boundaries, but also to discuss pushing the boundaries, exploding those boundaries and doing excellent, artful creation in response to the arts that affect our lives.

## NMC 311. INTRODUCTION TO NONPROFIT

 MANAGEMENT (3). Introduction to the principles of effective nonprofit management and lays a foundation for future leaders and managers in the nonprofit sector. Focuses on historical perspectives, ethics, governance and leadership, legal structure and standards, financial management, strategic planning principles, fundraising principles, volunteer management, marketing and communications, and the future of the nonprofit sector.
## NMC 320. HISTORY OF

TELECOMMUNICATIONS (3). A historica overview of the telecommunications industry. The goal is to understand how the industry got where it is today and, by analyzing principles, events, and trends, suggest what directions it may take in the future. The emphasis is on constructing a causal chronology, interrelating developments in technology, organization, and structure of the industry. This course will focus on the technological developments in the industry. PREREQS: NMC 101 [C-] and NMC 260 [C-] and WR II completed with a passing grade.

NMC 321. HISTORY OF BROADCASTING (3). The technological, economic and corporate, legal and political, artistic, and social developments that shaped American broadcasting in the 20th century are examined. Implications for the future of broadcasting are addressed as well. PREREQS: NMC 260 [C-] and WR II completed with a passing grade.

NMC 322. LANDMARKS IN MEDIA CONTENT (3). Introduces students to media content that represents advances in the art and science of creative use of media technology. Some of these advances were recognized immediately, some only after time had passed. PREREQS: NMC 101 [C-] and NMC 260 [C-] and WR II completed with a passing grade.

## NMC 330. THE MEANING OF VIDEO GAMES

(3). Examines approaches to understanding the experience of playing video games, including the role of storytelling in diverse games, the relationship between the player and the game, the game as art, and intersections between games
and real life. PREREQS: NMC 301 [C-] and NMC 101

NMC 340. SOCIAL MEDIA STRATEGY (3).
Designing systems of interaction is important for understanding how people come to be a part of social networks. Students will participate in a series of simulation games that will explore the dimensions of the interaction between publics and social networks, culminating in an original research project. PREREQS: NMC 240 [C-] and NMC 260 [C-] and completion of NMC 301 recommended.
NMC 349. VIDEO ART (4). Studio course in video art and time-based media projects. Emphasis on experimental approaches to video art in a contemporary art context, linear and nonlinear video production and the projection and screening of video art projects. Introduction to the history of video art as an art form. Lec/studio. CROSSLISTED as ART 349. This course is repeatable for a maximum of 8 credits. PREREQS: ART 122 [C-] and ART 263 [C-]
NMC 351. NEW MEDIA VISUALIZATION (3). Principles of visual composition, sequential imagery, interactive design, narrative structure, and cinematic language as they relate to new media communications. PREREQS: NMC 101

NMC 355. APPLIED SOUND DESIGN (3). In this hands-on course, students will apply their conceptual knowledge of sound design principles to create soundtracks for radio, TV and film projects. Students will learn how to record, edit, and mix dialogue, sound effects and music using the industry standard software, Pro Tools. Class projects will include producing a radio spot, TV commercial, short film scene and movie trailer. This course will prepare students to take the Avid Pro Tools certification exam. PREREQS: NMC 255 [C-] and NMC 101

NMC 380. PRE-PRODUCTION (3). Focuses on pre-production or the planning phase of multimedia production, which includes concept development, scriptwriting, storyboarding, budgeting, and talent/location scouting. Class projects emphasize brainstorming, story concept/ structure, conceptual art, storyboards, animatics, and interactive design. Class examines narrative structure and the languages of graphic design, cinema, and interactive story. Lec/studio. PREREQS: NMC 101

NMC 382. STUDIO AND MULTICAMERA PRODUCTION (4). Proficiency in organizing, producing, directing, and evaluating television programs using multicamera studio techniques, including graphics, set design, audio for television and digital video production, and lighting. Emphasis on bringing ideas from conception to realization in a studio setting. Lec/lab. PREREQS: NMC 101
NMC 383. FIELD PRODUCTION (4). Development of the technical abilities and conceptual approaches to audio, film, video and multimedia production. Emphasis on singlecamera production techniques and concepts. Students will begin the study of post-production process. Students will also begin to study lighting and audio as they relate to single-camera field production. PREREQS: NMC 380 [C-] and NMC 351

NMC 388. SOCIAL MEDIA AND INTERPERSONAL RELATIONSHIPS (3).
Examines how individuals build and maintain close relationships through new media and social networks. Currently, scholars are seeing a shift in how individuals self-report building close relationships, as people use elements of new media more and more frequently. This course is designed to look into the similarities and differences of these relationships as compared to face-to-face relationships. CROSSLISTED as COMM 388.

NMC 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

NMC 401. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
NMC 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Departmental approval required.
NMC 403. THESIS/DISSERTATION (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Departmental approval required.
NMC 404. WRITING AND CONFERENCE (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

## NMC 405. READING AND CONFERENCE (1-

16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
NMC 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required

NMC 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
NMC 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
NMC 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
NMC 410. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Students must have completed 15 credits with the NMC prefix to be eligible for an NMC internship. Departmental approval required.
NMC 418. VIRAL CONTENT (3). Online media is often filled with memes, likes, shares, tweets and even hilarious cat videos. Companies like Buzzfeed exist to create, maintain and drive traffic to content. In 2015, collectively the top 10 YouTube content creators made 70.5 million dollars. So, what's the secret to going viral? This class is designed to look at this question by examining the culture of viral content, the social and psychological influences that shape online behavior and the business of creating and spreading viral content. Throughout the term, students will apply these principle concepts in an attempt to make their own viral content.

NMC 419. REEFER MADNESS IN THE MEDIA (3). Critically examines the history of hemp and marijuana prohibition, issues of propaganda and the media's role during the transition between prohibition and the current state of reform. The purpose of this course is to better understand the role media plays in shaping our political, cultural and personal experiences. For students, this knowledge is invaluable for analysis, evaluation and critical thinking skills. The framework of this class is based on four modules: "History of Marijuana Prohibition", "Marijuana, Media and Culture", "Medicinal Marijuana Movement" and "Legalizing Marijuana Campaigns".
NMC 421. DIFFUSION OF INNOVATIONS (3). An introduction to old and emerging theories that explain the spread of innovative ideas and technologies among members of a society, emphasizing the role of communication processes and the special problems for diffusion in communication technology. PREREQS: NMC 301 [C-] and NMC 101
NMC 425. LATINOS IN THE MEDIA (3).
Examines the sociohistorical context for the underrepresention of Latinos in mainstream media, the narrow roles and issues ascribed to Latinos and the ways in which media moguls attempt to attract Latino consumers. Focus on Latino filmakers, actors, and writers as they rewrite traditional scripts to create a vibrant, multifaceted picture of Latinos in the U.S. today. PREREQS: NMC 101 [D-]

NMC 427. *DIGITAL PORNOGRAPHY (3).
Exploration of the prominent role pornography plays in digital communication innovation globally including the examination of social consequences; diffusion of technology, business models and economic impact; legal, ethical, and moral issues; and community health and well-being. (Bacc Core Course) PREREQS: Junior or senior standing. This requirement is to ensure all students are over the age of 18 and are able to synthesize complex social and technological concepts and trends appropriate for an STS course.

NMC 430. MEDIA THEORY (3). Specifies the concepts, hypotheses, and theoretical paradigms that have characterized the study of media since the early 20th century. The evolution of theory as new media has changed the media economy is emphasized, as well as the need for new concepts to describe phenomena unique to the Internet era (concepts such as PREREQS: NMC 301 [C-] and NMC 101
NMC 433. NEW MEDIA STORY TELLING (3). Students will study and develop storytelling methods using new media communications technology. Storytelling will focus on telling stories using non-linear, interactive, multidimensional, multi-sensory, multimedia techniques. PREREQS: NMC 101
NMC 435. MEDIA EFFECTS (3). Reviews the potential for media technology and media content to influence the beliefs and behaviors of individuals. The media's ability to bring about specific changes in people's attitudes, values, political agendas, purchasing habits, and jury decisions are discussed. The impact of new media's interactive technology and content on people's beliefs and behaviors is emphasized. PREREQS: NMC 301 [C-]
NMC 437. NEW MEDIA AND SOCIETY (3). Traces the impact of new media--from the telegraph to the Internet--on American society. Emphasizes the way that existing social institutions (e.g., schools and churches) and opinion leaders (e.g., presidents and scholars) greeted the arrival of new media with an increasingly predictable mixture of fear and euphoria. Social changes such as the westward expansion of the U.S. in the 19th century, the arrival of immigrants in the late 19th and early 20th centuries, and the rise of youth culture in the mid-20th century are discussed in terms of their connection to developments in the technology and structure of media. The integration of Internetbased services into contemporary American society is the focus of one-half of the course. PREREQS: NMC 301 [C-] and NMC 101
NMC 440. MEDIA MANAGEMENT (3). Principles of management and their application to new media. The practice of new media management including personnel, programming, sales and promotions. Students will gain an understanding of the business side of the media industries. Students will also develop the analytical methods and problem solving techniques used in the management decision-making process as they relate to the mass media. Students will study the media of radio, broadcast television, cable television, DBS, MMDS, SMATV, satellite, telephony, Internet, film, the recording industry, advertising and public relations, as well as emerging media businesses. PREREQS: NMC 301 [C-]

## NMC 441. MEDIA ENTREPRENEURSHIP

(3). Studies the entrepreneurial process as it relates uniquely to the arts and sciences of new media. Students will study the basic entrepreneurial processes of law, finance, accounting, organizational structure, budgeting, business plans, market analyses, taxes, licensing, and insurance as they relate to new media enterprises. Students will also study the sales/ revenue generation side of new media ventures. PREREQS: NMC 301 [C-]

NMC 470. MEDIA LAW (3). The relevant laws and regulations that govern the mass media; the participants in the law making process; he analytical methods and problem solving techniques used in the law making process; the laws and policies affecting journalists. Issues such as libel, privacy, obscenity, indecency, fair trail/ free press and copyright are covered. PREREQS: NMC 301 [C-]
NMC 471. TELECOMMUNICATIONS POLICY
(3). Covers past and present telecommunications policy. Examines the agencies that govern the telecommunications industry, including the Federal Communications Commission. Studies the differences and similarities between the regulations associated with public and private telecommunications systems and services. Students will gain knowledge of telecommunications industry ownership regulations, including antitrust regulation of the telecommunications industry. PREREQS: NMC 301 [C-]
NMC 481. POST PRODUCTION (4). Advanced film and video production with emphasis on techniques, equipment, and theories involved in editing film and video. Emphasis on the use of computer-based nonlinear editing systems. Students will also study the use of special effects in visual production. PREREQS: NMC 383 [C-] and NMC 101 and NMC 351 and NMC 380

NMC 482. DOCUMENTARY (4). Theory and production of the documentary genre. The class covers all stages of producing a documentary film from the idea through development, marketing, planning, shooting, editing, and post-production. Lec/lab. PREREQS: NMC 383 [C-] and NMC 351 and NMC 380

NMC 483. NEW MEDIA 3-D (4). Hands-on introduction to the world of 3-D computer modeling and animation, including investigations of light, texture, form, spatial design and motion. Course includes discussions of professional and artistic practice and critique of student and professional work. Lec/lab.

NMC 484. NEW MEDIA ANIMATION (4). An in-depth theoretical and hands-on investigation of advanced animation tools and techniques used for educational, scientific, entertainment, and expressive communication projects. Tools and techniques covered include motion capture (full body, face, hand), automated lip-sync dialogue processing, dynamic simulation, particle motion, and other simulation or performancebased animation approaches. Students will work individually and in teams to explore the communicative and creative possibilities of the described technologies. PREREQS: NMC 101

NMC 487. VIRTUAL MEDIA (4). Explores the topics of interactivity in virtual space from conceptual, historical, theoretical, and practical perspectives. The course will compare and contrast real world physical space with virtual space in an attempt to create a virtual world designed with an audience in mind. Color, light, form, motion, and sound will all be examined and applied throughout this course. Lec/lab. PREREQS: NMC 101 [C] and NMC 483* [C]

NMC 490. MEDIA ETHICS (3). Exploration of the ethical issues surrounding new media communications. Topics include professionalism in journalism, new media visual production, new media management, advertising, film, and public relations. Topics also include new media's relationship with society, violence in the media, and sex in the media. PREREQS: NMC 301 [C-] and NMC 101

NMC 498. ADVANCED COLLABORATIVE EXPERIENCE (3-4). Senior-level course designed to integrate the skills and knowledge obtained through NMC course work into a group research, group project, and/or group production that will be useful to students for their professional portfolio or serve as the basis for academic publication. Topic changes per term. This course is repeatable
for a maximum of 4 credits. PREREQS: NMC 101 [C-] and NMC 301 [C-] and senior standing and departmental approval prior to term course offered. Taken within last three senior terms.
NMC 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## ■ THEATRE ARTS COURSES

TA 121. ORAL INTERPRETATION I (3). Analysis and presentation of literature. Exploration of emotional reactions, expressive vocal and physical responses, and performing techniques for effective communication. (FA)
TA 144. PLAYREADING (1). Reading/discussion/ examination of plays from world theatre of past and present from the perspective of production and theatre history. This course is repeatable for a maximum of 2 credits.
TA 147. *INTRODUCTION TO THE THEATRE (3). Origins, history, nature, elements, and style of theatre production; function of artists and craftspersons of the theatre. (FA) (Bacc Core Course)

TA 147H. *INTRODUCTION TO THE THEATRE
(3). Origins, history, nature, elements, and style of theatre production; function of artists and craftspersons of the theatre. (FA) (Bacc Core Course) PREREQS: Honors College approval required.

TA 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

TA 242. VISUAL PRINCIPLES OF THEATRE (3). An introduction to visual creativity, creative thinking, and visual problem solving as applied to theatre arts as a whole, and to scene and costume design. (FA)
TA 243. PRINCIPLES OF COSTUMING FOR THE STAGE (3). Principles and techniques of costume construction; practical application in the costume shop on theatre production. PREREQS: TA 147 and TA 242
TA 244. SCENE CRAFTS (3). Constructing scenery and stage properties; practical experience in backstage procedures and scene painting. Lec/ lab. (FA)
TA 245. STAGE LIGHTING (3). Fundamentals of electricity as used in stage lighting; color and light, lighting instruments and control systems, theory and practice of lighting stage production. PREREQS: TA 244
TA 247. STAGE MAKEUP (3). Basic principles and theory with laboratory experience in most-used applications of theatrical makeup. PREREQS: Preference given to TA majors.
TA 248. FUNDAMENTALS OF ACTING I (3). Examination of basic principles and techniques of acting. Exploration of relaxation/focus, personal vocal/physical awareness, the actor's craft, and the performance process. (FA) PREREQS: TA 147 or instructor approval required.
TA 249. FUNDAMENTALS OF ACTING II (3).
Continued work in the basic principles and techniques of acting. Emphasis on improvisation, character analysis, and creation, the balance between truth and technique. PREREQS: TA 248 [D-] and TA 248 or instructor approval required.
TA 250. WORKSHOP: THEATRE ARTS (1-3). Practical experience in performance, technical theatre, or design. Maximum for 6 credits may be applied toward graduation. This course is repeatable for a maximum of 6 credits. PREREQS: Departmental approval required.
TA 250H. WORKSHOP: THEATRE ARTS (1-3). Practical experience in performance, technical theatre, or design. Maximum for 6 credits may be applied toward graduation. This course is repeatable for a maximum of 6 credits. PREREQS: Departmental approval required and Honors College approval required.

TA 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

TA 330. *HISTORY OF THE THEATRE (3). The rise and development of the composite arts of the theatre in their cultural and social context. Origins to 1500. Offered alternate years. (H) (Bacc Core Course)
TA 331. *HISTORY OF THE THEATRE (3). The rise and development of the composite arts of the theatre in their cultural and social context. 1500 to 1870. Offered alternate years. (H) (Bacc Core Course) PREREQS: TA 144 and TA 147 are recommended.
TA 332. *^HISTORY OF THE THEATRE (3). The rise and development of the composite arts of the theatre in their cultural and social context. 1870 to present. Offered alternate years. (H) (Bacc Core Course) (Writing Intensive Course) PREREQS: TA 144 and TA 147 are recommended.
TA 344. PLAYSCRIPT ANALYSIS (3). Study of major approaches to playscript analysis and detailed application of these systems to the theatrical production process. (H) PREREQS: TA 147 [D-] and TA 144

TA 346. SCENE AND STAGE DESIGN (3). Designs for stage productions including elements of color, mass, line, and lighting for various types of theatre architecture and plays. Offered alternate years. PREREQS: TA 147 and TA 244
TA 348. ADVANCED ACTING: REALISM (3).
Discussion, research, rehearsal, performance, and criticism of scenes from realistic drama. Emphasis on the craft of acting, emotional availability/ honesty, personal awareness. Offered alternate years. PREREQS: TA 248 [D-] and instructor approval required.
TA 349. ADVANCED ACTING: STYLES (3). Discussion, research, rehearsal, performance, and criticism of scenes from a range of period and genre styles. Offered alternate years. PREREQS: TA 248 [D-] and instructor approval required.
TA 350. WORKSHOP: THEATRE ARTS (1-3). Advanced work in acting, directing or technical theatre in dramatic productions; laboratory experience. Maximum of 6 credits may be applied toward graduation. This course is repeatable for a maximum of 6 credits. PREREQS: Departmental approval required.
TA 351. PRINCIPLES OF PLAYWRITING (3). Basic principles and techniques of playwriting. Offered alternate years. PREREQS: TA 144 and TA 344

TA 352. PLAYWRITING WORKSHOP (3).
Intensive work on student playscripts generated in TA 351, through re-writes, revision and rehearsals. Offered alternate years. PREREQS: TA 351
TA 354. FUNDS PLAY DIRECTION (3). History, theories and techniques of stage direction. Script analysis, study of the audience, staging, working with actors and designers, the production process Emphasis on practical exploration and application. Offered alternate years. PREREQS: TA 244 and TA 248 and instructor approval required.
TA 360. *MULTICULTURAL AMERICAN THEATRE (3). Examines the rich panorama of multicultural-American theatre (e.g., AfricanAmerican, gay and lesbian, Hispanic, Asian American). (H) (Bacc Core Course)

TA 360H. *MULTICULTURAL AMERICAN THEATRE (3). Examines the rich panorama of multicultural-American theatre (e.g., AfricanAmerican, gay and lesbian, Hispanic, Asian American). (H) (Bacc Core Course) PREREQS: Honors College approval required.

TA 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

TA 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

TA 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
TA 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
TA 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

TA 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

TA 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

TA 407H. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
TA 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
TA 410. THEATRE ARTS INTERNSHIP (1-16). One- to three-term residency in a producing theatre, for a maximum allowable total of 15 credits. Student works in a department of the theatre and in related production activities, according to areas of interest or specialization. Work supervised and evaluated by agency staff; academic evaluation by supervising department faculty member(s). Available to upper-division theatre arts majors and graduate students approved by faculty and selected by intern agency. This course is repeatable for a maximum of 15 credits. PREREQS: 27 credits of theatre arts, with a minimum of 6 credits in area of skill specialization, or 12 credits of upper-division theatre arts courses, with a minimum of 6 credits in area of skill specialization. Must be arranged with instructor prior to registration. Departmental approval required.

TA 416. TOPICS IN THEATRE ARTS (3). Lectures and explorations of theories, issues, methods, problems, and applications in theatre arts. Concentrated work in a variety of selected theatre topics. Offered as demand and staffing allow. This course is repeatable for a maximum of 12 credits. PREREQS: 9 credits of theatre arts or instructor's approval required.
TA 443. COSTUME DESIGN (3). Theory and practice of designing costumes for a theatrical production. PREREQS: TA 243
TA 444. ^THEORY AND CRITICISM OF
THEATRE ARTS (3). Major theories that have influenced and motivated theatre practice in Western civilization throughout its development. Offered on alternate years. (Writing Intensive Course) PREREQS: 6 credits of theatre history, or 6 credits of dramatic literature.
TA 450. STUDIO: THEATRE ARTS (3-6).
Advanced individual study on approved projects in one of the arts of the theatre: acting, directing or scene/costume/lighting design; or in stage or theatre management. This course is repeatable for a maximum of 6 credits. PREREQS: 9 credits of upper-division theatre arts. Departmental approval required.

TA 451. INTRODUCTION TO ARTS ENTREPRENEURSHIP (3). Survey of the business strategies behind a successful career in the arts. Emphasizes the importance of entrepreneurial thinking, engages students with the fundamentals of the arts "business", and explores ways to influence and shape the industry's future. (FA) CROSSLISTED as ART 451, MUS 451. PREREQS: Junior standing and above. For majors.
TA 454. ADVANCED PLAY DIRECTION (3).
Expanded exploration of directing theories and techniques. Practical application through the production of a one-act play in a laboratory theatre. Offered alternate years. PREREQS: TA

354 [D-] and instructor approval required.
TA 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
TA 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

TA 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
TA 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
TA 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

TA 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

TA 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
TA 510. THEATRE ARTS INTERNSHIP (6-15). One- to three-term residency in a producing theatre, for a maximum allowable total of 15 credits. Student works in a department of the theatre and in related production activities, according to areas of interest or specialization Work supervised and evaluated by agency staff; academic evaluation by supervising department faculty member(s). Available to upper-division theatre arts majors and graduate students approved by faculty and selected by intern agency. This course is repeatable for a maximum of 15 credits. PREREQS: 27 credits in theatre arts, with a minimum of 6 credits in area of skill specialization, or 12 credits of upper-division theatre arts courses, with a minimum of 6 credits in area of skill specialization. Must be arranged with instructor prior to registration. Departmental approval required.
TA 516. TOPICS IN THEATRE ARTS (3). Lectures and explorations of theories, issues, methods, problems, and applications in theatre arts. Concentrated work in a variety of selected theatre topics. Offered as demand and staffing allow. This course is repeatable for a maximum of 12 credits. PREREQS: 9 credits of theatre arts or instructor's approval required.

TA 543. COSTUME DESIGN (3). Theory and practice of designing costumes for a theatrical production. PREREQS: TA 243
TA 550. STUDIO: THEATRE ARTS (3-6). Advanced individual study on approved projects in one of the arts of the theatre: acting, directing or scene/costume/lighting design; or in stage or theatre management. This course is repeatable for a maximum of 6 credits. PREREQS: 9 credits of upper-division theatre arts. Departmental approval required.
TA 554. ADVANCED PLAY DIRECTION (3).
Expanded exploration of directing theories and techniques. Practical application through the production of a one-act play in a laboratory theatre. Offered alternate years. PREREQS: TA 354 and instructor approval required.

SCHOOL OF HISTORY, PHILOSOPHY, AND RELIGION

Ben Mutschler, Director
Stacey Smith, Associate Director, History

Robert Figueroa, Associate Director, Philosophy
Courtney Campbell, Associate
Directory, Religious Studies
Dwance Howard, Assistant to the Director

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## FACULTY

Professors Campbell, Carson, Clough, Ferngren, Guerrini, Hamblin, Husband, Kaplan, Katz, Kopperman, Leibowitz, Luft, Osborne, von Germeten
Associate Professors Chappell, Figueroa, Ip, Koehlinger, Mutschler, Nichols, Orosco, Sarbacker, Smith, Thompson
Assistant Professors Barstow, Hogg, Jenkins, Lauer, Muraca, Osterloh, Ritzheimer

## Undergraduate Majors

History (BA, BS, HBA)
Philosophy (BA, BS, HBA, HBS)
Religious Studies (BA, BS, HBA, HBS)
Minors
History
Philosophy
Religious Studies
Undergraduate Certificates
Applied Ethics
Medical Humanities
Peace Studies
Religion and Culture
Graduate Majors
Applied Ethics (MA, MAIS)
Graduate Areas of Concentration
Art and Morality
Bioethics
Environmental Ethics
History of Science (MA, MAIS, MS, PhD)
Graduate Minors
Applied Ethics
History
Graduate Areas of Concentration
American History (U.S.)
Western U.S. History
European History

Non-American and Non-European History (Asian, African, Latin American, Islamic)

## History of Science

Graduate Areas of Concentration
Development of the Physical, Biological, and Environmental Sciences
History of Science and Medicine
Intellectual and Social History of Science in Europe and the U.S.

## Philosophy

Graduate Areas of Concentration Aesthetic Theory
Ethics (including environmental ethics and biomedical ethics)
History of Philosophy
Logic and Philosophy of Science
Religious Studies

## HISTORY

The School of History, Philosophy, and Religion offers a BA or BS degree in History. Courses provide fundamental background for the social sciences and humanities and are of special value to students of government, education, law, science, journalism, and business. History majors go on to careers in teaching and many jobs benefitting from a liberal arts background.

BA candidates must have proficiency at the second-year college level of a foreign language.

The school also offers a minor program for undergraduates with majors in other fields.

## PHILOSOPHY

The School of History, Philosophy, and Religion offers a BA or BS degree in Philosophy, a Philosophy minor, an undergraduate and postbaccalaureate certificate in Applied Ethics, an MA in Applied Ethics, and participates in the Master of Arts in Interdisciplinary Studies (MAIS) program with a focus on applied ethics and other areas of philosophy. The school's Program for Ethics, Science, and the Environment (PESE) supports multidisciplinary education and scholarship on ethical and policy issues that are raised by advances in scientific knowledge, biotechnology, and natural resource use.

The Spring Creek Project seeks to bring together the practical wisdom of the environmental sciences, the clarity of philosophical analysis, and the creative, expressive power of the written word, to find new ways to understand and re-imagine our relation to the natural world.

Baccalaureate core courses are taught for students interested in broadening their intellectual horizons, developing their abilities for intellectual criticism, and enlarging their understanding of social, ethical, religious, political, and aesthetic values in contemporary society
and world cultures. Many philosophy courses have content that is relevant to the interests of women and minority students.
The school invites non-majors to combine the study of philosophy with their major program by enrolling in the philosophy minor or the Applied Ethics certificate program.
Students interested in philosophy programs should contact or visit the school's undergraduate advisor or director of graduate studies.

## HISTORY OF SCIENCE

The School of History, Philosophy, and Religion offers the degrees of Master of Arts (MA), Master of Science (MS) and Doctor of Philosophy (PhD) in History of Science. The History of Science graduate program provides professional training in the interdisciplinary subject of the history of science. The program connects the humanities, social sciences, and natural sciences by studying and interpreting the development of the sciences within particular historical settings and analyzing the changing roles of the sciences within modern cultures. The emphasis in the program is on scientific traditions since the sixteenth century in Europe and North America, in the physical, earth, biological, medical, and social sciences, as well as on environmental history and the history of the environmental sciences.

## MA IN APPLIED ETHICS DEGREE

The MA in Applied Ethics provides students skills in moral reasoning and an understanding of the ethical values and dilemmas in today's world. Students will be able to identify, analyze and suggest solutions to ethical problems that arise in their professional and civic lives.

## MAIS DEGREE

The school also participates in the Master of Arts in Interdisciplinary Studies (MAIS) degree program. In other advanced degree programs, philosophy may be used as a minor. See the graduate section of this catalog for details.

## UNDERGRADUATE MAJORS WITH OPTIONS

HISTORY (BA, BS, CRED, HBA, HBS)

## Also available via Ecampus.

The History undergraduate major is available to Ecampus students as a BA or BS degree only.

## Minimum Total Credits (49)

Minimum Upper-Division Credits (33)
I. History Surveys ( 15 credits): 15 credits from the following courses:

HST 101 *History of Western Civilization (4)
HST 102 *History of Western Civilization (4)
HST 103 *History of Western Civilization (4)
HST 104. *World History I: Ancient
Civilizations (3)
HST 105. *World History II: Middle and Early Modern Ages (3)
HST 106. *World History III: The Modern and Contemporary World (3)
HST 201 *History of the United States (4)
HST 202 *History of the United States (4)
HST 203 *History of the United States (4)
HST/PHL 210 *Religion in the United States (4)

History majors must take at least one of the following courses that cover a period prior to 1800 CE: HST 101, HST 102, HST 104, HST 105, and/or HST 201.

## II. Global Historical Literacy (12 credits):

4 upper-division credits in each of the following areas, for a total of 12 credits:

- European history
- U.S. history
- Non-European/Non-U.S. history
III. History Electives (12 credits):

12 additional credits in any 300- or $400-\mathrm{level}$ HST or HSTS courses. Only 4 of these credits may come from HST 410: Internship.

## IV. History Capstone Courses:

HST 310. The Historian's Craft (4)
HST 407. ^Seminar (5)
Students must complete HST 310 before attempting HST 407.
A minimum grade of C is required for both HST 310 and HST 407.

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: 900

## PHILOSOPHY (BA, BS, CRED,

 HBA, HBS)An undergraduate major in philosophy provides a broad education and intellectual skills that are useful in many occupations and areas of life. It is also a valuable background for graduate study in philosophy and religious studies and for advanced study in such professional fields as law and public service.

- At least 32 credits must be upper division.
- At least 12 credits must be 400 level.
- All courses offered by the School of History, Philosophy, and Religion must be graded, no $\mathrm{S} / \mathrm{U}$.
- Only courses with C- or better will be accepted for the major.
- Students must have a 2.5 GPA in those courses offered by the school.
Philosophical Foundations (10-12)
PHL 101. Critical Thinking (4)
or PHL 121. *Reasoning and Writing (3)
PHL 205. *Ethics (4)
PHL 251. *Knowers, Knowing, and the Known (4)

Philosophical Perspectives (24-27)
PHL 301, PHL 302, PHL 303. *History of
Western Philosophy ( $4,4,4$ )

## Select one Logic course:

PHL 321. Deductive Logic (4)
PHL 325. *Scientific Reasoning (4)
PHL 421. Mathematical Logic (3)
Select one Value Theory or one Metaphysics/Epistemology course from the two lists below (3-4):

## Value Theory:

PHL 207. *Political Philosophy (4)
PHL 342. Contemporary Ethics (4)
PHL 344. *Pacifism, Just War, and Terrorism (4)

PHL 360. *Philosophy and the Arts (4)
PHL 365. *Law in Philosophical Perspective
(4)

PHL 390. Moral Theories (3)
PHL 417. Feminist Philosophies (3)
PHL 430. History of Buddhist Philosophy (4)
PHL 439. Philosophy of Nature (3)
PHL 440. *Environmental Ethics (3)
PHL 499. Topics in Philosophy [some qualify; check with professor] (1-4)
OR:
Metaphysics/Epistemology:
PHL 325. *Scientific Reasoning (4)
PHL 365. *Law in Philosophical Perspective (4)

PHL 430. History of Buddhist Philosophy (4)
PHL 436. Philosophy and Religion (3)
PHL 451. Knowledge and Reality (3)
PHL 470. Philosophy of Science (3)
PHL 474. Philosophy of Biology (4)
PHL 499. Topics in Philosophy [some
qualify; check with professor] (1-4)
Diversity: Select one course from below (3-4):
PHL 208. Introduction to Buddhist Traditions (4)
PHL 280. *Ethics of Diversity (4)
PHL 312. *Asian Thought (4)
PHL 316. Intellectual Issues of Mexico and Mexican Americans (4)
PHL 371. *Philosophies of China (4)
PHL 417. Feminist Philosophies (3)
PHL 430. History of Buddhist Philosophy (4)
PHL 448. Native American Philosophies (4)
PHL 499. Topics in Philosophy: [some qualify; check with professor] (1-4)
PHL 407. Seminar (3)
Electives (12-16) Consultation with advisor is required.

## Total=46-55 (14-15 courses)

## Philosophical Pathways:

Students are encouraged to select their Diversity, Value Theory, or Metaphysics and Epistemology, Seminar, and Elective courses so as to form a Philosophical Pathway. These are groups of courses that allow the student to concentrate on different subject areas within engaged philosophy. Here are sample pathways, with themes that interest many students:

## Science and Technology:

PHL 325. *Scientific Reasoning (4)
PHL 371. *Philosophies of China (4)
PHL 417. Feminist Philosophies (3)
PHL 439. Philosophy of Nature (3)

PHL 440. *Environmental Ethics (3)
PHL 443. *World Views and Environmental Values (3)
PHL 448. Native American Philosophies (4)
PHL 451. Knowledge and Reality (3)
PHL 470. Philosophy of Science (3)
PHL 474. ^Philosophy of Biology (4)
Health and Wellbeing:
PHL 208. Introduction to Buddhist Traditions (4)
PHL 213. *Introduction to Hindu Traditions (4)

PHL 360. *Philosophy and the Arts (4)
PHL 417. Feminist Philosophies (3)
PHL 430. History of Buddhist Philosophy (4)
PHL 432. *Yoga and Tantric Traditions (4)
PHL 444. *Biomedical Ethics (4)
PHL 455. Death and Dying (3)
PHL 474. ^Philosophy of Biology (4)

## Social Justice and Civic

Engagement:
PHL 207. *Political Philosophy (4)
PHL 280. *Ethics of Diversity (4)
PHL 315. *Gandhi and Nonviolence (4)
PHL 316. Intellectual Issues of Mexico and Mexican Americans (4)
PHL 342. Contemporary Ethics (4)
PHL 344. *Pacifism, Just War, and Terrorism (4)

PHL 365. *Law in Philosophical Perspective (4)

PHL 417. Feminist Philosophies (3)
PHL 431. Buddhism, Nonviolence and
Social Justice (4)
PHL 443. *World Views and Environmental Values (4)
PHL 448. Native American Philosophies (4)
PHL 461. Art and Morality (3)
Faith in Philosophical Perspective:
PHL 207. *Political Philosophy (4)
PHL 208. Introduction to Buddhist Traditions (4)
PHL 210. *Religion in the United States (4)
PHL 213. *Introduction to Hindu Traditions (4)

PHL 214. *Introduction to Islamic Traditions (4)
PHL 316. Intellectual Issues of Mexico and Mexican Americans (4)
PHL 344. *Pacifism, Just War, and Terrorism (4)

PHL 371. *Philosophies of China (4)
PHL 430. History of Buddhist Philosophy (4)
PHL 436. Philosophy and Religion (3)
PHL 443. *World Views and Environmental Values (3)
PHL 448. Native American Philosophies (4)

## The Examined Life:

PHL 207. *Political Philosophy (4)
PHL 208. Introduction to Buddhist Traditions (4)
PHL 280. *Ethics of Diversity (4)
PHL 316. Intellectual Issues of Mexico and Mexican Americans (4)
PHL 325. *Scientific Reasoning (4)
PHL 342. Contemporary Ethics (4)
PHL 344. *Pacifism, Just War, and Terrorism (4)

PHL 360. *Philosophy and the Arts (4)
PHL 365. *Law in Philosophical Perspective (4)

PHL 371. *Philosophies of China (4)
PHL 390. Moral Theories (3)
PHL 417. Feminist Philosophies (3)
PHL 430. History of Buddhist Philosophy
(4)

PHL 436. Philosophy and Religion (3)
PHL 440. *Environmental Ethics (3)
PHL 439. Philosophy of Nature (3)
PHL 448. Native American Philosophies (4)
PHL 451. Knowledge and Reality (3)
PHL 470. Philosophy of Science (3)
PHL 474. ^Philosophy of Biology (4)
Courses numbered PHL 299, 399, and
499 (Special Topics) as well as PHL 407
(Seminar) and PHL 411 (Great Figures)
vary in their content from term to term, and will sometimes satisfy the Diversity, Value Theory, or Metaphysics/Epistemology requirements. To determine whether a particular course of this type may be counted toward a particular degree requirement, ask your professor.

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: 955

## RELIGIOUS STUDIES (BA, BS,

 CRED, HBA, HBS)The School of History, Philosophy, and Religion offers a BA or BS degree in Religious Studies as well as a minor in Religious Studies, and undergraduate certificates in religion and culture and in medical humanities. Courses emphasize skills in critical thinking, argumentative and expository writing, cultural literacy, citizenship, and global diversity. Majors in religious studies pursue graduate studies and careers in numerous fields, including education, government, humanitarian services, journalism, law, medicine, and politics.

## Foundations and Concepts

## Required Core Courses (12):

PHL 160. *Quests for Meaning: World Religions (4)
PHL 202. Introduction to Religious Studies (4)

REL 407. ^Seminar: Theories and Methods of Religion (4) [Pending approval]

## Global Literacy in Religion

Select 12 credits from courses below:
PHL 206. *Religious Ethics and Moral Problems (4)
PHL 208. Introduction to Buddhist Traditions (4)
PHL/HST 210. *Religion in the United States (4)

PHL 213. *Introduction to Hindu Traditions (4)

PHL 214. *Introduction to Islamic Traditions (4)
PHL 220. World-Views and Values in the Bible (4)
REL 215. Introduction to Jewish Traditions (4)

## Studies in Religion and Culture Select 24 credits from courses below, at least 12 from SHPR courses:

SHPR Courses:
HST 325. History of Early Christianity: Origins to 600 (4)
HST 327. History of Medieval Europe (4)
HST 328. History of Medieval Europe (4)
HST 330. History of Early Modern Europe (4)

HST 333. Medieval and Early Modern Spanish History (4)
HST 350. *Modern Latin America (4)
HST 352. *Africans in Latin American History (4)
HST 387. *Islamic Civilization (4)
HST 388. *Islamic Civilization (4)
HST 425. *The Holocaust in Its History (4)
HST 466. Religion and U.S. Foreign
Relations (4)
HST 485. *Politics and Religion in the
Modern Middle East (4)
PAX 201. Study of Peace and the Causes of Conflict (3)
PHL 170. *The Idea of God (4)
PHL 312. *Asian Thought (4)
PHL 315. *Gandhi and Non-violence (4)
PHL 316. Intellectual Issues of Mexico and Mexican Americans (4)
PHL 344. *Pacifism, Just War, and Terrorism (4)

PHL 345. *Freedom First: Religious Liberty and Intolerance (4)
PHL 371. *Philosophies of China (4)
PHL 411. Great Figures in Philosophy (4)
PHL 430. History of Buddhist Philosophy (4)

PHL 431. Buddhism, Non-Violence, and Social Justice (4)
PHL 432. *Yoga and Tantric Traditions (4)
PHL 436. Philosophy and Religion (3)
REL 437. Religious Dimensions of Modern
Literature (3) [Pending submission
and approval of a proposal]
PHL 443. *World Views and Environmental Values (3)
PHL 444. *Biomedical Ethics (4)
PHL/ES 448. Native American Philosophies (3)

PHL 455. Death and Dying (3)
PHL 461. Art and Morality (3)
REL 199. Selected Studies (4)
REL 299. Selected Topics (4)
REL 399. Special Topics (4)
REL 402. Independent Study (4)
REL 405. Reading and Conference (4)
REL 415. Selected Topics (4)

## Non-SHPR Courses:

ANTH 452. Folklore and Expressive Culture (4)

ANTH 472. Contemporary Indian Issues (4)
ENG 275. *The Bible as Literature (4)
ENG/PHL/WGSS 295. *Feminism and the Bible (4)
ENG 330. *The Holocaust in Literature and Film (4)
ENG 360. *Native American Literature (4)
NMC 437. New Media and Society (3)
PS 361. *Classical Political Thought (4)
PS 370. *Science, Religion, and Politics (4)
SOC 452. Sociology of Religion (4)
WGSS 223. *Women: Self and Society (3)
WGSS 380. *Muslim Women (3)
WGSS 495. *Global Feminist Theologies (4)
WGSS 496. *Feminist Theologies in the United States (4)

## Total=Min. 48 credits

Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)


## Major Code: 977

UNDERGRADUATE MINORS

## HISTORY MINOR

Also available via Ecampus.
Undergraduate students may elect a minor in History to complement course work in their major discipline. History minors must complete 28-29 credits, depending on the area:

## U.S. History

HST 201, 202, 203. *History of the United States ( $4,4,4$ ) (or equivalent)
Minimum of 12 upper-division credits in U.S. history courses ( $300+$ level)

Additional history credits (any history courses) (4)

## European History

HST 101, 102, 103. *History of Western Civilization ( $4,4,4$ ) (or equivalent)
Minimum 12 upper-division credits in
"European" history (300+ level)
Additional history credits (any history courses) (8)
Non-European, Non-U.S. History
(African, Asian, Islamic World,

## Latin American History)

HST 104. *World History I: Ancient Civilizations (3) (or equivalent)
HST 105. *World History II: Middle and Early Modern Ages (3) (or equivalent)
HST 106. *World History III: The Modern and Contemporary World (3) (or equivalent)
Minimum 12 upper-division credits in nonEuropean, non-U.S. history ( $300+$ level)
Additional history credits (any history courses) (8)
All courses for a History minor must be taken for graded credit. Minor courses may be used to fulfill baccalaureate core, CLA, and minor requirements.

## Footnote:

* Baccalaureate Core Course (BCC)


## Minor Code: 900

## PHILOSOPHY MINOR

The Philosophy minor allows students to specialize in such areas as ethics, legal and political philosophy, philosophy and religion, non-Western philosophies and religious ideas, philosophy of art, logic, philosophy of science, and the history of philosophy.

## History of Philosophy-Select one

 course from:PHL 301. *History of Western Philosophy (4)

PHL 302. *History of Western Philosophy (4)

PHL 303. *History of Western Philosophy (4)

Logic-Select one course from:
PHL 101. Critical Thinking (4)
PHL 121. *Reasoning and Writing (3)

PHL 321. Deductive Logic (4)
PHL 325. *Scientific Reasoning (4)
PHL 421. Mathematical Logic (3)

## Concentration:

Students must arrange a minor area of concentration with approval of a faculty advisor.

## Electives:

As many as needed to complete the total credit requirement.

Total must include 12 credits of upperdivision with at least 3 credits at the 400 level.

## Total=27

A grade of C - or better is required in all courses used to complete minor requirements. Only one elective may be taken with $\mathrm{S} / \mathrm{U}$ grading.

## Footnote:

* Baccalaureate Core Course (BCC)

Minor Code: 955

## Religious Studies Minor

Foundations and Concepts
Required Core Courses (8)
PHL 160. *Quests for Meaning: World Religions (4)
PHL 202. Introduction to Religious Studies (4)

Global Literacy in Religion
Select 8 credits from lower-division courses below:
PHL 170. *The Idea of God (4)
PHL 206. *Religious Ethics and Moral Problems (4)
PHL 208. Introduction to Buddhist Traditions (4)
PHL/HST 210. *Religion in the United States (4)

PHL 213. *Introduction to Hindu Traditions (4)

PHL 214. *Introduction to Islamic Traditions (4)
PHL 220. World-Views and Values in the Bible (4)
REL 215. Introduction to Jewish Traditions (4)

## Studies in Religion and Culture

Select 8 credits from upper-division courses below:
HST 325. Early Christianity: Origins to 600 (4)

HST 350. *Modern Latin America (4)
HST 352. *Africans in Latin American History (4)
HST 387. *Islamic Civilization (4)
HST 388. *Islamic Civilization (4)
HST 425. *The Holocaust in Its History (4)
HST 466. Religion and U.S. Foreign Relations (4)
HST 485. *Politics and Religion in the Modern Middle East (4)
PHL 312. *Asian Thought (4)
PHL 315. *Gandhi and Non-violence (4)
PHL 344. *Pacifism, Just War, and Terrorism (4)

PHL 345. *First Freedom: Religious Liberty and Intolerance (4)
PHL 371. *Philosophies of China (4)
PHL 430. History of Buddhist Philosophy (4)

PHL 431. Buddhism, Non-Violence, and Social Justice (4)
PHL 432. *Yoga and Tantric Traditions (4)
PHL 436. Philosophy and Religion (3)
REL 437. Religious Dimensions of Modern Literature (3) [Pending submission and approval of proposal]
PHL 443. *World Views and Environmental Values (3)
PHL 444. *Biomedical Ethics (4)
PHL 455. Death and Dying (3)
PHL 461. Art and Morality (3)
Select 4 credits earned from a disciplinary elective:
Any HST, PHL, REL course, or special topics as approved by academic advisor.

## Total=28

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 978

## GRADUATE MAJORS

## APPLIED ETHICS (MA, MAIS)

Graduate Areas of Concentration Art and morality, bioethics, environmental ethics
The MA in Applied Ethics is designed to provide students with skills of moral reasoning and an understanding of ethical values and dilemmas in today's world. Students will be able to identify, analyze and suggest solutions to ethical problems that arise in their professional and civic lives.
Students are required to take courses in ethical theory, as well as courses in applied ethics and in an appropriate disciplinary or integrated minor. Completion of the degree requires a practicum and thesis. Please note that Oregon State University also requires completion of two years of a foreign language for the master of art's degree.

## Required Course of Study (45 credits minimum)

## A. Philosophy Core (9)

PHL 525. Philosophical Methods (3)
PHL 541. Classical Moral Theories (3)
PHL 542. Contemporary Moral Theories (3)

## B. Applied Ethics (15 credits, with

 maximum of 6 from PHL 501, PHL
## 502, PHL 505)

PHL 501. Research (1-16)
PHL 502. Independent Study (1-16)
PHL 505. Reading and Conference (1-16)
PHL 507. Seminar (1-16)
PHL 517. Feminist Philosophies (3)
PHL 540. Environmental Ethics (3)
PHL 543. World View and Environmental Values (3)
PHL 544. Biomedical Ethics (4)
PHL 547. Research Ethics (3)
PHL 555. Death and Dying (3)
PHL 561. Art and Morality (3)
PHL 570. Philosophy of Science (3)
PHL 599. Topics in Philosophy (1-4)
C. PHL 510. Practicum (3-6)
D. PHL 503. Thesis (6-9)
E. Disciplinary or Integrated Minor (12)

Major Code: 9580

## HISTORY OF SCIENCE (MA, MS, PhD, MAIS)

Graduate Areas of Concentration
Development of the physical, biological, and environmental sciences; history of science and medicine; intellectual and social history of science in Europe and the U.S.
The graduate program leading to the MS, MA, and PhD is offered through the School of History, Philosophy, and Religion. Graduate work in the school may apply to the Master of Arts in Interdisciplinary Studies and to minors in other advanced-degree programs.

Students applying for graduate work in history must meet the following requirements:

1. Minimum overall undergraduate GPA of 3.00
2. Appropriate undergraduate course work in history
3. Have Graduate Record Examination scores sent to the School of History, Philosophy, and Religion
Course work in the history of science graduate major provides a critical perspective on the scientific enterprise through the centuries. It is valuable for graduate students in a variety of disciplines in the sciences and the humanities.

## Admission Requirements

Students must have completed a fouryear baccalaureate degree from an accredited college or university and have achieved a combined GPA of 3.00 for the last 90 quarter ( 60 semester) credits of graded undergraduate work of the first baccalaureate and all subsequent graded credits.

The applicant must submit photocopies of official transcripts of all previous academic work at the college or university level.

Applicants must also provide:

- A statement of the student's particular fields of interest and overall aims and purpose in the study of the history of science. An additional writing sample (no more than 25 pages) would be helpful to the graduate admissions committee.
- A photocopy of the official Graduate Record Examination (GRE) scores.
- Three letters of recommendation that specifically evaluate academic abilities and professional potential.


## Graduate Degree Requirements

Requirements for a Master's Degree:
Either the MA or MS may be earned. The

MA requires demonstration, either by course work or examination, of a reading knowledge of a foreign language appropriate for research. Both degrees require the successful completion of 45 graduate credits. Candidates are required to have a major field of at least 24 credits of course work (including historiography) from a list of approved history of science courses and a minor field of 15 credits of course work in science, history, or a related (or integrated) field; a thesis is optional.

## Requirements for a Doctoral

 Degree:The equivalent of three years of graduate work beyond the bachelor's degree is required including a doctoral thesis. This must include the requirements for, or the equivalent of, a master's degree in history of science. Course work should have history of science as a major; the minor field can be in science, history, or a related (or integrated) field. Generally, one foreign language is required.

## Major Code: 5440

## GRADUATE MINORS

## APPLIED ETHICS GRADUATE MINOR

For more information, see the departmental advisor.
Minor Code: 9580

## HISTORY GRADUATE MINOR

Graduate Areas of Concentration
American history (U.S.) Western U.S.
history, European history, non-American and non-European history (Asian,
African, Latin American, Islamic), history of science
Graduate work in the School of History, Philosophy, and Religion may apply to the Master of Arts in Interdisciplinary Studies degree and to minors in other advanced degree programs.

Students applying for graduate work in history must meet the following requirements:

1. Minimum overall undergraduate GPA of 3.00
2. Appropriate undergraduate course work in history
3. Have Graduate Record Examination scores sent to the School of History, Philosophy, and Religion.
Minor Code: 9000

## HISTORY OF SCIENCE GRADUATE MINOR

## Graduate Areas of Concentration

History of science and medicine, development of the physical, biological, and environmental sciences, intellectual and social history of science in Europe and the U.S.
Graduate work in the School of History, Philosophy, and Religion may apply to the Master of Arts in Interdisciplinary

Studies and to minors in other advanced degree programs.
Students applying for graduate work in history must meet the following requirements:

1. Minimum overall undergraduate GPA of 3.00
2. Appropriate undergraduate course work in history
3. Have Graduate Record Examination scores sent to the School of History, Philosophy, and Religion.

## Minor Code: 5440

PHILOSOPHY GRADUATE MINOR
Graduate Areas of Concentration
Aesthetic theory, ethics (including environmental ethics and biomedical ethics), history of philosophy, logic and philosophy of science, religious studies
The School of History, Philosophy, and Religion is committed to teaching students the skills and knowledge they need to reason cogently and decide wisely about difficult issues they will confront as citizens and professionals. The school offers graduate work leading to the Master of Arts in Interdisciplinary Studies degree with a specialization in applied ethics and in other areas of philosophy and religious studies. The MAIS thesis option is encouraged. The study of applied ethics builds on a special strength among school faculty.
Graduate credit is offered in logic, ethics (including environmental ethics and biomedical ethics), aesthetics, religious studies, philosophy of science, contemporary philosophy, and history of philosophy. PHL 550 Ideas Matter is offered in conjunction with the "IDEAS MATTER" lecture series.

Prospective students should request additional program literature from the school. Some teaching assistantship support is available.

## Minor Code: 9550

## CERTIFICATES

## APPLIED ETHICS CERTIFICATE

The Applied Ethics undergraduate certificate builds upon the various courses in ethics taught in the School of History, Philosophy, and Religion and courses with ethics-related content found throughout the university, in order to provide students with a systematic and thorough understanding of the moral world for their civic, professional, and personal lives.
Students pursuing a major in any academic or professional field may also pursue applied ethics for educational interest and for professional preparation. The certificate adds a critical philosophical dimension to students' understanding of their professional aspirations.
Students seeking a baccalaureate de-
gree at OSU may earn the Applied Ethics certificate by completing a minimum of 28 credits of approved course work.
For more information, contact Courtney Campbell, 541-737-5651, ccampbell@oregonstate.edu.

## Philosophy Requirements

PHL 205. *Ethics (4)
12 credits from any of the following courses:
PHL 150. *Great Ideas in Philosophy (3)
PHL 280. *Ethics of Diversity (4)
PHL 325. *Scientific Reasoning (4)
PHL 342. Contemporary Ethics (4)
PHL 390. Moral Theories (3)
PHL 405. Reading and Conference (1-16)
PHL 417. Feminist Philosophies (3)
PHL 440. *Environmental Ethics (3)
PHL 443. *Worldviews/Environmental Values (3)
PHL 444. *Biomedical Ethics (4)
PHL 450. Topics (1)
PHL 499. Topics in Contemporary
Philosophy [w/approval] (1-4)

## Elective Requirements (12)

Three concentrations of courses to achieve the 12 elective credits for the Applied Ethics certificate have already been established, but creating an individualized program is possible. The established concentrations are:

1. Ethics and scientific inquiry
2. Ethics and the environment
3. Ethics, health and medicine

## Total=28

The Applied Ethics certificate coordinator will assist students in course selection from a list available in the School of History, Philosophy, and Religion.

## Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course


## Major Code: C200

## MEDICAL HUMANITIES <br> CERTIFICATE

The undergraduate certificate in Medical Humanities offers OSU students a multi-disciplinary integrated program to study health, medicine, and the healing professions. The certificate relies on key courses in medical anthropology, literature and medicine, medical history, and biomedical ethics for its core content foundations. Courses from additional different disciplines-biology; ethnic studies; exercise science; philosophy; political science; psychology; public health; religious studies; sociology; and women, gender, and sexuality studies-can fulfill complementary elective courses. In addition, the certificate program provides a team-taught colloquium on "the art of healing" that emphasizes skills in professional identity, reflective writing, cultural competency, and diversity as a complement to the scientific features of the healing professions. The certificate will prepare students to empathize with
the sufferings of others, reflect critically on medical knowledge and discourse, create new representations of the medical experience, and confront moral, psychological, and ethical dilemmas.
For further information, please contact Courtney Campbell, 541-737-5651, ccampbell@oregonstate.edu.
Current students in the Medical Humanities Certificate program should contact David Bishop, 541-737-8918, david. bishop@oregonstate.edu.

## Medical Humanities Core

(minimum 10 credits)
ANTH 345. *Biological and Cultural
Constructions of Race (3)
ANTH 383. *Introduction to Medical Anthropology (3)
ENG 489/ENG 589. Writing, Literature and Medicine (4)
HSTS 416/HSTS 516. *History of Medicine Pre-1800 (4)
HSTS 417/HSTS 517. *^History of Medicine (4)

PHL 299/HC 299. Selected Topics: The Art of Healing (2)
PHL 444/PHL 544. *Biomedical Ethics (4)
PHL 455/PHL 555. Death and Dying (3)

## Medical Humanities Electives

(minimum 17 credits)
ANTH 240. Introduction to Biological Anthropology (3)
ANTH 345. *Biological and Cultural
Constructions of Race (3)
ANTH 352. *Anthropology, Health, and Environment (3)
ANTH 383. *Introduction to Medical Anthropology (3)
ANTH 442/ANTH 542. Biocultural
Perspectives on Human Biology (4)
ANTH 449/ANTH 549. Biocultural
Perspectives on Human Reproduction (4)
ANTH 474/ANTH 574. Cross-Cultural
Health and Healing (4)
ANTH 483/ANTH 583. Advanced Medical Anthropology (4)
BB 331. *Introduction to Molecular Biology (3)

BB 332. *Molecular Medicine (3)
BI 301. *Human Impacts on Ecosystems (3)
ENG 489/ENG 589. Writing, Literature and Medicine (4)
ENT 300/HORT 330. *Plagues, Pests and Politics (3)
ES 445. *Native American Science and Technology (4)
FCSJ 361. Food Studies in Social Justice Perspective (4)
H 100. Introduction to Public Health (4)
H 210. *Introduction to the Health Care System (3)
H 225. *Social and Individual Health Determinants (4)
H 312. *HIV/AIDS and STIS in Modern Society (3)
H 320. Introduction to Human Disease (3)
H 344. Foundations of Environmental Health (3)
HDFS 447/HDFS 547. *Families and Poverty (4)

HSTS 415/HSTS 515. *^Theory of Evolution and Foundation of Modern Biology (4)
HSTS 416/HSTS 516. *History of Medicine

Pre-1800 (4)
HSTS 417/HSTS 517. *^History of Medicine (4)

HSTS 419/HSTS 519. *^Studies in Scientific
Controversy: Methods and Practices (4)
HSTS 423/HSTS 523. *Science and Religion (4)

HSTS 437/HSTS 537. ^History of Animals in Science (4)
HSTS 440/HSTS 540. *History of
Psychotherapy (4)
KIN 312. *Sociocultural Dimensions of
Physical Activity (3)
NUTR 240. Human Nutrition (3)
NUTR 312. *Issues in Nutrition and Health (3)

PHAR 210. Terminology of the Health Sciences (2)
PHL/HC 299. Selected Topics: The Art of Healing (2)
PHL 440/PHL 540. *Environmental Ethics (3)

PHL 444/PHL 544. *Biomedical Ethics (4)
PHL 455/PHL 555. Death and Dying (3)
PHL 474/PHL 574. ^Philosophy of Biology (4)

PSY 498/PSY 598. Health Psychology (4)
SOC 350. Health, Illness and Society (4)
SOC 355. Death and Dying (3)
SOC 432/SOC 532. Sociology of Aging (3)
WGSS 270. Violence Against Women (3)
WGSS 340. *Gender and Science (3)
WGSS 350. *Politics of Motherhood in a Global Context (3)
WGSS 465. Women, Weight, and Body
Image (3)
WGSS 466/WGSS 566. *Fat Studies (3)
WGSS 482/WGSS 582. Global Perspectives on Women's Health (3)

## Total=27 Credits

## Footnotes:

* Baccalaureate Core Course
^ Writing Intensive Course (WIC)
Major Code: C868


## PEACE STUDIES CERTIFICATE

## Joseph A. Orosco, Director

## 102D Hovland Hall

Oregon State University
Corvallis, OR 97331-3902
541-737-4335
Email: joseph.orosco@oregonstate.edu
Website: http://liberalarts.or-
egonstate.edu/shpr/academic-
programs/certificate-programs/
peace-studies-certificate-requirements
To earn the undergraduate Peace Studies certificate, students must complete a minimum of 30 credits consisting of 12 credits from the PAX core courses and 18 credits of elective courses.
For more information, contact Joseph Orosco, 541-737-4335, email: joseph. orosco@oregonstate.edu

## PAX Core Requirements (12)

PAX 201. Study of Peace and the Causes of Conflict (3)
Plus at least 9 credits from the following:
ANTH 380. *Cultures in Conflict (3)
COMM 440/COMM 540. Theories of
Conflict and Conflict Management (3)

HST 317. *Why War: A Historical
Perspective (4)
PHL 344. *Pacifism, Just War, and Terrorism (4)

PS 205. *Introduction to International Relations (4)
PAX Electives (18 credits from areas listed below):

1. Peace, Research and Practice
2. Communication and Peace
3. Cultures and Peace
4. Economics and Peace
5. Ethics and Peace
6. History and Peace
7. Inequality and Peace
8. Politics and Peace

Footnote:

* Baccalaureate Core Course

Major Code: C815

## RELIGION AND CULTURE

## CERTIFICATE

The Religion and Culture undergraduate certificate is designed to provide undergraduate students with both breadth and depth in the academic study of religion, with a focus on how religious practice and ideas are manifested as both a shaper and critic of broader cultures nationally and globally.

The certificate is open to all OSU undergraduates as a supplement to any undergraduate degree program. It builds on a core curriculum of courses in the study of religion in the School of History, Philosophy, and Religion and extends student learning to courses in religion and culture, diversity, literature, and western religious experience in many other academic units. The certificate is recognized with a transcript-visible notation.

For advising, contact David Bishop, Academic Coordinator, School of History, Philosophy, and Religion, 322B Milam Hall, 541-737-8918, David.Bishop@ oregonstate.edu.

## Required Core (8):

PHL 160. *Quests for Meaning: World Religions (4)
PHL 202. Introduction to Religious Studies (4)

Religion and Culture Electives (10):

## Select from the following courses:

HST 387. *Islamic Civilization (4)
HST 388. *Islamic Civilization (4)
HST 425/HST 525. *The Holocaust in its History (4)
PHL 170. *The Idea of God (4)
PHL 208. Introduction to Buddhist
Traditions (4)
PHL/HST 210. *Religion in the United States (4)

PHL 213. *Introduction to Hindu Traditions (4)

PHL 214. *Introduction to Islamic Traditions (4)
PHL 220. *World-Views and Values in the Bible (4)
PHL 312. *Asian Thought (4)
PHL 315. *Gandhi and Nonviolence (3)

PHL 344. *Pacifism, Just War, Terrorism (4)
PHL 371. *Philosophies of China (4)
PHL 430/PHL 530. History of Buddhist Philosophy (4)
PHL 431/PHL 531. Buddhism, Non-Violence and Social Justice (4)
PHL 432/PHL 532. *Yoga and Tantric Traditions (4)
PHL 436/PHL 536. Philosophy and Religion (3)

PHL 443/PHL 543. *World Views and Environmental Values (3)
PHL 448/PHL 548. Native American Philosophies (4)
or ES 448/ES 548. Native American Philosophies (4)
PHL 455/PHL 555. Death and Dying (3)

## Interdisciplinary Electives (9):

Select from the following courses:
ANTH 110. *Introduction to Cultural
Anthropology (3)
ANTH 452. Folklore and Expressive Culture (4)

ANTH 472. Contemporary Indian Issues (4)
ART 204. *Introduction to Art History Western (3)
ART 205. *Introduction to Art History Western (3)
ART 206. *Introduction to Art History Western (3)
ART 208. *Introduction to Asian Art (3)
ENG 215. *Classical Mythology (4)
ENG 275. *The Bible as Literature (4)
ENG 330. *The Holocaust in Literature and Film (4)
ENG 360. *Native American Literature (4)
HST 333. Medieval and Early Modern Spanish History (4)
HST 390. *Mideast Women: In Their Own Words (4)
HST 485/HST 585. *Politics and Religion in the Modern Middle East (4)
HSTS 423/HSTS 523. *Science and Religion (4)

NMC 437. New Media and Society (3)
PAX 201. Study of Peace and the Causes of Conflict (3)
PS 204. *Introduction to Comparative Politics (4)
PS 361. Classical Political Thought (4)
SOC 205. *Institutions and Social Change (3)
SOC 452/SOC 552. Sociology of Religion (4)

WGSS 223. *Women: Self and Society (3)

WGSS 380. *Muslim Women (3)
WGSS 420/WGSS 520. *Hate,
Resistance, and Reconciliation (3) [Terminated summer 2016]
WGSS 495/WGSS 595. *Global Feminist Theologies (4)
WGSS 496/WGSS 596. *Feminist Theologies in the United States (4)

## Total=27 credits minimum

Footnotes

* Baccalaureate Core Course
^ Writing Intensive Course (WIC)
Major Code: C830


## ■ ENVIRONMENTAL ARTS AND hUMANITIES COURSES

## EAH 411. *^PERSPECTIVES IN

ENVIRONMENTAL ARTS AND HUMANITIES (4). Introduction to methods of inquiry in the field of environmental arts and humanities. Students will learn key concepts in approaches to environmental humanities scholarship and environmental art, informed by ecological principles and other perspectives from the natural sciences. Disciplinary approaches include history, literature, philosophy, and the formal arts (Bacc Core Course) (Writing Intensive Course)
PREREQS: Upper-division standing
EAH 412. *^ENVIRONMENTAL SCIENCE IN
CONTEXT (4). Introduction to environmental science methods and practice, especially for students studying in the arts and humanities. Students will gain a working understanding of the scientific method, theory, and analysis, including how to interpret and evaluate risk assessment, statistics-based arguments, and visual representations of data. Students will also gain an understanding of the history and role of the sciences in environmental discourse. (Bacc Core Course) (Writing Intensive Course) PREREQS: Upper-division standing.
EAH 501. RESEARCH (1-4). Graded $P / N$. This course is repeatable for a maximum of 8 credits.

EAH 503. THESIS (1-4). Graded P/N. This course is repeatable for a maximum of 8 credits.

EAH 505. READING AND CONFERENCE (1-4). Graded P/N. This course is repeatable for a maximum of 4 credits.

EAH 506. FIELD COURSE PROJECTS (3).
EAH 507. SEMINAR (2-4). This course is repeatable for a maximum of 10 credits.

EAH 508. PROFESSIONAL DEVELOPMENT WORKSHOP (1). Graded P/N. This course is repeatable for a maximum of 6 credits.
EAH 510. WORK AND FIELD EXPERIENCE
(1-4). Graded $P / N$. This course is repeatable for a maximum of 8 credits.
EAH 511. PERSPECTIVES IN ENVIRONMENTAL ARTS AND HUMANITIES (4). Introduction to methods of inquiry in the field of environmental arts and humanities. Students will learn key concepts in approaches to environmental humanities scholarship and environmental art, informed by ecological principles and other perspectives from the natural sciences. Disciplinary approaches include history, literature, philosophy, and the formal arts. PREREQS: Graduate standing
EAH 512. ENVIRONMENTAL SCIENCE IN
CONTEXT (4). Introduction to environmental science methods and practice, especially for students studying in the arts and humanities. Students will gain a working understanding of the scientific method, theory, and analysis, including how to interpret and evaluate risk assessment, statistics-based arguments, and visual representations of data. Students will also gain an understanding of the history and role of the sciences in environmental discourse. PREREQS: Graduate standing.
EAH 599. SPECIAL TOPICS (4). This course is repeatable for a maximum of 12 credits.

## HISTORY COURSES

HST 101. *HISTORY OF WESTERN
CIVILIZATION (4). Provides an awareness and understanding of the Western cultural heritage. Stresses the major ideas and developments that have been of primary importance in shaping the Western tradition. Covers the Ancient World to 1000 A.D. HST 101, HST 102 and HST 103 need not be taken in sequence. (H) (SS) (Bacc Core Course)

HST 102. *HISTORY OF WESTERN
CIVILIZATION (4). Provides an awareness and understanding of the Western cultural heritage. Stresses the major ideas and developments that have been of primary importance in shaping the Western tradition. Covers 1000 A.D. to 1789. HST 101, HST 102 and HST 103 need not be taken in sequence. (H) (SS) (Bacc Core Course)

## HST 103. *HISTORY OF WESTERN

CIVILIZATION (4). Provides an awareness and understanding of the Western cultural heritage. Stresses the major ideas and developments that have been of primary importance in shaping the Western tradition. Covers 1789 to the present. HST 101, HST 102 and HST 103 need not be taken in sequence. (H) (SS) (Bacc Core Course)

## HST 104. *WORLD HISTORY I: ANCIENT

 CIVILIZATIONS (3). A survey of the historical development of several world civilizations from antiquity to roughly 600 to 700 A.D. Exploration of religious, cultural, social, political, and economic institutions of various societies. Cultural diversity analysis of both ancient Western and non-Western civilizations. Not offered every year. (H) (Bacc Core Course)
## HST 105. *WORLD HISTORY II: MIDDLE

 AND EARLY MODERN AGES (3). A survey of the historical development of several world civilizations roughly from the 8th century to the late 18th century. Exploration of religious, cultural, social, political, and economic institutions of various societies. Cultural diversity analysis of both ancient Western and non-Western civilizations. (H) (Bacc Core Course)HST 105H. *WORLD HISTORY II: MIDDLE AND EARLY MODERN AGES (3). A survey of the historical development of several world civilizations roughly from the 8th century to the late 18th century. Exploration of religious, cultural, social, political, and economic institutions of various societies. Cultural diversity analysis of both ancient Western and non-Western civilizations. (H) (Bacc Core Course) PREREQS: Honors College approval required.

HST 106. *WORLD HISTORY III: THE MODERN AND CONTEMPORARY WORLD (3). A survey of the historical development of several world civilizations from the 18th century to the contemporary period. Exploration of religious, cultural, social, political, and economic institutions of various societies. Cultural diversity analysis of both ancient Western and non-Western civilizations. Not offered every year. (H) (Bacc Core Course)

## HST 106H. *WORLD HISTORY III: THE

MODERN AND CONTEMPORARY WORLD (3). A survey of the historical development of several world civilizations from the 18th century to the contemporary period. Exploration of religious, cultural, social, political, and economic institutions of various societies. Cultural diversity analysis of both ancient Western and non-Western civilizations. Not offered every year. (H) (Bacc Core Course) PREREQS: Honors College approval required.
HST 199. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.
HST 201. *HISTORY OF THE UNITED STATES (4). Provides an overview of the development of the U.S. from the pre-Columbian era to the present. Attention is given to economic, political, and social trends, as well as to international relations. Covers pre-Columbian and colonial origins to 1820. HST 201, HST 202, HST 203 need not be taken in sequence. (H) (SS) (Bacc Core Course)

HST 202. *HISTORY OF THE UNITED STATES (4). Provides an overview of the development of the U.S. from the pre-Columbian era to the present. Attention is given to economic, political, and social trends, as well as to international relations. Covers 1820 to 1920. HST 201, HST 202, HST 203 need not be taken in sequence. (H)
(SS) (Bacc Core Course)
HST 202H. *HISTORY OF THE UNITED STATES
(4). Provides an overview of the development of the U.S. from the pre-Columbian era to the present. Attention is given to economic, political, and social trends, as well as to international relations. Covers 1820 to 1920. HST 201H, HST 202H, and HST 203H need not be taken in sequence. (H) (SS) (Bacc Core Course) PREREQS: Honors College approval required.
HST 203. *HISTORY OF THE UNITED STATES
(4). Provides an overview of the development of the U.S. from the pre-Columbian era to the present. Attention is given to economic, political, and social trends, as well as to international relations. Covers 1920 to present. HST 201, HST 202, HST 203 need not be taken in sequence. (H) (SS) (Bacc Core Course)
HST 203H. *HISTORY OF THE UNITED STATES (4). Provides an overview of the development of the U.S. from the pre-Columbian era to the present. Attention is given to economic, political, and social trends, as well as to international relations. Covers 1920 to present. HST 201H, HST 202H, and HST 203H need not be taken in sequence. (H) (SS) (Bacc Core Course) PREREQS: Honors College approval required.

HST 210. *RELIGION IN THE UNITED STATES (4). A thematic overview of the historical study of religion in the United States, with an eye toward ways that social and cultural contexts have shaped the religious experience of Americans in different places and times. Surveys a wide array of religious movements, groups, and individuals from the colonial period to present. CROSSLISTED as PHL 210, REL 210. (Bacc Core Course)
HST 210H. *RELIGION IN THE UNITED STATES (4). A thematic overview of the historical study of religion in the United States, with an eye toward ways that social and cultural contexts have shaped the religious experience of Americans in different places and times. Surveys a wide array of religious movements, groups, and individuals from the colonial period to present. CROSSLISTED as PHL 210H, REL 210H. (Bacc Core Course) PREREQS: Honors College approval required.

## HST 215. *INTRODUCTION TO JEWISH

TRADITIONS (4). An introduction to Judaism's traditions, histories, and practices. Covers historical origins and developments from the biblical period through the Middle Ages, and considers Judaism in the modern world. Topics include the Jewish calendar (including holidays and their traditions), Jewish life cycle events, Jewish prayer, and traditional texts such as the Mishnah and Talmud. CROSSLISTED as HST 215. (Bacc Core Course)

HST 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

HST 299H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HST 310. THE HISTORIAN'S CRAFT (4). A study of the practice as well as theory of historical work. Combines training in reading, writing, and thinking historically with a survey of the development of history, philosophies of history, types and use of historical evidence, varieties of historical investigation, and factors that influence the writing of history. (H) PREREQS: 9 credits of history or upper-division standing.
HST 315. THE EUROPEAN MILITARY, 1400-1815 (4). Major aspects of European military history, 1400-1815, notable developments in weaponry and strategy, the social history of the military, impact of war on the civilian front, and pacifism and antimilitarism. Not offered every year. (H)
HST 316. THE AMERICAN MILITARY, 1607-1865 (4). Major aspects of American military history, 1607-1865, notable developments in weaponry and strategy, the social history of the military, impact of war on the civilian front, and pacifism
and antimilitarism. Not offered every year. (H)
HST 317. *WHY WAR: A HISTORICAL
PERSPECTIVE (4). An inquiry into the origins of mass violence. Theory and case studies are used to suggest possible causes of international war, civil war, revolution, and genocide. (H) (Bacc Core Course)
HST 317H. *WHY WAR: A HISTORICAL
PERSPECTIVE (4). An inquiry into the origins of mass violence. Theory and case studies are used to suggest possible causes of international war, civil war, revolution, and genocide. (H) (Bacc Core Course) PREREQS: Honors College approval required.
HST 318. THE AMERICAN MILITARY,
1865-PRESENT (4). Major aspects of American military history, 1865-present: evolution of strategy, tactics, and technology in war; the impact of the military on American society in peace and war; historiographic aspects of U.S. military history. Not offered every year. (H)
HST 320. *ANCIENT NEAR EAST (4). A detailed survey of the peoples and cultures of the ancient Near East, including Assyria, Babylon, Egypt, Israel, Mesopotamia, and Persia, from the earliest recorded beginnings of civilization to about 500 B.C. Particular attention is given to the art, religion, law, and literature of these civilizations. (H) (NC) (Bacc Core Course)

HST 321. GREECE (4). The history of the Greek city-states and the civilization they produced; the archaeological discovery of early Greece; the development of the polis; Sparta, Athenian democracy, the Persian and Peloponnesian Wars; Greek private life and religion. (H)
HST 322. ROMAN REPUBLIC (4). The rise of Rome from a city-state to a world power, Rome's wars with Carthage, her growing domination of the Mediterranean, the ensuing breakdown of Roman society and traditional values, and the rise of ambitious leaders who ultimately destroyed the Republic. (H)
HST 323. ROMAN EMPIRE (4). Roman history from 31 B.C. to A.D. 493. The establishment of the Principate, Roman social and private life, the rise of Christianity, the decline and fall of the Western Empire, Rome's contributions to arts, religion, and law. Not offered every year. (H)
HST 324. *ANCIENT JEWISH HISTORY (4).
History of Judaism from the Second Temple through the early Rabbinic period (539 BCE--200 CE). Covers historical origins and developments of Judaism including the canonization of the Bible, Jewish life in the Persian and GrecoRoman worlds, and the beginnings of Diasporic and Rabbinic Judaism. (Bacc Core Course) CROSSLISTED as REL 324.

HST 325. *EARLY CHRISTIANITY: ORIGINS TO 600 (4). Traces early Christianity from its origins to the beginning of the Middle Ages. It deals with the origins and Jewish background of Christianity in Palestine, the ministry and teachings of Jesus, the spread of Christianity throughout the Roman Empire by his disciples and early missionaries, the formation of the New Testament canon, the development of Christian doctrine, controversies over heresy, and the origin of monasticism and the Papacy. (Bacc Core Course) CROSSLISTED as REL 325.
HST 327. HISTORY OF MEDIEVAL EUROPE (4).
Cultural, political, and economic history of the European Middle Ages from the fall of the Roman Empire in the West to the Renaissance. Covers 284 A.D. to 1000. Not offered every year. (H) CROSSLISTED as REL 327. PREREQS: HST/ REL 327 and HST/REL 328 need not be taken in sequence.
HST 328. HISTORY OF MEDIEVAL EUROPE (4). Cultural, political, and economic history of the European Middle Ages from the fall of the Roman Empire in the West to the Renaissance. Covers 1000 to 1400 . Not offered every year. (H)

CROSSLISTED as REL 328. PREREQS: HST/ REL 327 and HST/REL 328 need not be taken in sequence.
HST 329. HISTORY OF EARLY MODERN
EUROPE (4). Political, social, intellectual, and cultural history of Europe from 1400-1789. Focuses on the Renaissance. HST 329, HST 330, and HST 331 need not be taken in sequence. Not offered every year. (H)

## HST 330. HISTORY OF EARLY MODERN

EUROPE (4). Political, social, intellectual, and cultural history of Europe from 1400-1789.
Focuses on the Reformation. Not offered every year. (H) CROSSLISTED as REL 330. PREREQS: HST/REL 329, HST/REL 330, and HST/REL 331 need not be taken in sequence.

HST 331. HISTORY OF EARLY MODERN
EUROPE (4). Political, social, intellectual, and cultural history of Europe from 1400-1789. Focuses on the scientific revolution. HST 329, HST 330, and HST 331 need not be taken in sequence. Not offered every year. (H)

HST 333. MEDIEVAL AND EARLY MODERN SPANISH HISTORY (4). From Islamic conquest to conquest of America, the social, religious, political and economic history of Spain from 1000 to 1700. Offered fall term in odd years. (H) CROSSLISTED as REL 333.
HST 335. *NINETEENTH-CENTURY EUROPE
(4). A thematic overview of the "long" nineteenth century, from the French Revolution (1789) to the outbreak of the first World War (1914): the industrial revolution and the class struggles that accompanied it; the growing importance of the nation in politics and culture; imperial expansion and Europeans' contacts with non-Europeans; urbanization; Darwinism and Social Darwinism; and the developments leading to the cataclysm of Europe's first "modern" war. Not offered every year. (H) (Bacc Core Course)

## HST 336. TWENTIETH-CENTURY EUROPE

(4). Examines the politics, culture, and society of Europe from World War I to the present. Themes include total war; ways that art and literature influenced politics; communist and fascist visions of the relationship of the individual to the society or collective; racial theories and genocide; the cold war division of Europe into East and West; decolonization; and the development of the European Community. Not offered every year. (H)
HST 338. *HITLER'S EUROPE (4). Examines WWII and Nazi Germany's efforts to construct an empire. Themes include: the Nazi Party's rise to power in 1933 and pursuit of war, battles and occupation policies in Western and Eastern Europe, anti-Semitism and the concept of Lebensraum, collaboration among occupied peoples and Germans, and the Holocaust. (Bacc Core Course)

HST 340. HISTORY OF RUSSIA (4). Survey of political, economic, and social developments from the origin of Russia to the post-Soviet period Focuses on the period from 862 to 1917. Not offered every year. HST 340 and HST 341 need not be taken in sequence. (H)
HST 341. HISTORY OF RUSSIA (4). Survey of political, economic, and social developments from the origin of Russia to the post-Soviet period. Focuses on the period from 1917 to the present. Not offered every year. HST 340 and HST 341 need not be taken in sequence. (H)

## HST 344. SPECIAL TOPICS IN RUSSIAN

HISTORY (4). Special topics and problems in Russian history not covered in other courses. May be repeated when topic varies. Not offered every year. (H) This course is repeatable for a maximum of 8 credits.
HST 345. SOCIETY IN MODERN RUSSIA
(4). Development of Russian/Soviet/Post-

Soviet society since 1861, focusing on gender, urbanization, and the general social ramifications of modernization. Not offered every year. (H)

HST 350. *MODERN LATIN AMERICA (4).
History of Latin America leading up to and after Spanish and Portuguese conquest. Focus on indigenous American, European and African cultures and religions in contact under colonial government and economic systems. Covers the period from 1400 to 1810. (H) (NC) (Bacc Core Course) CROSSLISTED as REL 350. PREREQS: HST 350 and HST 351 need not be taken in sequence.
HST 350H. *MODERN LATIN AMERICA (4). History of Latin America leading up to and after Spanish and Portuguese conquest. Focus on indigenous American, European and African cultures and religions in contact under colonial government and economic systems. Covers the period from 1400 to 1810. (H) (NC) (Bacc Core Course) PREREQS: HST 350 and HST 351 need not be taken in sequence. Honors College approval required.
HST 351. *MODERN LATIN AMERICA (4).
History of the development of Latin America, emphasizing the issues of imperialism, economic dependency, social stratification, political instability, and nationalism within an international context. Covers 1850 to the present. (H) (NC) (Bacc Core Course) PREREQS: HST 350 and HST 351 need not be taken in sequence.
HST 352. *AFRICANS IN LATIN AMERICAN HISTORY (4). A survey of the role of Africans and their descendants in Latin American history, linking the history of the Americas, Europe and Africa. (Baccalaureate Core Course) CROSSLISTED as REL 352. PREREQS: HST 350 and HST 351 suggested.
HST 353. *SLAVERY IN THE AMERICAS (4). A comparative examination of slavery and bound labor in the Americas, the Caribbean, and the Atlantic World from the 1600-1900s. Focuses on slavery as an economic system, a set of social and cultural practices, and power relationships. Examines legacies of racial discrimination and social and cultural consequences of slave resistance, rebellion, manumission, emancipation, and abolition. (Bacc Core Course)

## HST 362. WOMEN IN UNITED STATES

HISTORY (4). Women in the United States--their roles in and contribution to American political, economic, social, cultural, and intellectual life. Course sequence pays particular attention to the diversity of American women's backgrounds and experiences. Covers 1620 to 1890. Not offered every year. HST 362 and HST 363 need not be taken in sequence. (H)

## HST 363. WOMEN IN UNITED STATES

HISTORY (4). Women in the United States--their roles in and contribution to American political, economic, social, cultural, and intellectual life. Course sequence pays particular attention to the diversity of American women's backgrounds and experiences. Covers 1890 to the present. Not offered every year. HST 362 and HST 363 need not be taken in sequence. (H)
HST 364. *UNITED STATES RELIGION AND SOCIAL REFORM (4). Provides an awareness of how various religious groups have thought about and engaged with social change pertaining to slavery, feminism, civil rights, same-sex marriage, and immigration. Focus on reading primary sources related to each of these issues. (Bacc Core Course) CROSSLISTED as REL 364

## HST 365. *THE CIVIL RIGHTS MOVEMENT

 IN THE MODERN U.S. (4). An exploration of the "long civil rights movement" among African Americans and their allies during the 20th century United States, with attention to the structure of racial inequality, movement philosophies and strategies, white allies and opponents, relationships to other freedom movements, and the movement's legacies. (Bacc Core Course)HST 365H. *THE CIVIL RIGHTS MOVEMENT IN THE MODERN U.S. (4). An exploration of the "long civil rights movement" among African

Americans and their allies during the 20th century United States, with attention to the structure of racial inequality, movement philosophies and strategies, white allies and opponents, relationships to other freedom movements, and the movement's legacies. (Bacc Core Course) PREREQS: Honors College approval required.

HST 366. HISTORY OF THE AMERICAN INDIAN (4). A study of the American Indian north of Mexico from before European contact to the present. Focuses on the indigenous population prior to European contact; initial alterations in and continued disruption of Indian society and culture; Indian-white conflict; emergence of U.S. Government Indian policy to 1848 . Not offered every year. (H)
HST 368. *LESBIAN AND GAY MOVEMENTS IN MODERN AMERICA (4). Examination of lesbian and gay male identities, lives, and collectivities in American culture from the post-Civil War period to the present. The political and cultural participation, rather than human sexual behaviors, orientations, or values. Not offered every year. (H) (Bacc Core Course)
HST 369. *^IMMIGRATION TO THE U.S. SINCE 1880 (4). The history of immigrants to the U.S. after 1880. Focuses on the experience of immigrants and their children in the U.S. and on the history of U.S. immigration policy. Includes several types of writing assignments: nongraded, drafts and revisions, and a research paper using outside primary and secondary sources and scholarly notations specific to the discipline of history. HST 369 satisfies WIC requirement for Liberal Studies majors but not History majors. (Baccalaureate Core Course) (Writing Intensive Course) Taught via Ecampus only.

## HST 370. *SOCIAL CHANGE AND AMERICAN

POPULAR MUSIC (4). An examination of the interactions between social history and popular music, including creation, performance, production, distribution, and reception. Social, ethnic, and economics groups have notoriously used popular music to identify themselves and their boundaries. This course examines how the functions of popular music in our culture and economy have changed over time, and the ways in which popular music reflects and sometimes helps precipitate social change. (Bacc Core Course)
HST 381. *HISTORY OF AFRICA (4). History of Africa from earliest times to present, including origins of human society, slave trade, European imperialism and African nationalism. Covers Africa before 1830. HST 381 and HST 382 need not be taken in sequence. (H) (NC) (Bacc Core Course)
HST 382. *HISTORY OF AFRICA (4). History of Africa from earliest times to present, including origins of human society, slave trade, European imperialism and African nationalism. Covers Nineteenth and Twentieth century Africa. (H) (NC) (Bacc Core Course) PREREQS: HST 381 and HST 382 need not be taken in sequence.

HST 382H. *HISTORY OF AFRICA (4). History of Africa from earliest times to present, including origins of human society, slave trade, European imperialism and African nationalism. Covers Nineteenth and Twentieth century Africa. (H) (NC) (Bacc Core Course) PREREQS: HST 381 and HST 382 need not be taken in sequence. Honors College approval required.
HST 385. *THE ARAB-ISRAELI CONFLICT (4). Examination of the origins of the Arab-Israeli conflict and subsequent efforts to find a lasting solution. (H) (Bacc Core Course)
HST 385H. *THE ARAB-ISRAELI CONFLICT
(4). Examination of the origins of the Arab-Israeli conflict and subsequent efforts to find a lasting solution. (H) (Bacc Core Course) PREREQS: Honors College approval required.
HST 386. *MODERN IRAN: REVOLUTION
AND ITS AFTERMATH (4). The history of 20th century Iran with a focus on the Islamic revolution and its consequences. Readings will provide the
cultural and political background for understanding contemporary Iran and its place in the world. (Bacc Core Course)

## HST 386H. *MODERN IRAN: REVOLUTION

AND ITS AFTERMATH (4). The history of 20th century Iran with a focus on the Islamic revolution and its consequences. Readings will provide the cultural and political background for understanding contemporary Iran and its place in the world. (Bacc Core Course) PREREQS: Honors College approval required.
HST 387. *ISLAMIC CIVILIZATION (4). Political, social, and religious developments from 600 to 1400. Early history and the formation of Islamic society to the Mongol invasion. (H) (NC) (Bacc Core Course) CROSSLISTED as REL 387. PREREQS: HST/REL 387 and HST/REL 388 need not be taken in sequence
HST 388. *ISLAMIC CIVILIZATION (4). Political, social, and religious developments from 1400 to the present. The expansion of Islam, Turkic, and Asian dynasties, impact of Western imperialism and modern Islamic world. (H) (NC) (Bacc Core Course) CROSSLISTED as REL 388. PREREQS: HST/REL 387 and HST/REL 388 need not be taken in sequence.
HST 390. *MIDEAST WOMEN: IN THEIR OWN WORDS (4). The lives of modern Middle Eastern women as told in memoirs, autobiography and film. First-person narratives and film portrayals provide the means for understanding historical events and contemporary trends in the region. (Bacc Core Course)
HST 390H. *MIDEAST WOMEN: IN THEIR OWN WORDS (4). The lives of modern Middle Eastern women as told in memoirs, autobiography and film. First-person narratives and film portrayals provide the means for understanding historical events and contemporary trends in the region. (Bacc Core Course) PREREQS: Honors College approval required.

HST 391. *TRADITIONAL CHINA AND JAPAN
(4). Prehistory to Western encounters in the middle of the nineteenth century, with emphasis on the philosophical, artistic heritage, and social institutions of these two countries which form East Asia. HST 391 and HST 392 need not be taken in sequence. (H) (NC) (Bacc Core Course)

HST 392. *MODERN CHINA AND JAPAN (4). From the opening of East Asia in the midnineteenth century to the present, with emphasis on modern political movements and cultural transformation. HST 391 and HST 392 need not be taken in sequence. (H) (NC) (Bacc Core Course)
HST 396. *GENDER, FAMILY AND POLITICS IN TRADITIONAL CHINA (4). Study of the interaction between gender, family and politics as major factors shaping traditional Chinese experience. (Bacc Core Course)
HST 397. *GENDER, FAMILY AND POLITICS
IN MODERN CHINA (4). Study of the interaction between gender, family and politics as three factors shaping modern Chinese experience. Elective for history majors. (Bacc Core Course)
HST 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
HST 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HST 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
HST 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
HST 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required

HST 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
HST 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
HST 407. ^SEMINAR (5). (Writing Intensive Course) This course is repeatable for a maximum of 20 credits.

HST 410. HISTORY INTERNSHIP (1-12).
Supervised work of a historical nature with historical societies, archives, museums, or other public or private organizations. No more than 6 of the maximum 12 credits may be used to satisfy the history major requirement of 51 credits. This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.

HST 415. SELECTED TOPICS (4). Selected topics of special or current interest not covered in other courses. (H) This course is repeatable for a maximum of 99 credits.
HST 415H. SELECTED TOPICS (4). Selected topics of special or current interest not covered in other courses. (H) This course is repeatable for a maximum of 99 credits. PREREQS: Honors College approval required.
HST 416. *FOOD IN WORLD HISTORY (4).
Historical analysis of food and cooking from pre-history to the present, with an emphasis on cross-cultural differences of food production and consumption. (Bacc Core Course) (H)
HST 421. HELLENISTIC GREECE (4). History of the Greek world from the end of the Peloponnesian War to the Roman conquest of Greece; the careers of Alexander the Great and his successors; the art, literature, science, religion, and philosophy of the post-classical or Hellenistic world. Not offered every year. (H)

HST 425. *THE HOLOCAUST IN ITS HISTORY (4). An inquiry into the causes, course, and impact of the Holocaust. The general theme of anti-Semitism in European history is explored for background. Topics discussed for comparative purposes include anti-Semitism in American history; other episodes of mass murder in the 20th century. Not offered every year. (H) (Bacc Core Course) CROSSLISTED as REL 425, REL 525.
HST 425H. *THE HOLOCAUST IN ITS HISTORY
(4). An inquiry into the causes, course, and impact of the Holocaust. The general theme of anti-Semitism in European history is explored for background. Topics discussed for comparative purposes include anti-Semitism in American history; other episodes of mass murder in the 20th century. Not offered every year. (Bacc Core Course) PREREQS: Honors College approval required.

HST 426. WORLD WAR I: A GLOBAL HISTORY
(4). Examines World War I from a global perspective, its origins, the course of the conflict and its aftermath, looking especially at Great Britain, France, Russia, Germany and their colonial possessions. Topics will include the concept of total war and the home fronts of a number of nations. PREREQS: HST 103 [D-]
HST 427. TEACHING THE HOLOCAUST (4). Provides a broad sense of the Holocaust; reviews the event itself, its long-term background (the history of anti-Semitism), and the rise of Nazism and Fascism in the years before World War II. Examines what has been learned from the Holocaust and addresses the broader issue of genocide, especially in the 20th century.
HST 428. HISTORY OF WESTERN THOUGHT (4). A synthesis of major developments in philosophy, science, social, and political theory and the arts in the European Enlightenment (1715-1789). Not offered every year. HST 428, HST 429, HST 430 need not be taken in sequence. (H)

HST 429. HISTORY OF WESTERN THOUGHT
(4). A synthesis of major developments in philosophy, science, social, and political theory and the arts between 1789 and 1890. Not offered every year. HST 428, HST 429, HST 430 need not be taken in sequence.
HST 430. HISTORY OF WESTERN THOUGHT
(4). A synthesis of major developments in philosophy, science, social, and political theory and the arts between 1890 and 1945. Not offered every year. HST 428, HST 429, HST 430 need not be taken in sequence. (H)
HST 432. THE HISTORY OF SEXUALITY (4). The history of human sexuality from ancient Greece to the present. (H) (SS)
HST 432H. THE HISTORY OF SEXUALITY (4).
The history of human sexuality from ancient Greece to the present. (H) (SS) PREREQS: Honors College approval required.
HST 433. ENGLISH HISTORY (4). The major political, cultural, economic, social and religious developments that have shaped the history of England and ultimately of America and much of the world. Medieval and Tudor-Stuart England. HST 433/HST 533, HST 434/HST 534 need not be taken in sequence. Not offered every year. (H)
HST 434. ENGLISH HISTORY (4). The major political, cultural, economic, social and religious developments that have shaped the history of England and ultimately of America and much of the world. England since 1688. HST 433/HST 533, HST 434/HST 534 need not be taken in sequence. Not offered every year. (H)
HST 435. THE HISTORY OF EUROPEAN WOMEN FROM 1400 TO 1789 (4). Focuses on the social, economic, and cultural roles women in Europe between 1400 and 1789. Topics include Christianity and women, the Renaissance lady, the European witch craze, women rulers, the debate about female intellectual abilities, and the beginning of the campaign for female equality. PREREQS: HST 102 and HST 103 recommended.

HST 436. HISTORY OF MODERN GERMANY
(4). Political, economic, social and intellectual developments from 1815 through the imperial, Weimar, and Nazi eras to the present. Not offered every year. (H)
HST 438. THE WILL AND THE SELF (4). A seminar on three major figures of nineteenthcentury German intellectual history: Arthur Schopenhauer, Friedrich Nietzsche, and Robert Musil. The central theme is the emergence of philosophical irrationalism, a distinctive view of human nature that developed in the context of modern science from Newton to Darwin to Einstein.
HST 452. MODERN MEXICO (4). History of
Mexico since 1810--economic, political, and social change and relations with the United States. Not offered every year. (H) PREREQS: HST 350 or HST 351 or upper-division standing.

HST 456. PROBLEMS IN LATIN AMERICAN
HISTORY (4). A focused examination of the origins and development of selective institutions and problems important to understanding the region, such as the church, the military, labor, political instability, economic stagnation, and social stratification. (H) PREREQS: HST 350 or HST 351 or upper-division standing.
HST 460. AMERICAN THOUGHT AND CULTURE
(4). An examination of the main currents of American thought and culture, emphasizing ideas and concepts that have influenced the development and growth of American institutions and values from 1776 to 1860 . Not offered every year. HST 460/HST 560, HST 461/HST 561, HST 462/HST 562 need not be taken in sequence. (H) PREREQS: HST 201 and HST 202 and HST 203 or upper-division standing.

HST 461. AMERICAN THOUGHT AND CULTURE
(4). An examination of the main currents of American thought and culture, emphasizing ideas and concepts that have influenced the development and growth of American institutions and values from 1860 to 1930. HST 460/HST 560, HST 461/HST 561, HST 462/HST 562 need not be taken in sequence. Not offered every year. (H) PREREQS: HST 201 and HST 202 and HST 203 or upper-division standing.
HST 462. AMERICAN THOUGHT AND CULTURE
(4). An examination of the main currents of American thought and culture, emphasizing ideas and concepts that have influenced the development and growth of American institutions and values from 1930 to the present. HST 460/ HST 560, HST 461/HST 561, HST 462/HST 562 need not be taken in sequence. Not offered every year. (H) PREREQS: HST 201 and HST 202 and HST 203 or upper-division standing.
HST 464. AMERICAN DIPLOMATIC HISTORY
(4). American diplomatic relations from the nation's founding to 1898. HST 464/HST 564 and HST 465/HST 565 need not be taken in sequence. Not offered every year. (H) PREREQS: HST 201 and HST 202 and HST 203 or upper-division standing.

## HST 465. *AMERICAN DIPLOMATIC HISTORY

(4). American diplomatic relations from 1898 to the present. HST 464/HST 564 and HST 465/HST 565 need not be taken in sequence. Not offered every year. (H) (Bacc Core Course) PREREQS: HST 201 and HST 202 and HST 203 or upperdivision standing.

## HST 465H. *AMERICAN DIPLOMATIC HISTORY

(4). American diplomatic relations from 1898 to the present. HST 464/HST 564 and HST 465/HST 565 need not be taken in sequence. Not offered every year. (H) (Bacc Core Course) PREREQS: HST 201 and HST 202 and HST 203 or upper-division standing. Honors College approval required.

## HST 466. RELIGION AND U.S. FOREIGN

RELATIONS (4). An examination of the intersection of religion and U.S. foreign relations from the late nineteenth century to the present. Surveys major events in U.S. diplomacy, including war and peace and explores the role of religion and religious ideas in shaping national identity, core values, and civil religion. CROSSLISTED as REL 466/REL 566. PREREQS: HST 202 and HST 203 or upper-division standing.

## HST 467. HISTORY OF THE AMERICAN WEST

(4). Important themes in the transformation of western America from the pre-industrial world of native Americans to the emergence of the region as a major force in the cultural, economic, and political life of the United States. HST 467/HST 567 and HST 468/HST 568 need not be taken in sequence. Not offered every year. (H) PREREQS: HST 201 and HST 202 and HST 203 or upperdivision standing.
HST 468. HISTORY OF THE AMERICAN WEST
(4). Important themes in the transformation of western America from the pre-industrial world of native Americans to the emergence of the region as a major force in the cultural, economic, and political life of the United States. HST 467/HST 567 and HST 468/HST 568 need not be taken in sequence. Not offered every year. (H) PREREQS: HST 201 and HST 202 and HST 203 or upperdivision standing.

## HST 469. HISTORY OF THE PACIFIC

NORTHWEST (4). The demographic, ecological, and cultural transformation of Oregon,
Washington, and Idaho from Indian times to the present. Not offered every year. (H) PREREQS: HST 201 and HST 202 and HST 203 or upperdivision standing.
HST 470. RELIGION IN THE AMERICAN WEST (4). The history of religion in the American West. Examines four themes in the religious history of the American West: locations (the designation of particular places as special), migrations
(movement in and out of the region), adaptations (changes over time, in response to changing conditions), and discrimination (recognition of difference, as well as prejudicial treatment based on difference). Engages with various primary and secondary sources, including texts, films, and photographs. CROSSLISTED as REL 470.

HST 471. COLONIAL AMERICA (4). Economic, political, social, religious, and intellectual development of colonial North America from the English background to 1689. HST 471/HST 571, HST 472/572 need not be taken in sequence. Not offered every year. (H) PREREQS: HST 201 or upper-division standing.

HST 472. COLONIAL AMERICA (4). Economic, political, social, religious, and intellectual development of colonial North America from 1689 to 1763. HST 471/HST 571, HST 472/572 need not be taken in sequence. Not offered every year. (H) PREREQS: HST 201 or upper-division standing.
HST 473. THE ERA OF THE AMERICAN
REVOLUTION (4). The American Revolution, the drafting of the Constitution, and the launching of the new nation, 1763 to 1789. Not offered every year. (H) PREREQS: HST 201 or upper-division standing.
HST 474. JEFFERSONIAN AND JACKSONIAN DEMOCRACY (4). American political, economic, religious, and social development during the early and middle national era with emphasis on the formation and growth of political parties, territorial expansion and western settlement, and the beginnings of sectional conflict. Not offered every year. (H) PREREQS: HST 201 and HST 202 or upper-division standing.
HST 475. CIVIL WAR AND RECONSTRUCTION (4). Origins of the war, nature of the war, and the critical postwar era, 1830s to 1880s, with special attention to the changing historiography of the period. Not offered every year. (H) PREREQS: HST 202 or upper-division standing.
HST 477. THE PROGRESSIVE AND NEW DEAL ERAS (4). Twentieth-century U.S. history from 1900 to 1939, with emphasis on political and economic developments; attention given to diplomatic, cultural, and social change. Not offered every year. (H) PREREQS: HST 203
HST 478. THE U.S. SINCE 1939 (4). United States political, cultural, and diplomatic history from the Second World War through the 1970s, with specia emphasis on the Cold War at home and abroad. Not offered every year. (H) PREREQS: HST 203 or upper-division standing.
HST 481. *ENVIRONMENTAL HISTORY OF THE UNITED STATES (4). A study of human interaction with the environment and the transformation of the landscape and ecology of North America from the Indian period to the present, with special attention to the progressive alterations induced by the modernizing world of agriculture, industry, urbanism, and their relation to the market system in the United States. Not offered every year. (H) (Bacc Core Course) PREREQS: Upper-division standing. HST 201, HST 202, HST 203 are recommended.

HST 485. *POLITICS AND RELIGION IN THE MODERN MIDDLE EAST (4). The role of religious and secular ideologies in the politics of the 20th century Middle East. Topics include the impact of liberal and nationalist thought, the Iranian revolution, radical Islamist movements, and Zionism. (H) (NC) (Bacc Core Course) CROSSLISTED as REL 485/REL 585. PREREQS: Upper-division standing or instructor approval required.
HST 486. A HISTORY OF CHRISTIANITY IN AFRICA (4). An investigation of the historical development and changing character of Christianity in Africa. Topics include the examination of the role of Christianity in the development of social identity and politics in historic Ethiopia from the early first millennium CE;

Portuguese missionary efforts in Central Africa during the period of the Atlantic slave trade from the 15th to the 18th centuries; the role of 19th century missionaries in both spreading Christianity in Africa and during the European colonization of Africa at the end of the 19th century, the emergence of African independence churches and prophetic Christianity in the 20th century; and the PREREQS: HST 381 and/or HST 382
HST 487. WORLD WAR II: A GLOBAL HISTORY (4). Examines World War II from a global perspective, its origins, the course of the conflict and its aftermath, looking especially at the US USSR, Britain, Germany and Japan. Topics will include the concept of total war and the home fronts of a number of nations. PREREQS: HST 103
HST 488. *THE UNITED STATES AND VIETNAM
1945-1995 (4). Examines the Vietnam War from both the US and Vietnamese perspective within the context of the Cold War. Political, military, social and moral issues will be covered within the concept of American exceptionalism. (Bacc Core Course)
HST 494. MODERN JAPAN: A CULTURAL HISTORY (4). Japanese history from the Meiji to the contemporary period (1980s/1990s). Examination of Japanese tradition and the Tokugawa period. Investigation of Westernization/ modernization, imperialism, national identity, gender, atomic bomb(s), and post-war culture. (H)
HST 495. CHINA IN 20TH CENTURY (4). Treats the decline of the Confucian tradition, shifts in the economy, and metamorphoses of the political system. Attention is given to China's attempt to balance her Communistic revolutionary legacies with her current modernizing goals. (H) (NC) PREREQS: HST 391 and HST 392 or upperdivision standing.

HST 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

HST 499H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HST 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
HST 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
HST 505. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
HST 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
HST 507. SEMINAR (5). This course is repeatable for a maximum of 20 credits.
HST 510. HISTORY INTERNSHIP (1-12). Supervised work of a historical nature with historical societies, archives, museums, or other public or private organizations. No more than 6 of the maximum 12 credits may be used to satisfy the history major requirement of 51 credits. This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.
HST 513. HISTORY OF SCIENCE (4). Stresses the interaction of scientific ideas with their social and cultural context. Development of modern science in the 18th and 19th centuries and to the present. HST 511, HST 512, HST 513 need taken in sequence. PREREQS: Graduate standing; at least one science sequence.
HST 515. SELECTED TOPICS (4). Selected topics of special or current interest not covered in other courses. This course is repeatable for a maximum of 16 credits.
HST 516. FOOD IN WORLD HISTORY (4). Historical analysis of food and cooking from
pre-history to the present, with an emphasis on cross-cultural differences of food production and consumption.

HST 521. HELLENISTIC GREECE (4).
History of the Greek world from the end of the Peloponnesian War to the Roman conquest of Greece; the careers of Alexander the Great and his successors; the art, literature, science, religion and philosophy of the post-classical or Hellenistic world. Not offered every year. PREREQS: HST 101 or graduate standing.
HST 525. THE HOLOCAUST IN ITS HISTORY
(4). An inquiry into the causes, course, and impact of the Holocaust. The general theme of anti-Semitism in European history is explored for background. Topics discussed for comparative purposes include anti-Semitism in American history; other episodes of mass murder in the 20th century. Not offered every year. CROSSLISTED as REL 425, REL 525.

HST 526. WORLD WAR I: A GLOBAL HISTORY (4). Examines World War I from a global perspective, its origins, the course of the conflict and its aftermath, looking especially at Great Britain, France, Russia, Germany and their colonial possessions. Topics will include the concept of total war and the home fronts of a number of nations. PREREQS: HST 103

HST 527. TEACHING THE HOLOCAUST (4).
Provides a broad sense of the Holocaust; reviews the event itself, its long-term background (the history of anti-Semitism), and the rise of Nazism and Fascism in the years before World War II. Examines what has been learned from the Holocaust and addresses the broader issue of genocide, especially in the 20th century.
HST 528. HISTORY OF WESTERN THOUGHT
(4). A synthesis of major developments in philosophy, science, social, and political theory and the arts in the European Enlightenment (1715-1789). Not offered every year. HST 528, HST 529, HST 530 need not be taken in sequence.
HST 529. HISTORY OF WESTERN THOUGHT
(4). A synthesis of major developments in philosophy, science, social, and political theory and the arts between 1789 and 1890. Not offered every year. HST 528, HST 529, HST 530 need not be taken in sequence.
HST 530. HISTORY OF WESTERN THOUGHT
(4). A synthesis of major developments in philosophy, science, social, and political theory and the arts between 1890 and 1945. Not offered every year. HST 528, HST 529, HST 530 need not be taken in sequence.
HST 532. THE HISTORY OF SEXUALITY (4). The history of human sexuality from ancient Greece to the present.
HST 533. ENGLISH HISTORY (4). The major political, cultural, economic, social and religious developments that have shaped the history of England and ultimately of America and much of the world. Medieval and Tudor-Stuart England. HST 433/HST 533, HST 434/HST 534 need not be taken in sequence. Not offered every year.
HST 534. ENGLISH HISTORY (4). The major political, cultural, economic, social and religious developments that have shaped the history of England and ultimately of America and much of the world. England since 1688. HST 433/HST 533 HST 434/HST 534 need not be taken in sequence Not offered every year.
HST 535. THE HISTORY OF EUROPEAN WOMEN FROM 1400 TO 1789 (4). Focuses on the social, economic, and cultural roles women in Europe between 1400 and 1789. Topics include Christianity and women, the Renaissance lady, the European witch craze, women rulers, the debate about female intellectual abilities, and the beginning of the campaign for female equality. PREREQS: HST 102, HST 103 recommended.

HST 536. HISTORY OF MODERN GERMANY
(4). Political, economic, social and intellectual developments from 1815 through the imperial, Weimar, and Nazi eras to the present. Not offered every year.
HST 552. MODERN MEXICO (4). History of Mexico since 1810--economic, political, and social change and relations with the United States. Not offered every year. PREREQS: HST 350 or HST 351 or graduate standing.
HST 556. PROBLEMS IN LATIN AMERICAN HISTORY (4). A focused examination of the origins and development of selective institutions and problems important to understanding the region, such as the church, the military, labor, political instability, economic stagnation, and social stratification. PREREQS: HST 350 or HST 351 or graduate standing.
HST 560. AMERICAN THOUGHT AND CULTURE (4). An examination of the main currents of American thought and culture, emphasizing ideas and concepts that have influenced the development and growth of American institutions and values from 1776 to 1860. HST 460/HST 560, HST 461/HST 561, HST 462/HST 562 need not be taken in sequence. Not offered every year. PREREQS: HST 201 and HST 202 and HST 203 or graduate standing.
HST 561. AMERICAN THOUGHT AND CULTURE
(4). An examination of the main currents of American thought and culture, emphasizing ideas and concepts that have influenced the development and growth of American institutions and values from 1860 to 1930. HST 460/HST 560, HST 461/HST 561, HST 462/HST 562 need not taken in sequence. Not offered every year. PREREQS: HST 201 and HST 202 and HST 203 or graduate standing.
HST 562. AMERICAN THOUGHT AND CULTURE
(4). An examination of the main currents of American thought and culture, emphasizing ideas and concepts that have influenced the development and growth of American institutions and values from 1930 to the present. HST 460/ HST 560, HST 461/HST 561, HST 462/HST 562 need not be taken in sequence. Not offered every year. PREREQS: HST 201 and HST 202 and HST 203 or graduate standing.
HST 564. AMERICAN DIPLOMATIC HISTORY
(4). American diplomatic relations from the nation's founding to 1898. HST 464/HST 564 and HST 465/HST 565 need not be taken in sequence. Not offered every year. PREREQS: HST 201 and HST 202 and HST 203 or graduate standing.
HST 565. AMERICAN DIPLOMATIC HISTORY (4). American diplomatic relations from 1898 to the present. HST 464/HST 564 and HST 465/HST 565 need not be taken in sequence. Not offered every year. PREREQS: HST 201 and HST 202 and HST 203 or graduate standing.
HST 566. RELIGION AND U.S. FOREIGN
RELATIONS (4). An examination of the intersection of religion and U.S. foreign relations from the late nineteenth century to the present. Surveys major events in U.S. diplomacy, including war and peace and explores the role of religion and religious ideas in shaping national identity, core values, and civil religion. CROSSLISTED as REL 466/REL 566. PREREQS: HST 202 and HST 203 or upper-division standing.
HST 567. HISTORY OF THE AMERICAN WEST
(4). Important themes in the transformation of western America from the pre-industrial world of native Americans to the emergence of the region as a major force in the cultural, economic, and political life of the United States. HST 467/HST 567 and HST 468/HST 568 need not be taken in sequence. Not offered every year. PREREQS: HST 201 and HST 202 and HST 203 or graduate standing.
HST 568. HISTORY OF THE AMERICAN WEST
(4). Important themes in the transformation of western America from the pre-industrial world of
native Americans to the emergence of the region as a major force in the cultural, economic, and political life of the United States. HST 467/HST 567 and HST 468/HST 568 need not be taken in sequence. Not offered every year. PREREQS: HST 201 and HST 202 and HST 203 or graduate standing.

HST 569. HISTORY OF THE PACIFIC
NORTHWEST (4). The demographic, ecological, and cultural transformation of Oregon,
Washington, and Idaho from Indian times to the present. Not offered every year. PREREQS: HST 201 and HST 202 and HST 203 or graduate standing.

HST 570. RELIGION IN THE AMERICAN WEST
(4). The history of religion in the American West. Examines four themes in the religious history of the American West: locations (the designation of particular places as special), migrations movement in and out of the region), adaptations (changes over time, in response to changing conditions), and discriminations (recognition of difference, as well as prejudicial treatment based on difference). Engages with various primary and secondary sources, including texts, films, and photographs. CROSSLISTED as REL 570.

HST 571. COLONIAL AMERICA (4). Economic, political, social, religious, and intellectual development of colonial North America from the English background to 1689. HST 471/HST 571 , HST 472/572 need not be taken in sequence. Not offered every year. PREREQS: HST 201 or graduate standing.
HST 572. COLONIAL AMERICA (4). Economic, political, social, religious, and intellectual development of colonial North America from 1689 to 1763. HST 471/HST 571, HST 472/572 need not be taken in sequence. Not offered every year. PREREQS: HST 201 or graduate standing.
HST 573. THE ERA OF THE AMERICAN
REVOLUTION (4). The American Revolution, the drafting of the Constitution, and the launching of the new nation, 1763 to 1789. Not offered every year. PREREQS: HST 201 or graduate standing.
HST 574. JEFFERSONIAN AND JACKSONIAN
DEMOCRACY (4). American political, economic, religious, and social development during the early and middle national era with emphasis on the formation and growth of political parties, territorial expansion and western settlement, and the beginnings of sectional conflict. Not offered every year. PREREQS: HST 201 and HST 202 or graduate standing.
HST 575. CIVIL WAR AND RECONSTRUCTION (4). Origins of the war, nature of the war, and the critical postwar era, 1830s to 1880s, with special attention to the changing historiography of the period. Not offered every year. PREREQS: HST 202 or graduate standing.

HST 577. THE PROGRESSIVE AND NEW
DEAL ERAS (4). Twentieth-century U.S. history from 1900 to 1939, with emphasis on political and economic developments; attention given to diplomatic, cultural, and social change. Not offered every year. PREREQS: HST 203
HST 578. THE U.S. SINCE 1939 (4). United States political, cultural, and diplomatic history from the Second World War through the 1970s, with special emphasis on the Cold War at home and abroad. Not offered every year. PREREQS: HST 203 or graduate standing.
HST 581. ENVIRONMENTAL HISTORY OF
THE UNITED STATES (4). A study of human interaction with the environment and the transformation of the landscape and ecology of North America from the Indian period to the present, with special attention to the progressive alterations induced by the modernizing world of agriculture, industry, urbanism, and their relation to the market system in the United States. Not offered every year. PREREQS: Graduate standing. HST 201, HST 202, HST 203 recommended.

HST 585. POLITICS AND RELIGION IN THE MODERN MIDDLE EAST (4). The role of religious and secular ideologies in the politics of the 20th century Middle East. Topics include the impact of liberal and nationalist thought, the Iranian revolution, radical Islamist movements, and Zionism. CROSSLISTED as REL 485/REL 585. PREREQS: Graduate standing or instructor approval required.
HST 586. A HISTORY OF CHRISTIANITY IN AFRICA (4). An investigation of the historical development and changing character of Christianity in Africa. Topics include the examination of the role of Christianity in the development of social identity and politics in historic Ethiopia from the early first millennium CE Portuguese missionary efforts in Central Africa during the period of the Atlantic slave trade from the 15th to the 18th centuries; the role of 19th century missionaries in both spreading Christianity in Africa and during the European colonization of Africa at the end of the 19th century; the emergence of African independence churches and prophetic Christianity in the 20th century; and the PREREQS: HST 381 and/or HST 382

HST 587. WORLD WAR II: A GLOBAL HISTORY (4). Examines World War II from a global perspective, its origins, the course of the conflict and its aftermath, looking especially at the US, USSR, Britain, Germany and Japan. Topics will include the concept of total war and the home fronts of a number of nations. PREREQS: HST 103*
HST 588. THE UNITED STATES AND VIETNAM 1945-1995 (4). Examines the Vietnam War from both the US and Vietnamese perspective within the context of the Cold War. Political, military, social and moral issues will be covered within the concept of American exceptionalism.
HST 594. MODERN JAPAN: A CULTURAL HISTORY (4). Japanese history from the Meiji to the contemporary period (1980s/1990s). Examination of Japanese tradition and the Tokugawa period. Investigation of Westernization/ modernization, imperialism, national identity, gender, atomic bomb(s), and post-war culture.
HST 595. CHINA IN 20TH CENTURY (4). Treats the decline of the Confucian tradition, shifts in the economy, and metamorphoses of the political system. Attention is given to China's attempt to balance her Communistic revolutionary legacies with her current modernizing goals. PREREQS: HST 391 and HST 392 or graduate standing.
HST 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## HISTORY OF SCIENCE COURSES

HSTS 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
HSTS 405. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
HSTS 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

HSTS 411. *HISTORY OF SCIENCE (4). Stresses the interaction of scientific ideas within their social and cultural contexts. Scientific thought from ancient civilizations to the post-Roman era. Not offered every year. HSTS 411/HSTS 511, HSTS 412/HSTS 512, HSTS 413/HSTS 513 need not be taken in sequence. (H) (SS) (Bacc Core Course) PREREQS: Upper-division standing; at least one science sequence.
HSTS 412. *HISTORY OF SCIENCE (4). Stresses the interaction of scientific ideas within their social and cultural context. Origin of modern science in the 16th and 17th centuries. HSTS 411/HSTS 511, HSTS 412/HSTS 512, HSTS 413/HSTS 513 need not be taken in sequence. (Bacc Core Course) PREREQS: Upper-division standing and at least
one science sequence.
HSTS 413. *HISTORY OF SCIENCE (4). Stresses
the interaction of scientific ideas with their social and cultural context. Development of modern science in the 18th and 19th centuries and to the present. HSTS 411/HSTS 511, HSTS 412/HSTS 512, HSTS 413/HSTS 513 need not be taken in sequence. (Bacc Core Course) PREREQS: Upper-division standing and at least one science sequence.
HSTS 414. *HISTORY OF TWENTIETH-
CENTURY SCIENCE (4). Focuses on the organization, practice, and theories of the natural sciences in the twentieth century, with emphasis primarily on the European and American scientific traditions from the 1890s to the present. (H) (SS) (Bacc Core Course)
HSTS 415. *^THEORY OF EVOLUTION AND FOUNDATION OF MODERN BIOLOGY (4). Origin and development of Darwin's theory of evolution. Reception of theory and history of evolution to the present. (H) (SS) (Bacc Core Course) (Writing Intensive Course) PREREQS: Upper-division standing.
HSTS 415H. *^THEORY OF EVOLUTION AND FOUNDATION OF MODERN BIOLOGY (4). Origin and development of Darwin's theory of evolution. Reception of theory and history of evolution to the present. (H) (SS) (Bacc Core Course) (Writing Intensive Course) PREREQS: Upper-division standing and Honors College approval required.
HSTS 416. *HISTORY OF MEDICINE PRE-1800 (4). History of medical theory and the changing role of the physician; internal development of medicine as a discipline as well as a profession; relationship of medicine's development to general changes in science and culture, to 1800. (Bacc Core Course)
HSTS 417. *^HISTORY OF MEDICINE (4). History of medical theory and the changing role of the physician; internal development of medicine as a discipline as well as a profession; relationship of medicine's development to general changes in science and culture. (H) (SS) (Bacc Core Course) (Writing Intensive Course) PREREQS: Upperdivision standing.

HSTS 418. *SCIENCE AND SOCIETY (4). Historical study of the interaction of science and society. Case studies are used from the 18th through 20th centuries. Topics vary by term. (Bacc Core Course)
HSTS 419. *^STUDIES IN SCIENTIFIC
CONTROVERSY: METHODS AND PRACTICES
(4). Course focuses on accounts of scientific discoveries that have been controversial, to understand the rational, psychological, and social characteristics which have defined the meaning and procedures of the natural sciences. Case studies are used from the 18th through 20th centuries. (H) (SS) (Bacc Core Course) (Writing Intensive Course)
HSTS 419H. *^STUDIES IN SCIENTIFIC
CONTROVERSY: METHODS AND PRACTICES
(4). Course focuses on accounts of scientific discoveries that have been controversial, to understand the rational, psychological, and social characteristics which have defined the meaning and procedures of the natural sciences. Case studies are used from the 18th through 20th centuries. (H) (SS) (Bacc Core Course) (Writing Intensive Course) PREREQS: Honors College approval required.

HSTS 421. *TECHNOLOGY AND CHANGE (4). Current views of technology and associated cultural changes and the contexts in which these developed; the changing role of technology in modern industrial society, especially in the United States; recent efforts to predict and control technological developments and the social and cultural consequences. (H) (SS) (Bacc Core Course) PREREQS: Upper-division standing.

HSTS 422. *^HISTORICAL STUDIES OF SCIENCE AND POLITICS (4). The historical study of scientists, their work, their political and ethical choices mainly in the United States and Europe from the 1920s to the 1950s. (H) (Bacc Core Course) (Writing Intensive Course)
HSTS 423. *SCIENCE AND RELIGION (4).
A historical survey of critical issues in the relationship of Western science and religion from ancient times to the end of the twentieth century. (H) (Bacc Core Course)

HSTS 425. *^HISTORY OF THE LIFE SCIENCES
(4). History of ideas about life from Greeks to present day. Cultural background and development of major theories of the life sciences with emphasis on natural history. (Bacc Core Course) (Writing Intensive Course) PREREQS: Upperdivision standing plus one year college sciences.
HSTS 437. ^HISTORY OF ANIMALS IN
SCIENCE (4). Using a variety of sources, this course explores the ways humans have thought about and used animals in science and medicine from the seventeenth century to the present. How has science constructed the boundaries between humans and animals, and what have the consequences been for each? (Writing Intensive Course)

HSTS 440. *HISTORY OF PSYCHOTHERAPY
(4). The history of psychotherapy in modern Western societies, from biomedical, cultural, political, and psychosocial perspectives. Not offered every year. (H) (Bacc Core Course)
HSTS 440H. *HISTORY OF PSYCHOTHERAPY
(4). The history of psychotherapy in modern Western societies, from biomedical, cultural, political, and psychosocial perspectives. Not offered every year. (H) (Bacc Core Course) PREREQS: Honors College approval required.
HSTS 451. *THE HISTORY OF OUTER SPACE
(4). Advancements in technology and science has made it possible to observe, robotically explore, personally visit, and daily use outer space including an overview of what we have learned, how this endeavor has shaped human civilization and culture, and what may lie ahead. (Bacc Core Course)
HSTS 470. *ECOLOGY AND HISTORY:
LANDSCAPES OF THE COLUMBIA BASIN (3).
Integrates environmental history and landscape ecology of the Columbia River Basin from geologic origins to the present, to create an understanding of change caused by natural processes and human activities. CROSSLISTED as FW 470/FW 570. (H) (Bacc Core Course) PREREQS: (HST 201 and HST 202 and HST 203) or BI 370 or equivalent course work.
HSTS 499. SPECIAL TOPICS (1-16). (H) This course is repeatable for a maximum of 16 credits.
HSTS 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
HSTS 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Graduate standing; departmental approval required.

HSTS 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
HSTS 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
HSTS 511. HISTORY OF SCIENCE (4). Stresses the interaction of scientific ideas within their social and cultural context. Scientific thought from ancient civilizations to the post-Roman era. Not offered every year. HSTS 411/HSTS 511, HSTS 412/HSTS 512, HSTS 413/HSTS 513 need not be taken in sequence. PREREQS: Graduate standing and at least one science sequence.

HSTS 512. HISTORY OF SCIENCE (4). Stresses the interaction of scientific ideas with their social and cultural context. Origin of modern science in the 16th and 17th centuries. HSTS 411/HSTS 511 HSTS 412/HSTS 512, HSTS 413/HSTS 513 need not be taken in sequence. PREREQS: Graduate standing and at least one science sequence.

HSTS 513. HISTORY OF SCIENCE (4). Stresses the interaction of scientific ideas with their social and cultural context. Development of modern science in the 18th and 19th centuries and to the present. HSTS 411/HSTS 511, HSTS 412/HSTS 512, HSTS 413/HSTS 513 need not be taken in sequence. PREREQS: Graduate standing and at least one science sequence.
HSTS 514. HISTORY OF TWENTIETH-CENTURY SCIENCE (4). Focuses on the organization, practice, and theories of the natural sciences in the twentieth century, with emphasis primarily on the European and American scientific traditions from the 1890s to the present.

## HSTS 515. THEORY OF EVOLUTION AND

 FOUNDATION OF MODERN BIOLOGY (4). Origin and development of Darwin's theory of evolution. Reception of theory and history of evolution to the present. PREREQS: Graduate standing.HSTS 516. HISTORY OF MEDICINE PRE-1800 (4). History of medical theory and the changing role of the physician; internal development of medicine as a discipline as well as a profession; relationship of medicine's development to general changes in science and culture, to 1800
HSTS 517. HISTORY OF MEDICINE (4). History of medical theory and the changing role of the physician; internal development of medicine as a discipline as well as a profession; relationship of medicine's development to general changes in science and culture. PREREQS: Graduate standing.
HSTS 518. SCIENCE AND SOCIETY (4).
Historical study of the interaction of science and society. Case studies are used from the 18th through 20th centuries. Topics vary by term.

## HSTS 519. STUDIES IN SCIENTIFIC

CONTROVERSY: METHOD AND PRACTICE
OF (4). Course focuses on accounts of scientific discoveries that have been controversial, to understand the rational, psychological, and social characteristics which have defined the meaning and procedures of the natural sciences. Case studies are used from the 18th through 20th centuries.

HSTS 521. TECHNOLOGY AND CHANGE (4).
Current views of technology and associated cultural changes and the contexts in which these developed; the changing role of technology in modern industrial society, especially in the United States; recent efforts to predict and control technological developments and the social and cultural consequences. PREREQS: Graduate standing.
HSTS 522. HISTORICAL STUDIES OF SCIENCE AND POLITICS (4). The historical study of scientists, their work, their political and ethical choices mainly in the United States and Europe from the 1920s to the 1950s.

## HSTS 523. SCIENCE AND RELIGION (4)

A historical survey of critical issues in the relationship of Western science and religion from ancient times to the end of the twentieth century PREREQS: Graduate standing.
HSTS 525. HISTORY OF THE LIFE SCIENCES
(4). History of ideas about life from Greeks to present day. Cultural background and development of major theories of the life sciences with emphasis on natural history. PREREQS: Graduate standing plus one year college sciences.
HSTS 537. HISTORY OF ANIMALS IN SCIENCE
(4). Using a variety of sources, this course explores the ways humans have thought about and used animals in science and medicine
from the seventeenth century to the present. How has science constructed the boundaries between humans and animals, and what have the consequences been for each? PREREQS: Upperdivision standing.
HSTS 540. HISTORY OF PSYCHOTHERAPY (4). The history of psychotherapy in modern Western societies, from biomedical, cultural, political, and psychosocial perspectives. Not offered every year.

## HSTS 570. ECOLOGY AND HISTORY:

LANDSCAPES OF THE COLUMBIA BASIN (3). Integrates environmental history and landscape ecology of the Columbia River Basin from geologic origins to the present, to create an understanding of change caused by natural processes and human activities. CROSSLISTED as FW 470/FW 570. PREREQS: (HST 201 and HST 202 and HST 203) or BI 370 or equivalent course work.

HSTS 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 36 credits.
HSTS 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Graduate standing and departmental approval required.

## ■ PEACE STUDIES COURSES

PAX 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PAX 201. STUDY OF PEACE AND THE CAUSES OF CONFLICT (3). Examination of the causes of personal, social, and institutional conflict and peaceful, constructive means of dealing with conflict. The history and current status of peace movements within and outside governments; prospects for world peace. Case studies in peace and conflict. (H) CROSSLISTED as REL 201.
PAX 402. INDEPENDENT STUDY (1-16). Individual basic and applied study projects on peace-related issues, designed in consultation with the Peace Studies Program director or a member of the Peace Studies faculty. This course is repeatable for a maximum of 16 credits.
PAX 405. READING AND CONFERENCE (1-
16). Study supervised and directed by members of the Peace Studies Program committee or approved faculty, as arranged by the student and Peace Studies Program director. This course is repeatable for a maximum of 16 credits.
PAX 407. SEMINAR (1-16). Close examination of peace-related topics, including theory, method, research, and application. May be taken more than one time as topics vary. This course is repeatable for a maximum of 16 credits.
PAX 410. PEACE STUDIES INTERNSHIP (1-16). Directed, supervised, and evaluated field work, to supplement the student's classroom work, arranged one term in advance. This course is repeatable for a maximum of 16 credits.

PAX 415. TOPICS IN PEACE STUDIES (1-16). Selected topics relevant to the study of conflict, peace, and war. May be taken more than one time as topics vary.
PAX 499. TOPICS IN PEACE STUDIES (1-4). Examination of the work of a particular nonviolence theorist or of a specific problem; e.g., pacifism and humanitarian intervention, nonviolence and gender. Course may be repeated as appropriate. Not offered every year. This course is repeatable for a maximum of 8 credits.
PAX 502. INDEPENDENT STUDY (1-16). Individual basic and applied study projects on peace-related issues, designed in consultation with the Peace Studies Program director or a member of the Peace Studies faculty. This course is repeatable for a maximum of 16 credits.
PAX 505. READING AND CONFERENCE (1-16). Study supervised and directed by members of the Peace Studies Program committee or approved faculty, as arranged by the student and Peace Studies Program director. This course is
repeatable for a maximum of 16 credits.
PAX 507. SEMINAR (1-16). Close examination of peace-related topics, including theory, method, research, and application. May be taken more than one time as topics vary. This course is repeatable for a maximum of 16 credits.
PAX 510. PEACE STUDIES INTERNSHIP (1-16). Directed, supervised, and evaluated field work, to supplement the student's classroom work, arranged one term in advance. This course is repeatable for a maximum of 16 credits.
PAX 515. TOPICS IN PEACE STUDIES (1-16). Selected topics relevant to the study of conflict, peace, and war. May be taken more than one time as topics vary.
PAX 599. TOPICS IN PEACE STUDIES (1-4). Examination of the work of a particular nonviolence theorist or of a specific problem; e.g., pacifism and humanitarian intervention, nonviolence and gender. Course may be repeated as appropriate. Not offered every year. This course is repeatable for a maximum of 8 credits.

## ■ PHILOSOPHY COURSES

PHL 101. CRITICAL THINKING (4). Analysis of arguments, basic patterns of inductive and deductive reasoning, logical relations, and logical fallacies. Intended to improve analytical, critical and reasoning skills.

PHL 110. CRITICAL ANALYSIS (3). Development of a question-asking attitude for academic study. Enables students to explore issues and make informed decisions. PREREQS: EOP students only.
PHL 121. *REASONING AND WRITING (3). Develops critical thinking skills to increase clarity and effectiveness of student writing; uses writing experiences to teach critical thinking skills. Subjects include identifying and evaluating arguments, analyzing assumptions, justifying claims with reasons, avoiding confused or dishonest reasoning, applying common patterns of reasoning in everyday contexts, and writing cogent complex arguments. (Bacc Core Course)
PHL 150. *GREAT IDEAS IN PHILOSOPHY (3). Explores the assumptions and deeper meanings of familiar concepts and experiences. An introduction to some basic and famous ideas in Western thought. Topics may include truth, beauty, infinity, perception, freedom, pleasure, knowledge, mind and body, morality, justice, and political authority. (H) (Bacc Core Course)
PHL 160. *QUESTS FOR MEANING: WORLD RELIGIONS (4). A survey and analysis of the search for meaning and life fulfillment represented in major religious traditions of the world, such as Hinduism, Buddhism, Taoism, Zen, Confucianism, Judaism, Christianity, and Islam. Lec/rec. (H) (Bacc Core Course) CROSSLISTED as REL 160.
PHL 160H. *QUESTS FOR MEANING: WORLD RELIGIONS (4). A survey and analysis of the search for meaning and life fulfillment represented in major religious traditions of the world, such as Hinduism, Buddhism, Taoism, Zen, Confucianism, Judaism, Christianity, and Islam. Lec/rec. (H) (Bacc Core Course) CROSSLISTED as REL 160. PREREQS: Honors College approval required.
PHL 170. *THE IDEA OF GOD (4). Concepts and images of God and their connections to worldviews, experience, science, gender, society, selfunderstanding, and religions. (Bacc Core Course) CROSSLISTED as PHL 170.
PHL 199. SPECIAL STUDIES (1-16). May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits.
PHL 201. *INTRODUCTION TO PHILOSOPHY
(4). An in-depth introduction to the methods and ideas of Western philosophy, concentrating on such great figures as Socrates, Plato, Aristotle, Descartes, Kant and Nietzsche and such topics as the nature of reality, the existence
of God, knowledge and doubt, the relation of consciousness to the world, free will and determinism, good and evil, and minds and machines. Philosophers and ideas covered will vary by the section. Written assignments are required. (H) (Bacc Core Course)
PHL 202. INTRODUCTION TO RELIGIOUS
STUDIES (4). An introduction to the academic study of religion. It examines the concepts of religion and the sacred, approaches to the study of religion, ubiquitous features of religious experience, including symbol, myth, ritual, and community, understandings of the human condition in diverse religious traditions, and ways religious communities address challenges of pluralism and secularization. CROSSLISTED as REL 202.
PHL 205. *ETHICS (4). Introduction to ethical theory and to the evaluation of ethical issues in society such as sexual ethics and euthanasia. Includes the study of philosophical theories of moral responsibility and moral virtue, and the philosophical ideas behind ethics debates in society. Students are encouraged to develop their own positions on ethical issues through discussion projects and term papers. Lec/rec. (H) (Bacc Core Course)
PHL 205H. *ETHICS (4). Introduction to ethical theory and to the evaluation of ethical issues in society such as sexual ethics and euthanasia. Includes the study of philosophical theories of moral responsibility and moral virtue, and the philosophical ideas behind ethics debates in society. Students are encouraged to develop their own positions on ethical issues through discussion projects and term papers. Lec/rec. (H) (Bacc Core Course) PREREQS: Honors College approval required.

## PHL 206. *RELIGIOUS ETHICS AND MORAL

PROBLEMS (4). An examination of the practical ethics of the monotheistic religious traditions of the West--Judaism, Christianity, Islam--and their different approaches to concrete moral problems. Topics include sexuality and marriage, euthanasia, capital punishment, pacifism and just war, and environmentalism. (Bacc Core Course) CROSSLISTED as REL 206.

## PHL 207. *POLITICAL PHILOSOPHY

(4). Introductory study of the philosophical justifications of political systems and philosophical theories about the rights and obligations of citizens and governments. (H) (Bacc Core Course)

## PHL 208. INTRODUCTION TO BUDDHIST

TRADITIONS (4). Survey of the historical development of Buddhism in India and its spread throughout Asia and beyond by investigating the literature, rituals, history and social structure of the Buddhist traditions of Sri Lanka and Southeast Asia, Tibet and the Himalayan region, China, Taiwan, Korea, Japan, and finally its growth in the West. CROSSLISTED as REL 208.

## PHL 210. *RELIGION IN THE UNITED STATES

(4). A thematic overview of the historical study of religion in the United States, with an eye toward ways that social and cultural contexts have shaped the religious experience of Americans in different places and times. Surveys a wide array of religious movements, groups, and individuals from the colonial period to present. CROSSLISTED as HST 210, REL 210. (Bacc Core Course)

PHL 210H. *RELIGION IN THE UNITED STATES (4). A thematic overview of the historical study of religion in the United States, with an eye toward ways that social and cultural contexts have shaped the religious experience of Americans in different places and times. Surveys a wide array of religious movements, groups, and individuals from the colonial period to present. CROSSLISTED as HST 210H, REL 210H. (Bacc Core Course) PREREQS: Honors College approval required.
PHL 213. *INTRODUCTION TO HINDU
TRADITIONS (4). Survey of the historical development of Hinduism in India and the "Hindu

Diaspora." Topics will include the Indus Valley civilization, the Vedic tradition, yoga, and Hindu renunciation, "Classical" Hindu theism and devotion, Hindu philosophy and ritual, and modern and contemporary Hinduism. (Bacc Core Course) CROSSLISTED as REL 213.
PHL 214. *INTRODUCTION TO ISLAMIC
TRADITIONS (4). Development of Islamic traditions in the Arab world and in the global context. Origins of Islam, the narrative of the Prophet Muhammad, the development of the Qur'an, and the central tenets of Islamic faith and practice. Transformation of Islam from a regional to a global tradition. (Bacc Core Course) CROSSLISTED as REL 214.

PHL 220. *WORLD-VIEWS AND VALUES IN THE BIBLE (4). A study of central portions of the Bible (in the Old Testament: Torah, prophets, psalms, and wisdom; in the New Testament: Jesus, gospels, and letters) from the perspective of the academic discipline of biblical scholarship, exploring the philosophical questions of the relationships between story, myth, thought, values, and understandings of life. (H) (Bacc Core Course) CROSSLISTED as REL 220.
PHL 251. *KNOWERS, KNOWING, AND THE
KNOWN (4). An introduction to the major debates in Western philosophy concerning the nature of reality, and the ways we come to know about that reality. One example concerns debates about the problem of skepticism: Is it possible that humans could be completely mistaken about the way the world is? Another example concerns debates about human identity and free will. Beginning with historical figures such as Descartes and Hume, the course also provides an introduction to more contemporary thinkers. (Bacc Core Course)

PHL 251H. *KNOWERS, KNOWING, AND THE KNOWN (4). An introduction to the major debates in Western philosophy concerning the nature of reality, and the ways we come to know about that reality. One example concerns debates about the problem of skepticism: Is it possible that humans could be completely mistaken about the way the world is? Another example concerns debates about human identity and free will. Beginning with historical figures such as Descartes and Hume, the course also provides an introduction to more contemporary thinkers. (Bacc Core Course)
PREREQS: Honors College approval required
PHL 275. *INTRODUCTION TO DISABILITY
STUDIES (4). Introduces core concepts and themes in the multidisciplinary field of disability studies. Analyzes disability as a product of discriminatory, oppressive, and inaccessible built environments and societies. Explores disability pride, culture, and community as alternatives to medical and charity models of disability. (Bacc Core Course)
PHL 280. *ETHICS OF DIVERSITY (4). Uses moral philosophy to examine difference-based discrimination and prejudice in the human community. (H) (Bacc Core Course)
PHL 295. *FEMINISM AND THE BIBLE (3). Examines feminist interpretations of the Bible and pays special attention to intersections of race, social class, sexual identity, and nation in biblical interpretation. (Bacc Core Course) CROSSLISTED as ENG 295, WGSS 295.

PHL 295H. *FEMINISM AND THE BIBLE (3). Examines feminist interpretations of the Bible and pays special attention to intersections of race, social class, sexual identity, and nation in biblical interpretation. (Bacc Core Course) CROSSLISTED as ENG 295, ENG 295H, WGSS 295, WGSS 295H.

PHL 299. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 99 credits.

## PHL 301. *HISTORY OF WESTERN

PHILOSOPHY (4). A study of the history of Western philosophy from the early Greeks into the twentieth century. Designed to give an appreciation and understanding of the Western
philosophical tradition and the philosophical foundations of Western civilization. May be taken independently. PHL 301: Greek and Roman philosophy. PHL 302: The rise of modern philosophy through Hume. PHL 303: Kant and the nineteenth century. (H) (Bacc Core Course) PREREQS: 3 credits of philosophy recommended

## PHL 302. *HISTORY OF WESTERN

PHILOSOPHY (4). A study of the history of Western philosophy from the early Greeks into the twentieth century. Designed to give an appreciation and understanding of the Western philosophical tradition and the philosophical foundations of Western civilization. May be taken independently. PHL 301: Greek and Roman philosophy. PHL 302: The rise of modern philosophy through Hume. PHL 303: Kant and he nineteenth century. (H) (Bacc Core Course) PREREQS: 3 credits of philosophy recommended

## PHL 303. *HISTORY OF WESTERN

PHILOSOPHY (4). A study of the history of Western philosophy from the early Greeks into the twentieth century. Designed to give an appreciation and understanding of the Western philosophical tradition and the philosophical foundations of Western civilization. May be taken independently. PHL 301: Greek and Roman philosophy. PHL 302: The rise of modern philosophy through Hume. PHL 303: Kant and the nineteenth century. (H) (Bacc Core Course) PREREQS: 3 credits of philosophy recommended.

## PHL 310. *CRITICS OF RELIGION (4). An

 introduction to critiques of religion by Nietzsche, Freud, Marx, and other influential thinkers. Examines the nature, scope, and effects of criticisms that challenge the psychological, moral, political, and epistemological foundations of religious belief, practice, and institutions. (Bacc Core Course) CROSSLISTED as REL 310.PHL 312. *ASIAN THOUGHT (4). Familiarizes students with key figures in the history of Asian religious ideas and philosophy. While the emphasis will be on the philosophical traditions of Asia, it will quickly become apparent that philosophy and religion are not so easily distinguishable in many Asian traditions. Areas of thought studied will include Hindu, Buddhist, Confucian, and Taoist. (NC) (Bacc Core Course) CROSSLISTED as REL 312.

PHL 315. *GANDHI AND NONVIOLENCE (4). An examination of the life and work of Mohandas K. Gandhi, the 20th century activist and author, and the theory and practice of nonviolence in his life and work. Emphasis will be placed upon Gandhi's biographical narrative, the development of satyagraha, Gandhi's nonviolent approach to social transformation, and post-Gandhian nonviolent movements. (Bacc Core Course) CROSSLISTED as REL 315.
PHL 316. INTELLECTUAL ISSUES OF
MEXICO AND MEXICAN AMERICANS (4). The
philosophical, social, cultural, and political reality of Mexican Americans and their historical roots in Mexico since the Spanish Conquest. Analysis of internal colonialism, racism, machismo, fatalism, alienation, cultural identity, as well as more contemporary including NAFTA, immigration, and U.S.-Mexican relations. (NC) CROSSLISTED as REL 316.
PHL 321. DEDUCTIVE LOGIC (4). Development of formal language and deductive systems for first-order, quantificational logic. Emphasis on translation of ordinary English statements into formal language. Discussion of the contrast between semantic and syntactic treatment of logical concepts. PREREQS: Upper-division standing or PHL 101.
PHL 325. *SCIENTIFIC REASONING (4).
Introduction to and analysis of scientific reasoning. Emphasis on understanding and evaluation of theoretical hypotheses, causal and statistical models, and uses of scientific knowledge to make personal and public decisions. (Bacc Core Course)

PHL 342. CONTEMPORARY ETHICS (4). A study of significant ethical developments and issues in contemporary society, including ethical principles and concepts behind social debates on such matters as sexual ethics, abortion, discrimination, the uses of animals in scientific research, and responsibilities of corporations. Not offered every year. (H) PREREQS: PHL 205 recommended.

## PHL 344. *PACIFISM, JUST WAR, AND

TERRORISM (4). An examination of the philosophical and theological issues pertaining to pacifism, justified war, and forms of terrorism in Islamic and Western traditions. Special attention is given to concepts of jihad, justifications of war, and restraints on conduct in war. (Bacc Core Course) CROSSLISTED as REL 344.
PHL 345. *FIRST FREEDOM: RELIGIOUS LIBERTY AND INTOLERANCE (4). An examination of the religious, philosophical, political, and historical issues regarding religious freedom, conscience, and disestablishment as enshrined in the First Amendment and as illustrated by historical and contemporary examples of religious intolerance in the United States. (Bacc Core Course) CROSSLISTED as REL 345.

PHL 360. *PHILOSOPHY AND THE ARTS (4). Major philosophical theories about art and its meaning, from ancient to modern times. How philosophers have understood beauty, the imagination, art and knowledge, art and pleasure, art and emotion. Offered every other year. (H) (Bacc Core Course) PREREQS: 3 credits of philosophy, or upper-division standing recommended.

## PHL 365. *LAW IN PHILOSOPHICAL

PERSPECTIVE (4). A study of philosophical issues in the law through the examination of legal cases and major essays in jurisprudence. Special attention given to concepts of justice, responsibility, liberty, law, and legal ethics. Offered every other year. (H) (Bacc Core Course) PREREQS: 3 credits of philosophy or upperdivision standing.

PHL 371. *PHILOSOPHIES OF CHINA (4). A study of the traditional philosophies of China, including Confucianism, Taoism, Mohism, Legalism, and Buddhism. Not offered every year. (NC) (Bacc Core Course) CROSSLISTED as REL 371. PREREQS: 3 credits of philosophy or upperdivision standing.

## PHL 371H. *PHILOSOPHIES OF CHINA (4).

 A study of the traditional philosophies of China, including Confucianism, Taoism, Mohism, Legalism, and Buddhism. Not offered every year. (NC) (Bacc Core Course) PREREQS: 3 credits of philosophy or upper-division standing. Honors College approval required.PHL 390. MORAL THEORIES (3). Examines the evolution of moral philosophy from the beginning of Western, Greek-based philosophy through contemporary moral theory, and will include philosophical questions about moral philosophy generally, virtue ethics, deontology, utilitarianism, environmental ethics, animal rights, and feminism and ecofeminism. PREREQS: PHL 205 [D-]

## PHL 399. SPECIAL TOPICS IN PHILOSOPHY

 (1-4). Examination of the work of a philosopher or of a specific philosophical problem; e.g., Wittgenstein, determinism, perception, philosophy of mind. May be repeated for credit when topic varies. Not offered every year. This course is repeatable for a maximum of 16 credits. PREREQS: 3 credits of upper-division philosophy recommended.PHL 399H. SPECIAL TOPICS IN PHILOSOPHY
(1-4). Examination of the work of a philosopher or of a specific philosophical problem; e.g., Wittgenstein, determinism, perception, philosophy of mind. May be repeated for credit when topic varies. Not offered every term. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval
required. 3 credits of upper-division philosophy recommended.

PHL 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Sophomore standing.
PHL 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PHL 405. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required and sophomore standing.

PHL 407. ^SEMINAR (1-16). (Writing Intensive Course) This course is repeatable for a maximum of 16 credits. PREREQS: Two upper-division philosophy courses or the equivalent and sophomore standing.
PHL 407H. ^SEMINAR (1-16). (Writing Intensive Course) This course is repeatable for a maximum of 16 credits. PREREQS: Two upper-division philosophy courses or the equivalent and sophomore standing. Honors College approval required.
PHL 410. INTERNSHIP (1-12). This course is repeatable for a maximum of 16 credits. PREREQS: Sophomore standing.
PHL 411. GREAT FIGURES IN PHILOSOPHY (4). Study of the works of a major philosopher such as Plato, Aristotle, Descartes, Hume, Kant, or Marx. Each course normally devoted to the work of a single figure. Need not be taken in sequence. Not offered every year. (H) CROSSLISTED as REL 411/REL 511. This course is repeatable for a maximum of 16 credits. PREREQS: 6 credits of philosophy and sophomore standing.
PHL 417. FEMINIST PHILOSOPHIES (3). Diverse forms of feminist philosophy, including a variety of critiques, especially those based on race and class, with in-depth consideration of selected social issues such as rape and pornography. CROSSLISTED as WGSS 417/WGSS 517. (H) PREREQS: 6 credits of philosophy or upperdivision standing.
PHL 421. MATHEMATICAL LOGIC (3). Rigorous definition of a formal logic and investigation of its characteristics. Emphasis on the distinction and relation between semantic and syntactic methods (model theory and proof theory) and on the meta-mathematical analysis of axiomatic theories. Not offered every year. PREREQS: PHL 321 or 6 credits of 400-level mathematics or computer science and sophomore standing.

## PHL 430. HISTORY OF BUDDHIST

PHILOSOPHY (4). Examination of the major philosophical schools, texts, and thinkers in Buddhist history, emphasizing its Indian origins, but looking beyond to the various Buddhist traditions throughout Asia. (NC) CROSSLISTED as REL 430/REL 530.

## PHL 430H. HISTORY OF BUDDHIST

PHILOSOPHY (4). Examination of the major philosophical schools, texts, and thinkers in Buddhist history, emphasizing its Indian origins, but looking beyond to the various Buddhist traditions throughout Asia. (NC) PREREQS: Honors College approval required.
PHL 431. BUDDHISM, NON-VIOLENCE, AND SOCIAL JUSTICE (4). Investigates the philosophical grounding of Buddhist ideas about non-violence, justice and social responsibility. Looks at broad-based Buddhist social activism movements and leaders; their methods of training, issues and types of actions taken by "Socially Engaged Buddhists" living Buddhist traditions. CROSSLISTED as REL 431.
PHL 431H. BUDDHISM, NON-VIOLENCE,
AND SOCIAL JUSTICE (4). Investigates the philosophical grounding of Buddhist ideas about non-violence, justice and social responsibility. Looks at broad-based Buddhist social activism
movements and leaders; their methods of training, issues and types of actions taken by PREREQS: Honors College approval required.
PHL 432. *YOGA AND TANTRIC TRADITIONS
(4). An examination of the theory and practice
of yoga and tantra in the traditions of Hinduism, Buddhism, and Jainism, and in their contemporary popular manifestations. Emphasis on the representation of yoga and tantra in Indian literature and history, including contemplative practices, bodily disciplines, and ritual. (Bacc Core Course) CROSSLISTED as REL 432/REL 532.
PHL 433. *THEORY AND PRACTICE OF
MODERN YOGA (4). An examination of the phenomenon of modern yoga in theory and in practice. Emphasis on the roots of contemporary forms of yoga in the intersection between traditional Hindu and Buddhist formulations of yoga, Indian wrestling and martial arts, European gymnastics, and cosmopolitan conceptions of "bodily culture" of both European and Indian origins. CROSSLISTED as REL 433, REL 533. (Bacc Core Course)
PHL 434. *SPIRITUALITY AND ECOLOGY: GREEN YOGA (4). An exploration of the relationship between spirituality and ecological engagement in traditional contexts and in contemporary spirituality, with a global focus on contemplative practices rooted in Indian tradition, such as yoga. CROSSLISTED as REL 434, REL 534.

PHL 434H. *SPIRITUALITY AND ECOLOGY:
GREEN YOGA (4). An exploration of the relationship between spirituality and ecological engagement in traditional contexts and in contemporary spirituality, with a global focus on contemplative practices rooted in Indian tradition, such as yoga. CROSSLISTED as REL 432H/ REL 532H. PREREQS: Honors College approval required.
PHL 436. PHILOSOPHY AND RELIGION (3). Examination of significant philosophical issues or movements and their relationship to theology and religion. CROSSLISTED as REL 436/REL 536. PREREQS: 6 credits of philosophy and sophomore standing.
PHL 439. PHILOSOPHY OF NATURE (3). Intensive one-week field course taught in the Cascade Range. What is nature? What is the relation of humans to the rest of the natural world? How are our concepts of nature and decisions about land use shaped by the words and metaphors we use? What is the value of wild places? What can we learn from a close study of the natural world about right ways of acting in communities, both civic and biotic? The course will draw on many ways of knowing--philosophical analysis, close observation, and especially writing. Camping required. PREREQS: Admission by application, departmental approval required.
PHL 440. *ENVIRONMENTAL ETHICS (3). Philosophical ideas about our ethical relationships with parts of the non-human world and future generations, with applications to current environmental issues. Includes a study of different conceptions of environmental ethics, philosophical problems in environmental ethics (such as the moral status of animals, plants, species, and ecosystems), the uses of environmental ethics by environmental groups, and selected contemporary global environmental issues such as global warming and loss of biodiversity. (H) (Bacc Core Course) PREREQS: PHL 205 and PHL 342 and PHL 365 or 6 credits of philosophy and sophomore standing.
PHL 440H. *ENVIRONMENTAL ETHICS (3). Philosophical ideas about our ethical relationships with parts of the non-human world and future generations, with applications to current environmental issues. Includes a study of different conceptions of environmental ethics, philosophical problems in environmental ethics (such as the moral status of animals, plants, species, and ecosystems), the uses of environmental ethics by
environmental groups, and selected contemporary global environmental issues such as global warming and loss of biodiversity. (H) (Bacc Core Course) PREREQS: PHL 205 and PHL 342 and PHL 365 or 6 credits of philosophy and sophomore standing and Honors College approval required.

## PHL 443. *WORLD VIEWS AND

ENVIRONMENTAL VALUES (3). A comparative study of world-views (secular and religious, Western and Eastern, modern and ancient) and how they affect concepts of nature, environmental values, and selected environmental issues. (Bacc Core Course) (NC) CROSSLISTED as REL 443, REL 543. PREREQS: One introductory-level science course and sophomore standing.

## PHL 443H. *WORLD VIEWS AND

ENVIRONMENTAL VALUES (3). A comparative study of world-views (secular and religious, Western and Eastern, modern and ancient) and how they affect concepts of nature, environmental values, and selected environmental issues. (Bacc Core Course) CROSSLISTED as REL 443H.
PREREQS: One introductory-level science course and sophomore standing and Honors College approval required

PHL 444. *BIOMEDICAL ETHICS (4). Application of ethical principles and decision-making processes to selected problems in medicine, health care, and biotechnology. Special attention given to end-of-life choices, reproductive rights and technologies, organ transplantation, research ethics, genetic engineering, and allocating scarce resources. An interdisciplinary focus that draws on social, legal, economic, and scientific issues in ethical decisions in medicine. (H) (Bacc Core Course) CROSSLISTED as REL 444/REL 544. PREREQS: Sophomore standing

PHL 444H. *BIOMEDICAL ETHICS (4). Application of ethical principles and decisionmaking processes to selected problems in medicine, health care, and biotechnology. Special attention given to end-of-life choices, reproductive rights and technologies, organ transplantation, research ethics, genetic engineering, and allocating scarce resources. An interdisciplinary focus that draws on social, legal, economic, and scientific issues in ethical decision in medicine. (H) (Bacc Core Course) PREREQS: Sophomore standing and Honors College approval required.
PHL 448. NATIVE AMERICAN PHILOSOPHIES
(4). Native American perspectives on ways of knowing, sources of meaning and ethics, the nature of reality, self, community, and cosmos. Includes lectures, scholarship, story-telling, poetry theater, and music as forums for this exploration. Introduces ideas of leading Native American thinkers about the human relation to the natural world, sources of strength and wisdom, the nature of time and place and spirit, right ways of acting in communities, both civic and biotic, and the place of beauty in a well-lived life. (NC) CROSSLISTED as ES 448/ES 548, REL 448/REL 548.
PHL 450. TOPICS (1-16). Uses the IDEAS MATTER lectures as the focus for an exploration of ideas that make a difference in the world. Students read background materials, attend lectures, meet with the speakers, and write essays on the ideas they learn. This course is repeatable for a maximum of 16 credits. PREREQS: Sophomore standing.

## PHL 451. KNOWLEDGE AND REALITY (3).

Examination of significant theories of knowledge, theories concerning the nature of reality, and their connections. Includes an analysis of important concepts and problems, such as perception, induction, belief, empiricism, rationalism, and skepticism. Not offered every year. (H) PREREQS: 6 credits of philosophy, sophomore standing.

PHL 455. DEATH AND DYING (3). A
multidisciplinary study of cultural, philosophical, and religious perspectives on death, dying, and grieving. Not offered every year. CROSSLISTED as REL 455, REL 555. PREREQS: 6 credits of
philosophy or sophomore standing
PHL 456. PHILOSOPHY OF MIND (4). Past and present theories about consciousness, the relationship of mind and body, and the roots and implications of those theories. Includes historical "isms" (e.g., dualism, monism), contemporary views, and connections of these theories to further issues in philosophy and contemporary culture, e.g., desires, mental illness, personhood and otherness, animal minds, explanation, the mind in non-Western traditions and in religions. PREREQS: Recommended: PHL 251
PHL 461. ART AND MORALITY (4). The arts in the context of their connections to, and conflicts with, varied conceptions of the common good. Topics include free expression and community standards, museums and obligations toward cultural treasures, art in public places, public funding of art, the politics of taste. CROSSLISTED as REL 461/REL 561. PREREQS: Sophomore standing.

PHL 470. PHILOSOPHY OF SCIENCE (3). Examination of philosophical questions, classic and contemporary, about science and scientific knowledge. Scientific explanations, the structure of theories, the concept of a natural law, revolutions in science, influences of the sciences and philosophy on one another, science and values. Not offered every year. (H) PREREQS: 6 credits of philosophy (upper-division philosophy recommended), sophomore standing.
PHL 474. ${ }^{\wedge}$ PHILOSOPHY OF BIOLOGY (4). An introduction to some of the conceptual challenges engendered by contemporary evolutionary biology, including the nature of fitness, natural selection, adaptations, and species; identifying organisms, traits, and the units of selection; the evidence required to support particular adaptive or historical hypotheses; and others. (Writing Intensive Course) PREREQS: Previous university-level course work in either philosophy or the biological sciences is strongly recommended.
PHL 499. TOPICS IN PHILOSOPHY (1-4). Examination of the work of a philosopher or of a specific problem; e.g., Wittgenstein, determinism, perception. May be repeated for credit when topic varies. Not offered every year. This course is repeatable for a maximum of 16 credits. PREREQS: 6 credits of upper-division philosophy, sophomore standing.

PHL 499H. TOPICS IN PHILOSOPHY (1-4). Examination of the work of a philosopher or of a specific problem; e.g., Wittgenstein, determinism, perception. May be repeated for credit when topic varies. Not offered every year. This course is repeatable for a maximum of 4 credits. PREREQS: 6 credits of upper-division philosophy, sophomore standing; Honors College approval required.

PHL 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

PHL 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Sophomore standing.
PHL 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits PREREQS: Departmental approval required.

PHL 505. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PHL 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Two upper-division philosophy courses or the equivalent and sophomore standing.

PHL 510. INTERNSHIP (1-12). This course is repeatable for a maximum of 16 credits. PREREQS: Sophomore standing.

PHL 511. GREAT FIGURES IN PHILOSOPHY (4). Study of the works of a major philosopher
such as Plato, Aristotle, Descartes, Hume, Kant, or Marx. Each course normally devoted to the work of a single figure. Need not be taken in sequence. Not offered every year. CROSSLISTED as REL 411/REL 511. This course is repeatable for a maximum of 16 credits. PREREQS: 6 credits of philosophy and sophomore standing.

PHL 517. FEMINIST PHILOSOPHIES (3). Diverse forms of feminist philosophy, including a variety of critiques, especially those based on race and class, with in-depth consideration of selected social issues such as rape and pornography. CROSSLISTED as WGSS 417/WGSS 517. PREREQS: 6 credits of philosophy or upperdivision standing.

## PHL 525. PHILOSOPHICAL METHODS (3)

Examines diverse ways of approaching philosophical issues. Contains readings from different philosophical traditions. Develops understanding of the skills and conventions of philosophical argumentation.

## PHL 530. HISTORY OF BUDDHIST

PHILOSOPHY (4). Examination of the major philosophical schools, texts, and thinkers in Buddhist history, emphasizing its Indian origins, but looking beyond to the various Buddhist traditions throughout Asia. CROSSLISTED as REL 430/REL 530.

## PHL 531. BUDDHISM, NON-VIOLENCE,

AND SOCIAL JUSTICE (4). Investigates the philosophical grounding of Buddhist ideas about non-violence, justice and social responsibility. Looks at broad-based Buddhist social activism movements and leaders; their methods of training, issues and types of actions taken by "Socially Engaged Buddhists" living Buddhist traditions. CROSSLISTED as REL 431.
PHL 532. YOGA AND TANTRIC TRADITIONS (4). An examination of the theory and practice of yoga and tantra in the traditions of Hinduism, Buddhism, and Jainism, and in their contemporary popular manifestations. Emphasis on the representation of yoga and tantra in Indian literature and history, including contemplative practices, bodily disciplines, and ritual. CROSSLISTED as REL 432/REL 532.

## PHL 533. THEORY AND PRACTICE OF

MODERN YOGA (4). An examination of the phenomenon of modern yoga in theory and in practice. Emphasis on the roots of contemporary forms of yoga in the intersection between traditional Hindu and Buddhist formulations of yoga, Indian wrestling and martial arts, European gymnastics, and cosmopolitan conceptions of "bodily culture" of both European and Indian origins. CROSSLISTED as REL 433, REL 533.

## PHL 534. SPIRITUALITY AND ECOLOGY:

GREEN YOGA (4). An exploration of the relationship between spirituality and ecological engagement in traditional contexts and in contemporary spirituality, with a global focus on contemplative practices rooted in Indian tradition, such as yoga. CROSSLISTED as REL 434, REL 534.

PHL 536. PHILOSOPHY AND RELIGION (3). Examination of significant philosophical issues or movements and their relationship to theology and religion. CROSSLISTED as REL 436/REL 536. PREREQS: 6 credits of philosophy and sophomore standing

PHL 539. PHILOSOPHY OF NATURE (3). ntensive one-week field course taught in the Cascade Range. What is nature? What is the relation of humans to the rest of the natural world? How are our concepts of nature and decisions about land use shaped by the words and metaphors we use? What is the value of wild places? What can we learn from a close study of the natural world about right ways of acting in communities, both civic and biotic? The course will draw on many ways of knowing--philosophical analysis, close observation, and especially writing Camping required. PREREQS: Admission by
application, departmental approval required.
PHL 540. ENVIRONMENTAL ETHICS (3).
Philosophical ideas about our ethical relationships with parts of the non-human world and future generations, with applications to current environmental issues. Includes a study of different conceptions of environmental ethics, philosophical problems in environmental ethics (such as the moral status of animals, plants, species, and ecosystems), the uses of environmental ethics by environmental groups, and selected contemporary global environmental issues such as global warming and loss of biodiversity. PREREQS: PHL 205 and PHL 342 and PHL 365 or 6 credits of philosophy and sophomore standing.
PHL 541. CLASSIC MORAL THEORIES (3). Philosophical issues in ethics analyzed through the examination of such classical works in moral philosophy as Aristotle's Nichomachean ethics. Not offered every year. PREREQS: Either PHL 205 or PHL 342 or PHL 440 or one course in the history of philosophy.
PHL 542. CONTEMPORARY MORAL THEORIES
(3). Examines contemporary ethical theories through study of moral philosophy in the 20th century, including recent developments in such areas as environmental ethics and feminist/ feminine ethics. PREREQS: At least two philosophy courses including at least one of PHL 205 or PHL 342 or PHL 541.

## PHL 543. WORLD VIEWS AND

ENVIRONMENTAL VALUES (3). A comparative
study of world-views (secular and religious, Western and Eastern, modern and ancient) and how they affect concepts of nature, environmental values, and selected environmental issues. CROSSLISTED as REL 443, REL 543. PREREQS: One introductory-level science course and sophomore standing.

PHL 544. BIOMEDICAL ETHICS (4). Application of ethical principles and decision-making processes to selected problems in medicine, health care, and biotechnology. Special attention given to end-of-life choices, reproductive rights and technologies, organ transplantation, research ethics, genetic engineering, and allocating scarce resources. An interdisciplinary focus that draws on social, legal, economic, and scientific issues in ethical decisions in medicine. CROSSLISTED as REL 444/REL 544. PREREQS: Graduate standing
PHL 547. RESEARCH ETHICS (3). An examination of the interrelationship between ethical values and scientific practice. Topics include professionalism in science; scientific integrity, misconduct, and whistleblowing; the ethics of authorship; conflicts of interest between academic science and commercial science, and social responsibilities in science.

## PHL 548. NATIVE AMERICAN PHILOSOPHIES

 (4). Native American perspectives on ways of knowing, sources of meaning and ethics, the nature of reality, self, community, and cosmos. Includes lectures, scholarship, story-telling, poetry, theater, and music as forums for this exploration. Introduces ideas of leading Native American thinkers about the human relation to the natural world, sources of strength and wisdom, the nature of time and place and spirit, right ways of acting in communities, both civic and biotic, and the place of beauty in a well-lived life. CROSSLISTED as ES 448/ES 548, REL 448/REL 548.PHL 550. TOPICS (1-16). Uses the IDEAS MATTER lectures as the focus for an exploration of ideas that make a difference in the world. Students read background materials, attend lectures, meet with the speakers, and write essays on the ideas they learn. This course is repeatable for a maximum of 16 credits. PREREQS:
Sophomore standing.
PHL 551. KNOWLEDGE AND REALITY (3). Examination of significant theories of knowledge, theories concerning the nature of reality, and their connections. Includes an analysis of important
concepts and problems, such as perception, induction, belief, empiricism, rationalism, and skepticism. Not offered every year. PREREQS: 6 credits of philosophy, sophomore standing.

## PHL 555. DEATH AND DYING (3). A

 multidisciplinary study of cultural, philosophical, and religious perspectives on death, dying, and grieving. Not offered every year. CROSSLISTED as REL 455, REL 555. PREREQS: 6 credits of philosophy or sophomore standing.PHL 556. PHILOSOPHY OF MIND (4). Past and present theories about consciousness, the relationship of mind and body, and the roots and implications of those theories. Includes historical "isms" (e.g., dualism, monism), contemporary views, and connections of these theories to further issues in philosophy and contemporary culture, e.g., desires, mental illness, personhood and otherness, animal minds, explanation, the mind in non-Western traditions and in religions. PREREQS: Recommended: PHL 251

PHL 561. ART AND MORALITY (4). The arts in the context of their connections to, and conflicts with, varied conceptions of the common good. Topics include free expression and community standards, museums and obligations toward cultural treasures, art in public places, public funding of art, the politics of taste. CROSSLISTED as REL 461/REL 561. PREREQS: Sophomore standing.
PHL 570. PHILOSOPHY OF SCIENCE (3).
Examination of philosophical questions, classic and contemporary, about science and scientific knowledge. Scientific explanations, the structure of theories, the concept of a natural law, revolutions in science, influences of the sciences and philosophy on one another, science and values. Not offered every year. PREREQS: 6 credits of philosophy (upper-division philosophy recommended), sophomore standing.
PHL 574. PHILOSOPHY OF BIOLOGY (4). An introduction to some of the conceptual challenges engendered by contemporary evolutionary biology, including the nature of fitness, natural selection, adaptations, and species; identifying organisms, traits, and the units of selection; the evidence required to support particular adaptive or historical hypotheses; and others. PREREQS: Previous university-level course work in either philosophy or the biological sciences is strongly recommended.
PHL 599. TOPICS IN PHILOSOPHY (1-4). Examination of the work of a philosopher or of a specific problem; e.g., Wittgenstein, determinism, perception. May be repeated for credit when topic varies. Not offered every year. This course is repeatable for a maximum of 16 credits. PREREQS: 6 credits of upper-division philosophy, sophomore standing.

## ■ RELIGIOUS STUDIES COURSES

REL 160. *QUESTS FOR MEANING: WORLD RELIGIONS (4). A survey and analysis of the search for meaning and life fulfillment represented in major religious traditions of the world, such as Hinduism, Buddhism, Taoism, Zen, Confucianism, Judaism, Christianity, and Islam. Lec/rec. (H) (Bacc Core Course) CROSSLISTED as PHL 160.
REL 160H. *QUESTS FOR MEANING: WORLD RELIGIONS (0-4). A survey and analysis of the search for meaning and life fulfillment represented in major religious traditions of the world, such as Hinduism, Buddhism, Taoism, Zen, Confucianism, Judaism, Christianity, and Islam. Lec/rec. (H) (Bacc Core Course) CROSSLISTED as PHL 160H. PREREQS: Honors College approval required.
REL 170. *THE IDEA OF GOD (4). Concepts and images of God and their connections to worldviews, experience, science, gender, society, selfunderstanding, and religions. (Bacc Core Course) CROSSLISTED as PHL 170.

REL 199. SPECIAL TOPICS (1-4). This course is repeatable for a maximum of 12 credits.
REL 201. STUDY OF PEACE AND THE CAUSES OF CONFLICT (3). Examination of the causes of personal, social, and institutional conflict and peaceful, constructive means of dealing with conflict. The history and current status of peace movements within and outside governments; prospects for world peace. Case studies in peace and conflict (H) CROSSLISTED as PAX 201.

## REL 202. INTRODUCTION TO RELIGIOUS

 STUDIES (4). An introduction to the academic study of religion. It examines the concepts of religion and the sacred, approaches to the study of religion, ubiquitous features of religious experience, including symbol, myth, ritual, and community, understandings of the human condition in diverse religious traditions, and ways religious communities address challenges of pluralism and secularization. CROSSLISTED as PHL 202.REL 206. *RELIGIOUS ETHICS AND MORAL
PROBLEMS (4). An examination of the practical ethics of the monotheistic religious traditions of the West--Judaism, Christianity, Islam--and their different approaches to concrete moral problems. Topics include sexuality and marriage, euthanasia, capital punishment, pacifism and just war, and environmentalism. (Bacc Core Course) CROSSLISTED as PHL 206.

## REL 208. INTRODUCTION TO BUDDHIST

 TRADITIONS (4). Survey of the historical development of Buddhism in India and its spread throughout Asia and beyond by investigating the literature, rituals, history and social structure of the Buddhist traditions of Sri Lanka and Southeast Asia, Tibet and the Himalayan region, China, Taiwan, Korea, Japan, and finally its growth in the West. (NC) CROSSLISTED as PHL 208.REL 210. *RELIGION IN THE UNITED STATES (4). A thematic overview of the historical study of religion in the United States, with an eye toward ways that social and cultural contexts have shaped the religious experience of Americans in different places and times. Surveys a wide array of religious movements, groups, and individuals from the colonial period to present. (Bacc Core Course) CROSSLISTED as HST 210, PHL 210.
REL 210H. *RELIGION IN THE UNITED STATES (4). A thematics overview of the historical study of religion in the United States, with an eye toward ways that social and cultural contexts have shaped the religious experience of Americans in different places and times. Surveys a wide array of religious movements, groups, and individuals from the colonial period to present. (Bacc Core Course) CROSSLISTED as HST 210H, PHL 210H. PREREQS: Honors College approval required.
REL 213. *INTRODUCTION TO HINDU
TRADITIONS (4). Survey of the historical development of Hinduism in India and the "Hindu Diaspora." Topics will include the Indus Valley civilization, the Vedic tradition, yoga, and Hindu renunciation, "Classical" Hindu theism and devotion, Hindu philosophy and ritual, and modern and contemporary Hinduism. (Bacc Core Course) CROSSLISTED as PHL 213.
REL 214. *INTRODUCTION TO ISLAMIC
TRADITIONS (4). Development of Islamic traditions in the Arab world and in the global context. Origins of Islam, the narrative of the Prophet Mohammad, the development of the Qur'an, and the central tenets of Islamic faith and practice. Transformation of Islam from a regional to a global tradition. (Bacc Core Course) CROSSLISTED as PHL 214.

REL 215. *INTRODUCTION TO JEWISH TRADITIONS (4). An introduction to Judaism's traditions, histories, and practices. Covers historical origins and developments from the biblical period through the Middle Ages, and considers Judaism in the modern world. Topics include the Jewish calendar (including holidays
and their traditions), Jewish life cycle events Jewish prayer, and traditional texts such as the Mishnah and Talmud. CROSSLISTED as HST 215. (Bacc Core Course)

REL 220. *WORLD-VIEWS AND VALUES IN THE BIBLE (4). A study of central portions of the Bible (in the Old Testament: Torah, prophets, psalms, and wisdom; in the New Testament: Jesus, gospels, and letters) from the perspective of the academic discipline of biblical scholarship, exploring the philosophical questions of the relationships between story, myth, thought, values, and understandings of life. (H) (Bacc Core Course) CROSSLISTED as PHL 220.

REL 299. SPECIAL TOPICS (1-4). This course is repeatable for a maximum of 12 credits.

REL 310. *CRITICS OF RELIGION (4). An introduction to critiques of religion by Nietzsche, Freud, Marx, and other influential thinkers.
Examines the nature, scope, and effects of criticisms that challenge the psychological, moral, political, and epistemological foundations of religious belief, practice, and institutions. (Bacc Core Course) CROSSLISTED as PHL 310.

REL 312. *ASIAN THOUGHT (4). Familiarizes students with key figures in the history of Asian religious ideas and philosophy. While the emphasis will be on the philosophical traditions of Asia, it will quickly become apparent that philosophy and religion are not so easily distinguishable in many Asian traditions. Areas of thought studied will include Hindu, Buddhist, Confucian, and Taoist. (NC) (Bacc Core Course) CROSSLISTED as PHL 312.

## REL 315. *GANDHI AND NONVIOLENCE (4)

 An examination of the life and work of Mohandas K. Gandhi, the 20th century activist and author, and the theory and practice of nonviolence in his life and work. Emphasis will be placed upon Gandhi's biographical narrative, the development of satyagraha, Gandhi's nonviolent approach to social transformation, and post-Gandhian nonviolent movements. (Bacc Core Course) CROSSLISTED as PHL 315.
## REL 316. INTELLECTUAL ISSUES OF

MEXICO AND MEXICAN AMERICANS (4). The philosophical, social, cultural, and political reality of Mexican Americans and their historical roots in Mexico since the Spanish Conquest. Analysis of internal colonialism, racism, machismo, fatalism, alienation, cultural identity, as well as more contemporary including NAFTA, immigration, and the U.S.-Mexican relations. (NC) CROSSLISTED as PHL 316

REL 324. *ANCIENT JEWISH HISTORY (4). History of Judaism from the Second Temple through the early Rabbinic period (539 BCE--200 CE). Covers historical origins and developments of Judaism including the canonization of the Bible, Jewish life in the Persian and GrecoRoman worlds, and the beginnings of Diasporic and Rabbinic Judaism. (Bacc Core Course) CROSSLISTED as HST 324.

REL 325. *EARLY CHRISTIANITY: ORIGINS TO 600 (4). Traces early Christianity from its origins to the beginning of the Middle Ages. It deals with the origins and Jewish background of Christianity in Palestine, the ministry and teachings of Jesus, the spread of Christianity throughout the Roman Empire by his disciples and early missionaries, the formation of the New Testament canon, the development of Christian doctrine, controversies over heresy, and the origin of monasticism and the Papacy. (Bacc Core Course) CROSSLISTED as HST 325.

REL 327. HISTORY OF MEDIEVAL EUROPE (4). Cultural, political, and economic history of the European Middle Ages from the fall of the Roman Empire in the West to the Renaissance. Covers 284 A.D. to 1000. Not offered every year. (H). CROSSLISTED as HST 327. PREREQS: HST/ REL 327 and HST/REL 328 need not be taken in sequence.

REL 328. HISTORY OF MEDIEVAL EUROPE (4). Cultural, political, and economic history of the European Middle Ages from the fall of the Roman Empire in the West to the Renaissance. Covers 1000 to 1400 . Not offered every year. (H) CROSSLISTED as HST 328. PREREQS: HST/ REL 327 and HST/REL 328 need not be taken in sequence.

REL 330. HISTORY OF EARLY MODERN
EUROPE (4). Political, social, intellectual, and cultural history of Europe from 1400-1789. Focuses on the Reformation. Not offered every year. (H) CROSSLISTED as HST 330. PREREQS HST/REL 329, HST/REL 330, and HST/REL 331 need not be taken in sequence.

## REL 333. MEDIEVAL AND EARLY MODERN

SPANISH HISTORY (4). From Islamic conquest to conquest of America, the social, religious, political and economic history of Spain from 1000 to 1700. Offered fall term in odd years. (H) CROSSLISTED as HST 333.

## REL 344. *PACIFISM, JUST WAR, AND

TERRORISM (4). An examination of the philosophical and theological issues pertaining to pacifism, justified war, and forms of terrorism in Islamic and Western traditions. Special attention is given to concepts of jihad, justifications of war, and restraints on conduct in war. (Bacc Core Course) CROSSLISTED as PHL 344.

## REL 345. *FIRST FREEDOM: RELIGIOUS

LIBERTY AND INTOLERANCE (4). An examination of the religious, philosophical, political, and historical issues regarding religious freedom, conscience, and disestablishment as enshrined in the First Amendment and as illustrated by historical and contemporary examples of religious intolerance in the United States. (Bacc Core Course) CROSSLISTED as PHL 345.

REL 350. *MODERN LATIN AMERICA (4). History of Latin America leading up to and after Spanish and Portuguese conquest. Focus on indigenous American, European and African cultures and religions in contact under colonial government and economic systems. Covers the period from 1400 to 1810. (H) (NC) (Bacc Core Course) CROSSLISTED as HST 350. PREREQS: HST 350 and HST 351 need not be taken in sequence.
REL 352. *AFRICANS IN LATIN AMERICAN
HISTORY (4). A survey of the role of Africans and their descendants in Latin American history, linking the history of the Americas, Europe and Africa. (Bacc Core Course) CROSSLISTED as HST 352. PREREQS: HST 350 and HST 351 suggested.
REL 364. *UNITED STATES RELIGION AND SOCIAL REFORM (4). Provides an awareness of how various religious groups have thought about and engaged with social change pertaining to slavery, feminism, civil rights, same-sex marriage, and immigration. Focus on reading primary sources related to each of these issues. (Bacc Core Course) CROSSLISTED as HST 364.

REL 371. *PHILOSOPHIES OF CHINA (4). A study of the traditional philosophies of China, including Confucianism, Taoism, Mohism, Legalism, and Buddhism. Not offered every year. (NC) (Bacc Core Course) CROSSLISTED as PHL 371. PREREQS: 3 credits of philosophy or upperdivision standing.

REL 387. *ISLAMIC CIVILIZATION (4). Political, social, and religious developments from 600 to 1400. Early history and the formation of Islamic society to the Mongol invasion. (H) (NC) (Bacc Core Course) CROSSLISTED as HST 387. PREREQS: HST/REL 387 and HST/REL 388 need not be taken in sequence

REL 388. *ISLAMIC CIVILIZATION (4). Political, social, and religious developments from 1400 to the present. The expansion of Islam, Turkic, and Asian dynasties, impact of Western imperialism and modern Islamic world. (H) (NC) (Bacc Core

Course) CROSSLISTED as HST 388. PREREQS: HST/REL 387 and HST/REL 388 need not be taken in sequence.

REL 399. SPECIAL TOPICS (1-4). This course is repeatable for a maximum of 12 credits.

REL 402. INDEPENDENT STUDY (1-12). This course is repeatable for a maximum of 16 credits.
REL 405. READING AND CONFERENCE (1-4). This course is repeatable for a maximum of 12 credits.
REL 411. GREAT FIGURES IN PHILOSOPHY
(4). Study of the works of a major philosopher such as Plato, Aristotle, Descartes, Hume, Kant, or Marx. Each course normally devoted to the work of a single figure. Need not be taken in sequence. Not offered every year. (H) CROSSLISTED as PHL 411/PHL 511. This course is repeatable for a maximum of 16 credits. PREREQS: 6 credits of philosophy and sophomore standing.
REL 415. SELECTED TOPICS (1-4). This course is repeatable for a maximum of 12 credits.

REL 425. *THE HOLOCAUST IN ITS HISTORY (4). An inquiry into the causes, course, and impact of the Holocaust. The general theme of anti-Semitism in European history is explored for background. Topics discussed for comparative purposes include anti-Semitism in American history; other episodes of mass murder in the 20th century. Not offered every year. (H) (Bacc Core Course) CROSSLISTED as HST 425, HST 525.

## REL 430. HISTORY OF BUDDHIST

PHILOSOPHY (4). Examination of the major philosophical schools, texts, and thinkers in Buddhist history, emphasizing its Indian origins, but looking beyond to the various Buddhist traditions throughout Asia. (NC) CROSSLISTED as PHL 430/PHL 530.
REL 431. BUDDHISM, NON-VIOLENCE,
AND SOCIAL JUSTICE (4). Investigates the philosophical grounding of Buddhist ideas about non-violence, justice and social responsibility. Looks at broad-based Buddhist social activism movements and leaders; their methods of training, issues and types of actions taken by "Socially Engaged Buddhists" living Buddhist traditions. CROSSLISTED as PHL 431.

## REL 432. *YOGA AND TANTRIC TRADITIONS

(4). An examination of the theory and practice of yoga and tantra in the traditions of Hinduism, Buddhism, and Jainism, and in their contemporary popular manifestations. Emphasis on the representation of yoga and tantra in Indian literature and history, including contemplative practices, bodily disciplines, and ritual. (Bacc Core Course) CROSSLISTED as PHL 432/PHL 532.
REL 433. *THEORY AND PRACTICE OF MODERN YOGA (4). An examination of the phenomenon of modern yoga in theory and in practice. Emphasis on the roots of contemporary forms of yoga in the intersection between traditional Hindu and Buddhist formulations of yoga, Indian wrestling and martial arts, European gymnastics, and cosmopolitan conceptions of "bodily culture" of both European and Indian origins. CROSSLISTED as PHL 433, PHL 533. (Bacc Core Course)
REL 434. *SPIRITUALITY AND ECOLOGY: GREEN YOGA (4). An exploration of the relationship between spirituality and ecological engagement in traditional contexts and in contemporary spirituality, with a global focus on contemplative practices rooted in Indian tradition, such as yoga. CROSSLISTED as PHL 434, PHL 534.

REL 434H. *SPIRITUALITY AND ECOLOGY: GREEN YOGA (4). An exploration of the relationship between spirituality and ecological engagement in traditional contexts and in contemporary spirituality, with a global focus on contemplative practices rooted in Indian tradition, such as yoga. CROSSLISTED as REL 434H,

REL 534H. PREREQS: Honors College approval required.
REL 436. PHILOSOPHY AND RELIGION (3). Examination of significant philosophical issues or movements and their relationship to theology and religion. CROSSLISTED as PHL 436/PHL 536. PREREQS: 6 credits of philosophy and sophomore standing.
REL 443. *WORLD VIEWS AND
ENVIRONMENTAL VALUES (3). A comparative study of world-views (secular and religious, Western and Eastern, modern and ancient) and how they affect concepts of nature, environmental values, and selected environmental issues. (NC) (Bacc Core Course) CROSSLISTED as PHL 443, PHL 543. PREREQS: One introductory-level science course and sophomore standing.

## REL 443H. *WORLD VIEWS AND

ENVIRONMENTAL VALUES (3). A comparative study of world-views (secular and religious, Western and Eastern, modern and ancient) and how they affect concepts of nature, environmental values, and selected environmental issues. (NC) (Bacc Core Course) CROSSLISTED as PHL 443H. PREREQS: One introductory-level science course and sophomore standing. Honors College approval required.
REL 444. *BIOMEDICAL ETHICS (4). Application of ethical principles and decision-making processes to selected problems in medicine, health care, and biotechnology. Special attention given to end-of-life choices, reproductive rights and technologies, organ transplantation, research ethics, genetic engineering, and allocating scarce resources. An interdisciplinary focus that draws on social, legal, economic, and scientific issues in ethical decisions in medicine. (H) (Bacc Core Course) CROSSLISTED as PHL 444/PHL 544. PREREQS: Sophomore standing
REL 444H. *BIOMEDICAL ETHICS (4). Application of ethical principles and decisionmaking processes to selected problems in medicine, health care, and biotechnology. Special attention given to end-of-life choices, reproductive rights and technologies, organ transplantation, research ethics, genetic engineering, and allocating scarce resources. An interdisciplinary focus that draws on social, legal, economic, and scientific issues in ethical decisions in medicine. (H) (Bacc Core Course) PREREQS: Sophomore standing and Honors College approval required.

## REL 448. NATIVE AMERICAN PHILOSOPHIES

(4). Native American perspectives on ways of knowing, sources of meaning and ethics, the nature of reality, self, community, and cosmos. Includes lectures, scholarship, story-telling, poetry, theater, and music as forums for this exploration. Introduces ideas of leading Native American thinkers about the human relation to the natural world, sources of strength and wisdom, the nature of time and place and spirit, right ways of acting in communities, both civic and biotic, and the place of beauty in a well-lived life. (NC) CROSSLISTED as ES 448/ES 548, PHL 448/PHL 548.
REL 455. DEATH AND DYING (3). A
multidisciplinary study of cultural, philosophical, and religious perspectives on death, dying, and grieving. Not offered every year. CROSSLISTED as PHL 455, PHL 555. PREREQS: 6 credits of philosophy or sophomore standing.
REL 461. ART AND MORALITY (4). The arts in context of their connections to, and conflicts with, varied conceptions of the common good. Topics include free expression and community standards, museums and obligations toward cultural treasures, art in public places, public funding of art, the politics of taste. CROSSLISTED as PHL 461/PHL 561. PREREQS: Sophomore standing.
REL 466. RELIGION AND U.S. FOREIGN RELATIONS (4). An examination of the intersection of religion and U.S. foreign relations from the late nineteenth century to the present. Surveys major events in U.S. diplomacy, including
war and peace and explores the role of religion and religious ideas in shaping national identity, core values, and civil religion. CROSSLISTED as HST 466/HST 566. PREREQS: HST 202 and HST 203 or upper-division standing.
REL 470. RELIGION IN THE AMERICAN WEST (4). The history of religion in the American West. Examines four themes in the religious history of the American West: locations (the designation of particular places as special), migrations (movement in and out of the region), adaptations changes over time, in response to changing conditions), and discrimination (recognition of difference, as well as prejudicial treatment based on difference). Engages with various primary and secondary sources, including texts, films, and photographs. CROSSLISTED as HST 470.
REL 485. *POLITICS AND RELIGION IN
THE MODERN MIDDLE EAST (4). The role
of religious and secular ideologies in the politics of the 20th century Middle East. Topics include the impact of liberal and nationalist thought, the Iranian revolution, radical Islamist movements, and Zionism. (H) (NC) (Bacc Core Course) CROSSLISTED as HST 485/HST 585. PREREQS: Upper-division standing or instructor approval required.

## REL 511. GREAT FIGURES IN PHILOSOPHY

(4). Study of the works of a major philosopher such as Plato, Aristotle, Descartes, Hume, Kant, or Marx. Each course normally devoted to the work of a single figure. Need not be taken in sequence. Not offered every year. CROSSLISTED as PHL 411/PHL 511. This course is repeatable for a maximum of 16 credits. PREREQS: 6 credits of philosophy and sophomore standing.
REL 525. THE HOLOCAUST IN ITS HISTORY
(4). An inquiry into the causes, course, and impact of the Holocaust. The general theme of anti-Semitism in European history is explored for background. Topics discussed for comparative purposes include anti-Semitism in American history; other episodes of mass murder in the 20th century. Not offered every year. CROSSLISTED as HST 425, HST 525.

## REL 530. HISTORY OF BUDDHIST

PHILOSOPHY (4). Examination of the major philosophical schools, texts, and thinkers in Buddhist history, emphasizing its Indian origins, but looking beyond to the various Buddhist traditions throughout Asia. CROSSLISTED as PHL 430/PHL 530.
REL 531. BUDDHISM, NON-VIOLENCE,
AND SOCIAL JUSTICE (4). Investigates the philosophical grounding of Buddhist ideas about non-violence, justice and social responsibility. Looks at broad-based Buddhist social activism movements and leaders; their methods of training, issues and types of actions taken by "Socially Engaged Buddhists" living Buddhist traditions. CROSSLISTED as PHL 531.

## REL 532. YOGA AND TANTRIC TRADITIONS (4).

 An examination of the theory and practice of yoga and tantra in the traditions of Hinduism, Buddhism, and Jainism, and in their contemporary popular manifestations. Emphasis on the representation of yoga and tantra in Indian literature and history, including contemplative practices, bodily disciplines, and ritual. CROSSLISTED as PHL 432/PHL 532.REL 533. THEORY AND PRACTICE OF MODERN YOGA (4). An examination of the phenomenon of modern yoga in theory and in practice. Emphasis on the roots of contemporary forms of yoga in the intersection between traditional Hindu and Buddhist formulations of yoga, Indian wrestling and martial arts, European gymnastics, and cosmopolitan conceptions of "bodily culture" of both European and Indian origins. CROSSLISTED as PHL 433, PHL 533.
REL 534. SPIRITUALITY AND ECOLOGY:
GREEN YOGA (4). An exploration of the relationship between spirituality and ecological
engagement in traditional contexts and in contemporary spirituality, with a global focus on contemplative practices rooted in Indian tradition, such as yoga. CROSSLISTED as PHL 434, PHL 534.

REL 536. PHILOSOPHY AND RELIGION (3).
Examination of significant philosophical issues or movements and their relationship to theology and religion. CROSSLISTED as PHL 436/PHL 536. PREREQS: 6 credits of philosophy and sophomore standing.

## REL 543. WORLD VIEWS AND

ENVIRONMENTAL VALUES (3). A comparative study of world-views (secular and religious, Western and Eastern, modern and ancient) and how they affect concepts of nature, environmental values, and selected environmental issues. CROSSLISTED as PHL 443, PHL 543. PREREQS: One introductory-level science course and sophomore standing.
REL 544. BIOMEDICAL ETHICS (4). Application of ethical principles and decision-making processes to selected problems in medicine, health care, and biotechnology. Special attention given to end-of-life choices, reproductive rights and technologies, organ transplantation, research ethics, genetic engineering, and allocating scarce resources. An interdisciplinary focus that draws on social, legal, economic, and scientific issues in ethical decisions in medicine. CROSSLISTED as PHL 444/PHL 544. PREREQS: Graduate standing
REL 548. NATIVE AMERICAN PHILOSOPHIES
(4). Native American perspectives on ways of knowing, sources of meaning and ethics, the nature of reality, self, community, and cosmos. Includes lectures, scholarship, story-telling, poetry, theater, and music as forums for this exploration. Introduces ideas of leading Native American thinkers about the human relation to the natural world, sources of strength and wisdom, the nature of time and place and spirit, right ways of acting in communities, both civic and biotic, and the place of beauty in a well-lived life. CROSSLISTED as ES 448/ES 584, PHL 448/PHL 548.

REL 555. DEATH AND DYING (3). A
multidisciplinary study of cultural, philosophical, and religious perspectives on death, dying, and grieving. Not offered every year. CROSSLISTED as PHL 455, PHL 555. PREREQS: 6 credits of philosophy or sophomore standing.
REL 561. ART AND MORALITY (4). The arts in context of their connections to, and conflicts with, varied conceptions of the common good. Topics include free expression and community standards museums and obligations toward cultural treasures, art in public places, public funding of art, the politics of taste. CROSSLISTED as PHL 461/PHL 561. PREREQS: Sophomore standing.

## REL 566. RELIGION AND U.S. FOREIGN

RELATIONS (4). An examination of the intersection of religion and U.S. foreign relations from the late nineteenth century to the present. Surveys major events in U.S. diplomacy, including war and peace and explores the role of religion and religious ideas in shaping national identity, core values, and civil religion. CROSSLISTED as HST 466/HST 566. PREREQS: HST 202 and HST 203 or upper-division standing.
REL 570. RELIGION IN THE AMERICAN WEST (4). The history of religion in the American West. Examines four themes in the religious history of the American West: locations (the designation of particular places as special), migrations (movement in and out of the region), adaptations (changes over time, in response to changing conditions), and discrimination (recognition of difference, as well as prejudicial treatment based on difference). Engages with various primary and secondary sources, including texts, films, and photographs. CROSSLISTED as HST 570.
REL 585. POLITICS AND RELIGION IN THE
MODERN MIDDLE EAST (4). The role of religious and secular ideologies in the politics
of the 20th century Middle East. Topics include the impact of liberal and nationalist thought, the Iranian revolution, radical Islamist movements, and Zionism. CROSSLISTED as HST 485/HST 585. PREREQS: Graduate standing or instructor approval required.

## ■ TWENTIETH CENTURY STUDIES COURSES

TCS 407. SEMINAR (1-12). Advanced study of selected topics related to issues and problems in the twentieth century introduced in TCS core course offerings. Section I seminars will be graded pass/no pass and carry 1 credit; other sections will be graded A-F and will carry variable credit. This course is repeatable for a maximum of 16 credits.

TCS 507. SEMINAR (1-12). Advanced study of selected topics related to issues and problems in the Twentieth Century introduced in TCS core course offerings. Section I seminars will be graded $\mathrm{P} / \mathrm{N}$ and carry 1 credit; other sections will be graded A-F and will carry variable credit. This course is repeatable for a maximum of 16 credits.

## SCHOOL OF LANCUACE, CULTURE, AND SOCIETY

## Larry Roper, Director

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Oregon State University
Corvallis, OR 97331-4603
541-737-2759
Email: larry.roper@oregonstate.edu
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## FACULTY

Professors Brauner, Gross, Krause, Lee, Price, Rivera-Mills, Shaw, Wood
Associate Professors Boudraa, Cheyney, Davis, Driskill, Duncan, Heiduschke, Maldonado, Minc, Mize, Osei-Kofi, Sakurai, Thompson, Tilt, Yu Assistant Professors Barnd, Boovy, Carpena-Mendez, Gerkey, Herrera, LopezCevallos, K. Maes, Shirazi, Trujillo

## Senior Instructors Chavarria

Escala, Freehling-Burton, McCullough, Nakajima, Nolan, Palacios, Rolston, Warren
Instructors Cunningham, DavisMalewitz, Detar, Druckenmiller, Ehlers, Esterberg, Floyd, Freeman, Ho, Kim, Krebs, Kudlacek, Lazzaretti, C. Maes, Morales Ortiz, Mulas, Nakamura, Osborne-Gowey, Reece, Robelo, SchusterProvaznikova, Van Londen, Wingard

## Undergraduate Majors

Anthropology (BA, BS, HBA, HBS)

## Options

Archaeology
Biocultural Option
Cultural/Linguistic
General Anthropology (Ecampus only)
Ethnic Studies (BA, BS, HBA, HBS)
French (BA, HBA)
German (BA, HBA)
Spanish (BA, HBA)
Women, Gender, and Sexuality Studies
(BA, BS, HBA, HBS)

## Minors

Anthropology
Asian Languages and Cultures
Ethnic Studies
French
German
Global Development Studies
Queer Studies
Social Justice
Spanish
Women, Gender, and Sexuality Studies

## Undergraduate Certificates

Food in Culture and Social Justice Language in Culture
Latin American Affairs
Medical Humanities
Russian Studies [Pending termination]
Women, Gender, and Sexuality Studies

## Graduate Majors

Applied Anthropology (MA, MAIS, MS, PhD)
College Student Services Administration (EDM, MS)

Graduate Areas of Concentration
College and university characteristics and environments; history, development, and current issues in higher education; leadership and management of administrative departments; program oversight in specialized administrative areas such as financial aid, student activities, career services, multicultural affairs, recreational sports, and student housing; student development theory and application
Contemporary Hispanic Studies (MA)

## Graduate Area of Concentration

Contemporary Hispanic Studies
Women, Gender, and Sexuality Studies (MA, MAIS)

Graduate Areas of Concentration
Feminist Leadership
Gender, Rhetoric, and Representation
Health and Gender Justice
Social Justice Theory and Practice

## Graduate Minors

Anthropology
Applied Anthropology
Contemporary Hispanic Studies
Ethnic Studies
Graduate Area of Concentration
Ethnic Studies
Food in Culture and Social Justice
Foreign Languages and Literatures
Graduate Areas of Concentration
Modern languages, French, German, Spanish
Queer Studies
Women, Gender, and Sexuality Studies
Graduate Areas of Concentration
Contemporary Women's Issues
Leadership and Community Engagement Race, Class and Gender
Sexuality Studies
Transnational Perspectives

## Graduate MAIS

Anthropology
Applied Anthropology
Ethnic Studies
Foreign Languages and Literatures
French
German
Spanish
Women, Gender, and Sexuality Studies
Primary or Secondary Area

## ANTHROPOLOGY

Anthropology offers courses to meet the needs of students interested in a comprehensive understanding of human societies and cultures past and present. Prehistoric, historic, ethnographic, and linguistic study provides the basis for understanding how a variety of societies solve common problems. The anthropology curriculum provides a cross-cultural perspective, a sound basis for later professional or graduate education.

An anthropology degree enables students to pursue a broad range of jobs requiring a liberal arts background; for example, education, human and governmental services, law, business, media, and medicine. It prepares them especially well for work situations that emphasize cross-cultural awareness, international contacts, and management of cultural resources.
Anthropology bridges sciences and the humanities and develops critical thinking, communication skills, facility with group processes, and the ability to work independently. It can help students succeed in an increasingly interconnected and complex world.

## ETHNIC STUDIES

Ethnic studies is an established academic discipline traditionally defined by a concentration on the experiences and concerns of the four major ethnic minority groups historically under-represented in United States political and institutional life and in university curricula. Ethnic studies faculty bring a variety of methodological approaches to bear on the exploration of issues affecting African American, Asian American, Chicano/aLatino/a, and American Indian and Alaskan Native communities. A degree in ethnic studies provides a sound basis for future work in graduate or professional programs and is of value to students interested in careers in a broad range of jobs requiring a liberal arts background and an understanding of race, ethnicity, and cultural competency.

## WORLD LANGUAGES

World languages and cultures (WLC) offers major programs leading to a BA degree in French, German, or Spanish, as well as minor programs in Asian Languages and Cultures, French, Ger-
man, and Spanish for undergraduate students with majors in other disciplines. The major and minor programs provide students with the opportunity to develop language skills and to raise their understanding of and appreciation for foreign literatures and cultures.
Proficiency in a foreign language and knowledge of a foreign culture can enhance career possibilities in fields that range from business, library work, and government service to park service, oceanography, agriculture, and forestry. Students often find it possible to combine languages with another major such as business administration, psychology, political science, sociology, and professional training to prepare for an exciting, internationally oriented career.
Study of a language other than English can help students improve communication skills in English, become more linguistically aware, develop analytical skills, and communicate on an equal basis with non-English-speaking people. Through language courses, students can gain a global perspective, more fully understand different cultures and value systems, and enhance their general knowledge of world development.
An undergraduate academic major (French, German, or Spanish) is required as a prerequisite to the Fifth-Year Teacher Education Program designed to prepare students for licensure and/or other graduate programs in education.

WLC cooperates with institutions of the Oregon University System and with other Northwest institutions of higher education in administering overseas study centers at Beijing and Fujian, China; Quito, Ecuador; Angers, Lyon, and Poitiers, France; Baden-Wurttemberg and Cologne, Germany; Tokyo, Japan; Seoul, Korea; Puebla, Mexico; Santander, Oviedo, and Segovia, Spain. Students may also study at different institutions in Russia and in the former Soviet republics. See the International Programs section of this catalog.

## LIBERAL STUDIES

The BA degree in Liberal Studies offers area studies that allow students to use language and culture courses taken in the School of Language, Culture, and Society to fulfill core course requirements. Students majoring in liberal studies can elect to complete their undergraduate degree using prestructured programs in the following areas: Asian studies, Chinese studies, European studies, Japanese studies, and Russian studies [suspended].
A minimum of 45 credits of course work in the concentration area is required to complete the Liberal Studies major.

## WOMEN, GENDER, AND SEXUALITY STUDIES

The Women, Gender, and Sexuality Studies Program at OSU relies on multidisciplinary approaches to the study of gender and sexuality, particularly as they intersect with race, ethnicity, class, culture, religion, nation, and ability. Our program emphasizes academic excellence, the use of feminist and anti-racist pedagogies, and scholarship that contributes to social change and justice. We are committed to challenging all forms of oppression, and we center queer, transnational, and women of color feminisms in our curriculum. We encourage creative, innovative, and collaborative frameworks of study, and we work to meet the needs of a wide range of students, developing curriculum that is meaningful for students who wish to pursue careers in academia, as well as those who may be interested in community organizing, feminist nonprofit work, and/or other professional areas. The Women, Gender, and Sexuality Studies Program offers an undergraduate major, minor, and certificate, as well as the MA in Women, Gender, and Sexuality Studies and the opportunity to declare Women, Gender, and Sexuality Studies as a primary and/or secondary area in the MAIS. We also offer undergraduate and graduate minors in Queer Studies.

## CERTIFICATE PROGRAMS

The School of Language, Culture, and Society participates in the Languages in Culture, Latin American Affairs and Russian Studies certificate programs. These interdisciplinary programs are designed for students who wish to combine their school major with a broad knowledge of Latin American or Russian affairs, past and present, or who wish to explore how languages and cultures interact. Core courses are typically taken in language, in the humanities and social sciences.

## GRADUATE PROGRAMS

The School of Language, Culture, and Society offers master's of arts and doctor of philosophy degrees in Applied Anthropology, College Student Services Administration; Contemporary Hispanic Studies; and Women, Gender, and Sexuality Studies. Graduate minors are offered in Anthropology; Applied Anthropology; Contemporary Hispanic Studies; Ethnic Studies; Food in Culture and Social Justice; Foreign Languages and Literatures; and Women, Gender, and Sexuality Studies.
Students may earn the Master of Arts in Interdisciplinary Studies (MAIS) degree in the areas of anthropology, applied anthropology, ethnic studies, foreign languages and literatures, French, German, Spanish, and women studies. Typically, candidates who select French,

German or Spanish as one of their primary areas complete graduate course work in language, linguistics, literature and culture studies. To be admitted to a foreign language component of the MAIS degree, students must meet the Graduate School's general entrance requirements and obtain the consent of a graduate faculty member of the School of Language, Culture, and Society who agrees to serve as the field advisor. A maximum of 6 graduate credits completed at an overseas study center may be used to satisfy requirements for any one of three fields of the MAIS degree.

## UNDERGRADUATE MAJORS WITH OPTIONS

## ANTHROPOLOGY (BA, BS, CRED,

 HBA, HBS)
## Also available via Ecampus.

Anthropology seeks to promote awareness of the complexity and diversity of humanity and the human experi-ence-past and present-in its cultural, biological, and ecological contexts. An Anthropology degree emphasizes cultural sensitivity and enables students to pursue a broad range of jobs requiring a liberal arts background; for example, education, human and governmental services, law, business, media and medicine. It prepares them especially well for work situations that emphasize cross-cultural awareness, international contacts and management of cultural resources. Anthropology curriculum provides a sound basis for later professional or graduate education. Four options are available: archaeology, biocultural, cultural/linguistic, and general anthropology. Completion of an option is required to earn a degree in Anthropology.

## Anthropology Core ( 24 Credits)

ANTH 110. *Introduction to Cultural Anthropology (3)
ANTH 230. Time Travelers (3)
ANTH 240. Introduction to Biological Anthropology (3)
ANTH 345. *Biological and Cultural Constructions of Race (3)
ANTH 350. *Language, Culture, and Society (4)

ANTH 370. ^Anthropological Theories (4)
ANTH 475. Anthropology in Practice (4) Majors must additionally fulfill requirements for one of the options, plus upper-division electives in Anthropology to complete a total of 60 credits for the major. The following restrictions apply:

- No more than 6 credits internship ANTH 410
- No more than 6 credits from ANTH 311-ANTH 319, *Peoples of the World classes $(3,3)$
- At least 12 credits at the 400 -level excluding blanket-numbered (ANTH 401-ANTH 409) and internship (ANTH 410) credits
- A grade of C - or better is required for all courses used to complete major requirements. Such courses cannot be taken $\mathrm{S} / \mathrm{U}$.
Major Code: $\mathbf{8 6 0}$


## OPTIONS

## ARCHAEOLOGY OPTION

Also available via Ecampus.
The Archaeology option focuses on the material remains of past cultures and their environments. This option provides students with the essential field and laboratory skills necessary to collect, analyze, and curate archaeological materials, as well as meet the ethical issues and legal responsibilities concerning cultural resource management.

## Anthropology Core (24 Credits)

ANTH 110. *Introduction to Cultural Anthropology (3)
ANTH 230. Time Travelers (3)
ANTH 240. Introduction to Biological Anthropology (3)
ANTH 345. *Biological and Cultural
Constructions of Race (3)
ANTH 350. *Language, Culture, and Society (4)

ANTH 370. ^Anthropological Theories (4)
ANTH 475. Anthropology in Practice (4)

## Archaeology Option (33 credits)

Foundations (20 credits):
ANTH 332. Archaeological Inference (4)
ANTH 435. Cultural Resources: Policy and Procedures (4)
ANTH 438. Archaeology Field School (12)

## Survey Courses

Select 2 classes for a minimum of 7 credits:
ANTH 331. Mesoamerican Prehistory (3)
ANTH 432. *Domestication, Urbanization, and the Rise of Civilization (4)
ANTH 433. First Americans, Last Frontiers (4)

ANTH 434. North America After the Ice Age (4)
ANTH 436. Northwest Prehistory (4)
ANTH 439. Archaeology of Foragers (4)
Methods Courses
Select 2 classes for a minimum of 6 credits:
ANTH 421. Analysis of Lithic Technologies (4)

ANTH 422. Historic Materials Analysis (4)
[Pending approval 96641]
ANTH 423. Methods and Theory in
Historical Archaeology (4)
ANTH 424. Settlement Archaeology (4)
ANTH 425. Ceramic Analysis in
Archaeology (4)
ANTH 430. Topics in Archaeology (1-4)
ANTH 437. Geoarchaeology (4)
ANTH 492. Archaeology Laboratory
Methods (1-3)
ANTH 497. Archeological Field Methods (1-3)

## Take remaining Anthropology

 credits to equal $\mathbf{6 0}$ credits with the following restrictions:- No more than 6 credits blanket numbers ANTH 401-ANTH 409
- No more than 6 credits internship ANTH 410
- No more than 6 credits from ANTH *311-ANTH 319, *Peoples of the World classes $(3,3)$
- At least 12 credits at the 400 level excluding blanket-numbered (ANTH 401-ANTH 409) and internship (ANTH 410) credits


## Total=60

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Option Code: 854

## BIOCULTURAL OPTION

Also available via Ecampus.
The Biocultural option focuses on the ways evolutionary biology, politicaleconomy, ecology, and culture interact to influence human health and behavior, over time and in cross-cultural perspective. This option prepares students to engage in ethical fieldwork, laboratory work, and data analyses, to ultimately understand the intersections of biomarkers and other indicators of human health status, demographic processes, social relationships, cultural norms, and political and economic inequalities.

## Anthropology Core ( $\mathbf{2 4}$ Credits)

ANTH 110. *Introduction to Cultural Anthropology (3)
ANTH 230. Time Travelers (3)
ANTH 240. Introduction to Biological
Anthropology (3)
ANTH 345. *Biological and Cultural
Constructions of Race (3)
ANTH 350. Language, Culture, and Society (4)

ANTH 370. ^Anthropological Theories (4)
ANTH 475. Anthropology in Practice (4)
Biocultural Option (30 additional credits)
Foundations (10 credits):
ANTH 371. Research Methods in Cultural Anthropology (4)
ANTH 374. *Anthropology and Global Health (3)
ANTH 383. *Introduction to Medical Anthropology (3)
Survey Courses ( $\mathbf{3}$ classes for a minimum of 12 credits):
ANTH 441. Human Evolution (4)
ANTH 446. *Forensic Anthropology (4)
ANTH 449. Biocultural Perspectives on
Human Reproduction (4)
ANTH 461. Neuroanthropology (4)
ANTH 477. Ecological Anthropology (4)
ANTH/FCSJ 486. Anthropology of Food (4)
Advanced Theory and Methods (2 classes
for a minimum of 8 credits):
ANTH 442. Human Adaptability (4)
ANTH 443. Human Osteology Lab (4)
ANTH 444. Nutritional Anthropology (4)

Take remaining Anthropology credits to equal 60 credits with the following restrictions:

- No more than 6 credits blanket numbers ANTH 401-ANTH 409
- No more than 6 credits internship ANTH 410
- No more than 6 credits from ANTH 311-ANTH 319, *Peoples of the World classes (3,3,)
- At least 12 credits at the 400 level excluding blanket-numbered (ANTH 401-ANTH 409) and internship (ANTH 410) credits.


## Footnotes

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Option Code: 864

## CULTURAL/LINGUISTIC OPTION

## Also available via Ecampus.

The Cultural/Linguistic option focuses on the diversity of living cultures, in terms of their subsistence practices, sacred and secular rituals, economies, technology, arts, language, and social institutions. This concentration prepares the student to engage in ethnographic research and to follow ethical and professional standards for cultural sensitivity in interpersonal and cross-cultural interactions.

## Anthropology Core (24 Credits)

ANTH 110. *Introduction to Cultural

## Anthropology (3)

ANTH 230. Time Travelers (3)
ANTH 240. Introduction to Biological
Anthropology (3)
ANTH 345. *Biological and Cultural
Constructions of Race (3)
ANTH 350. Language, Culture, and Society (4)

ANTH 370. ^Anthropological Theories (4)
ANTH 475. Anthropology in Practice (4)
Cultural/Linguistics Option (27
additional credits)
Methods: (2 classes)
ANTH 371. Research Methods in Cultural
Anthropology (4)
ANTH 490. Topics in Methodology (4)
ANTH 498. Oral Traditions (1-3)
Cultural Production: (2 classes for a minimum of 8 credits)
ANTH 452. Folklore and Expressive Culture (4)

ANTH 465. Popular Culture: An
Anthropological Perspective (4)
ANTH 468. Anthropology of Childhood (4)
ANTH 478. Anthropology of Tourism (4)

## Economic Systems and the

Environment: (3 classes for a minimum of 12 credits)
ANTH 361. Food Studies in a Social Justice Perspective (4)
ANTH 466. *Rural Anthropology (4)
ANTH 471. Cash, Class and Culture:
Hunter-Gatherers to Capitalism (4)
ANTH 477. Ecological Anthropology (4)
ANTH 479. Anthropology of Migration (4)

## Take remaining Anthropology

 credits to equal $\mathbf{6 0}$ credits with the following restrictions:- No more than 6 credits blanket numbers ANTH 401-ANTH 409
- No more than 6 credits internship ANTH 410
- No more than 6 credits from ANTH 311-ANTH 319, *Peoples of the World classes $(3,3)$
- At least 12 credits at the 400 level excluding blanket-numbered (ANTH 401-ANTH 409) and internship (ANTH 410) credits


## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Option Code: 855

## GENERAL ANTHROPOLOGY OPTION

## Also available via Ecampus.

Anthropology Core (24)
ANTH 110. *Introduction to Cultural Anthropology (3)
ANTH 230. Time Travelers (3)
ANTH 240. Introduction to Biological Anthropology (3)
ANTH 345. *Biological and Cultural
Constructions of Race (3)
ANTH 350. Language, Culture, and Society (4)

ANTH 370. ^Anthropological Theories (4)
ANTH 475. Anthropology in Practice (4)

## General Option (32 credits)

## Methods:

Select from below (16 credits)
ANTH 371. Research Methods in Cultural Anthropology (4)
ANTH 421. Analysis of Lithic Technologies (4)

ANTH 422. Historic Materials Analysis (4)
[Pending approval 96641]
ANTH 423. Method and Theory in
Historical Archaeology (4)
ANTH 424. Settlement Archaeology (4)
ANTH 425. Ceramic Analysis in
Archaeology (4)
ANTH 430. Topics in Archaeology (1-4)
ANTH 437. Geoarchaeology (4)
ANTH 438. Archaeology Field School (12)
ANTH 443. Human Osteology Lab (4)
ANTH/FCSJ 444. Nutritional Anthropology (4)

ANTH 460. Etnographic Field School (6)
ANTH 490. Topics in Methodology (1-4)
ANTH 492. Archaeology Laboratory
Methods (1-3)
ANTH 497. Archaeological Field Methods (1-3)
ANTH 498. Oral Traditions (1-3)

## Survey:

Select from below (16 credits)
ANTH 331. Mesoamerican Prehistory (3)
ANTH 332. Archaeological Inference (4)
ANTH/FCSJ 361. *Food Justice (4)
ANTH 372. *Social Networks and Society (3)
ANTH 374. *Anthropology and Global Health (3)
ANTH 383. *Introduction to Medical

Anthropology (3)
ANTH 432. *Domestication, Urbanization, and the Rise of Civilization (4)
ANTH 433. First Americans, Last Frontiers (4)

ANTH 434. North America After the Ice Age (4)
ANTH 435. Cultural Resources: Policy and Procedures (4)
ANTH 436. Northwest Prehistory (4)
ANTH 439. Archaeology of Foragers (4)
ANTH 441. Human Evolution (4)
ANTH 442. Human Adaptability (4)
ANTH 446. Forensic Anthropology (4)
ANTH 447. *Arctic Perspectives on Global Problems (4)
ANTH 449. Biocultural Perspectives on Human Reproduction (4)
ANTH 452. Folklore and Expressive Culture (4)

ANTH 461. Neuroanthropology (4)
ANTH 466. *Rural Anthropology (4)
ANTH 468. Anthropology of Childhood (4)
ANTH 471. Cash, Class and Culture:
Hunter-Gatherers to Capitalism (4)
ANTH 473. *Gender, Ethnicity, and Culture (4)

ANTH 477. Ecological Anthropology (4)
ANTH 478. *Anthropology of Tourism (4)
ANTH 479. Anthropology of Migration (4)
ANTH 481. *Natural Resources and
Community Values (4)
ANTH 484. *Wealth and Poverty (4)
[Pending approval]
ANTH 486/FCSJ 486. Anthropology of Food (4)

Take remaining Anthropology credits to equal 60 credits with the following restrictions:

- No more than 6 credits blanket numbers ANTH 401-ANTH 409
- No more than 6 credits internship ANTH 410
- No more than 6 credits of *Peoples of the World courses ANTH 311-ANTH 319
- At least 12 credits at the 400 level excluding blanket-numbered (ANTH 401-ANTH 409) and internship (410) credits


## Total=60

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: $\mathbf{8 6 3}$


## ETHNIC STUDIES (BA, BS, CRED,

 HBA, HBS)Ethnic Studies is an interdisciplinary field critically engaging the historical and ongoing impact of race and ethnicity primarily in the US but within a global context. A major in Ethnic Studies provides students with a strong background and set of analytical skills to address issues of difference and inequity in a wide range of areas, from state policy and institutions to pop culture, media, and literature.

## Ethnic Studies Major Core-

Required of all majors ( 14 credits):
ES 101. *Introduction to Ethnic Studies (3)
ES 201. *Inventing Ethnic America (3)
Either ES 350. ${ }^{\wedge}$ Public Discourse and
Writings on Race (4)
or ES 354. ^Literature of Ethnic
Minorities in the United States (4)
ES 451. Theories of Race and Ethnicity (4)
Ethnic Studies 200-level Courses
Choose 3 courses from among the following (12 credits):
ES 211. *Introduction to Latino/a Studies (4) (Pending Approval 97876)

ES 213. *Contemporary Issues in Latino/a
Studies (4) (Pending Approval 97877)
ES 221. *Survey of African American Studies I (4)
ES 223. *Survey of African American Studies II (4)
ES 231. *Introduction to Asian American Studies (4)
ES 233. *Asian Pacific American Activism and Empowerment (4)
ES 241. *Introduction to Native American Studies (4)
ES 243. *Native American Assimilation and Activism (4)

## Ethnic Studies Upper-Division

Elective Courses ${ }^{1}$
Choose 6 courses from among the following (22-24 credits, at least 3 courses must be 400 level):
ES 311. Narratives of Latino Migrations (3)
ES 314. Chicano/a Literature (3)
ES 321. African American Political and Social Thought: 20th Century (4)
ES 323. Contemporary African American Social Discourse (4)
ES 332. Asian Pacific Americans and the Media (4)
ES 334. *Asian Pacific American Literature (4)
ES 345. Native Americans in Oregon (4)
ES 351. *Ethnic Minorities in Oregon (4)
ES 353. *Environmental Racism (4)
ES 355. *Race, Space, and Difference (4)
ES 357 *Farmworker Justice Movements (4)
ES/QS/WGSS 375. *Arts and Social Justice (4)
ES 399. Special Topics (3-4)
ES 411. Chicano/as in/on Film (3)
ES/QS/WGSS 431. *Queer of Color Critiques (4)

ES 437. *(En)gendering Asian Pacific America (4)
ES 444. Native American Law: Tribes,
Treaties, and the United States (4)
ES 445. *Native American Science and Technology (4)
ES/PHL/REL 448. Native American
Philosophies (4)
ES 452. *Ethnicity in Film (4)
ES 453. *Ethnohistory Methodology (4)
ES 457. *Literature by Women of Color in the United States (4)
ES 458. Racial Patterns of Urbanization (4)
ES/ANTH/WLC 459. Language, Race and Racism in the U.S.: Advanced Study (4)
ES 460. Ethnicity and Social Justice (4)
ES 461. Racism and the Prison Industrial Complex (4)
ES/FCSJ 464. Food and Ethnic Identity:
Decolonizing Our Food and Body (3)
ES/QS/WGSS 472. *Indigenous Two-Spirit
and Queer Studies (3)
ES/QS/WGSS 477. *Queer/Trans People of
Color Arts and Activism (4)
ES 499. Special Topics (3-4)
A grade-point average of 2.0 is required and majors must earn a grade of C - or above in all major courses.

## Total=48-50 credits (30-32 upper <br> division)

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
${ }^{1}$ With prior written ES faculty approval, students may elect to include $4-8$ credits of ES 403 Thesis, ES 406 Projects, or ES 410 Internship, in lieu of one or two 300-level upper division elective courses.


## Major Code: 894

FRENCH (BA, CRED, HBA)

## Also available via Ecampus.

The minimum upper-division course requirements are listed below. Additional requirements are available from departmental advisors and the departmental office. Required courses may not be taken S/U.

## French (45)

FR 311, FR 312, FR 313. Third-Year French $(3,3,3)^{\mathbf{8}}$
FR 333. *French Culture and Society Since the Revolution (3) ${ }^{7,8}$
FR 339. French: Francophone Studies (3) ${ }^{\mathbf{8}}$
FR 340. Introduction to French Literary Studies (3) ${ }^{8}$
FR 411. Fourth-Year French (3) ${ }^{7,8}$
FR 439. ^French: Francophone Studies (3) ${ }^{8}$
Upper-division French electives, to be approved by the major advisor (21)

## Total=45

All prospective majors and minors must see a departmental advisor at least once a year.

WLC majors must participate in an OUS and OSU-approved study abroad program or in an approved internship experience in a French-, German-, or Spanish-speaking country or fulfill this requirement as determined by the director.

Students who do not find an OSUapproved program (this includes OUS and other programs run through IDEA and OUS) that fits their academic and/ or geographical needs can petition to have a different program approved by a sub-committee of the Study Abroad Advisory Committee. The requirement for petitioning a program must include an academic and/or geographic reason why a student is choosing a program that is not on the approved list.

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
${ }^{7}$ Must be taken on the Corvallis campus.
${ }^{8}$ These courses must be completed with a B average.
Major Code: 925


## GERMAN (BA, CRED, HBA)

## Also available via Ecampus.

Individualized development of German language proficiency and intercultural competence via intensive content-based language learning, mentoring and guided internship experience.
Required courses may not be taken S/U. Majors are required to complete each required course with a grade of Bor better.

## German (49)

GER 111, GER 112, GER 113. First-Year German (4,4,4)
GER 211, GER 212, GER 213. Second-Year German (4,4,4)
GER 311, GER 312, GER 313. Third-Year German (3,3,3)
GER 379. Proctor Experience (1-2). Needs to be taken for at least 1 credit.
GER 410. Internship (1-16). Needs to be taken for at least 6 credits.
GER 411. ^Fourth-Year German (3)
GER 412, GER 413. Fourth-Year German $(3,3)$

## Total=49

All prospective majors and minors must see a departmental advisor at least once a year.
German majors must participate in a study abroad program or in an approved internship experience in a Germanspeaking country or fulfill this requirement as determined by the director of the School of Language, Culture, and Society.

Students who do not find a program that fits their academic and/or geographical needs can petition to have a different program approved by the director of the School of Language, Culture, and Society. The requirement for petitioning a program must include an academic and/ or geographic reason why a student is choosing a program that is not on the approved list.

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Major Code: 930

## SPANISH (BA, CRED, HBA)

## Also available via Ecampus.

The minimum upper-division course requirements are listed below. Additional requirements are available from departmental advisors and the departmental office. Required courses may not be taken S/U.

## Spanish (45)

SPAN 331, SPAN 332, SPAN 333. *The Cultures of Spain and Portugal ( $3,3,3)^{\mathbf{8}}$ and/or SPAN 336, SPAN 337, SPAN 338, SPAN 339. *Latin American Culture $(3,3,3,3)^{8}$
SPAN 438. ^Selected Topics in LusoHispanic Culture (3) ${ }^{\mathbf{8}}$
Upper-division Spanish electives, to be approved by the major advisor (24-33)

## All prospective majors and minors must see a departmental advisor at least once a year.

WLC majors must participate in an OUS and OSU-approved study abroad program or in an approved internship experience in a French-, German-, or Spanish-speaking country or fulfill this requirement as determined by the director.

Students who do not find an OSUapproved program (this includes OUS and other programs run through IDEA and OUS) that fits their academic and/ or geographical needs can petition to have a different program approved by a sub-committee of the Study Abroad Advisory Committee. The requirement for petitioning a program must include an academic and/or geographic reason why a student is choosing a program that is not on the approved list.

## Footnotes:

${ }^{8}$ These courses must be completed with a B average.

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: 940

## WOMEN, GENDER, AND SEXUALITY STUDIES (BA, BS, CRED, HBA, HBS)

## Also available via Ecampus.

The Women, Gender, and Sexuality Studies major represents an interdisciplinary curriculum composed of course work in the social sciences and humanities with gender as the focal point of analysis. The curriculum examines women's experiences, past and present, through feminist theory and research to better understand differences in power and privilege based on gender as well as race and ethnicity, religion, socioeconomic status, sexual identity, age, physical appearance, and mental or physical ability. Many classes incorporate a social activism component, and students are required to complete an internship to put their course work into action as well as a senior research project to understand and contribute to the scholarship in this field.

A total of 51 credits is required for the major, 43 credits of required Women, Gender, and Sexuality Studies core courses and 8 credits of elective courses chosen from Women, Gender, and Sexuality Studies or Women, Gender, and Sexuality Studies Program courses. An approved program course is one that has a focus on gender and/or women's issues, is taught in a unit other than the Women, Gender, and Sexuality Studies Program, and has been approved as fulfilling the requirements of a Women, Gender, and Sexuality Studies course.
No more than 9 credits of Women, Gender, and Sexuality Studies Program courses may be used toward the major. All required course work must be taken
on campus and no more than 6 credits of online elective course work can be used toward the on-campus major.

## Baccalaureate Core (48 credits excluding WIC)

## Liberal Arts Core ( $\mathbf{1 5}$ credits)

Fine Arts (3)
Humanities (3)
Non-Western Culture (3)
Social Sciences (3)
Plus one additional course from the above areas (3)

## College of Liberal Arts BA/BS

## Requirements (15)

- The BA requires second year language proficiency at the college level with C grade or better
- The BS requires 15 credits in science, computer science, and quantitative studies.
Free Electives to allow for a minor or second major (51)
WGSS Major Requirements (51 credits)
With the exception of WIC, courses used to satisfy requirements for the major may not be used to meet baccalaureate or liberal arts core requirements.


## Core (43)

WGSS 223. *Women: Self and Society (3)
WGSS 224. *Women: Personal and Social Change (3)
WGSS/QS 262. *Introduction to Queer Studies (3)
WGSS 270. Violence Against Women (3)
WGSS 410. Internship (3)
WGSS 414. *Systems of Oppression in
Women's Lives (4)
WGSS 416. Theories of Feminism (4)
WGSS 418. Feminist Research Methods (4)
WGSS 430. Women of Color Feminisms (4)
WGSS 460. ^Women and Sexuality (3)
WGSS 480. *Women in a Cross-Cultural
Context (4) [Pending approval]
WGSS 498. Senior Seminar (4)

## Electives (8)

WGSS Electives
ANTH/ES/WGSS/WLC 373. Approaches to Social Justice (3)
ES/WGSS/QS 431. *Queer of Color Critiques (4)

ES/WGSS/QS 472. ^Indigenous Queer and Two-Spirit Studies (4)
PHL/WGSS 417. Feminist Philosophies (3)
PSY/WGSS 466. *Fat Studies (3)
WGSS 199. Special Studies (3)
WGSS 230. *Women in the Movies (3)
WGSS 235. *Women in World Cinema (3)
WGSS 240. *Gender and Sport (3)
WGSS 280. *Women Worldwide (3)
WGSS 299. Topics in Women, Gender, and Sexuality Studies (3)
WGSS 320. *Gender and Technology (3)
WGSS 325. *Disney: Gender, Race, Empire (3)

WGSS 340. *Gender and Science (3)
WGSS 350. *Politics of Motherhood in a Global Context (3)
WGSS 360. *Men and Masculinities in a

Global Context (3)
WGSS 364. *Transgender Politics (3)
WGSS 380. *Muslim Women (3)
WGSS 399. Topics in Women, Gender, and Sexuality Studies (1-6)
WGSS 402. Independent Study (3)
WGSS 406. Projects (1-16)
WGSS 440. *Women and Natural Resources (3)

WGSS 450. Ecofeminism (3)
WGSS/QS 462 *Queer Theories (4)
WGSS 465. Women, Weight, and Body Image (3)
WGSS/QS 473. Transgender Lives (3)
WGSS 482. Global Perspectives on Women's Health (4)
WGSS 486. Global Experience I (1)
WGSS 487. Global Experience II (1)
WGSS 488. Global Experience III (1)
WGSS 490. Self-Esteem and Personal Power (3)

WGSS 495. *Global Feminist Theologies (4)
WGSS 496. *Feminist Theologies in the United States (4)
WGSS 499. Topics (1-6)
Program Course Electives
ANTH 473. *Gender, Ethnicity, and Culture (4)

COMM 432. Gender and Communication (3)

ENG 362. *American Women Writers (4)
ENG 416. *Power and Representation (4)
ENG 497. *International Women's Voices (4)

ENG 498. Women and Literature (4)
ES 437. *(En)Gendering Asian Pacific America (4)
ES 457. *Literature by Women of Color in the United States (4)
HDFS 444. Family Violence and Neglect (4)
HDFS 447. *Families and Poverty (4)
HST 362. Women in United States History (4)

HST 368. *Lesbian and Gay Movements in Modern America (4)
HST 390. *Mideast Women: In Their Own Words (4)
HST 432. The History of Sexuality (4)
HST 435 The History of European Women
From 1400 to 1789 (4)
PS 317. Gender and Politics (4)
PS 363. *Gender and Race in American Political Thought (4)
PS 425. *Gender and the Law (4)
PSY 426. *Psychology of Gender (4)
PSY 456. Social Development (4)
SOC 312. *Sociology of the Family (4)
SOC 430. Gender and Society (4)
SOC 466. International Development:
Gender Issues (4)
SOC 480. *Environmental Sociology (4)

## Total=180

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Major Code: 808


## UNDERGRADUATE MINORS

## ANTHROPOLOGY MINOR

Also available via Ecampus.
Undergraduate students may elect the Anthropology minor to complement course work in their major discipline.

A grade of C - or better is required for all courses used to complete minor requirements. Such courses cannot be taken for an S/U grade.

ANTH 101. *Introduction to Anthropology (3)
Additional Anthropology credits to total 27 with the following restrictions:

- No more than 6 blanket credits (ANTH 401-409).
- No more than 6 internship credits (ANTH 410)
- No more than 6 Peoples credits (ANTH 311-319).
- At least 12 400-level credits, excluding blanket credits and internship credits.


## Total=27

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: $\mathbf{8 6 0}$

## ASIAN LANGUAGES AND

## CULTURES MINOR

## Requirements

A total of 21 upper-division credits is required. Fifteen credits out of the 21 credits must be completed in residence with an average grade of C . The courses offered through Ecampus are included.

## Chinese Concentration

CHN 311, CHN 312, CHN 313. Third-Year
Chinese Language $(3,3,3)$
CHN 333. *Chinese Culture III (3)
Japanese Concentration
JPN 311, JPN 312, JPN 313. Third-Year
Japanese (3,3,3)
JPN 333. *Japanese Culture (3)

## Electives

9 credits from the following courses
after consultation with an advisor:
CHN 331. *Chinese Culture I (3)
CHN 332. *Chinese Culture II (3)
JPN 331. *Japanese Culture I (3)
JPN 332. *Japanese Culture II (3)
Special topics in Chinese/Japanese Language, culture, and literature (1-3 credits):
CHN 399. Special Topics (1-3)
JPN 399. Special Topics (1-3)
Courses related to China or Japan in other OSU departments or completed abroad on an approved study-abroad program.

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Minor Code: 939


## ETHNIC STUDIES MINOR

Ethnic Studies is an interdisciplinary field founded in activism and critically engaging the historical and ongoing impact of race and ethnicity primarily in the US but within a global context. A minor in Ethnic Studies provides students with a strong background and set of analytical skills to address issues of difference and inequality in a wide range of areas, from state policy and institutions to pop culture, media, and literature, and is a valuable complement to any major.

## Ethnic Studies Minor Core -

Required of all minors ( 6 credits):
ES 101. *Introduction to Ethnic Studies (3)
ES 201. *Inventing Ethnic America (3)
Ethnic Studies 200-level Courses Choose two courses from among the following (8 credits):
ES 211. *Introduction to Latino/a Studies (4) (Pending Approval 97876)

ES 213. *Contemporary Issues in Latino/a
Studies (4) (Pending Approval 97877)
ES 221. *Survey of African American Studies I (4)
ES 223. *Survey of African American Studies II (4)
ES 231. *Introduction to Asian American Studies (4)
ES 233. *Asian Pacific American Activism and Empowerment (4)
ES 241. *Introduction to Native American Studies (4)
ES 243. *Native American Assimilation and Activism (4)
Ethnic Studies Upper-Division

## Elective Courses

Choose four courses from among the following (14-16 credits, at least two courses must be 400-level):
ES 311. Narratives of Latino Migrations (3)
ES 314. Chicano/a Literature (3)
ES 321. African American Political and Social Thought: 20th Century (4)
ES 323. Contemporary African American Social Discourse (4)
ES 332. Asian Pacific Americans and the Media (4)
ES 334 *Asian Pacific American Literature (4)

ES 345. Native Americans in Oregon (4)
ES 350. ^Public Discourse and Writings on Race (4)
ES 351. *Ethnic Minorities in Oregon (4)
ES 353. *Environmental Racism (4)
ES 354. ^Literature of Ethnic Minorities in the United States (4)
ES 355. *Race, Space, and Difference (4)
ES 357. *Farmworker Justice Movements (4)
ES/QS/WGSS 375. *Arts and Social Justice (4)

ES 399. Special Topics (3-4)
ES 411. Chicano/as in/on Film (3)
ES/QS/WGSS 431. *Queer of Color Critiques (4)

ES 437. *(En)gendering Asian Pacific America (4)
ES 444. Native American Law: Tribes, Treaties, and the United States (4)
ES 445. *Native American Science and Technology (4)

ES/PHL/REL 448. Native American
Philosophies (4)
ES 451. Theories of Race and Ethnicity (4)
ES 452. *Ethnicity in Film (4)
ES 453. *Ethnohistory Methodology (4)
ES 457. *Literature by Women of Color in the United States (4)
ES 458. Racial Patterns of Urbanization (4)
ES/ANTH/WLC 459. Language, Race and
Racism in the U.S.: Advanced Study (4)
ES 460. Ethnicity and Social Justice (4)
ES 461. Racism and the Prison Industrial
Complex (4)
ES/FCSJ 464. Food and Ethnic Identity:
Decolonizing Our Food and Body (3)
ES/QS/WGSS 472. *Indigenous Two-Spirit and Queer Studies (3)
ES/QS/WGSS 477. *Queer/Trans People of
Color Arts and Activism (4)
ES 499. Special Topics (3-4)
A grade-point average of 2.0 and a
grade of C - or above in all minor course work are required.
Total Required: 28-30 credits (14-16
upper division)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Minor Code: 894


## FRENCH MINOR

Also available via Ecampus.
FR 211, FR 212, FR 213. Second-Year French (4,4,4)
FR 311, FR 312. Third-Year French $(3,3)$
FR 313. Third-Year French (3)
or FR 315. French for Business (3)
FR 333. *French Culture and Society
Since the Revolution (3)
FR 339. French: Francophone Studies (3)
Upper-division French electives (may
include FR 270, France Today) to be ap-
proved by the minor advisor (3).

## Total=30

All prospective majors and minors must see a departmental advisor at least once a year.
Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Minor Code: 925


## GERMAN MINOR

Also available via Ecampus.
GER 111, GER 112, GER 113. First-Year German (4,4,4)
GER 211, GER 212, GER 213. Second-Year German (4,4,4)
GER 311, GER 312, GER 313. Third-Year German (3,3,3)
GER 403. Thesis (1)
GER 410. Internship (1)

## Total=35

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Minor Code: 930


## GLOBAL DEVELOPMENT <br> STUDIES MINOR

"Development" refers to the expansion of economic activity, integration into global flows of information and commerce, and improvement of the quality of life. The undergraduate minor program in Global Development Studies at OSU is designed to help students understand the challenges faced by developing communities and countries, including economic inequality, poverty, health and wellness, and the sustainable use of natural resources. Emphasis is placed on interdisciplinary and practical solutions to international development problems.

Courses address both thematic and regional dimensions of international development. Some required and elective courses may also count toward fulfillment of baccalaureate core requirements in categories such as "Contemporary Global Issues," "Cultural Diversity," "Science, Technology and Society," and "Social Processes and Institutions." Courses will be offered on campus, with the potential for some instruction via Ecampus. Students will be encouraged to participate in research projects, international experiences, and applied work (e.g., internships, service learning, etc.).

Students putting together a program of study in Global Development Studies should consult their academic advisor. Students are required to take a minimum of 27 credits, as follows.

## Core

Choose 2 of the following (minimum 6 credits):
ANTH 482. *Anthropology of International
Development (4)
ECON 455. *Economic Development (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
PS 345. *Politics of Developing Nations (4)

## Regional Focus

Choose 2 courses that focus on a single region of the developing world (minimum 6 credits): (e.g., HST 350. History of Latin America, and ANTH 313. Peoples of the WorldLatin America)
ANTH 311. *Peoples of the World-North America (3)
ANTH 312. *Peoples of the World-Europe (3)
ANTH 313. *Peoples of the World-Latin
America (3)
ANTH 314. *Peoples of the World-Middle East (3)
ANTH 315. *Peoples of the World-Africa (3)
ANTH 316. *Peoples of the World-South
and Southeast Asia (3)
ANTH 317. *Peoples of the World-Pacific (3)
ANTH 318. *Peoples of the World-China (3)
ANTH 319. *Peoples of the World-Japan and
Korea (3)
GEOG 311. *Geography of Africa (3)
GEOG 313. *Geography of Asia (3)
GEOG 314. *Geography of Latin America (3)
HST 320. *Ancient Near East (4)
HST/REL 350. *Modern Latin America (4)
or HST 351. *Modern Latin America (4)
HST 381, HST 382. *History of Africa $(4,4)$
HST 392. *Modern China and Japan (4)
PS 344. *Latin American Politics (4)
PS 346. *Middle East Politics (4)
PS 348. *Chinese Politics (4)
PS 350. *Japanese Politics (4)

## Thematic/Topical Focus

Choose 4 or 5 courses from the following (minimum 15 credits):
ANTH 374. *Anthropology and Global Health (3)
ANTH 466. *Rural Anthropology (4)
ANTH 481. *Natural Resources and
Community Values (3)
COMM 326. Intercultural Communication (3)

COMM 440. Theories of Conflict and Conflict Management (3)
CROP 330. *World Food Crops (3)
GEOG 240. *Climate Change, Water, and Society (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. Population, Consumption, and Environment (3)
GEOG 431. Global Resources and
Development (3)
GEOG 432. *Geography of Food and
Agriculture (3)
H 333. *Global Public Health (3)
HDFS 447. *Families and Poverty (3)
HEST 310. *Introduction to Community
Engagement and Community-Based
Design (3)
HEST 411. Engineering Design for
Emergency and Low-Resource
Environments (3)
HEST 412. Multidisciplinary Case Studies in
Humanitarian Engineering, Science and
Technology (3)
PHL/REL 443. *World Views and
Environmental Values (3)
PS 205. *Introduction to International Relations (4)
PS 458. *International Political Economy (4)
SOC 381. Social Dimensions of
Sustainability (4)
SOC 460. The Sociology of Globalization (4)
SOC 481. *Society and Natural Resources (4)
SUS 102. *Introduction to Environmental Science and Sustainability (4)
WGSS 280. *Women Worldwide (3)
WGSS/ES/ANTH/WLC 373. Approaches to Social Justice (3)
WGSS 480. *International Women (3)

## Experiential, International or ServiceLearning (0-3)

Highly encouraged, but not required. Students may fulfill this by taking credits in any discipline listed above involving experiential learning, international exchange, or service learning (e.g., ANTH 409. Practicum, ANTH 410. Internship). The OSU Center for Civic Engagement can also help connect students with opportunities.

## Total=27 minimum

Footnotes:

* Baccalaureate Core Course


## $\wedge$ Writing Intensive Course (WIC)

## Minor Code: 711

## QUEER STUDIES MINOR

## Also available via Ecampus.

The undergraduate minor in Queer Studies prepares students to examine how gender and sexuality are constructed and policed and, further, imagines liberatory futures for people of all genders and sexualities. Centering itself on the activism and scholarship of women of color, transnational feminisms, Two-Spirit Indigenous people, and Lesbian, Gay, Bisexual, Transgender, and Queer (LGBTQ) people of color, this minor examines homophobia and transphobia's relationship with racism, colonialism, sexism, ableism, classism and other forms of power. A total of 33 credits is required for the
minor, with at least 12 of these credits at the upper-division level.

## Core Requirements (25 Credits)

QS/WGSS 262. *Introduction to Queer
Studies (3)
QS/WGSS 364. *Transgender Politics (3)
QS 409. Practicum: Projects in Queer
Studies (3)
QS/WGSS/ES 431. *Queer of Color Critiques (4)

QS/WGSS 462. *Queer Theories (4)
QS/WGSS/ES 472. ^Indigenous Two-Spirit and Queer Studies (3)
QS/WGSS 476. *Transnational Sexualities (4)

## Electives (8 Credits)

The remaining 8 credits may be taken from the Queer Studies electives (any course with the QS prefix) and from approved program courses offered by other departments.
ART/QS/WGSS 432.* Gender, Sexuality, and the Photographic Image (3)
HST 368. *Lesbian and Gay Movements in Modern America (4)
QS 299. Special Topics (3)
QS/WGSS 362: *Serving the LGBTQ+
Communities (3) (Pending approval)
QS/WGSS/ES 375. *Arts and Social Justice (4)

QS 399. Special Topics in Queer Studies (3)
QS 409. Practicum: Projects in Queer Studies (3)
QS/WGSS 473. Transgender Lives (3)
QS/WGSS/ES 477. *Queer/Trans People of
Color Arts and Activism (4)
QS 499. Special Topics in Queer Studies (4)
WGSS 360. *Men and Masculinities in a
Global Context (3)
WGSS 430. Women of Color Feminisms (4)
WGSS 460. ^Women and Sexuality (3)
WGSS/PSY 466. *Fat Studies (4)
WGSS 480. *International Women (3)

## Total=33

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Minor Code: $\mathbf{8 7 7}$


## SOCIAL JUSTICE MINOR

The Social Justice minor provides interdisciplinary academic classes in which students think critically about social justice and experiential learning activities in which students engage in the work of social justice. The program addresses local, national and international issues of social justice. A core of theory, case studies, and practice is combined with elective courses from across the College of Liberal Arts that address the following areas: histories, cultures and geographies of dominance; experiences of oppression; theories of justice; policies, institutions, and structures that promote or hinder equity; and collective action or processes of change leading to social justice.

The Social Justice minor is a collaboration of the School of Language, Culture, and Society, the School of History, Philosophy, and Religion, and the School of Public Policy.

## Required courses (9 credits)

ANTH/ES/WGSS/WLC 373. Approaches to Social Justice (3)
ANTH/ES/WGSS/WLC 410. Internship (4) (3 of active internship, 1 of critical discussion about internship.)
ANTH/ES/WGSS/WLC 485. Capstone in Social Justice (2)

## Electives:

18 credits taken in at least three different designators with at least one globallyoriented course (indicated by ${ }^{\mathbf{1}}$ ). Categorization of courses is to facilitate advising and choice by students.

## Theories and Perspectives

ANTH 345. *Biological and Cultural
Constructions of Race (3)
ES 451. Theories of Race and Ethnicity (4)
ES 460. Ethnicity and Social Justice (4)
PHL 160. *Quests for Meaning: World Religions (4) ${ }^{1}$
PHL 205. *Ethics (4)
PHL 207. *Political Philosophy (4)
PHL 220. *World-Views and Values in the Bible (4) ${ }^{\mathbf{1}}$
PHL 315. *Gandhi and Nonviolence (4) ${ }^{\mathbf{1}}$
PHL 344. *Pacifism, Just War, and Terrorism (4) ${ }^{1}$

PHL 365. *Law in Philosophical Perspective (4)

PHL 431. Buddhism, Non-Violence, and Social Justice (4) ${ }^{\mathbf{1}}$
PHL 444. *Biomedical Ethics (4)
PAX 201. Study of Peace and the Causes of Conflict (3)
PS 206. *Introduction to Political Thought (4)

PS 322. *Constitutional Law: Civil Rights and Liberties (4)
PS 361. Classical Political Thought (4)
PS 362. Modern Political Thought (4)
PS 363. *Gender and Race in American Political Thought (4)
PS 461. Environmental Political Theory (4)
PS 462. Theories of Law (4)
QS/WGSS 462. *Queer Theories (3)
WGSS 416. Theories of Feminism (4)

History, Cultures, Experiences of Oppression; Collective Movements
ANTH 315. *Peoples of the World-Africa (3) ${ }^{1}$
ANTH 468. Anthropology of Childhood (4) ${ }^{1}$
ANTH 473. *Gender, Ethnicity, and Culture (4) ${ }^{1}$

ANTH 481. *Natural Resources and
Community Values (3) ${ }^{1}$
ANTH 484. *Wealth and Poverty (3) ${ }^{1}$
ENG/FILM 220. *Topics in Difference,
Power, and Discrimination (4)
FR 329.*Francophone Cultures in Film (3) ${ }^{1}$
FR 339. French: Francophone Studies (3) ${ }^{\mathbf{1}}$
HST 368. *Lesbian and Gay Movements in
Modern America (4)
HST 425. *The Holocaust in its History (4) ${ }^{1}$
QS/WGSS 262. *Introduction to Queer
Studies (3)
QS/WGSS 431. *Queer of Color Critiques (3)
QS/ES/WGSS 472. ^Indigenous Two-Spirit
and Queer Studies (3)
SOC 471. Social Movements (4)

## Systems of Oppression:

## Institutions, Policies, Structures

ANTH 251. *Language in the USA (3)
ANTH 383. *Introduction to Medical Anthropology (3)
ANTH 471. Cash, Class and Culture: Hunter-Gatherers to Capitalism (4) ${ }^{\mathbf{1}}$
ANTH 482. *Anthropology of International Development (4) ${ }^{1}$
COMM 368. Propaganda and Social Control (3)

COMM 460. Rhetoric of Revolutionaries and Reactionaries: 1750 to 1900 (3)
COMM 462. Rhetoric of Revolutionaries and Reactionaries: 1900-Present (3)
FCSJ 361. Food Studies in a Social Justice Perspective (4) ${ }^{1}$
GER 231. *German Dictatorships: Nazis and Communists (3) ${ }^{1}$
HST/PHL 210. *Religion in the United States (4)

HST 362. Women in United States History (4)
HST 363. Women in United States History (4)
PHL 316. Intellectual Issues of Mexico and
Mexican Americans (4) ${ }^{1}$
PS 317. Gender and Politics (4)
PS 425. *Gender and the Law (4)
QS/WGSS 364. *Transgender Politics (3)
SOC 426. *Social Inequality (4)
SOC 439. Welfare and Social Services (4)
SOC 450. Sociology of Education (4)
SOC 472. Giving and Voluntarism (4)
WGSS 414. *Systems of Oppression in
Women's Lives (4)
WGSS 495. *Global Feminist Theologies (4) ${ }^{1}$

## Total=27

Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
${ }^{1}$ Globally-oriented course
Minor Code: 271


## SPANISH MINOR

Also available via Ecampus.
SPAN 211, SPAN 212, SPAN 213. Second-
Year Spanish (4,4,4)
SPAN 311. Advanced Spanish Grammar (3) or SPAN 314. Third-Year Spanish for
Native Speakers (3)
SPAN 317. Directed Reading and Writing in

Spanish (3)
or SPAN 318. Introduction to SpanishLanguage Literature (3)
or SPAN 327. Mexican-American
Literature and Composition for Spanish
Heritage Language Learners (3)
Select 6 credits from below:
SPAN 331, SPAN 332, SPAN 333. *The
Cultures of Spain and Portugal $(3,3)$
SPAN 336, SPAN 337, SPAN 338. *Latin
American Culture $(3,3,3)$
SPAN 339. Mexican Immigrant Experience in the United States (3)
Upper-division Spanish electives, to be approved by the minor advisor (6)

## Total=30

All prospective majors and minors must see a departmental advisor at least once a year.

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Minor Code: 940
WOMEN, GENDER, AND SEXUALITY STUDIES MINOR


## Also available via Ecampus.

The Women, Gender, and Sexuality Studies minor provides an exploration of gender and a focus on the lives of women both in the U.S. and worldwide. It studies the interaction of gender within a complex matrix of class, race, age, ethnicity, nationality, sexual identity, appearance, and ability.

Students are expected to take the bulk of their course work toward the minor from the core and elective courses offered by the Women, Gender, and Sexuality Studies Program. A total of 27 credits is required for the minor, with at least 12 credits at the upper-division level.
All required course work must be taken on campus and no more than 3 credits of online elective course work can be used toward the on-campus minor.

## Core Requirements (24)

WGSS 223. *Women: Self and Society (3)
WGSS 224. *Women: Personal and Social
Change (3)
WGSS 262. *Introduction to Queer Studies (3)

WGSS 410. Internship (3)
WGSS 414. *Systems of Oppression in
Women's Lives (4)
WGSS 416. Theories of Feminism (4)
WGSS 480. *Women in a Cross-Cultural Context (4) [Pending approval]
The remaining 3 credits may be taken from Women, Gender, and Sexuality Studies electives and from approved program courses offered in other departments. An approved program course is one that has a focus on gender and/or women's issues, is taught in a unit other than the Women, Gender, and Sexuality Studies Program, and has been approved as fulfilling the requirements of a Women, Gender, and Sexuality Studies Program course. See the electives for the

Women, Gender, and Sexuality Studies major. In addition, WGSS 270: Violence Against Women (3), WGSS 340: *Gender and Science (3), WGSS 430: Women of Color Feminisms (4), and WGSS 460: ${ }^{\wedge}$ Women and Sexuality (4) may be taken as electives for the minor. No more than 3 credits of WGSS 402 Independent Study and WGSS 410 Internship may count toward the minor.

## Total=27

Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Minor Code: 908

## GRADUATE MAJORS

## APPLIED ANTHROPOLOGY (MA,

## MS, PhD, MAIS)

The MA, MS, and PhD degrees in Applied Anthropology provide advanced education in anthropology that will prepare students to practice their skills in occupations in both public and private sectors at the local, national, and international levels. These courses of study integrate anthropological theory and practice within a specific concentration chosen by the student.
MA, MS Program Requirements (64 credits)

1) Core Requirements (12 credits)

ANTH 575. Theory of Culture (4)
ANTH 593. Statistical Applications in Anthropology (4)*
ANTH 595. Anthropological Research
Design (4)
*Or equivalent course, e.g., H 524.
Introduction to Biostatistics (4) or FES
523. Quantitative Analysis in Social Science (4)
2) Major Specialization (12 credits)

Take courses in one of the following options:
a) Archaeology:

ANTH 531. Archaeological Theory (4)
ANTH 535. Cultural Resources: Policy and
Procedures (4)
ANTH 543. Human Osteology (4)
b) Biocultural Anthropology:

ANTH 583. Advanced Medical
Anthropology (4)
ANTH 585. Uses of Anthropology (4)
ANTH 591. Ethnographic Methods (4)
c) Cultural/Linguistic

## Anthropology:

ANTH 576. Advanced Anthropological
Theory Seminar (4)
ANTH 585. Uses of Anthropology (4)
ANTH 591. Ethnographic Methods (4)

## 3) Supporting Courses in

Anthropology (12 credits)
Any combination of 500-level courses as approved your advisor/committee
4) Outside Skills/Minor (15 credits)

Any combination of 500-level courses in another discipline that facilitate student's mastery of knowledge and skills needed
to carry out original research as approved by advisor/committee

## 5) Internship (6-12 credits)

## 6) Thesis (6-12 credits)

7) Seminar, "Tan Sack" (1 credit)

ANTH 507. Seminar (1)

## 8) Degree Type Proficiencies

For the Master of Arts degree, the student must show second proficiency (including American Sign Language) equivalent to that attained at the end of a second-year university course in that language with a grade of "C" (2.00) or better. Students who have successfully completed at least two years of high school in a language other than English will have fulfilled this requirement.

The Master of Science degree is an option for students specializing in archaeology and biocultural anthropology, where appropriate, pending approval of the major professor. The student must show technical proficiency in areas that emphasize scientific methodological skills (e.g., GIS, statistics, and epidemiology). The MS student is encouraged to undertake the 15 credits of proficiency as part of their outside skills/minor requirements. This will be in lieu of the language proficiency required for MA. The courses for the MS degree must be completed and approved by the student's Committee before the student takes the final oral examination for the degree. Students specializing in cultural/linguistic anthropology are not eligible for the MS.

## MAIS Degree

The school also participates in the Master of Arts in Interdisciplinary Studies (MAIS) degree program. In other advanced degree programs, anthropology may be used as a minor. See the Graduate School for details.

## PhD Requirements (110 credits)

1) Students must have MA or MS in Anthropology or related discipline (34 credits)
Students must bring in graduate credits to cover the equivalent of the courses central to the MA/MS in Applied Anthropology at Oregon State University (20 credits, see below) plus 14 credits of graduate level Anthropology courses or graduate courses in relevant disciplines as agreed upon by the major professor. If these requirements are not met upon entrance to the program, they must be earned after admittance. Students will work with their major professors in consultation with the Director of Graduate Studies to assess what can be accepted from past work and what must be made up at OSU.
Central Courses of the MA/MS in Applied

## Anthropology

Two courses in Anthropological Theory (8 credits)

Statistics (4 credits)
Methods (such as Ethnographic Methods or Osteology or Archaeological Methods, etc.) (4 credits)
Course in Applied Anthropology or Uses of Anthropology (4 credits)

## 2) Specialization Courses (25 credits)

Specialization courses are those that enable students to develop their knowledge in order to do effective comprehensive exams and dissertation work in their particular field of expertise. Students work with their major professor and their Committee to determine what courses will be most helpful for them.

Specializations courses must include ANTH 695. Anthropological Research Design (4) for developing their dissertation research project, two courses in Anthropology, and 2 credits of "Tan Sack" (ANTH 607. Seminar). All other specialization courses may be within or outside of Anthropology.

## 3) Second Language Proficiency

Evidenced by passing two years of uni-versity-level second language study or by passing the proficiency exam. Must be completed before Comprehensive Exams are taken. A substitution of skill sets is possible for archaeology students in consultation with the major professor and the Director of Graduate Studies.
4) Graduate Minor is optional
5) Residency ( 6 credits)

ANTH 610. Internship
6) Comprehensive Exams (9 credits)

ANTH 699. Special Topics: Comprehensive Review

## 7) Dissertation ( $\mathbf{3 6}$ credits) <br> ANTH 603. Thesis

## Major Code: 8640

## COLLEGE STUDENT SERVICES ADMINISTRATION (EDM, MS)

Graduate Areas of Concentration College and university characteristics and environments; history, development, and current issues in higher education; leadership and management of administrative departments; program oversight in specialized administrative areas such as financial aid, student activities, career services, multicultural affairs, recreational sports, and student housing; student development theory and application

## Also available via Ecampus.

The College Student Services Administration program offers preparation in the organization, leadership and administration of programs, services, and facilities in postsecondary education, including college union/centers, recreational sports, student government and activities, residence life programs, student housing, financial aid, career services, and general student advising and academic support.

## CSSA students have two degree tracks from which to select:

This first degree track, the Master of Education (EdM), is earned through successful completion of all required program course work and successful completion and defense of a capstone portfolio. The capstone portfolio is a cumulative, comprehensive, and reflective form of student assessment. Completing a portfolio requires that the student address each program competency in a comprehensive, meaningful, and creative way. The portfolio "product" can be shared in any number of formats, including, but not limited to, writings, pictures, audio or video clips, and electronic media (websites, PowerPoint documents, etc.). Final portfolios are distributed to and evaluated in writing by a committee just prior to the last term of course work. A public, formal committee meeting with oral presentation and defense serves as the second method of evaluation.

The second degree track, the Master of Science (MS), is earned through successful completion of all required program course work and successful completion and defense of thesis. In addition to required course work and the thesis, students pursuing the MS degree must also demonstrate adequate evidence of competence and learning in each of the five CSSA competency areas. Demonstration of this evidence may take the form of an extended/detailed competency plan with select work samples or other methods approved by the major professor. This demonstration need not be a portfolio, but it should clearly show evidence of competency mastery. Thesis research should be reflected in the demonstration.

For thesis work, CSSA and university policies require students to convene (a) a proposal meeting to present their research plan (generally spring of the first year for full-time students or fall/winter of the second year for part-time students) and (b) a final defense for presentation and evaluation of the research and competency demonstration (final term of course work). Students who wish to pursue the MS should decide this early in their graduate program, ideally during the first term, since such research requires careful and lengthy planning. Major professors should be made aware of this decision.

## Graduation from the program requires the following:

- Successful completion of at least 54 credits of graduate-level course work, the majority of which are required in the major field of study (CSSA). Additionally, a minor or area of specialization is chosen and completed by the individual student; and
- Successful completion and
presentation of a capstone project (EdM degree) or a thesis capstone (MS degree) during the final year.
Additional information available at http://liberalarts.oregonstate.edu/ school-language-culture-and-society/cssa/ cssa-admission-prospective-students.


## Major Code: 2200

## CONTEMPORARY HISPANIC STUDIES (MA)

Graduate Areas of Concentration Contemporary Hispanic studies
The MA degree in Contemporary Hispanic Studies provides an alternative to traditional pre-doctoral programs focused on literary theory or linguistics.

Based on the multidimensional approach to language education promoted in the National Standards for Foreign Language Education, this program brings together theoretical knowledge and practical skills in a single program designed to prepare students for further graduate study or for careers in education, migrant programs, nongovernmental organizations, and other sectors affected by rapidly changing demographics. The integrated minor provides an additional exploration of themes related to intercultural communication from a broad, interdisciplinary perspective.

The Master of Arts in Contemporary Hispanic Studies requires completion of 48 credits of graduate-level course work. A 15-credit integrated minor emphasizing intercultural studies must also be completed.

## Core Requirements (33 credits)

## Spanish Language (6)

SPAN 561. Fifth-Year Spanish (3)
SPAN 562. Fifth-Year Spanish (3)

## Hispanic Cultural Studies (9)

SPAN 538. Selected Topics in Luso-Hispanic Culture (3)
Two other SPAN courses (6)
Hispanic Literature (6)
SPAN 544. Selected Topics in the Literature of Spain (3)
SPAN 545. Selected Topics in the Literature of Latin America (3)
SPAN 546. Recent Latin American Literature (3)

SPAN 547. Mexican Women Writers (3)
SPAN 548. Latin American Great Works (3)

## Field/Research Project (6)

SPAN 501. Research (3)
SPAN 510. Internship (3)
SPAN 563. Fifth-Year Spanish (3)

## Linguistics (6)

LING 545. Methods and Materials for
Second Language Acquisition (4)
LING 551. General Linguistics (3)
LING 599. Special Topics (3)
Integrated minor emphasizing intercultural studies ( 15 credits)
The integrated minor provides an ad-
ditional exploration of themes related to intercultural communication from a broad, interdisciplinary perspective and is comprised of other graduate-level courses approved in advanced by the Contemporary Hispanic Studies program coordinator.

AHE 507. Seminar (1-16)
AHE 599. Special Topics (1-3)
ANTH 550. Topics in Linguistic
Anthropology (1-4)
ANTH 551. Sociolinguistics (3)
ANTH 573. Gender, Ethnicity, and Culture (4)

ANTH 575. Theory of Culture (4)
ANTH 587. Language in Global Context (3)
ES 551. Theories of Race and Ethnicity (4)
ES 553. Ethnohistory Methodology (4)
HST 552. Modern Mexico (4)
HST 556. Problems in Latin American History (4)
PS 555. The United States as Viewed from Abroad (4)
SOC 537. Race and Ethnic Relations (4)
SOC 560. Comparative Societies (4)
SOC 566. International Development: Gender Issues (4)
COMM 516. Ethnography of
Communication (3)
COMM 526. Intercultural Communication:
Theories and Issues (3)
COMM 527. Cultural Codes in
Communication (3)
Major Code: $\mathbf{8 5 0 0}$

## WOMEN, GENDER, AND

SEXUALITY STUDIES (MA, PhD, MAIS)

Graduate Areas of Concentration
Feminist leadership; gender, rhetoric, and representation; health and gender
justice; social justice theory and practice
MA students in Women, Gender, and Sexuality Studies will take 41-43 credits of required course work, including at least one course from each of three cluster areas:

1. Women of Color Feminisms/Queer of Color Feminisms,
2. Global/Transnational Feminisms, and
3. Feminist Praxis, as well as 6 elective credits.
MA students must also demonstrate second-year proficiency in a second language.

PhD students in Women, Gender, and Sexuality Studies will take 27-28 credits of core requirements, as well as 36 dissertation credits, and 12 credits of electives in a concentration specific to their area of focus, for a total of 75-76 required credits. No more than two "slash" courses will be accepted toward the degree.

## MA in Women, Gender, and

Sexuality Studies
Core (41-43)
WGSS 503. Thesis (6)
WGSS 511/512/513. Orientation and
Professionalization I, II, III $(1,1,1)$
WGSS 514. Systems of Oppression in

Women's Lives (4)
WGSS 516. Theories of Feminism (4)
WGSS 518. Feminist Research (4)
WGSS 616. Multiracial, Transnational, and Queer Feminisms I (4)
All MA students must take at least one course from each of the following three clusters, and 6 additional credits of electives:

## Cluster \#1: Women of Color <br> Feminisms/Queer of Color

## Feminisms

WGSS 530. Women of Color Feminisms (4)
WGSS/ES/QS 531. Queer of Color Critiques (3)

WGSS/ES 575. Critical Race Feminisms and Outsider Jurisprudence (4)
WGSS/ES/QS 577. Queer/Trans People of Color Arts and Activism (3)
WGSS 583. Race, Gender, and Health Justice (4)

## Cluster \#2: Global/Transnational

## Feminisms

All MA students must take at least one of the following courses:
WGSS/ES/QS 572. Indigenous Two-Spirit and Queer Studies (3)
WGSS/QS 576. Transnational Sexualities (4)
WGSS 582. Global Perspectives on Women's Health (4)
WGSS 585. Transnational Feminisms (4)
WGSS 595. Global Feminist Theologies (4)

## Cluster \#3: Feminist Praxis

WGSS 510. Internship (3)
WGSS 521. Feminist Leadership (4)
WGSS 535. Feminist Teaching and Learning (4)

WGSS/GRAD 542. The Inclusive Classroom: Difference, Power, and Discrimination (3)
WGSS 586/587/588: Global Experience I, II, III (1,1,1)

## Second-year proficiency in a

 second language as demonstrated by:1. Two years of a college language sequence on the transcript.
2. Scoring at second-year proficiency on a language placement test.
3. Completing the 213 course of a language sequence while enrolled in the MA program.

## Electives (6)

Students may elect to take any WGSS/QS electives.

## Total Minimum Required Credits =

 41-43PhD in Women, Gender, and
Sexuality Studies
Core Requirements (27-28)
WGSS 518. Feminist Research (4)
or WGSS 619. Decolonizing Methods (4)
or WGSS 555. Feminist Textual and
Discourse Analysis (4)
(Students who have already taken WGSS 518 and WGSS 555 at OSU may take WGSS 619 or another approved methods course.)
WGSS 521. Feminist Leadership (4)
(Students who have already taken WGSS
521 at OSU will take WGSS 610 Internship
and Shadowing.)
WGSS 535. Feminist Teaching and Learning (4)
or WGSS/GRAD 542. The Inclusive Classroom: Difference, Power, and Discrimination (3)
WGSS 611. Colloquium (1) (Students must take 4 terms of colloquium and must present dissertation research once.)
WGSS 616. Multiracial, Transnational, and Queer Feminisms I (4)
WGSS 617. Multiracial, Transnational, and Queer Feminisms II (4)
WGSS 620. Social Justice Theory and Practice (4)
Thesis (36)
WGSS 603. Thesis (36)

## Electives (12)

Students may select a concentration in one of the four areas below or may work in consultation with their advisor to develop a 12 -credit concentration specific to their needs and interests. Students may also elect to take 12 elective credits from any WGGS graduate courses or other approved courses in any of the graduate concentrations.

## Graduate Concentrations

Minimum 12 credits of course work; no more than two of these courses may be "slash" courses.

## Feminist Leadership

## Core Courses:

WGSS 518. Feminist Research (4)
WGSS 610. Internship (Shadowing) (4)

## Gender, Rhetoric, and <br> Representation

## Core Courses:

ENG 598. Women and Literature (4)
WGSS 555. Feminist Textual and Discourse Analysis (4)

## Health and Gender Justice

## Core Courses:

WGSS 518. Feminist Research (4)
WGSS 582. Global Perspectives on Women's Health (4)
WGSS 583. Race, Gender, and Health Justice (4)

## Social Justice Theory and Practice

## Core Courses:

WGSS 514. Systems of Oppression in Women's Lives (4)
WGSS 518. Feminist Research (4)

## Major Code: 8008

## GRADUATE MINORS

ANTHROPOLOGY GRADUATE

## MINOR

The School of Language, Culture, and Society offers graduate work leading to a Master of Arts in Applied Anthropology. The school also offers graduate work leading to a master of arts in interdisciplinary studies and participates as a minor field in other advanced degree programs. A variety of individualized programs is available within the MAIS framework.

## Minor Code: 8600

## APPLIED ANTHROPOLOGY

## GRADUATE MINOR

The School of Language, Culture, and Society offers graduate work leading to a Master of Arts in Applied Anthropology. The school also offers graduate work leading to a master of arts in interdisciplinary studies and participates as a minor field in other advanced degree programs. A variety of individualized programs is available within the MAIS framework.
Minor Code: 8640

## CONTEMPORARY HISPANIC STUDIES GRADUATE MINOR

See an advisor for more information.
Minor Code: $\mathbf{8 5 0 0}$

## ETHNIC STUDIES GRADUATE MINOR

## Graduate Areas of Concentration

 Ethnic studiesGraduate work in the School of Language, Culture, and Society may serve as a field of study for the Master of Arts in Interdisciplinary Studies degree or as a minor in other advanced degree programs. The program offers an interdisciplinary exploration of the critical areas of race, class, ethnicity, and gender in American life, as well as focused study of the four major ethnic minority groups in the United States (African Americans, Asian Americans, Chicano/Latinos and Native Americans).
Students applying for graduate work in ethnic studies must meet the following requirements:

1. a minimum GPA of 3.00 in the last 90 credits of graded undergraduate work on the first baccalaureate degree plus all work completed thereafter;
2. appropriate undergraduate or postgraduate work in ethnic studies. Applicants are urged to speak with an advisor prior to submitting their materials.

## Minor Code: 8940

## FOOD IN CULTURE AND SOCIAL

 JUSTICE GRADUATE MINORThis interdisciplinary graduate minor in Food in Culture and Social Justice prepares students to examine food from a variety of perspectives. When and how we eat, what is considered acceptable to eat, how we prepare it, and how we learn about producing and eating food are all fascinating questions to explore by humanists and social scientists. Histories of particular food commodities and changes in the way people think about sustaining healthy bodies richly contextualize our present practices. Cultural analyses of food and food production lead us to
question the level of social justice within the local and global food systems.
Students complete at least 1 credit of experiential/service learning which will be spent volunteering with food-related organizations.

## Required Service Learning Course

FCSJ 506. Food Projects (1)
Choose 15 credits (master's) or 18 credits (PhD) from the following courses:
AGRI 511. Introduction to Food Systems: Local to Global (3)
FCSJ/ANTH 544. Nutritional Anthropology (4)

FCSJ/ANTH 547. Methods in Food in
Culture and Social Justice Studies (4)
FCSJ/ES 564. Food and Ethnic Identity:
Decolonizing Food and Our Body (3)
FCSJ/ANTH 567. Agri-Food Movements (4)
FCSJ/ANTH 586. Anthropology of Food (4)
HDFS 547. Families in Poverty (3)
HST 516. Food in World History (4)
Substitutions subject to approval of minor professor.

## Minor Code: 4260

## FOREIGN LANGUAGES AND LITERATURES GRADUATE MINOR

## Graduate Areas of Concentration

Modern languages, French, German, Spanish
See an advisor for more information.

## Minor Code: 8950

## QUEER STUDIES GRADUATE

 MINORThe graduate minor in Queer Studies prepares students to examine how gender and sexuality are constructed and policed and, further, imagines liberatory futures for people of all genders and sexualities. Centering itself on the activism and scholarship of women of color, transnational feminisms, Two-Spirit Indigenous people, and Lesbian, Gay, Bisexual, Transgender, and Queer (LGBTQ) people of color, this graduate option examines homophobia and transphobia's relationship with racism, colonialism, sexism, ableism, classism and other forms of power.

Master's students must complete a total of 20 credits, and doctoral students must complete a total of 24 credits. Students whose primary area is WGSS may use required course work for their program towards an MA or PhD minor in Queer Studies.

## Required of All Students:

QS/WGSS 562. Queer Theories (4)
In each of the following two sections, both master's and doctoral students will complete 8 credits. Doctoral students will complete an additional 4 credits in either area.

Sexuality, Gender, Race, and Nation (8 credits)
QS/WGSS/ES 531. Queer of Color Critiques (4)

QS/ES/WGSS 572. Indigenous Two-Spirit and Queer Studies (4)
QS/WGSS 576. Transnational Sexualities (4)
QS/ES/WGSS 577. Queer/Trans People of Color Arts and Activism (4)
QS 599. Special Topics in Queer Studies (4)
WGSS/SPAN/QS/ES 569. Topics in Joteria Studies (3)

## Gender Politics (8 credits)

QS/WGSS 524. Trans/Gender Politics (4)
QS/WGSS 573. Transgender Lives (3)
QS 599. Special Topics in Queer Studies (4)
WGSS 514. Systems of Oppression in
Women's Lives (4)
WGSS 560. Women and Sexuality (3)
WGSS 585. Transnational Feminisms (4)
WGSS 616: Multiracial, Transnational, and Queer Feminisms I (4)

## Total=20 credits for Master's students <br> Total=24 credits for Doctoral students <br> Minor Code: 8777

## WOMEN, GENDER, AND SEXUALITY STUDIES GRADUATE MINOR

Graduate Areas of Concentration
Contemporary women's issues; leadership
and community engagement; race, class and gender; sexuality studies; transnational perspectives
Women, Gender, and Sexuality Studies is the multidisciplinary study of gender and women's lives and experiences. Course work explores women's realities in such areas as the political and social sciences, health, psychology, history, literature, and the arts. Women, Gender, and Sexuality Studies programs grew out of the women's movement, involving understandings of discrimination in society and a need to celebrate different women's strengths, contributions, and forms of resistance.

Women, Gender, and Sexuality Studies can be elected as a primary and/or secondary field for the Master of Arts in Interdisciplinary Studies degree (MAIS) and as a graduate minor. Areas of specialization include contemporary women's issues; gender, race and class; and global women's issues. The master's program requires a thesis or research report (nonthesis option) and the completion of a core curriculum. This curriculum includes an understanding of how issues of gender, race, class, and other differences among women affect their status in Western and global perspectives. It also emphasizes the relationship between theory and strategies for social change. An internship or field placement in an agency that is concerned with gender issues or women's role and status in society is
required and is designed to help students integrate classroom knowledge with practical experience. The graduate program is beneficial for any work experience in which gender is negotiated or women are affected. Women, Gender, and Sexuality Studies graduates are employed in human service agencies and programs, advocacy organizations such as battered women's shelters and women's resource centers and community organizing, teaching, business, administration, and cultural work. Many students have used their degree as a preparatory base for doctoral work.

Women, Gender, and Sexuality Studies faculty are drawn from colleges across the university. Many teach Women, Gender, and Sexuality Studies program courses in their home departments and are involved in research projects that give them different perspectives on the challenges in Women, Gender, and Sexuality Studies. These courses and faculty are not listed in this entry. For more information, contact Patti Duncan, Director, Women, Gender, and Sexuality Studies, 252 Waldo Hall, OSU, Corvallis, OR 97331.
Master of Arts in Interdisciplinary Studies (MAIS)-Primary Area in
Women, Gender, and Sexuality Studies
WGSS 510. Internship (3)
WGSS 511, 512, 513. Orientation and Professionalization I, II, III ( $1,1,1$ )
WGSS 514. Systems of Oppression in Women's Lives (4)
WGSS 516. Theories of Feminism (4)
WGSS 518. Feminist Research (4)[Thesis option only]
WGSS 585. Transnational Feminisms (4)
Consult advisor for additional requirements.

## Minor Code: 9008

## CERTIFICATES

FOOD IN CULTURE AND SOCIAL JUSTICE CERTIFICATE
Food is more than simple nourishment. It is part of a system of communication firmly rooted in individual and group identities within cultures around the world. When and how we eat, what is considered acceptable to eat, how we prepare it, and how we learn about producing and eating food are all fascinating questions to explore by humanists and social scientists. Histories of particular food commodities and changes in the way people think about sustaining healthy bodies richly contextualize our present practices. Cultural analyses of food and food production lead us to question the level of social justice within the local and global food systems. Community food security is a condition in which all community residents obtain a safe, culturally acceptable, nutritionally
adequate diet through a sustainable food system that maximizes community selfreliance and social justice. Students who complete this certificate will not only have a clear idea of the cultural bases of food and food production but will obtain some experience working towards community food security.

Complete 16 credits of core classes and then choose 6 credits of electives within the College of Liberal Arts and 6 credits of electives from outside the College of Liberal Arts.

## Core (16)

AGRI 411. *Introduction to Food Systems:
Local to Global (3)
FCSJ/ANTH 361. *Food Justice (4)
FCSJ 406. Food Projects (1)
FCSJ/ES 464. Food and Ethnic Identity:
Decolonizing Food and Our Body (3)
FCSJ 467. Capstone: Food in Culture and Social Justice (1)
HST 416. *Food in World History (4)

## Liberal Arts Electives (6)

Check the catalog for prerequisites.

## Choose from the following:

ANTH 439. Archaeological Study of Foragers (4)

ANTH 471. Cash, Class and Culture:
Hunter-Gatherers to Capitalism (4)
ANTH 482. *Anthropology of International Development (4)
ES/PHL/REL 448. Native American
Philosophies (4)
FCSJ/ANTH 261. *Food in American Culture (3)

FCSJ 422. Intercultural Learning Community (3-6)
FCSJ/ANTH 444. Nutritional Anthropology (4)

FCSJ 454. *International Perspectives on
Food Systems (4) [Ecampus only]
FCSJ/ANTH 486. Anthropology of Food (4)
PHL 440. *Environmental Ethics (3)
PS 470. Global Food Politics and Policy (4) [Ecampus only]
SOC 426. *Social Inequality (4)
WGSS/PSY 465. Women, Weight, and Body Image (3)
WGSS/PSY 466. Fat Studies (3) [Ecampus only]
WR 383. Food Writing (4)
Appropriate courses through the Col-
lege of Liberal Arts, as well as transfer credits, may also be used to satisfy requirements when approved in advance by the program coordinator.

## Electives from Outside the College

of Liberal Arts (6)
Check the catalog for prerequisites.
AG 301. *Ecosystem Science of Pacific NW Indians (3)
AEC 461. ${ }^{\wedge}$ Agricultural and Food Policy Issues (4)
ANS 251. Principles of Animal Foods Technology (3)
ANS 315. *Contentious Social Issues in Animal Agriculture (3)
CROP 200. Crop Ecology and Morphology (3)

CROP 330. *World Food Crops (3)

CROP 340. *Pens and Plows: Writings of Working the Land (3) [Ecampus only]
CSS 205. *Soil Science (4)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FST 210. Fruit and Vegetable Processing (3)
FST 212. Dairy Processing (2)
FST 260. *Food Science and Technology in Western Culture (3)
FST 273. *Wine in the Western World (3)
FST 360. Food Safety and Sanitation (3)
FST 421. *Food Law (3)
GEOG 300. *Sustainability for the Common Good (3)
H 477. Dietary Interventions for Public Health (3)
HDFS 447. *Families and Poverty (4)
HORT 112. Introduction to Horticultural Systems, Practices and Careers (2)
HORT 260. Organic Farming and Gardening (3)

HORT/CROP 300. Crop Production in Pacific Northwest Agroecosystems (4)
HORT 452. Berry and Grape Physiology and Culture (4)
NUTR 216. *Food in Non-Western Culture (3)

NUTR 416. ${ }^{\wedge}$ Cultural Aspects of Foods (3)
NUTR 417. Human Nutrition Science (4)
NURT 423. Community Nutrition (4)
NUTR 446. Managing Food and Nutrition Services (4)
SUS 350. *Sustainable Communities (4)
TOX 429. Toxic Substances in Food (3)
Appropriate courses outside of the College of Liberal Arts, as well as transfer credits, may also be used to satisfy requirements when approved in advance by the program Coordinator.

## Total=28

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Major Code: C315

## LANGUAGE IN CULTURE <br> CERTIFICATE

## Core (13)

ANTH 251. *Language in the USA (3)
ANTH 350. Language, Culture and Society (4)

ANTH 403. Thesis (1)
or LING 403. Thesis (1)
LING 251. Languages of Oregon (3)
LING 451/LING 551. General Linguistics (3)

## Languages

To develop a sense of linguistic diversity, certificate students must study two languages other than English. End-of-second-year proficiency is required in one language and end-of-first-year proficiency in another language. One of these languages must be outside the IndoEuropean language family. It is highly recommended that students participate in a study abroad program.

## Electives (18)

Select 18 credits from below:
ANTH 208/LING 208. *Western Culture Study Abroad (3)
ANTH 209/LING 209. *Cultural Diversity

Study Abroad (3)
ANTH 450/ANTH 550. Topics in Linguistic
Anthropology (1-4)
ANTH 452/ANTH 552. Folklore and Expressive Culture (4)
ANTH 487/ANTH 587. *Language in Global Context (4)
ANTH 498/ANTH 598. Oral Traditions (1-3)
COMM 326. Intercultural Communication (3)

COMM 416/COMM 516. Ethnography of Communication (3)
COMM 426/COMM 526. Intercultural Communication: Theories and Issues (3)
COMM 427/COMM 527. Cultural Codes in Communication (3)
ENG 490/ENG 590. History of the English Language (3)
ENG 495/ENG 595. Language, Technology, and Culture (3) [ENG 495 terminated spring 2017]
ENG 497/ENG 597. *International Women's Voices (3)
GER 351. German Pronunciation and
Phonetics (3)
LING 359. Selected Topics in Linguistics (3)
PSY 458/PSY 558. Language Acquisition (3)
PH 331. *Sound, Hearing, and Music (3)
SPAN 350. Phonetics and Pronunciation (3)
SPAN 351. Hispanic Linguistics (3)
Total=31
Footnote:

* Baccalaureate core course (BCC)


## Major Code: C700

## LATIN AMERICAN AFFAIRS

## CERTIFICATE

Juan A. Trujillo, Director

## 36 Kidder Hall

Oregon State University
Corvallis, OR 97331-4603
541-737-3956
Email: jtrujillo@oregonstate.edu
Students earning a Latin American Af-
fairs certificate will have gained a broad knowledge and understanding of the history and current situation in Latin America. The program allows students with majors in any discipline to complement their professional studies; certificates are awarded concurrently with the undergraduate or graduate degree.

Course work is drawn from several departments and schools, primarily in the College of Liberal Arts. Interested students should contact the program director early in their academic careers in order to plan their schedules.

## Certificate Curriculum

The course of study consists of a minimum of 30 credits: 9 credits of required core courses, and 21 credits of appropriate electives. In addition, the student must have proficiency in Spanish or Portuguese equivalent to that attained by the end of the third-year language sequence, as certified by the School of Language, Culture, and Society, or by placement scores.

## The minimum of $\mathbf{3 0}$ credits of approved courses must include: <br> Core Requirement (9)

HST 350, HST 351. *Modern Latin America $(4,4)$
SPAN 336. *Latin American Culture (3)

## Electives (21)

A minimum of 21 credits of approved Latin American courses outside the major from at least two departments/schools.
ANTH 313. *Peoples of the World-Latin America (3)
ES 311. Narratives of Latino Migrations (3)
ES 314. Chicano/a Literature (3)
ES 411. Chicano/as in/on Film (3)
GEO 328/GEOG 314. *Geography of Latin America (3)
HST 452. Modern Mexico (4)
HST 456. Problems in Latin American History (4)
PHL 316. Intellectual Issues of Mexico and Mexican Americans (4)
PS 344. *Latin American Politics (4)
SPAN 311. Advanced Spanish Grammar (3)
SPAN 312. Intermediate Writing Skills (3)
SPAN 313. Spanish Language Through Culture (3)
or SPAN 314, SPAN 315, SPAN 316.
Spanish for Native Speakers $(3,3,3)$
SPAN 337. *Latin American Culture (3)
SPAN 338. *Latin American Culture (3)
SPAN 438. ^Selected Topics in Luso-
Hispanic Culture (3)
SPAN 445. Selected Topics in the Literature of Latin America (3)
Appropriate open-ended courses (402,
405,407 ) through participating departments/schools, as well as transfer credits, may also be used to satisfy requirements when approved in advance by the program director.

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: C810

## WOMEN, GENDER, AND SEXUALITY STUDIES CERTIFICATE

## Also available via Ecampus.

The Women, Gender, and Sexuality Studies undergraduate certificate is designed to facilitate the broad interdisciplinary study of gender and women's issues. It emphasizes the diversity of women's experience through a focus on disciplinarybased knowledge about women's lives and relationships in the many schools/ departments where courses on gender are taught.

While core course work taught by the Women, Gender, and Sexuality Studies Program is required, students are expected to take the bulk of their elective course work from approved Women, Gender, and Sexuality Studies Program classes offered throughout the different academic units on campus. A total of 27 credits is required for the certificate, with at least 12 of these credits at the upperdivision level.

All required course work must be taken on campus and no more than 3 credits of online elective course work can be used toward the on-campus certificate. The undergraduate certificate in Women, Gender, and Sexuality Studies is also available through Ecampus.

## Core Requirements (10)

WGSS 223. *Women: Self and Society (3)
WGSS 410. Internship (3)
WGSS 414. *Systems of Oppression in
Women's Lives (4)
The remaining 17 credits can be taken from elective courses offered by the Women, Gender, and Sexuality Studies Program and from approved program courses offered in any school/department at OSU. However, at least 12 of these 17 credits must consist of approved program courses. An approved program course is one that has a focus on gender and/or women's issues, is taught in a unit other than the Women, Gender, and Sexuality Studies Program, and has been approved as fulfilling the requirements of a Women, Gender, and Sexuality Studies Program course. See the electives for the Women, Gender, and Sexuality Studies major.

No more than 3 credits of WGSS 402 Independent Study and WGSS 410 Internship may count toward the Women, Gender, and Sexuality Studies undergraduate certificate.

## Footnote:

* Baccalaureate Core Course (BCC)


## Major Code: C808

■ ANTHROPOLOGY COURSES
ANTH 101. *INTRODUCTION TO
ANTHROPOLOGY (3). Located at the intersection of the humanities and the sciences, anthropology strives for a holistic understanding of the human condition. This course introduces students to the basic concepts, theories and methods of anthropology, including its four main sub-fields: archaeology, biological anthropology, cultural anthropology, and linguistic anthropology. The course is driven by fundamental questions, including: What is culture? How do anthropologists study human populations, both past and present? How can this field help us better understand contemporary human problems? (Bacc Core Course)
ANTH 110. *INTRODUCTION TO CULTURAL ANTHROPOLOGY (3). Investigates cultural adaptation and change in different environmental and historical contexts. Compares the means by which cultures solve common human problems. Shows similarities and differences throughout the world in systems of values, family, religion, economics, and politics. Students are asked to consider future cultural conditions. Uses a video format. (SS) (Bacc Core Course)
ANTH 159. *LANGUAGE, RACE AND RACISM IN THE US: AN INTRODUCTION (4). Students in this course will unpack language, race and racism--as well as the intersections between those ideas-- as cornerstones to understanding identity and society as inherently socially constructed notions. (Bacc Core Course) CROSSLISTED as ES 159 and WLC 159.

ANTH 199. SPECIAL STUDIES (1-3). This course is repeatable for a maximum of 3 credits.

ANTH 208. *WESTERN CULTURE STUDY ABROAD (3). Overseas study of the history and contemporary form of important features of Western culture. Based on at least 10 weeks of studying abroad. CROSSLISTED as LING 208. (Bacc Core Course) PREREQS: Must be arranged with instructor prior to registration. Enrolled in Study Abroad program.

## ANTH 209. *CULTURAL DIVERSITY STUDY

ABROAD (3). Overseas study of non-Western cultures. Based on at least 10 weeks of studying abroad. CROSSLISTED as LING 209. (Bacc Core Course) PREREQS: Must be arranged with instructor prior to registration. Enrolled in Study Abroad program.
ANTH 210. *COMPARATIVE CULTURES (3).
Compares the cultures originating in Asia,
Africa, and precolonial Australia, Oceania, and North and South America. Introduces method and theory for comparative cultural analysis from historical, ethnographic, and indigenous viewpoints. Considers the contribution and influences of minority and ethnic groups on the mainstream culture in nation states. Summarizes the characteristics of cultures in the major world culture areas. (Bacc Core Course)
ANTH 230. TIME TRAVELERS (3). Introduction to the historical developments of modern archaeology. The often romanticized public image of archaeology will be contrasted with scientific reality. The nature of archaeological data, modern field methods, analytical techniques, and theoretical background will be reviewed in order to illustrate how the unwritten record of human cultural behavior is deciphered. (SS)
ANTH 240. INTRODUCTION TO BIOLOGICAL ANTHROPOLOGY (3). An investigation of the origin of modern people (Homo sapiens) in a historical context; review of key discoveries and current research on the relationships between humans and other primates; exploration of contrasting views of humanity. (SS)
ANTH 251. *LANGUAGE IN THE USA (3). Examines the linguistic aspects of ethnic, class, and gender differences in the United States of America, with a focus on language attitudes. Uses ooth oral and written materials and quantitative and qualitative approaches. (Bacc Core Course) PREREQS: Freshman and sophomore standing.
ANTH 251H. *LANGUAGE IN THE USA (3).
Examines the linguistic aspects of ethnic, class, and gender differences in the United States of America, with a focus on language attitudes. Uses both oral and written materials and quantitative and qualitative approaches. (Bacc Core Course) PREREQS: Freshman and sophomore standing. Honors College approval required.

ANTH 261. *FOOD IN AMERICAN CULTURE (3). Fosters understanding of the meanings of foods and foodways in American culture. Uses food as a lens to explore general topic areas such as work, family, ecology, and identity. Critically examines core issues that shape and have shaped American culture. (Bacc Core Course) (SS) CROSSLISTED as FCSJ 261.

## ANTH 284. *PRIMATE ADAPTATION AND

EVOLUTION (4). Introduces students to our closest living relatives, the primates. Uses theories and concepts from evolutionary biology to explore the diverse anatomical and behavioral adaptations of different primate species. Also explores the relationships between anatomy, behavior, and ecology on the individual and community level. Provides an evolutionary and ecological framework with which to view primates (including humans) and all living organisms. (Bacc Core Course)
ANTH 311. *PEOPLES OF THE WORLD-NORTH
AMERICA (3). Survey of peoples around the world. Early settlement, cultural history, ecological adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues
pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement.

## ANTH 311H. *PEOPLES WORLD-NORTH

AMERICA (3). Survey of peoples around the world. Early settlement, cultural history, ecological adaptations, population, family and gender roles religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement. Honors College approval required.

ANTH 312. *PEOPLES WORLD-EUROPE (3). Survey of peoples around the world. Early settlement, cultural history, ecological adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement.

## ANTH 312H. *PEOPLES WORLD-EUROPE

 (3). Survey of peoples around the world. Early settlement, cultural history, ecological adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement. Honors College approval required.ANTH 313. *PEOPLES OF THE WORLD-LATIN AMERICA (3). Survey of peoples around the world. Early settlement, cultural history, ecological adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement.
ANTH 313H. *PEOPLES OF THE WORLD-LATIN AMERICA (3). Survey of peoples around the world. Early settlement, cultural history, ecological adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement. Honors College approval required.
ANTH 314. *PEOPLES OF THE WORLD-MIDDLE EAST (3). Survey of peoples around the world Early settlement, cultural history, ecological adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement.
ANTH 314H. *PEOPLES OF THE WORLD-
MIDDLE EAST (3). Survey of peoples around the world. Early settlement, cultural history, ecological
adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement. Honors College approval required.
ANTH 315. *PEOPLES OF THE WORLD-AFRICA
(3). Survey of peoples around the world. Early settlement, cultural history, ecological adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement.
ANTH 315H. *PEOPLES OF THE WORLD-
AFRICA (3). Survey of peoples around the world. Early settlement, cultural history, ecological adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement. Honors College approval required.

ANTH 316. *PEOPLES OF THE WORLD-SOUTH AND SOUTHEAST ASIA (3). Survey of peoples around the world. Early settlement, cultural history ecological adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement.

ANTH 317. *PEOPLES OF THE WORLD-PACIFIC
(3). Survey of peoples around the world. Early settlement, cultural history, ecological adaptations population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement.
ANTH 318. *PEOPLES OF THE WORLD-CHINA (3). Survey of peoples around the world. Early settlement, cultural history, ecological adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement.
ANTH 318H. *PEOPLES OF THE WORLD-
CHINA (3). Survey of peoples around the world. Early settlement, cultural history, ecological adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 [D-] or ANTH 210 [D-] and /or completion of social processes and institutions requirement. Honors College approval required.

ANTH 319. *PEOPLES OF THE WORLD-JAPAN AND KOREA (3). Survey of peoples around the world. Early settlement, cultural history, ecological adaptations, population, family and gender roles, religious ideology, political and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. (NC) (Bacc Core Course) PREREQS: ANTH 110 or ANTH 210 or completion of social processes and institutions requirement.

ANTH 330. *EVOLUTION OF PEOPLE, TECHNOLOGY, AND SOCIETY (3). Overview of the evolution and prehistory of the human species, including the development and interaction of human biology, technology, and society. (SS) (Bacc Core Course) PREREQS: Sophomore standing.

ANTH 331. MESOAMERICAN PREHISTORY
(3). Explores the archaeology and prehistory of Mesoamerica from Paleo-Indian times through the Olmec, Maya, Zapotec, and Aztec cultures to the Spanish Conquest. Themes include the transition to settled agriculture, emergence of social inequality and political authority, the role of the natural environment, and the rich cultural heritage of Mesoamerican civilizations. PREREQS: Students need to understand the fundamentals of archaeology.
ANTH 332. ARCHAEOLOGICAL INFERENCE
(4). In this course on archaeological inference, or the thought process of forming our understanding about the past, we will take a guided tour of the main stages of archaeological research design and try our hand at making archaeological inferences. We begin by learning about the basic conceptual problems in the study of the past, then, we engage with the theories and models used to address them, and finally we apply this knowledge in hands-on analytical activities during the laboratory sessions with archaeological artifacts. Lec/lab. PREREQS: ANTH 230 [D-]

## ANTH 345. *BIOLOGICAL AND CULTURAL

 CONSTRUCTIONS OF RACE (3). The social, cultural, and historical context of human biological diversity in the United States. Students become acquainted with primary resources relating to biological diversity within the modern human species and will offer a critical perspective on racial/ethnic categorization of that diversity. (Bacc Core Course) PREREQS: Sophomore standing and completion of one anthropology course.ANTH 350. LANGUAGE, CULTURE AND
SOCIETY (4). An examination of the communicative functions of language and the role of language in the construction of social relations. Covers the origins, structure, and diversity of language. Explores the relationships between language and thought and the use of linguistic models in the study of culture. (SS) PREREQS: 3 credits of social science.
ANTH 352. *ANTHROPOLOGY, HEALTH,
AND ENVIRONMENT (3). Major threats to human health are increasingly linked to global environmental changes. This course engages medical and environmental anthropology research to critically explore the values, meanings and ideologies associated with ecological and public health issues in given localities throughout the world. (Bacc Core Course)
ANTH 361. *FOOD JUSTICE (4). Contemporary food systems are examined from a cultural and social justice perspective. The human right to food as recognized by the United Nations serves as the justice grounding point. Impediments to realizing the right to food will be examined in national and international contexts. (Bacc Core Course) (SS) CROSSLISTED as FCSJ 361.

ANTH 370. ^ANTHROPOLOGICAL THEORIES (4). Foundational theories, approaches, and concepts are explored and used as a means to understanding how anthropologists past and present use theory. Students compare and
contrast prominent theories, analyze curren events and situations, and write a major research paper using anthropological sources. PREREQS: ANTH 110 [D-] and /or completion of social processes and institutions requirement.
ANTH 371. RESEARCH METHODS IN
CULTURAL ANTHROPOLOGY (4). Designed for anthropology majors, this course involves students in learning about and practicing anthropological research methods. Students practice ethnographic fieldwork by conducting participant observation and interviews, writing fieldnotes, analyzing real-life material for cultural values and power differences, and writing up a research paper. PREREQS: ANTH 110 [D-]
ANTH 372. *SOCIAL NETWORKS AND SOCIETY (3). Introduces the foundational theory and concepts of social network analysis (SNA) and explores practical applications of SNA in environmental science, public health, business, politics, education, and public life. Also explores how the Internet, social media, and other information and communication technologies are affecting social networks and culture in the 21st century. (Bacc Core Course)

ANTH 373. APPROACHES TO SOCIAL JUSTICE
(3). Students study various ways of thinking about social justice and evaluate these in case studies and current events. As a basis for the Social Justice minor, students write a research paper on the theoretical and practical aspects of a social justice issue. CROSSLISTED as ES 373, WGSS 373, WLC 373.

ANTH 374. *ANTHROPOLOGY AND GLOBAL HEALTH (3). An overview of historical and contemporary issues in gender health with emphasis on politics, globalization, and the complex outcomes of interventions in diverse cultural settings. Students will articulate a critica and evidence-based perspective on complex global health issues. (Bacc Core Course)
ANTH 374H. *ANTHROPOLOGY AND GLOBAL HEALTH (3). An overview of historical and contemporary issues in gender health with emphasis on politics, globalization, and the complex outcomes of interventions in diverse cultural settings. Students will articulate a critical and evidence-based perspective on complex global health issues. (Bacc Core Course) PREREQS: Honors College approval required.

ANTH 380. *CULTURES IN CONFLICT (3). Communication and commerce draw East and West, industrial and pre-industrial, state and stateless societies together. Beliefs and values clash and complement one another. Explores the processes of intercultural contact, crosscultural interaction, and the consequences of global penetration of European-American culture. Evaluates theoretical explanations for cultural persistence and change. (SS) (Bacc Core Course) PREREQS: ANTH 110 or completion of nonWestern cultures requirement.

ANTH 380H. *CULTURES IN CONFLICT (3).
Communication and commerce draw East and West, industrial and pre-industrial, state and stateless societies together. Beliefs and values clash and complement one another. Explores the processes of intercultural contact, crosscultural interaction, and the consequences of global penetration of European-American culture. Evaluates theoretical explanations for cultural persistence and change. (SS) (Bacc Core Course) PREREQS: ANTH 110 [D-] and /or completion of non-Western cultures requirement. Honors College approval required.
ANTH 383. *INTRODUCTION TO MEDICAL ANTHROPOLOGY (3). Examines human health and healing systems from evolutionary and cross-cultural perspectives. Using a case study approach, this class explores individual- and population-level experiences of illness and healing, while providing students with the tools to evaluate global disease patterns and international health promotion and education programs. (Bacc

Core Course)
ANTH 383H. *INTRODUCTION TO MEDICAL
ANTHROPOLOGY (3). Examines human health and healing systems from evolutionary and cross-cultural perspectives. Using a case study approach, this class explores individual- and population-level experiences of illness and healing, while providing students with the tools to evaluate global disease patterns and international health promotion and education programs. (Bacc Core Course) PREREQS: Honors College approval required.
ANTH 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ANTH 399H. SPECIAL TOPICS (1-16). This
course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required

ANTH 401. RESEARCH (1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANTH 402. INDEPENDENT STUDY (1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANTH 403. THESIS (1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
ANTH 405. READING AND CONFERENCE
(1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ANTH 405H. READING AND CONFERENCE
(1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
ANTH 406. PROJECTS (1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ANTH 407. SEMINAR (1-3). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANTH 407H. SEMINAR (1-3). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required
ANTH 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.
ANTH 410. INTERNSHIP (1-16). Opportunities for students at junior and first-term senior class levels to take advantage of off-campus work experiences during regular term sessions for academic credit. Allows students to broaden and deepen their understanding and appreciation of the value of their academic activity. Internship is supervised and evaluated by individual faculty members. This course is repeatable for a maximum of 16 credits. PREREQS: 6 credits of anthropology.

ANTH 420. WORLD CULTURES--TOPICS (4). in-depth study of world cultures. Early settlement, cultural history, ecological adaptations, population, family and gender roles, religious ideology, politica and economic systems, modern social changes, and contemporary issues pertaining to indigenous peoples in culturally distinct regions of the world. Emphasis is placed on dispelling stereotypic images, both past and present. Includes three hours of lecture and one hour of seminar. Cannot be taken if student is taking or has completed the 300-level course in the same geographical area. Graded P/N. PREREQS: 9 credits of social science including 3 credits of anthropology or graduate standing.

## ANTH 421. ANALYSIS OF LITHIC

TECHNOLOGIES (4). Covers the principles, procedures, and purpose of archaeological lithic analysis and the anthropological interpretation of lithic technologies used by prehistoric huntergatherers. PREREQS: ANTH 230 [D-] and /or equivalent
ANTH 422. HISTORIC MATERIALS ANALYSIS
(3). Introduction to the analytical and descriptive
methods and techniques used by historical archeologists to study late 18th through 20th century machine and handmade objects.
PREREQS: ANTH 230 [D-]
ANTH 423. METHOD AND THEORY IN HISTORICAL ARCHAEOLOGY (4). Examines the origins and growth of historical archaeology in the Americas. Students will critically learn about the linkages with history and anthropology and explore the theoretical underpinnings of historical archaeology.
ANTH 424. SETTLEMENT ARCHAEOLOGY
(4). Explores the evolution of the theoretical underpinnings and field methods of settlement archaeology as well as the refinement of the meaning of

## ANTH 425. CERAMIC ANALYSIS IN

ARCHAEOLOGY (4). Provides fundamental practical skills and theoretical perspectives for the analysis and interpretation of archaeological ceramics. On the practical side, students will learn both basic and advanced techniques for describing and analyzing pottery assemblages encountered by field archaeologists. On the theoretical side, the course will explore the diversity of research questions in which pottery can play a critical role, as well as the various ways in which ceramic data can be interpreted. Lec/lab. PREREQS: ANTH 230 [D-]
ANTH 430. TOPICS IN ARCHAEOLOGY (1-4). Recent advances in archaeology and their application to special fields of study. Topics vary from term to term. This course is repeatable for a maximum of 99 credits. PREREQS: (ANTH 230 [D-] or ANTH 330 [D-] ) and /or equivalent.
ANTH 432. *DOMESTICATION, URBANIZATION, AND THE RISE OF CIVILIZATION (4). Reviews the development of culture in the Old and New Worlds with special emphasis placed on the when, where, and how of early domestication of plants and animals. Examines the process of urbanization. (Bacc Core Course) PREREQS: 6 credits of anthropology.
ANTH 432H. *DOMESTICATION,
URBANIZATION, AND THE RISE OF
CIVILIZATION (4). Reviews the development of culture in the Old and New Worlds with special emphasis placed on the when, where, and how of early domestication of plants and animals Examines the process of urbanization. (Bacc Core Course) PREREQS: 6 credits of anthropology. Honors College approval required.

ANTH 433. FIRST AMERICANS, LAST
FRONTIERS (4). The initial human occupation of the Western Hemisphere is explored with particular emphasis on northeast Siberian cultural progenitors, routes and timing of entry into the Americas, population dispersal theory, the paleoenvironmental record, and human cultural responses to the conditions of the last frontier prior to 8,000 years ago. PREREQS: 6 credits of anthropology.
ANTH 434. NORTH AMERICA AFTER THE ICE AGE (4). The development of regional hunting and gathering adaptive strategies in North America from 8000 B.C. to the historic period are examined against a backdrop of changing climate, natural disasters, population growth, and human invention. PREREQS: ANTH 433 or 6 credits of anthropology.
ANTH 435. CULTURAL RESOURCES: POLICY AND PROCEDURES (4). Description and analysis of requirements and demands of cultural resource management. Historical development of cultural resource laws and appropriate field techniques and strategies to implement legislation PREREQS: ANTH 230 [D-] and /or instructor approval required

ANTH 436. NORTHWEST PREHISTORY (4).
Materials and theories relating to prehistoric aboriginal cultures of the Northwest. Evaluation of different theories on the origins and adaptations of prehistoric populations to ecological zones
within the Northwest; comparisons of the cultura development through prehistoric times of the Columbia Plateau, intermontane and coastal zones of Oregon, Washington, and British Columbia. Special emphasis on the theories of origin, subsequent development of prehistoric cultures in the Northwest, and the present circumstances of archaeology in the Northwest. PREREQS: 6 credits of anthropology.
ANTH 437. GEOARCHAEOLOGY (4). Provides an introduction to geoarchaeological concepts and methods. Emphasis will be placed on the use of geoscientific perspectives and datasets to solve archaeological problems. PREREQS: ANTH 230 [D-]

## ANTH 438. ARCHAEOLOGY FIELD SCHOOL

(10-12). Practical skills, archaeological methods and techniques including use of equipment, site surveying and mapping techniques, site excavation strategies, record keeping, field cataloging, report writing, and field camp management. PREREQS: 6 credits of anthropology and instructor approval required.
ANTH 439. ARCHAEOLOGY OF FORAGERS
(4). Provides an in-depth review of the concepts and approaches employed to study cultural aspects of past foraging peoples using archaeological research methods and theoretical perspectives.

## ANTH 440. TOPICS IN PHYSICAL

ANTHROPOLOGY (1-4). Recent advances in physical anthropology and their applications to special fields of study. Topics vary from term to erm. This course is repeatable for a maximum of 16 credits. PREREQS: (ANTH 240 [D-] or ANTH 330 [D-] ) and /or general biology or equivalent.
ANTH 441. HUMAN EVOLUTION (4). The evolutionary history of the primate order as it is represented by fossils of the Paleocene through the Holocene. Special attention given to development of the Hominoids in the Miocene, the Australopithecines in the Pliocene, and members of the genus Homo in the Pleistocene. Lec/lab. PREREQS: ((ANTH 110 [D-] or ANTH 210 [D-] ) and ANTH 240 [D-] ) and /or general biology or equivalent.

ANTH 442. HUMAN ADAPTABILITY (4).
Overview of human biology and its various subfields, applications of human biology in areas of nutrition, health, growth, adaptation, and demography. Understanding adaptive variations among populations and individuals in responses to environment, disease, and nutritional stress. PREREQS: ANTH 240 [D-] and /or ANTH 340 or general biology or equivalent.
ANTH 443. HUMAN OSTEOLOGY LAB (4).
Identification and analysis of human skeletal materials in an archaeological context. PREREQS: ANTH 240 [D-]

ANTH 444. NUTRITIONAL ANTHROPOLOGY
(4). Examines human nutrition and food systems from comparative, biocultural and evolutionary perspectives. Long-term evolutionary processes are examined within an ecological framework as significant factors affecting human biology and susceptibility to diet-related disease. An emphasis on anthropological methods in nutritional assessment including anthropometry, paleodietary assessment and nutritional participant-observation will provide students with the tools to evaluate human diet from skeletal and fossil collections through contemporary cross-cultural populations. CROSSLISTED as FCSJ 444. PREREQS: ANTH 240 [C] or ANTH 330 [C]
ANTH 446. FORENSIC ANTHROPOLOGY (4).
Concepts and practices in the use of anthropology in legal matters and police cases, especially involving identification of human remains. PREREQS: ANTH 443 [D-] and /or equivalent.

ANTH 447. *ARCTIC PERSPECTIVES ON GLOBAL PROBLEMS (4). The Arctic is on the frontline of today's most pressing global problems. This course uses Arctic perspectives
to explore issues affecting us all: climate change, environmental conservation, traditional ecological knowledge, development, energy extraction, indigenous rights, and indigenous media. Using insights from Arctic perspectives, we will plot pathways toward potential solutions. (Bacc Core Course)

ANTH 447H. *ARCTIC PERSPECTIVES ON GLOBAL PROBLEMS (4). The Arctic is on the frontline of today's most pressing problems. This course uses Arctic perspectives to explore issues affecting us all: climate change, environmental conservation, traditional ecological knowledge, development, energy extraction, indigenous rights, and indigenous media. Using insights from Arctic perspectives, we will plot pathways toward potential solutions. (Bacc Core Course) PREREQS: Honors College approval required.

ANTH 448. EVOLUTIONARY MEDICINE (4).
Evolutionary medicine is founded on the idea that many challenges to human health can be accounted for by discordances between contemporary environments and those under which humans evolved. This course examines ways anthropologists may help to reframe questions about diseases within long-term, evolutionary contexts. PREREQS: (ANTH 110 [D-] or ANTH 210 [D-] ) and (ANTH 240 [D-] or ANTH 330 [D-] )

ANTH 449. BIOCULTURAL PERSPECTIVES ON HUMAN REPRODUCTION (4). Examines human reproduction and sexuality from the perspective of the New Biocultural Synthesis, a theoretical approach in anthropology that examines the interface of evolved biological, sociocultural and political-economic factors that interact to produce complex human behaviors and biologies. Topics are presented from a life-history perspective where questions related to human reproduction and evolutionary history are examined across the lifespan from mating and conception through elderhood and menopause. Lec/lab.

## ANTH 450. TOPICS IN LINGUISTIC

ANTHROPOLOGY (1-4). Recent advances in the study of culture and communication and their application to special fields of knowledge. Topics vary from term to term. This course is repeatable for a maximum of 16 credits. PREREQS: 3 credits of linguistic anthropology.
ANTH 452. FOLKLORE AND EXPRESSIVE CULTURE (4). The study of folklore/popular culture in its social and historical context. Examines content, structure, communicative potential, and performative aspects of various forms of oral and written expression. Includes familiarization with the analysis of myths, legends, tall tales, proverbs, riddles, and play languages.
(FA) PREREQS: 3 credits of social science.
ANTH 453. COMMUNITY HEALTH FIELD
SCHOOL (3-12). Meets the growing need for international experiences for students in medical anthropology; international public health; and women, gender and sexuality studies. The field school is offered over a three- to seven-week period during the summer term. In-country time is flexible and can be adjusted depending on program requirements and financial constraints. Provides an intensive cross-cultural field experience in San Juan, Puerto Rico, that is premised on a model of community-engaged, service learning and applied, emancipatory research. This course is repeatable for a maximum of 12 credits. PREREQS: Graduate standing or junior or senior standing and completion of the Anthropology Undergraduate Program's or other discipline's core courses is required for participation in this community field school. Students who meet these requirements will apply, and students will be selected based on fit of expertise and interest with the goals set by community partners for that year.
ANTH 455. REPRODUCTIVE JUSTICE: A SERVICE LEARNING COURSE (4). Reproductive Justice is a service-learning course that aims to
bridge theory and practice in reproductive health and social justice by developing connections between the university campus and members of the local community.
ANTH 459. LANGUAGE, RACE AND RACISM IN THE U.S.: ADVANCED STUDY (4). Students in this course will unpack language, race and racismas well as the intersections between those ideas-as cornerstones to understanding identity and society as inherently socially constructed ideas. The goal of this course is to better understand how racism is produced and reproduced in talk and text (this will include symbols and signs), especially in the context of the denial of racism. Our course will specifically focus on the language of racism, and, more specifically, types of discourse that construct Whiteness as dominant over Color. CROSSLISTED as ES 459/ES 559, WLC 459/WLC 559.

ANTH 460. ETHNOGRAPHIC FIELD SCHOOL (6). Involves an intensive field experience, learning and developing practical skills for operating socially and culturally in another culture. Students engage in anthropological and mixed research topics, methods, and analysis, such as research ethics, research design, participant observation, ethnographic interviewing, community mapping, qualitative and quantitative data analysis. PREREQS: Sophomore standing and application.
ANTH 461. NEUROANTHROPOLOGY
(4). The emerging interdisciplinary field of neuroanthropology combines anthropological understandings of human biological and cultural variation with recent findings in neuroscience. Key topics include socialization and enculturation, addiction, ritual, depression, and psychiatric disorders. PREREQS: ANTH 240 [C-] or ANTH 345 [C-] or ANTH 383 [C-]

ANTH 463. ANTHROPOLOGICAL RESEARCH: PROFESSIONAL AND ETHICAL CONDUCT (4). Examines the history and scope of professional and ethical guidelines in anthropology; critically evaluate major issues involving ethics, confidentiality, and anonymity that academic and professional anthropologists face during their careers. PREREQS: At least 6 credits of anthropology courses or graduate standing.
ANTH 465. POPULAR CULTURE: AN ANTHROPOLOGICAL PERSPECTIVE (4).
Introduces some of the debates and issues swirling around analyses of late twentieth-, early twenty-first century popular/mass/public/ mediated/commercial culture. Learning about its pervasive forms, its origins and effects, how we are situated in it, and how it situates us is vital to understanding the changes that characterize our postmodern world.

ANTH 466. *RURAL ANTHROPOLOGY (4). Concentrates on study of the socio-cultural dynamics in rural communities as they develop in national and global contexts of political and economic change. Includes anthropological readings on rural issues in domestic and international contexts and a research paper on a contemporary rural issue. (Bacc Core Course) PREREQS: 3 credits of social science.
ANTH 468. ANTHROPOLOGY OF CHILDHOOD
(4). Ethnographies of the organization of children's lives in different cultural contexts are combined with readings on the conceptual and methodological genealogies that have constructed children as research subjects in anthropology. PREREQS: 3 credits of social science

ANTH 469. ENERGY IN CULTURAL
PERSPECTIVE (4). Examines historical and current trends in energy around the globe. Course themes include the role of energy in economic development, cultural innovation in energy production, social problems that arise from energy shortages or the uneven distribution of energy resources and social and cultural changes required as societies attempt to reduce their dependence on fossil fuels. PREREQS: ANTH 110 [D-] or ANTH 210 [D-]

ANTH 470. TOPICS IN CULTURAL
ANTHROPOLOGY (1-16). Covers recent advances in cultural anthropology and their applications to the field. Topics vary from term to term. This course is repeatable for a maximum of 16 credits. PREREQS: 3 credits of social science.
ANTH 471. CASH, CLASS AND CULTURE: HUNTER-GATHERERS TO CAPITALISM (4). Students explore the cultural and social effects of capitalism in the contemporary world within the larger question of how economics and society intersect and change over time. Special emphases are put on food and work, but students explore the linkages of global forces and local life in a variety of ways. PREREQS: 3 credits of social science.
ANTH 472. CONTEMPORARY INDIAN ISSUES (4). Examines the background of Indian treaties and reservations with discussions of present issues such as health care, education, the Indian Child Welfare Act, fishing rights, and religious freedom. Issues are discussed in class with considerable class participation and some role playing. PREREQS: 3 credits of social science
ANTH 473. *GENDER, ETHNICITY, AND CULTURE (4). Study of the practices and ideologies of gender as they intersect with those of ethnicity, race, class, and culture. (Bacc Core Course) PREREQS: 3 credits of social science.

ANTH 474. CROSS-CULTURAL HEALTH AND HEALING (4). A comprehensive overview of current issues in global health with particular emphasis on social, cultural, and behavioral interventions. Explores issues of health and development in the international context, focusing on such issues as inequality, structural adjustment, economic development, and community-based approaches to health care, specific cultural beliefs and practices, and the influence of people's perceptions of health, illness and healing.
ANTH 475. ANTHROPOLOGY IN PRACTICE
(4). Capstone course for Anthropology majors. Discusses the use of anthropological skills and methods to solve real-world problems. Addresses professional opportunities for anthropologists; provides career development opportunities; and assesses learning outcomes for Anthropology majors. PREREQS: Junior or senior standing and completion of the Anthropology Undergraduate Program's common core courses are required for participation in this capstone class.

## ANTH 477. ECOLOGICAL ANTHROPOLOGY

(4). Examines past and present interactions between humans and their environments. Emphasizes the concept of system and process of human adaptation. PREREQS: Upper-division standing and 3 credits of social science.

ANTH 478. *ANTHROPOLOGY OF TOURISM (4). Tourism is among the world's largest industries. The anthropology of tourism seeks to understand the relationships between the industry and the other cultural productions. Students explore the cultural practices and impacts of tourism in relation to both host and guest communities, and travel as cultural practice. Course is taught online and on Corvallis campus. (Bacc Core Course) PREREQS: 3 credits of social science. Junior or senior standing.
ANTH 479. ANTHROPOLOGY OF MIGRATION
(4). Focuses on the multiple aspects of population movements around the globe. Investigates the history of recent human migration; current theories, trends and policies; as well as issues of immigrant incorporation and anti-immigrant politics. PREREQS: 3 credits of social science.

## ANTH 480. TOPICS IN APPLIED

ANTHROPOLOGY (1-4). Recent advances in applied anthropology and their application to special fields of study. Topics vary from term to term. This course is repeatable for a maximum of 16 credits. PREREQS: 3 credits of social science.

ANTH 481. *NATURAL RESOURCES AND COMMUNITY VALUES (3). Investigates relations between human communities and the values of community members. Resource issues integrate concepts from social science, economics, and ecology. (Bacc Core Course) PREREQS: 3 credits of social science.

## ANTH 482. *ANTHROPOLOGY OF

INTERNATIONAL DEVELOPMENT (4). Examines the ideological and theoretical bases of world assistance programs and their effects on different sectors and classes, including women. Causes of world hunger in terms of agronomic, mainstream economic and radical economic paradigms are developed and contrasted. (Bacc Core Course) PREREQS: Senior standing
ANTH 483. ADVANCED MEDICAL
ANTHROPOLOGY (4). An overview of anthropological studies of the health of human communities from a biological and behavioral perspective. Topics include prehistory of disease, cultural perspectives on causation of disease and approaches to healing; anthropological approach to international health issues; and case studies. PREREQS: (ANTH 110 [D-] or ANTH 210 [D-] ) and (ANTH 240 [D-] or ANTH 330 [D-] )

ANTH 484. *WEALTH AND POVERTY (3). Summarizes the distribution of wealth observed cross-culturally and through time. Determines the relation between wealth distribution and economic productivity. Shows the impact of industrialization and economic wealth distribution in Western civilization and cross-culturally. Evaluates how cultural practices affect wealth distribution in Western and non-Western societies. (Bacc Core Course) PREREQS: 3 credits of social science.
ANTH 485. CAPSTONE IN SOCIAL JUSTICE (2).
Working with an advisor from the Social Justice minor, students conduct research to synthesize and extend analysis of a particular social justice issue, building on three previous papers or projects. Results are presented in a 10-15 page paper and a public poster, presentation or website CROSSLISTED as ES 485, WGSS 485, WLC 485. This course is repeatable for a maximum of 4 credits. PREREQS: (ANTH 373 [D-] or ES 373 [D-] or WGSS 373 [D-] or WLC 373 [D-]) and (ANTH 410 [D-] or ES 410 [D-] or WGSS 410 [D-] or WLC 410 [D-] )

ANTH 486. ANTHROPOLOGY OF FOOD (4).
The role of food in human cultures, both past and present. Includes discussion of different food procurement styles, social movements and the political economy of food. Looks at the symbolic aspects of food as well as its relationship with the environment. CROSSLISTED as FCSJ 486. PREREQS: 3 credits of social science.
ANTH 487. LANGUAGE IN GLOBAL CONTEXT (4). Deals with practical uses of linguistics in the global political arena. Explores use of official vs. unofficial languages, language standardization, the preservation of dying languages; problems in learning first and second languages, and the relevance of linguistic knowledge to education and cross-cultural communication. PREREQS: (ANTH 251 [D-] or ANTH 350 [D-] ) and /or some knowledge of linguistic structure or graduate standing.
ANTH 488. *BUSINESS AND ASIAN CULTURE (3). Examines the mutual influence of business organization and culture in Asia. Starts with the premise that a business organization contains a set of values. These values are analyzed as to their effect on society in general and some Asian societies in particular, including Japan, China, Korea, India, and Indonesia. A second area of investigation is the influence of Asian societies on the organization and practice of Western businesses both in Asia and the West. (Bacc Core Course) PREREQS: 3 credits of social science.
ANTH 489. ANTHROPOLOGY OF BUSINESS (3). Students are exposed to the methods and perspectives used by anthropologists working in business. How does anthropology contribute in
such areas as product development, workplace organization and communication, marketing and interfacing with technology? Students do a lengthy project in one of these areas and present it as if in a corporate setting.
ANTH 490. TOPICS IN METHODOLOGY
(1-4). Recent advances in anthropological methodologies and their application to special fields of study. Topics vary from term to term. This course is repeatable for a maximum of 16 credits. PREREQS: 6 credits of anthropology or graduate standing.
ANTH 492. ARCHAEOLOGICAL LABORATORY
METHODS (1-3). Provides information on the basics of archaeological laboratory work. Students learn the day-to-day operations of a lab, how to classify and catalog artifacts, and how to do artifact analysis, research hypothesis. PREREQS: 6 credits of anthropology or graduate standing
ANTH 494. LINGUISTIC ANTHROPOLOGY
LAB (1-3). A training and practicum in the elicitation, transcription and analysis of language. PREREQS: ANTH 350 [D-] and /or graduate standing.
ANTH 497. ARCHAEOLOGICAL FIELD METHODS (1-3). Archaeological field strategies emphasizing reconnaissance and survey. Application of field equipment and project management.

ANTH 498. ORAL TRADITIONS (1-3). Method of examining unwritten culture preserved in speech, including local history, folklore, and songs passed from one generation to another. May include the use of life history, genealogy, and other means of collecting information. Attention is given to ethics, legal issues, and the process of transcription. PREREQS: ANTH 350 [D-] and ANTH 452* [D-] and /or graduate standing
ANTH 499. SPECIAL TOPICS IN
ANTHROPOLOGY (1-16). This course is
repeatable for a maximum of 16 credits.
ANTH 499H. SPECIAL TOPICS IN ANTHROPOLOGY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
ANTH 501. RESEARCH (1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANTH 502. INDEPENDENT STUDY (1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANTH 503. THESIS (1-12). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.

ANTH 505. READING AND CONFERENCE
(1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANTH 506. PROJECTS (1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANTH 507. SEMINAR (1-3). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ANTH 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

ANTH 510. GRADUATE INTERNSHIP (1-16). Opportunities for students at junior and first-term senior class levels to take advantage of offcampus work experiences during regular term sessions for academic credit. Allows students to broaden and deepen their understanding and appreciation of the value of their academic activity. Internship is supervised and evaluated by individual faculty members. This course is repeatable for a maximum of 16 credits. PREREQS: 6 credits of anthropology.
ANTH 515. ADVANCED RESEARCH LITERATURE REVIEW (3). Provides graduate
students with knowledge and experience in the advanced literature review process including construction of the literature review as product. One of the primary skills graduate students must master is advanced review of a body of literature for the research project. Mastery of the literature review process influences quality and sophistication of claims developed to justify research, with the written review clearly delineating the unique contribution of the student's research and the knowledge gap that it fills. The literature review as a product is a strong written argument that builds a case from credible evidence based on previous research. CROSSLISTED as CSSA 515, ES 515, WGSS 515. PREREQS: Graduate standing

ANTH 519. BIOLOGIES OF POVERTY (4).
A readings-based, discussion seminar on the applications of biological and biocultural anthropological theory to questions of embodiment and poverty. In it we will explore the ways key theoretical and methodological developments over the past two decades enable biocultural anthropologists to measure and explain the ways poverty and inequality become embedded beneath our skin--that is, the ways culture, belief, difference, power and discrimination are written on our bodies, and thus contribute to inequities in health outcomes across populations. PREREQS: In order to participate in this class, graduate standing, or if an undergraduate, a minimum of 6 credits of anthropology course work and instructor approval, is required.

## ANTH 521. ANALYSIS OF LITHIC

TECHNOLOGIES (4). Covers the principles procedures, and purpose of archaeological lithic analysis and the anthropological interpretation of lithic technologies used by prehistoric huntergatherers. PREREQS: ANTH 230 or equivalent
ANTH 522. HISTORIC MATERIALS ANALYSIS
(3). Introduction to the analytical and descriptive methods and techniques used by historical archeologists to study late 18th through 20th century machine and handmade objects.
PREREQS: ANTH 230
ANTH 523. METHOD AND THEORY IN HISTORICAL ARCHAEOLOGY (4). Examines the origins and growth of historical archaeology in the Americas. Students will critically learn about the linkages with history and anthropology and explore the theoretical underpinnings of historical archaeology.
ANTH 524. SETTLEMENT ARCHAEOLOGY
(4). Explores the evolution of the theoretical underpinnings and field methods of settlement archaeology as well as the refinement of the meaning of

## ANTH 525. CERAMIC ANALYSIS IN

ARCHAEOLOGY (4). Provides fundamenta practical skills and theoretical perspectives for the analysis and interpretation of archaeological ceramics. On the practical side, students will learn both basic and advanced techniques for describing and analyzing pottery assemblages encountered by field archaeologists. On the theoretical side, the course will explore the diversity of research questions in which pottery can play a critical role, as well as the various ways in which ceramic data can be interpreted. Lec/lab. PREREQS: ANTH 230
ANTH 530. TOPICS IN ARCHAEOLOGY (1-4).
Recent advances in archaeology and their application to special fields of study. Topics vary from term to term. This course is repeatable for a maximum of 16 credits. PREREQS: ANTH 230 or ANTH 330 or equivalent.
ANTH 531. ARCHAEOLOGICAL THEORY (4). Historical development of archaeological field techniques and theoretical concepts with an emphasis on modern method and theory in North American archaeology. PREREQS: Anthropology graduate student status with ANTH 230 or equivalent.

ANTH 533. FIRST AMERICANS, LAST
FRONTIERS (4). The initial human occupation of the Western Hemisphere is explored with particular emphasis on northeast Siberian cultural progenitors, routes and timing of entry into the Americas, population dispersal theory, the paleoenvironmental record, and human cultural responses to the conditions of the last frontier prior to 8,000 years ago. PREREQS: 6 credits of anthropology.

ANTH 534. NORTH AMERICA AFTER THE ICE
AGE (4). The development of regional hunting and gathering adaptive strategies in North America from 8000 B.C. to the historic period are examined against a backdrop of changing climate, natural disasters, population growth, and human invention. PREREQS: ANTH 433 or 6 credits of anthropology.

ANTH 535. CULTURAL RESOURCES: POLICY AND PROCEDURES (4). Description and analysis of requirements and demands of cultural resource management. Historical development of cultural resource laws and appropriate field techniques and strategies to implement legislation PREREQS: ANTH 431 or instructor approval required

ANTH 536. NORTHWEST PREHISTORY (4).
Materials and theories relating to prehistoric aboriginal cultures of the Northwest. Evaluation of different theories on the origins and adaptations of prehistoric populations to ecological zones within the Northwest; comparisons of the cultural development through prehistoric times of the Columbia Plateau, intermontane and coasta zones of Oregon, Washington, and British Columbia. Special emphasis on the theories of origin, subsequent development of prehistoric cultures in the Northwest, and the present circumstances of archaeology in the Northwest. PREREQS: 6 credits of anthropology.
ANTH 537. GEOARCHAEOLOGY (4). Provides an introduction to geoarchaeological concepts and methods. Emphasis will be placed on the use of geoscientific perspectives and datasets to solve archaeological problems. PREREQS: ANTH 230

## ANTH 538. ARCHAEOLOGY FIELD SCHOOL

 (1-10). Practical skills, archaeological methods and techniques including use of equipment, site surveying and mapping techniques, site excavation strategies, record keeping, field cataloging, report writing, and field camp management. PREREQS: 6 credits of anthropology and instructor approval required.ANTH 539. ARCHAEOLOGY OF FORAGERS
(4). Provides an in-depth review of the concepts and approaches employed to study cultural aspects of past foraging peoples using archaeological research methods and theoretical perspectives.

## ANTH 540.TOPICS IN PHYSICAL

ANTHROPOLOGY (1-4). Recent advances in physical anthropology and their applications to special fields of study. Topics vary from term to term. This course is repeatable for a maximum of 16 credits. PREREQS: ANTH 240 or ANTH 330 or general biology or equivalent
ANTH 541. HUMAN EVOLUTION (4). The evolutionary history of the primate order as it is represented by fossils of the Paleocene through the Holocene. Special attention given to development of the Hominoids in the Miocene, the Australopithecines in the Pliocene, and members of the genus Homo in the Pleistocene. Lec/lab. PREREQS: (ANTH 110 or ANTH 210) and ANTH 240
ANTH 542. HUMAN ADAPTABILITY (4).
Overview of human biology and its various sub fields, applications of human biology in areas of nutrition, health, growth, adaptation, and demography. Understanding adaptive variations among populations and individuals in responses to environment, disease, and nutritional stress. PREREQS: ANTH 240 or ANTH 340 or general
biology or equivalent.
ANTH 543. HUMAN OSTEOLOGY LAB (4).
Identification and analysis of human skeletal materials in an archaeological context. PREREQS: ANTH 240

ANTH 544. NUTRITIONAL ANTHROPOLOGY
(4). Examines human nutrition and food systems from comparative, biocultural and evolutionary perspectives. Long-term evolutionary processes are examined within an ecological framework as significant factors affecting human biology and susceptibility to diet-related disease. An emphasis on anthropological methods in nutritional assessment including anthropometry, paleodietary assessment and nutritional participant-observation will provide students with the tools to evaluate human diet from skeletal and fossil collections through contemporary cross-cultural populations. CROSSLISTED as FCSJ 544. PREREQS: ANTH 240 or ANTH 330

ANTH 546. FORENSIC ANTHROPOLOGY (4).
Concepts and practices in the use of anthropology in legal matters and police cases, especially involving identification of human remains. PREREQS: ANTH 443 or equivalent
ANTH 547. METHODS IN FOOD IN CULTURE AND SOCIAL JUSTICE STUDIES (4). Exposes graduate students to the methodological approaches and methods used in guiding empirical research on the socio-cultural aspects of food, focusing on vulnerable populations, food security, procurement, foodways, disasters, and climate change. Methodological approaches and methods as evidenced in peer-reviewed publications is the grounding for the course. CROSSLISTED as FCSJ 547. PREREQS: Graduate standing.
ANTH 548. EVOLUTIONARY MEDICINE (4). Evolutionary medicine is founded on the idea that many challenges to human health can be accounted for by discordances between contemporary environments and those under which humans evolved. This course examines ways anthropologists may help to reframe questions about diseases within long-term, evolutionary contexts. PREREQS: (ANTH 110 or ANTH 210) and (ANTH 240 or ANTH 330)
ANTH 549. BIOCULTURAL PERSPECTIVES ON HUMAN REPRODUCTION (4). Examines human reproduction and sexuality from the perspective of the New Biocultural Synthesis, a theoretical approach in anthropology that examines the interface of evolved biological, sociocultural and political-economic factors that interact to produce complex human behaviors and biologies. Topics are presented from a life-history perspective where questions related to human reproduction and evolutionary history are examined across the lifespan from mating and conception through elderhood and menopause. Lec/lab.

## ANTH 550. TOPICS IN LINGUISTIC

ANTHROPOLOGY (1-4). Recent advances in the study of culture and communication and their application to special fields of knowledge. Topics vary from term to term. This course is repeatable for a maximum of 16 credits. PREREQS: 3 credits of linguistic anthropology.
ANTH 551. LINGUISTIC ANTHROPOLOGY
(4). The study of language in social context including the relationships between language and age, gender, personality, religion, ethnicity and social class. Examines pidgins, creoles, dialects, genres and the processes of language change. PREREQS: ANTH 251 or ANTH 350 or graduate standing.
ANTH 552. FOLKLORE AND EXPRESSIVE
CULTURE (4). The study of folklore/popular culture in its social and historical context. Examines content, structure, communicative potential, and performative aspects of various forms of oral and written expression. Includes familiarization with the analysis of myths, legends, tall tales, proverbs, riddles, and play languages.

PREREQS: ANTH 251 or ANTH 350 or graduate standing.

ANTH 553. COMMUNITY HEALTH FIELD
SCHOOL (3-12). Meets the growing need for international experiences for students in medical anthropology; international public health; and women, gender and sexuality studies. The field school is offered over a three- to seven-week period during the summer term. In-country time is flexible and can be adjusted depending on program requirements and financial constraints. Provides an intensive cross-cultural field experience in San Juan, Puerto Rico, that is premised on a model of community-engaged, service learning and applied, emancipatory research. This course is repeatable for a maximum of 12 credits. PREREQS: Graduate standing or junior or senior standing and completion of he Anthropology Undergraduate Program's or other discipline's core courses is required for participation in this community field school. Students who meet these requirements will apply, and students will be selected based on fit of expertise and interest with the goals set by community partners for that year.
ANTH 555. REPRODUCTIVE JUSTICE: A SERVICE LEARNING COURSE (4). Reproductive Justice is a service-learning course that aims to bridge theory and practice in reproductive health and social justice by developing connections between the university campus and members of the local community.
ANTH 556. SOCIAL NETWORK ANALYSIS:
METHODS AND THEORY (4). An introduction to social network analysis (SNA), focusing on the methods of research design, data collection, and analysis. Students will learn key concepts and theories of SNA, apply these concepts to research projects in their chosen field, develop methods for collecting network data, and perform qualitative and quantitative analysis of these networks. Readings draw on studies of social networks from a variety of disciplines, including anthropology, sociology, environmental studies, public health and political science.
ANTH 559. LANGUAGE, RACE AND RACISM IN THE U.S.: ADVANCED STUDY (4). Students in this course will unpack language, race and racism--as well as the intersections between those ideas-as cornerstones to understanding identity and society as inherently socially constructed ideas. The goal of this course is to better understand how racism is produced and reproduced in talk and text (this will include symbols and signs), especially in the context of the denial of racism. Our course will specifically focus on the language of racism, and, more specifically, types of discourse that construct Whiteness as dominant over Color. CROSSLISTED as ES 459/ES 559, WLC 459/WLC 559.

ANTH 560. ETHNOGRAPHIC FIELD SCHOOL
(6). Involves an intensive field experience, learning and developing practical skills for operating socially and culturally in another culture. Students engage in anthropological and mixed research topics, methods, and analysis, such as research ethics, research design, participant observation, ethnographic interviewing, community mapping, qualitative and quantitative data analysis. PREREQS: Sophomore standing and application.

ANTH 561. NEUROANTHROPOLOGY
(4). The emerging interdisciplinary field of neuroanthropology combines anthropological understandings of human biological and cultural variation with recent findings in neuroscience. Key topics include socialization and enculturation, addiction, ritual, depression, and psychiatric disorders. PREREQS: ANTH 240 or ANTH 345 or ANTH 383

ANTH 563. ANTHROPOLOGICAL RESEARCH: PROFESSIONAL AND ETHICAL CONDUCT (4). Examines the history and scope of professional and ethical guidelines in anthropology; critically evaluate major issues involving ethics,
confidentiality, and anonymity that academic and professional anthropologists face during their careers. PREREQS: At least 6 credits of anthropology courses or graduate standing.

## ANTH 565. POPULAR CULTURE: AN

ANTHROPOLOGICAL PERSPECTIVE (4).
Introduces some of the debates and issues swirling around analyses of late twentiethearly twenty-first century popular/mass/public/ mediated/commercial culture. Learning about its pervasive forms, its origins and effects, how we are situated in it, and how it situates us is vital to understanding the changes that characterize our postmodern world.

ANTH 566. RURAL ANTHROPOLOGY (4). Concentrates on study of socio-cultural dynamics in rural communities as they develop in national and global contexts of political and economic change. Includes anthropological readings on rural issues in domestic and international contexts and a research paper on a contemporary rural issue. PREREQS: 3 credits of social science.
ANTH 567. AGRI-FOOD MOVEMENTS (4). Investigates the origins and contemporary status of producer and consumer food movements including, but not limited to, organics, agricultural labor movements, animal welfare, vegetarian and vegan movements, farmers' markets, and permaculture. CROSSLISTED as FCSJ 567.
ANTH 568. ANTHROPOLOGY OF CHILDHOOD
(4). Ethnographies of the organization of
children's lives in different cultural contexts are combined with readings on the conceptual and methodological genealogies that have constructed children as research subjects in anthropology. PREREQS: 3 credits of social science
ANTH 569. ENERGY IN CULTURAL
PERSPECTIVE (4). Examines historical and current trends in energy around the globe. Course themes include the role of energy in economic development, cultural innovation in energy production, social problems that arise from energy shortages or the uneven distribution of energy resources and social and cultural changes required as societies attempt to reduce their dependence on fossil fuels. PREREQS: ANTH 110 or ANTH 210

## ANTH 570. TOPICS IN CULTURAL

ANTHROPOLOGY (1-16). Covers recent advances in cultural anthropology and their applications to the field. Topics vary from term to term. This course is repeatable for a maximum of 16 credits. PREREQS: 3 credits of social science.

## ANTH 571. CASH, CLASS AND CULTURE:

HUNTER-GATHERERS TO CAPITALISM (4).
Students explore the cultural and social effects of capitalism in the contemporary world within the larger question of how economics and society intersect and change over time. Special emphases are put on food and work, but students explore the linkages of global forces and local life in a variety of ways. PREREQS: 3 credits of social science.

## ANTH 572. CONTEMPORARY INDIAN ISSUES

(4). Examines the background of Indian treaties and reservations with discussions of present issues such as health care, education, the Indian Child Welfare Act, fishing rights, and religious freedom. Issues are discussed in class with considerable class participation and some role playing. PREREQS: 3 credits of social science.
ANTH 573. GENDER, ETHNICITY, AND
CULTURE (4). Study of the practices and ideologies of gender as they intersect with those of ethnicity, race, class, and culture. PREREQS: 3 credits of social science.
ANTH 574. CROSS-CULTURAL HEALTH AND
HEALING (4). A comprehensive overview of current issues in global health with particular emphasis on social, cultural, and behavioral interventions. Explores issues of health and development in the international context, focusing on such issues as inequality, structural adjustment, economic development, and
community-based approaches to health care, specific cultural beliefs and practices, and the influences of people's perceptions of health, illness, and healing.
ANTH 575. THEORY OF CULTURE (4).
Core ideas in the discipline of anthropology. Examination of the contributions to anthropologica method and theory of the major schools of though in the history of anthropology. PREREQS: 9 credits of upper-division social science, including at least one 400-level anthropology course.

## ANTH 576. ADVANCED ANTHROPOLOGICAL

THEORY SEMINAR (4). Investigates theories used by current anthropologists to explicate issues of concern in a world of movement, fragmentation, global-local interactions, individuation via state and media unequal power relations, and neoliberal agendas. Students will participate in discussions, essays and a paper that links these theories to their research topics for theses or dissertations PREREQS: Must be a PhD student or have taken ANTH 575.
ANTH 577. ECOLOGICAL ANTHROPOLOGY
(4). Examines past and present interactions between humans and their environments. Emphasizes the concept of system and process of human adaptation. PREREQS: Upper-division standing and 3 credits of social science.

## ANTH 578. ANTHROPOLOGY OF TOURISM

4). Examines the cultural practices and impacts of tourism in relation to both host and guest communities, and travel itself as a part of culture We will explore theories of tourism and what role anthropology can play in influencing the industry and tourist and host relationships. PREREQS: 3 credits of social science
ANTH 579. ANTHROPOLOGY OF MIGRATION
(4). Focuses on the multiple aspects of population movements around the globe. Investigates
the history of recent human migration; current theories, trends and policies; as well as issues of immigrant incorporation and anti-immigrant politics. PREREQS: 3 credits of social science

## ANTH 580. TOPICS IN APPLIED

ANTHROPOLOGY (1-4). Recent advances in applied anthropology and their application to special fields of study. Topics vary from term to term. This course is repeatable for a maximum of 16 credits. PREREQS: 3 credits of social science
ANTH 581. NATURAL RESOURCES AND
COMMUNITY VALUES (4). Investigates relations between human communities and the values of community members. Resource issues integrate concepts from social science, economics, and ecology. PREREQS: 3 credits of social science.

## ANTH 582. ANTHROPOLOGY OF

INTERNATIONAL DEVELOPMENT (4). Examines the ideological and theoretical bases of world assistance programs and their effects on different sectors and classes, including women. Causes of world hunger in terms of agronomic, mainstream economic and radical economic paradigms are developed and contrasted. PREREQS: Graduate standing.
ANTH 583. ADVANCED MEDICAL
ANTHROPOLOGY (4). An overview of anthropological studies of the health of human communities from a biological and behavioral perspective. Topics include prehistory of disease, cultural perspectives on causation of disease and approaches to healing; anthropological approach to international health issues; and case studies PREREQS: (ANTH 110 or ANTH 210) and (ANTH 240 or ANTH 330)
ANTH 584. WEALTH AND POVERTY (3).
Summarizes the distribution of wealth observed cross-culturally and through time. Determines the relation between wealth distribution and economic productivity. Shows the impact of industrialization and economic wealth distribution in Western civilization and cross-culturally. Evaluates how cultural practices affect wealth distribution in Western and non-Western societies. PREREQS: 3
credits of social science.
ANTH 585. USES OF ANTHROPOLOGY
(4). Examines the practical applications of anthropological knowledge in historical and contemporary contexts. Focuses on planned social change and roles of anthropologists in interdisciplinary research and nonacademic settings such as international business, industrial relations, economic and technological development, education, legal institutions, environmental change, minority relations, health care, and cultural preservation. Emphasizes relevance to public policy and ethical issues associated with applications of anthropological knowledge. PREREQS: 3 credits of social science

ANTH 586. ANTHROPOLOGY OF FOOD (4).
The role of food in human cultures, both past and present. Includes discussion of different food procurement styles, social movements and the political economy of food. Looks at the symbolic aspects of food as well as its relationship with the environment. CROSSLISTED as FCSJ 586. PREREQS: 3 credits of social science.
ANTH 587. LANGUAGE IN GLOBAL CONTEXT (4). Deals with practical uses of linguistics in the global political arena. Explores use of official vs. unofficial languages, language standardization, the preservation of dying languages; problems in learning first and second languages, and the relevance of linguistic knowledge to education and cross-cultural communication. PREREQS: ANTH 251 or ANTH 350 or some knowledge of linguistic structure or graduate standing.
ANTH 588. BUSINESS AND ASIAN CULTURE (3). Examines the mutual influence of business organization and culture in Asia. Starts with the premise that a business organization contains a set of values. These values are analyzed as to their effect on society in general and some Asian societies in particular, including Japan, China, Korea, India, and Indonesia. A second area of investigation is the influence of Asian societies on the organization and practice of Western businesses both in Asia and the West. PREREQS: 3 credits of social science.

## ANTH 589. ANTHROPOLOGY OF BUSINESS

(3). Students are exposed to the methods and perspectives used by anthropologists working in business. How does anthropology contribute in such areas as product development, workplace organization and communication, marketing and interfacing with technology? Students do a lengthy project in one of these areas and present it as if in a corporate setting.

## ANTH 590. TOPICS IN METHODOLOGY

(1-4). Recent advances in anthropological methodologies and their application to special fields of study. Topics vary from term to term. This course is repeatable for a maximum of 16 credits. PREREQS: 6 credits anthropology or graduate standing.

ANTH 591. ETHNOGRAPHIC METHODS (4).
Cultural descriptions are produced through systematic observation, elicitation, and analysis o achieve proximity to the insider's point of view. Covers techniques of interviewing, validating, and interpreting cultural data. Allows students to practice what they have learned. PREREQS: 6 credits of anthropology or graduate standing.

ANTH 592. ARCHAEOLOGICAL LABORATORY METHODS (1-3). Provides information on the basics of archaeological laboratory work. Students learn the day-to-day operations of a lab, how to classify and catalog artifacts, and how to do artifact analysis. PREREQS: 6 credits of anthropology or graduate standing.
ANTH 593. STATISTICAL APPLICATIONS IN ANTHROPOLOGY (4). Develops the skills necessary to use statistical software to analyze and interpret numerical data. Covers descriptive statistics, correlation, and multivariate statistical procedures. Evaluate the adequacy of data for parametric and nonparametric statistical tests.

PREREQS: Graduate standing or a minimum of 6 credits of anthropology with instructor approval if an undergraduate.
ANTH 594. LINGUISTIC ANTHROPOLOGY LAB (1-3). A training and practicum in the elicitation, transcription and analysis of language. PREREQS: ANTH 350 or graduate standing.
ANTH 595. ANTHROPOLOGICAL RESEARCH
DESIGN (4). Critical examination of research design and methodology in anthropology; analysis of methods and procedures of research in the subfields of anthropology. PREREQS: 9 credits of upper-division social science, including at least one 400-level anthropology course.
ANTH 597. ARCHAEOLOGICAL FIELD
METHODS (1-3). Archaeological field strategies emphasizing reconnaissance and survey. Application of field equipment and project management.
ANTH 598. ORAL TRADITIONS (1-3). Method of examining unwritten culture preserved in speech, including local history, folklore, and songs passed from one generation to another. May include the use of life history, genealogy, and other means of collecting information. Attention is given to ethics, legal issues, and the process of transcription.
PREREQS: ANTH 350 and ANTH 452* or graduate standing
ANTH 599. SPECIAL TOPICS IN
ANTHROPOLOGY (1-16). This course is repeatable for a maximum of 16 credits.

ANTH 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANTH 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required
ANTH 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ANTH 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANTH 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANTH 610. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ANTH 695. ANTHROPOLOGICAL RESEARCH
DESIGN (4). Doctoral student seminar focused on the research process, from the selection of a research topic, to the choice of appropriate methods for data collection and analysis, to the submission of a research proposal. Class assignments will result in completion of a research proposal. Seminal discussion will focus on problem formulation, statement of objectives, theoretical background, methodological approach, analytical techniques, ethical responsibilities, justification for the research, data analysis and interpretation, and budgetary concerns. PREREQS: Doctoral standing.
ANTH 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ANTH 808. WORKSHOPS (1-16). This course is repeatable for a maximum of 16 credits.

## - ARABIC LANGUAGE COURSE

ARAB 111. FIRST-YEAR ARABIC (4).
Pronunciation, intonation, grammar, reading, writing, listening comprehension and conversation Initiation to Arabic culture and attitudes. Designed for students with no prior training in Arabic. Native and/or bilingual speakers of Arabic will not receive credit for ARAB 111, ARAB 112, ARAB 113. PREREQS: ARAB 111, ARAB 112, ARAB 113 must be taken in order.

ARAB 112. FIRST-YEAR ARABIC (4)
Pronunciation, intonation, grammar, reading, writing, listening comprehension and conversation Initiation to Arabic culture and attitudes. Designed for students with no prior training in Arabic. Native and/or bilingual speakers of Arabic will not receive credit for ARAB 111, ARAB 112, ARAB 113.
PREREQS: ARAB 111 [D-] or ARAB 111H [D-]
ARAB 113. FIRST-YEAR ARABIC (4).
Pronunciation, intonation, grammar, reading, writing, listening comprehension and conversation Initiation to Arabic culture and attitudes. Designed for students with no prior training in Arabic. Native and/or bilingual speakers of Arabic will not receive credit for ARAB 111, ARAB 112, ARAB 113.
PREREQS: ARAB 112 [D-] or ARAB 112H [D-]
ARAB 199. SPECIAL TOPICS (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.

## ARAB 211. SECOND-YEAR ARABIC (4),

Further development of listening comprehension, speaking, reading, and writing skills. Completion of ARAB 213 with a grade of C- or better satisfies the $B A$ requirement in foreign languages. PREREQS: ARAB 113 [D-] and /or instructor approval. Native and/or bilingual speakers of Arabic will not receive credit for ARAB 211.
ARAB 212. SECOND-YEAR ARABIC (4).
Further development of listening comprehension, speaking, reading, and writing skills. Completion of ARAB 213 with a grade of C- or better satisfies the BA requirement in foreign languages. PREREQS: ARAB 211 [D-] and /or instructor approval. Native and/or bilingual speakers of Arabic will not receive credit for ARAB 212.
ARAB 213. SECOND-YEAR ARABIC (4).
Further development of listening comprehension, speaking, reading, and writing skills. Completion of ARAB 213 with a grade of C- or better satisfies the BA requirement in foreign languages. PREREQS: ARAB 212 [D-] and /or instructor approval. Native and/or bilingual speakers of Arabic will not receive credit for ARAB 213.
ARAB 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

ARAB 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Instructor permission and school approval are required to register for this course.
ARAB 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## ■ AMERICAN SIGN LANGUAGE COURSE

ASL 111. FIRST-YEAR AMERICAN SIGN LANGUAGE (4). A beginning course to learn the basics of American Sign Language. The course focuses on the ASL language and its uses of syntax, grammar, vocabulary, facial expressions and deaf culture.
ASL 112. FIRST-YEAR AMERICAN SIGN LANGUAGE (4). A continuation of ASL 111 with the development of structures, receptive/ expressive skills and vocabulary. Native and/or bilingual speakers of ASL will not receive credit for ASL 111, ASL 112, ASL 113. PREREQS: ASL 111 [D-] and /or placement test or instructor permission. Students need to have a basic foundation of the language in order to continue with the first-year series.

ASL 113. FIRST-YEAR AMERICAN SIGN LANGUAGE (4). A continuation of ASL 111 and ASL 112 with the further development of structures, receptive/expressive skills and vocabulary. Native and/or bilingual speakers of ASL will not receive credit for ASL 111, ASL 112, ASL 113. PREREQS: ASL 112 [D-]
ASL 211. SECOND-YEAR AMERICAN SIGN LANGUAGE (4). A continuation of the first-
year ASL courses with the further development of structures, receptive/expressive skills and vocabulary. Native and/or bilingual speakers of ASL will not receive credit for ASL 211, ASL 212, ASL 213. PREREQS: ASL 113 [D-]
ASL 212. SECOND-YEAR AMERICAN SIGN LANGUAGE (4). A continuation of the secondyear ASL series with the further development of structures, receptive/expressive skills and vocabulary. Native and/or bilingual speakers of ASL will not receive credit for ASL 211, ASL 212, ASL 213. PREREQS: ASL 211 [D-]
ASL 213. SECOND-YEAR AMERICAN SIGN LANGUAGE (4). A continuation of the secondyear ASL series with the further development of structures, receptive/expressive skills and vocabulary. Native and/or bilingual speakers of ASL will not receive credit for ASL 211, ASL 212, ASL 213. PREREQS: ASL 212 [D-]

## - ASIAN LANGUAGES AND CULTURES COURSE

ASN 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## - Chinese Language COURSES

CHN 111. FIRST-YEAR CHINESE (4). Essentials of colloquial Mandarin with emphasis on conversation, reading, and writing. Designed for students with no prior training in Chinese. Native and/or bilingual speakers of Chinese will not receive credit for CHN 111, CHN 112, CHN 113. Lec/rec. PREREQS: CHN 111, CHN 112, CHN 113 must be taken in order.
CHN 112. FIRST-YEAR CHINESE (4). Essentials of colloquial Mandarin with emphasis on conversation, reading, and writing. Designed for students with no prior training in Chinese. Native and/or bilingual speakers of Chinese will not receive credit for CHN 111, CHN 112, CHN 113. Lec/Rec. PREREQS: CHN 111 [D-] and CHN 111, CHN 112, CHN 113 must be taken in order.
CHN 113. FIRST-YEAR CHINESE (4). Essentials of colloquial Mandarin with emphasis on conversation, reading, and writing. Designed for students with no prior training in Chinese. Native and/or bilingual speakers of Chinese will not receive credit for CHN 111, CHN 112, CHN 113. Lec/Rec. PREREQS: CHN 112 [D-] and CHN 111, CHN 112, CHN 113 must be taken in order.
CHN 199. SPECIAL STUDIES (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.

CHN 211. SECOND-YEAR CHINESE (4). Further development of listening comprehension, speaking, reading, and writing skills. Emphasis on conversational fluency and increased vocabulary. Native and/or bilingual speakers of Chinese will not receive credit for CHN 211, CHN 212 , CHN 213. Completion of CHN 213 with grade of C- or better satisfies BA requirement in foreign languages. Lec/Rec. PREREQS: CHN 113 [C-] and /or placement. CHN 211, CHN 212, CHN 213 must be taken in order.

## CHN 212. SECOND-YEAR CHINESE (4).

Further development of listening comprehension, speaking, reading, and writing skills. Emphasis on conversational fluency and increased vocabulary. Native and/or bilingual speakers of Chinese will not receive credit for CHN 211, CHN 212, CHN 213. Completion of CHN 213 with grade of C- or better satisfies BA requirement in foreign languages. Lec/discussion/activity. PREREQS: CHN 211 [D-]
CHN 213. SECOND-YEAR CHINESE (4). Further development of listening comprehension, speaking, reading, and writing skills. Emphasis on conversational fluency and increased vocabulary. Native and/or bilingual speakers of Chinese will not receive credit for CHN 211, CHN 212,

CHN 213. Completion of CHN 213 with grade of C- or better satisfies BA requirement in foreign languages. Lec/discussion. PREREQS: CHN 212 [C-]
CHN 299. SPECIAL STUDIES (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.

CHN 311.THIRD-YEAR CHINESE LANGUAGE (3). Further development of listening, speaking, reading, and writing skills to a more advanced level with emphasis on the practical application of the Chinese language. PREREQS: CHN 213 [C-] and /or instructor approval.

CHN 312. THIRD-YEAR CHINESE LANGUAGE (3). Further development of listening, speaking, reading, and writing skills to a more advanced level with emphasis on the practical application of the Chinese language. Lec/rec. PREREQS: CHN 311 [C-] and /or instructor approval.
CHN 313. THIRD-YEAR CHINESE LANGUAGE
(3). Further development of listening, speaking, reading, and writing skills to a more advanced level with emphasis on the practical application of the Chinese language. PREREQS: CHN 312 [C-] and /or instructor approval.
CHN 331. *CHINESE CULTURE (3). Introduction to basic features of Chinese culture from ancient times to the 9th century. Topics include philosophy and religion, the Chinese language, literature and the arts, science and technology, government, family and gender, social and economic conditions, contacts with the outside world. Taught in English. Open to all students. (NC) (Bacc Core Course) PREREQS: Sophomore standing. CHN 331, CHN 332, CHN 333 need not be taken in order.
CHN 332. *CHINESE CULTURE (3). Introduction to basic features of Chinese culture from the 10th through the 19th centuries. Topics include philosophy and religion, literature and the arts, science and technology, government, family and gender, social and economic conditions, daily life, and contacts with the outside world. Taught in English. Open to all students. (NC) (Bacc Core Course) PREREQS: Sophomore standing. CHN 331, CHN 332, CHN 333 need not be taken in order.
CHN 333. *MODERN CHINESE CULTURE (3).
Survey of important developments of Chinese society and culture from the early 20th century to the present. Topics include wars and revolutions, economic, political, and social conditions, the new culture movement, changing family structure and women's status, relationships within greater China (Mainland China, Taiwan, and Hong Kong). Taught in English. Open to all students. (NC) (Bacc Core Course) PREREQS: Sophomore standing. CHN 331, CHN 332, CHN 333 need not be taken in order.
CHN 345. MULTIMODAL LITERACIES: CHINESE
(2). Introduction to the analysis and production of multimodal literacies. Study of semiotic resources such as language and images across modalities such as film, manga, and social media. Required of all majors in World Languages and Cultures. Taught in Chinese. Has to be taken in conjunction with the lecture in English. PREREQS: CHN 213 with a grade of at least C-, or equivalent, or placement test. Sophomore standing required. COREQS: WLC 345

CHN 379. PROCTOR EXPERIENCE (1-2).
Supervised practicum for advanced students, with assignments as proctor or tutor in lower-division Chinese courses. May be repeated for credit. No credit may be used to satisfy requirements for a minor in Chinese. Graded P/N. This course is repeatable for a maximum of 6 credits. PREREQS: Completion of third-year Chinese with a minimum 3.0 GPA in that sequence and prior authorization from supervisor.

CHN 399. SPECIAL TOPICS (1-16). This course
is repeatable for a maximum of 16 credits.
CHN 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Departmental approval required

CHN 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CHN 405. READING AND CONFERENCE (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CHN 410. INTERNSHIP (1-15). This course is repeatable for a maximum of 15 credits.
CHN 411. FOURTH-YEAR CHINESE (NEWSPAPER CHINESE) (3). Development of reading, writing, and speaking skills at a more advanced level; reading of newspaper articles from China, Taiwan, and other sources; oral eports and compositions in Chinese. Not offered every year. PREREQS: CHN 313 or placement and departmental approval required. CHN 411, CHN 412, CHN 413 must be taken in order.

CHN 412. FOURTH-YEAR CHINESE
(NEWSPAPER CHINESE) (3). Development of reading, writing, and speaking skills at a more advanced level; reading of newspaper articles from China, Taiwan, and other sources; oral reports and compositions in Chinese. Not offered every year. PREREQS: CHN 411 or placement and departmental approval required.
CHN 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CHN 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.

## COLLEGE STUDENT SERVICES ADMINISTRATION COURSES

CSSA 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CSSA 502. INDEPENDENT STUDY (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

CSSA 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

CSSA 505. READING AND CONFERENCE (116). Graded $P / N$. This course is repeatable for a maximum of 16 credits.

CSSA 506. PROJECTS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

CSSA 507. SEMINAR (1-5). Graded P/N. This course is repeatable for a maximum of 16 credits.
CSSA 508. WORKSHOP (1-3). Graded P/N. This course is repeatable for a maximum of 16 credits.

CSSA 510. INTERNSHIP (1-18). Graded P/N. This course is repeatable for a maximum of 18 credits. PREREQS: By special permission and arrangement.
CSSA 513. RESEARCH IN HIGHER
EDUCATION (3). Basic understanding of research and assessment ideas, uses, and practices in higher education and student affairs.

## CSSA 515. ADVANCED RESEARCH

LITERATURE REVIEW (3). Provides graduate students with knowledge and experience in the advanced literature review process including construction of the literature review as product. One of the primary skills graduate students must master is advanced review of a body of literature for the research project. Mastery of the literature review process influences quality and sophistication of claims developed to ustify research, with the written review clearly delineating the unique contribution of the student's research and the knowledge gap that
it fills. The literature review as a product is a strong written argument that builds a case from credible evidence based on previous research CROSSLISTED as ANTH 515, ES 515, WGSS 515. PREREQS: Graduate standing

CSSA 520. MULTICULTURAL ISSUES IN HIGHER EDUCATION (3). Developing understanding, knowledge, and skills of multiculturalism affecting the student affairs profession and careers in student affairs administration.
CSSA 548. AMERICAN HIGHER EDUCATION
(3). The origins and development of higher education in the United States from the colonial colleges to the present.

CSSA 551. PROGRAMS AND FUNCTIONS IN COLLEGE STUDENT SERVICES (3). Historical, philosophical, and organizational foundations; operational components and functional areas; overview and analysis of college student services in postsecondary educational institutions; leadership development.

CSSA 552. STUDENT DEVELOPMENT IN UNIVERSITIES AND COLLEGES (3). Theoretical and philosophical foundations of student development; analysis of college student characteristics and the student culture; nontraditional student subgroups; student attitudes, values, and beliefs; concepts and models that promote student learning; and assessment of student growth. This course is repeatable for a maximum of 6 credits.
CSSA 554. LEGAL ISSUES IN HIGHER EDUCATION (3). A comprehensive presentation and discussion of the law governing administration within public colleges and universities with a special emphasis on tort liability and freedom of expression.
CSSA 557. PROFESSIONAL DEVELOPMENT IN COLLEGE STUDENT SERVICES (1). Selfassessment, goal setting, professional growth, and professional ethics as a practitioner in college student services administration. Graded P/N.

CSSA 558. ORGANIZATION AND
ADMINISTRATION OF COLLEGE STUDENT
SERVICES (3). Legal foundations, governance models, planning, and goal setting, resource acquisition and allocation, personnel and financial management and administrative leadership

CSSA 574. BUDGET AND FINANCE (2).
Introduction to budget and finance in student services. Overview of topics with which student affairs practitioners should be familiar, able to use, and to assess.
CSSA 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## ■ ETHNIC STUDIES COURSES

ES 101. *INTRODUCTION TO ETHNIC STUDIES (3). This interdisciplinary course focuses on the ethnic group experience in the United States with emphasis on African Americans, Native Americans, Chicanos/as, Latinos/as, and Asian Americans. (Bacc Core Course)
ES 159. *LANGUAGE, RACE AND RACISM IN THE US: AN INTRODUCTION (4). Students in this course will unpack language, race and racism--as well as the intersections between those ideas-as cornerstones to understanding identity and society as inherently socially constructed notions. (Bacc Core Course) CROSSLISTED as ANTH 159 and WLC 159.
ES 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ES 201. *INVENTING ETHNIC AMERICA (3). An examination of past and present constructions of race and ethnicity in U.S. culture and society and their impact on individuals, institutions, policies, and practices, with particular emphasis on contemporary America. (Bacc Core Course) (H) (SS)

ES 212. *SURVEY OF CHICANO/A-LATINO/A STUDIES (3). An interdisciplinary survey of the Chicano/a-Latino/a experience, 1848-present. Topics include conquest and colonization, cultural resistance, social stratification, immigration, grassroots movements, and expressive culture. (Bacc Core Course)

ES 213. *CONTEMPORARY LATINO/A
CULTURE AND ISSUES (3). A comparative interdisciplinary treatment of contemporary Latino/a cultures and current issues affecting their status in the United States. (Bacc Core Course)
ES 221. *SURVEY OF AFRICAN AMERICAN STUDIES I (4). An interdisciplinary survey of the African American experience beginning with precolonial Africa to the early 1900s. (H) (NC) (Bacc Core Course)
ES 221H. *SURVEY OF AFRICAN AMERICAN STUDIES I (3). An interdisciplinary survey of the African American experience beginning with pre-colonial Africa and ending with World War I. (H) (NC) (Bacc Core Course) PREREQS: Honors College approval required.
ES 223. *SURVEY OF AFRICAN AMERICAN STUDIES II (4). An interdisciplinary survey of the African American experience from World War I to the present. (Bacc Core Course)
ES 231. *INTRODUCTION TO ASIAN AMERICAN
STUDIES (4). An examination of the histories and experiences of Asian Americans from the mid-1800s to the present through historical texts, oral histories, personal essays, video, audio, and creative writings. (H) (Bacc Core Course)
ES 233. *ASIAN PACIFIC AMERICAN ACTIVISM AND EMPOWERMENT (4). A look at Asian Pacific American activism and issues, from early labor organizing to contemporary community efforts, with particular emphasis on the 1960s to the present. (H) (Bacc Core Course)

## ES 241. *INTRODUCTION TO NATIVE

AMERICAN STUDIES (4). A survey of Native American cultures and history, both prior to and following contact with Europeans. Introduces the key contemporary issues and questions in the field of Native American studies. (H) (NC) (Bacc Core Course)

## ES 241H. *INTRODUCTION TO NATIVE

AMERICAN STUDIES (4). A survey of Native American cultures and history, both prior to and following contact with Europeans. Introduces the key contemporary issues and questions in the field of Native American studies. (H) (NC) (Bacc Core Course) PREREQS: Honors College approval required.
ES 243. *NATIVE AMERICAN ASSIMILATION
AND ACTIVISM (4). Comprehensive course dealing with Native American experiences in the United States. Focuses on tribal and individual Native American activism and responses to government policies and cultural practices of assimilation since 1900. (Bacc Core Course) (H) (NC)
ES 260. *INTRODUCTION TO PACIFIC ISLANDS STUDIES (4). Introduction to the geography, societies, histories, cultures, and contemporary issues of Oceania (Pacific islands). Especially concerned with the experience of indigenous communities and the representations generated inside and outside Oceania. (Bacc Core Course)

ES 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

ES 311. NARRATIVES OF LATINO MIGRATIONS
(3). A study of the scholarship and creative literature dealing with migrations from Mexico and other Latin American countries to the United States.
ES 314. CHICANO/A LITERATURE (3). A survey of select works in various genres. Attention to questions of cultural production, reception, critical approaches and how factors such as race, gender, and class impact Chicano/a discursive practices.

ES 321. AFRICAN AMERICAN POLITICAL AND SOCIAL THOUGHT: 20TH CENTURY (4). This interdisciplinary course examines the dialogues, conflicts and self-representations produced by African Americans beginning with the closing years of the 19 century (1895) and ending with the opening days of World War II. (SS)
ES 323. CONTEMPORARY AFRICAN AMERICAN SOCIAL DISCOURSE (4). Interdisciplinary course examines key African American political discourse(s) that emerged in response to major social and cultural transformations occurring in the United States after World War II to the present. (SS)

## ES 332. ASIAN PACIFIC AMERICANS AND

THE MEDIA (4). A broad study of representations of Asians, Pacific Islanders, and Asian Pacific Americans in various US media, including media produced by Asian Pacific Americans themselves.

## ES 334. *ASIAN PACIFIC AMERICAN

LITERATURE (4). An examination of various
works by Asian Pacific American writers and some of the critical debates surrounding them. (Bacc Core Course)

ES 345. NATIVE AMERICANS IN OREGON (4). Analysis and understanding of the complex experiences of Native Americans in the present state of Oregon, from early contact with those of other ethnicities to contemporary demographic contexts. (H) (NC)
ES 350. ^PUBLIC DISCOURSE AND
WRITINGS ON RACE (4). Explores historical and contemporary cases of private, political, and public discourse on race and difference. Students will study diverse examples to explore strategies and methods of dominant and resistant discourse, as well as their social and material impacts. (Writing Intensive Course)
ES 351. *ETHNIC MINORITIES IN OREGON (4). Exploration of the cultures and contributions of major ethnic groups in the state of Oregon. With timelines, oral histories, and audiovisual aids, the course will allow students to learn the ethnic and regional diversity in Oregon history. (Bacc Core Course) (H)
ES 353. *ENVIRONMENTAL RACISM (4).
Introduces environmental racism; the unequal impact of environmental harm on communities of color and indigenous peoples. Presents empirical evidence and theoretical frames, and explores efforts by government, residents, and activists to combat it. Considers questions of environmental justice via social structure, public access, open space, indigeneity, food, and media. (Bacc Core Course)
ES 353H. *ENVIRONMENTAL RACISM (4). Introduces environmental racism; the unequal impact of environmental harm on communities of color and indigenous peoples. Presents empirical evidence and theoretical frames, and explores efforts by government, residents, and activists to combat it. Considers questions of environmental justice via social structure, public access, open space, indigeneity, food, and media. (Bacc Core Course) PREREQS: Honors College approval required.

ES 354. ^LITERATURE OF ETHNIC MINORITIES IN THE UNITED STATES (4). An examination of various literary works by ethnic minorities addressing issues of race and ethnicity in U.S. culture and society. (Writing Intensive Course)
ES 355. *RACE, SPACE, AND DIFFERENCE (4). A hands-on approach to exploring how we make space, and why geography is always infused with markers of social identity and exercises of power. Will practice "reading" space and landscapes, and learn how notions of race and other forms of "difference" shape space (and vice versa) to produce experiences of inclusion, exclusion, cooperation, and conflict. (Bacc Core Course)

ES 355H. *RACE, SPACE, AND DIFFERENCE
(4). A hands-on approach to exploring how
we make space, and why geography is always infused with markers of social identity and exercises of power. Will practice "reading" space and landscapes, and learn how notions of race and other forms of "difference" shape space and (vice versa) to produce experiences of inclusion, exclusion, cooperation, and conflict. (Bacc Core Course) PREREQS: Honors College approval required.

## ES 357. *FARMWORKER JUSTICE

MOVEMENTS (4). Justice movements for farmworkers have a long and storied past in the annals of US history. This course begins with the 1960s Chicano civil rights era struggles for social justice. Focus on the varied strategies of four farmworker justice movements: United Farm Workers, Farm Labor Organizing Committee, Pineros y Campesinos Unidos Noroeste, and the Coalition of Immokalee Workers. The course is structured around the question of the movement and its various articulations. Course covers centra themes and strategies that comprise the core of farmworker movements but is designed to allow students to explore other articulations they find relevant. (Bacc Core Course)
ES 373. APPROACHES TO SOCIAL JUSTICE
(3). Students study various ways of thinking about social justice and evaluate these in case studies and current events. As a basis for the Social Justice minor, students write a research paper on the theoretical and practical aspects of a social justice issue. CROSSLISTED as ANTH 373, WGSS 373, WLC 373.
ES 375. *ARTS AND SOCIAL JUSTICE (4). Explores concepts of structural inequality, difference, power, and discrimination through a critical survey of arts activism. Students will think critically about artwork and artists which address a number of social issues in the United States, including race, ethnicity, class, gender, sexuality, immigration, and indigeneity. CROSSLISTED as QS 375, WGSS 375.

ES 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

ES 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
ES 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ES 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ES 403. THESIS (1-16). This course is repeatable or a maximum of 16 credits. PREREQS: Departmental approval required.

ES 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ES 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ES 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ES 408. WORKSHOP (1-16). This course is repeatable for a maximum of 99 credits.

ES 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ES 410. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ES 411. CHICANO/AS IN/ON FILM (3).
Exploration of how Mexicans and Mexican
Americans have been portrayed in Hollywood film and how contemporary filmmakers from this group are challenging traditional representations.

ES 416. MIGRANT HEALTH (4). An overview of major health and health care issues related to immigrant communities in the United States From an ecological perspective, students gain an understanding of the theories and realities about migration and the migration-health relationship. In particular, the situation of migrant and seasonal farmworkers in the Pacific Northwest is analyzed. Specific topics include assimilation and acculturation, access to care, protective practices (the so-called Latino paradox), migrant health centers and community health workers, environmental and occupational issues, immigrant families

ES 431. *QUEER OF COLOR CRITIQUES (4). "Queer of color critiques" refers to political theories and activism that emerge from LGBTQ people of color to examine the intersections between race, sexuality and gender. This course addresses these intersections through theory, history, and activism. (Bacc Core Course) CROSSLISTED as QS 431 and WGSS 431. PREREQS: Junior standing.
ES 437. *(EN)GENDERING ASIAN PACIFIC
AMERICA (4). An examination of intersecting articulations of race, class, gender, sexuality, and ethnicity as they relate to and are addressed by Asian Pacific Americans. (H) (Bacc Core Course)
ES 444. NATIVE AMERICAN LAW: TRIBES TREATIES, AND THE UNITED STATES
4). Examination of the parameters of native treaty relationships with the federal and state governments, and considers the future of these agreements
ES 445. *NATIVE AMERICAN SCIENCE AND TECHNOLOGY (4). Examination of scientific and technological discovery, continuity, and change among indigenous peoples, with particular emphasis on selected communities of pre- and post-European contact North America. (Bacc Core Course) (H) (NC)
ES 448. NATIVE AMERICAN PHILOSOPHIES
(4). Native American perspectives on ways of knowing, sources of meaning and ethics, the nature of reality, self, community, and cosmos. Includes lectures, scholarship, story-telling, poetry, theater, and music as forums for this exploration. Introduces ideas of leading Native American thinkers about the human relation to the natural world, sources of strength and wisdom, the nature of time and place and spirit, right ways of acting in communities, both civic and biotic, and the place of beauty in a well-lived life. (NC) CROSSLISTED as PHL 448/PHL 548, REL 448/REL 548.
ES 451. THEORIES OF RACE AND ETHNICITY
(4). A seminar examining various theories of race and ethnicity, their historical contexts, and applications.

ES 452. *ETHNICITY IN FILM (4). Using ethnicity and gender as primary frames of reference, this upper-division/graduate level seminar seeks to introduce students to critical film theory and examine ethnicity and gender as a force both in front of and behind the camera. (Bacc Core Course)

ES 453. *ETHNOHISTORY METHODOLOGY (4). A seminar developing techniques for collecting, analyzing, and incorporating ethnic community histories in research papers and theses. (Bacc Core Course)
ES 455. INTERNSHIP SEMINAR (1). Prepares students for the internship and provides an opportunity to explore career options and/or graduate study. PREREQS: ES 101 and ES 201

ES 457. *LITERATURE BY WOMEN OF COLOR IN THE UNITED STATES (4). An examination of works by various women writers of color and their treatment of issues such as race, ethnicity, class, sexuality, and gender. (Bacc Core Course)
ES 458. RACIAL PATTERNS OF URBANIZATION
(4). This interdisciplinary course will examine the linkages between race and patterns of urbanization. It will examine how ideologies about
race, gender, and class have set the themes of debate and discussion about urbanization in both theoretical and popular discourses.

ES 459. LANGUAGE, RACE AND RACISM IN
THE U.S.: ADVANCED STUDY (4). Students in this course will unpack language, race and racism--as well as the intersections between those ideasas cornerstones to understanding identity and society as inherently socially constructed ideas The goal of this course is to better understand how racism is produced and reproduced in talk and text (this will include symbols and signs), especially in the context of the denial of racism. Our course will specifically focus on the language of racism, and, more specifically, types of discourse that construct Whiteness as dominant over Color. CROSSLISTED as ANTH 459/ANTH 559, WLC 459/WLC 559

ES 460. ETHNICITY AND SOCIAL JUSTICE (4). Seminar examines inequities and social justice issues in contemporary U.S. society, particularly dimensions of race and ethnicity in our public policies and practices impacting communities in areas such as housing, poverty, employment, public health, education, law enforcement, and the environment.

## ES 461. RACISM AND THE PRISON

INDUSTRIAL COMPLEX (4). The prison industrial/punishment complex in the late 20th and early 21st centuries has become a growth industry with the privatization of prisons, and mass incarceration of mostly people-of-color. This course examines the history and growth of this industry and the implications that it has on this democracy.

## ES 464. FOOD AND ETHNIC IDENTITY:

## DECOLONIZING OUR FOOD AND BODY

(3). This interdisciplinary and comparative course will examine the relationship between food and identity. Food, from its production to consumption, is a powerful symbol of social and cultural meaning. As an expression of identity and subjectivity, food also marks borders between humans and non-humans, plants and animals, nature and culture, tradition and modernity, etc. CROSSLISTED as FCSJ 464. (H)
ES 472. ^INDIGENOUS TWO-SPIRIT AND QUEER STUDIES (3). "Two-spirit" refers to North American indigenous genders outside of European male/female binaries. Two-spirit communities argue for decolonization as a central political struggle, calling all people to unlearn settler colonial gender/sexuality on Native land This course addresses indigenous two-spirit/ GLBTQ issues through theory, literature, activism, and art. CROSSLISTED as QS 472, WGSS 472. PREREQS: QS 262 or ES 242 or WGSS 414 or instructor permission
ES 477. QUEER/TRANS PEOPLE OF COLOR ARTS AND ACTIVISM (4). LGBTQ people of color often engage struggles for social justice through artistic movements. This course will focus on arts by LGBTQ people of color and the way these artistic movements contribute to activism that interrupts interlocking systems of oppression. CROSSLISTED as QS 477/QS 577, WGSS 477/ WGSS 577. PREREQS: QS 262 and QS 462

ES 485. CAPSTONE IN SOCIAL JUSTICE (2). Working with an advisor from the Social Justice minor, students conduct research to synthesize and extend analysis of a particular social justice issue, building on three previous papers or projects. Results are presented in a 10-15 page paper and a public poster, presentation or website CROSSLISTED as ANTH 485, WGSS 485, WLC 485. This course is repeatable for a maximum of 4 credits. PREREQS: (ANTH 373 [D-] or ES 373 [D-] or WGSS 373 [D-] or WLC 373 [D-] ) and (ANTH 410 [D-] or ES 410 [D-] or WGSS 410 [D-] or WLC 410 [D-])
ES 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ES 501. RESEARCH (1-16). This course
is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ES 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Departmental approval required.
ES 503. THESIS (1-16). This course is repeatable or a maximum of 999 credits. PREREQS: Departmental approval required.
ES 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ES 506. SPECIAL PROJECTS (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Departmental approval required.

ES 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ES 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
ES 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required

ES 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required. ES 515. ADVANCED RESEARCH LITERATURE REVIEW (3). Provides graduate students with knowledge and experience in the advanced literature review process including construction of the literature review as product. One of the primary skills graduate students must master is advanced review of a body of literature for the research project. Mastery of the literature review process influences quality and sophistication of claims developed to justify research, with the written review clearly delineating the unique contribution of the student's research and the knowledge gap that it fills. The literature review as a product is a strong written argument that builds a case from credible evidence based on previous research. CROSSLISTED as ANTH 515, CSSA 515, WGSS 515. PREREQS: Graduate standing

ES 516. MIGRANT HEALTH (4). An overview of major health and health care issues related to immigrant communities in the United States. From an ecological perspective, students gain an understanding of the theories and realities about migration and the migration-health relationship. In particular, the situation of migrant and seasonal farmworkers in the Pacific Northwest is analyzed. Specific topics include assimilation and acculturation, access to care, protective practices (the so-called Latino paradox), migrant health centers and community health workers, environmental and occupational issues, immigrant families.
ES 531. QUEER OF COLOR CRITIQUES (4). "Queer of color critiques" refers to political theories and activism that emerge from LGBTQ people of color to examine the intersections between race, sexuality and gender. This course addresses these intersections through theory, history, and activism. CROSSLISTED as QS 531 and WGSS 531. PREREQS: Junior standing.
ES 537. (EN)GENDERING ASIAN PACIFIC
AMERICA (4). An examination of intersecting articulations of race, class, gender, sexuality, and ethnicity as they relate to and are addressed by Asian Pacific Americans.
ES 544. NATIVE AMERICAN LAW: TRIBES TREATIES, AND THE U.S. (4). Examination of the parameters of native treaty relationships with the federal and state governments, and considers the future of these agreements.

ES 548. NATIVE AMERICAN PHILOSOPHIES
(4). Native American perspectives on ways of knowing, sources of meaning and ethics, the nature of reality, self, community, and cosmos. Includes lectures, scholarship, story-telling, poetry,
theater, and music as forums for this exploration. Introduces ideas of leading Native American thinkers about the human relation to the natural world, sources of strength and wisdom, the nature of time and place and spirit, right ways of acting in communities, both civic and biotic, and the place of beauty in a well-lived life. CROSSLISTED as PHL 448/PHL 548, REL 448/REL 548

ES 551. THEORIES OF RACE AND ETHNICITY (4). A seminar examining various theories of race and ethnicity, their historical contexts, and applications.
ES 552. ETHNICITY IN FILM (4). Using ethnicity and gender as primary frames of reference, this upper-division/graduate level seminar seeks to introduce students to critical film theory and examine ethnicity and gender as a force both in front of and behind the camera.
ES 553. ETHNOHISTORY METHODOLOGY (4). A seminar developing techniques for collecting, analyzing, and incorporating ethnic community histories in research papers and theses.

ES 557. LITERATURE BY WOMEN OF COLOR IN THE UNITED STATES (4). An examination of works by various women writers of color and their treatment of issues such as race, ethnicity, class, sexuality, and gender.
ES 558. RACIAL PATTERNS OF URBANIZATION
(4). This interdisciplinary course will examine the linkages between race and patterns of urbanization. It will examine how ideologies about race, gender, and class have set the themes of debate and discussion and about urbanization in both theoretical and popular discourses.
ES 559. LANGUAGE, RACE AND RACISM IN
THE U.S.: ADVANCED STUDY (4). Students in this course will unpack language, race and racism--as well as the intersections between those ideas-as cornerstones to understanding identity and society as inherently socially constructed ideas. The goal of this course is to better understand how racism is produced and reproduced in talk and text (this will include symbols and signs), especially in the context of the denial of racism. Our course will specifically focus on the language of racism, and, more specifically, types of discourse that construct Whiteness as dominant over Color. CROSSLISTED as ANTH 459/ANTH 559, WLC 459/WLC 559.
ES 560. ETHNICITY AND SOCIAL JUSTICE (4). Seminar examines inequities and social justice issues in contemporary U.S. society, particularly dimensions of race and ethnicity in our public policies and practices impacting communities in areas such as housing, poverty, employment, public health, education, law enforcement, and the environment.

## ES 561. RACISM AND THE PRISON

INDUSTRIAL COMPLEX (4). The prison
industrial/punishment complex in the late 20th and early 21st centuries has become a growth industry with the privatization of prisons, and mass incarceration of mostly people-of-color. This course examines the history and growth of this industry and the implications that it has on this democracy.

ES 564. FOOD AND ETHNIC IDENTITY: DECOLONIZING OUR FOOD AND BODY
(3). This interdisciplinary and comparative course will examine the relationship between food and identity. Food, from its production to consumption, is a powerful symbol of social and cultural meaning. As an expression of identity and subjectivity, food also marks borders between humans and non-humans, plants and animals, nature and culture, tradition and modernity, etc. CROSSLISTED as FCSJ 564.
ES 569. TOPICS IN JOTERIA STUDIES (3). A space for engaging with arts, activism and scholarship emerging from queer Latin@/ Chican@ experiences and consciousness is provided. Offered winter term in odd years. CROSSLISTED as QS 569, SPAN 569, WGSS
569. This course is repeatable for a maximum of 6 credits. PREREQS: Instructor approval.

## ES 572. INDIGENOUS TWO-SPIRIT AND

 QUEER STUDIES (3). "Two-spirit" refers to North American indigenous genders outside of European male/female binaries. Two-spirit communities argue for decolonization as a central political struggle, calling all people to unlearn settler colonial gender/sexuality on Native land This course addresses indigenous two-spirit/ GLBTQ issues through theory, literature, activism, and art. CROSSLISTED as QS 572, WGSS 572. PREREQS: QS 262 or ES 242 or WGSS 414 or WGSS 514 or instructor permissionES 575. CRITICAL RACE FEMINISM AND OUTSIDER JURISPRUDENCE (4). Critical exploration of critical legal justice movements and their relationship to social identities. Seminar emphasizes specific legal cases, federal and state laws, and constitutional issues that impact groups deemed outsiders in legal discourse as well as their social implications. The critical justice movement and anti-subordination struggles will be explored via case analyses that shape race, class, gender, sexuality, and disability relations. Theoretical contributions of law and society, critical race theory, LatCrit, and critical race feminism, critical white studies, critical mixed race studies, OutCrit, ClassCrit, and critical disability studies applied to historical precedent and current attempts at marginalizing/empowering communities. CROSSLISTED as WGSS 575.

ES 577. QUEER/TRANS PEOPLE OF COLOR ARTS AND ACTIVISM (4). LGBTQ people of color often engage struggles for social justice through artistic movements. This course will focus on arts by LGBTQ people of color and the way these artistic movements contribute to activism that interrupts interlocking systems of oppression. CROSSLISTED as QS 477/QS 577, WGSS 477/ WGSS 577. PREREQS: QS 262 and QS 464

ES 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ES 808. WORKSHOP (1-16). This course is repeatable for a maximum of 99 credits.

## I FOOD IN CULTURE AND SOCIAL JUSTICE COURSES

FCSJ 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

FCSJ 261. *FOOD IN AMERICAN CULTURE (3).
Fosters understanding of the meanings of foods and foodways in American culture. Uses food as a lens to explore general topic areas such as work, family, ecology, and identity. Critically examines core issues that shape and have shaped American culture. (Bacc Core Course) (SS) CROSSLISTED as ANTH 261.
FCSJ 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
FCSJ 361. *FOOD JUSTICE (4). Contemporary food systems are examined from a cultural and social justice perspective. The human right to food as recognized by the United Nations serves as the justice grounding point. Impediments to realizing the right to food will be examined in national and international contexts. CROSSLISTED as ANTH 361. (Bacc Core Course) (SS)

FCSJ 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
FCSJ 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FCSJ 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FCSJ 403. THESIS (1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
FCSJ 405. READING AND CONFERENCE (1-6).

This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FCSJ 406. FOOD PROJECTS (1-6). Graded
$\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 6 credits.
FCSJ 407. SEMINAR (1-3). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FCSJ 410. INTERNSHIP (1-16). Opportunities for students to take advantage of off-campus work experiences during regular term sessions for academic credit. Allows students to broaden and deepen their understanding and appreciation of the value of their academic activity. Internship is supervised and evaluated by individual faculty members. This course is repeatable for a maximum of 16 credits. PREREQS: 6 credits of FCSJ or related course work.
FCSJ 422. INTERCULTURAL LEARNING COMMUNITY (3-6). Taught as a learning community combining students, professors and community members to explore contemporary food-related questions in two different countries. Syllabus content will change depending on 1) The countries chosen, 2) The questions that are most of interest to the members of the community. Depending on the year, up to $25 \%$ of the time might be spent on the Corvallis campus. This course is repeatable for a maximum of 6 credits. PREREQS: FCSJ 454 [C-]
FCSJ 444. NUTRITIONAL ANTHROPOLOGY (4). Examines human nutrition and food systems from comparative, biocultural and evolutionary perspectives. Long-term evolutionary processes are examined within an ecological framework as significant factors affecting human biology and susceptibility to diet-related disease. An emphasis on anthropological methods in nutritional assessment including anthropometry, paleodietary assessment and nutritional participant-observation will provide students with the tools to evaluate human diet from skeletal and fossil collections through contemporary cross-cultural populations. CROSSLISTED as ANTH 444. PREREQS: ANTH 240 [C] or ANTH 330 [C]
FCSJ 454. *INTERNATIONAL PERSPECTIVES ON FOOD SYSTEMS (4). Macro and microcomparative overview of food systems in at least two different international settings, highlighting the influences of culture, social structure, geography, and economy on food systems. Non-traditional and emerging theoretical critiques of such influences on food systems are highlighted. (Bacc Core Course) (H) (SS) (NC)
FCSJ 464. FOOD AND ETHNIC IDENTITY:
DECOLONIZING FOOD AND OUR BODY
(3). This interdisciplinary and comparative course will examine the relationship between food and identity. Food, from its production to consumption, is a powerful symbol of social and cultural meaning. As an expression of identity and subjectivity, food also marks borders between humans and non-humans, plants and animals, nature and culture, tradition and modernity, etc. CROSSLISTED as ES 464. (H)
FCSJ 467. CAPSTONE: FOOD IN CULTURE AND SOCIAL JUSTICE (1). Working under the supervision of a Food in Culture and Social Justice faculty person, students further engage with a topic previously explored in FCSJ course work and produce a 5-page paper and public poster, presentation or website that demonstrates critical thinking and writing competencies about food, culture and social justice. Graded P/N. PREREQS: Students should have completed or be taking concurrently the last of their course work for the Food in Culture and Social Justice undergraduate certificate.
FCSJ 486. ANTHROPOLOGY OF FOOD (4).
The role of food in human cultures, both past and present. Includes discussion of different food procurement styles, social movements and the
political economy of food. Looks at the symbolic aspects of food as well as its relationship with the environment. CROSSLISTED as ANTH 486. PREREQS: 3 credits of social science.
FCSJ 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
FCSJ 501. RESEARCH (1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FCSJ 502. INDEPENDENT STUDY (1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

FCSJ 503. THESIS (1-12). This course is repeatable for a maximum of 999 credits PREREQS: Departmental approval required.
FCSJ 505. READING AND CONFERENCE (1-6). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FCSJ 506. FOOD PROJECTS (1-6). Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 6 credits.
FCSJ 507. SEMINAR (1-3). This course
is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

FCSJ 510. GRADUATE INTERNSHIP (1-16). Opportunities for students to take advantage of off-campus work experiences during regular term sessions for academic credit. Allows students to broaden and deepen their understanding and appreciation of the value of their academic activity. Internship is supervised and evaluated by individual faculty members. This course is repeatable for a maximum of 16 credits. PREREQS: 6 credits of FCSJ or related course work.

FCSJ 522. INTERCULTURAL LEARNING
COMMUNITY (3-6). Taught as a learning community combining students, professors and community members to explore contemporary food-related questions in two different countries. Syllabus content will change depending on 1) The countries chosen, 2) The questions that are most of interest to the members of the community. Depending on the year, up to $25 \%$ of the time might be spent on the Corvallis campus. This course is repeatable for a maximum of 6 credits. PREREQS: FCSJ 554 [C]
FCSJ 544. NUTRITIONAL ANTHROPOLOGY (4)
Examines human nutrition and food systems from comparative, biocultural and evolutionary perspectives. Long-term evolutionary processes are examined within an ecological framework as significant factors affecting human biology and susceptibility to diet-related disease. An emphasis on anthropological methods in nutritional assessment including anthropometry, paleodietary assessment and nutritional participant-observation will provide students with the tools to evaluate human diet from skeletal and fossil collections through contemporary cross-cultural populations. CROSSLISTED as ANTH 544. PREREQS: ANTH 240 or ANTH 330
FCSJ 547. METHODS IN FOOD IN CULTURE AND SOCIAL JUSTICE (4). Exposes graduate students to the methodological approaches and methods used in guiding empirical research on the socio-cultural aspects of food, focusing on vulnerable populations, food security, procurement, foodways, disasters, and climate change. Methodological approaches and methods as evidenced in peer-reviewed publications is the grounding for the course. CROSSLISTED as ANTH 547. PREREQS: Graduate standing
FCSJ 554. INTERNATIONAL PERSPECTIVES ON FOOD SYSTEMS (4). Macro and microcomparative overview of food systems in at least two different international settings, highlighting the influences of culture, social structure, geography, and economy on food systems. Non-traditional and emerging theoretical critiques of such influences on food systems are highlighted.

FCSJ 564. FOOD AND ETHNIC IDENTITY: DECOLONIZING FOOD AND OUR BODY (3). This interdisciplinary and comparative course will examine the relationship between food and identity. Food, from its production to consumption, is a powerful symbol of social and cultural meaning. As an expression of identity and subjectivity, food also marks borders between humans and non-humans, plants and animals, nature and culture, tradition and modernity, etc. CROSSLISTED as ES 564.
FCSJ 567. AGRI-FOOD MOVEMENTS (4).
Investigates the origins and contemporary status of producer and consumer food movements including but not limited to organics, agricultural labor movements, animal welfare, vegetarian and vegan movements, farmer's markets, and permaculture. CROSSLISTED as ANTH 567.

FCSJ 586. ANTHROPOLOGY OF FOOD (4).
The role of food in human cultures, both past and present. Includes discussion of different food procurement styles, social movements and the political economy of food. Looks at the symbolic aspects of food as well as its relationship with the environment. CROSSLISTED as ANTH 586. PREREQS: 3 credits of social science.

FCSJ 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## ■ FRENCH COURSES

FR 111. FIRST-YEAR FRENCH (4).
Pronunciation, grammar, reading, writing, listening comprehension, speaking, conversation. Designed specifically for students with no prior training in French. Native and/or bilingual speakers of French will not receive credit for FR 111, FR 112, FR 113. Lec/rec. PREREQS: Simultaneous enrollment in FR 199 strongly recommended. FR 111, FR 112, FR 113 must be taken in order.
FR 112. FIRST-YEAR FRENCH (4).
Pronunciation, grammar, reading, writing, listening comprehension, speaking, conversation. Designed specifically for students with no prior training in French. Native and/or bilingual speakers of French will not receive credit for FR 111, FR 112, FR 113. Lec/rec. PREREQS: FR 111 [D-] or Placement Test X112(1) and simultaneous enrollment in FR 199 strongly recommended.

## FR 113. FIRST-YEAR FRENCH (4).

Pronunciation, grammar, reading, writing, listening comprehension, speaking, conversation. Designed specifically for students with no prior training in French. Native and/or bilingual speakers of French will not receive credit for FR 111, FR 112, FR 113. Lec/rec. PREREQS: FR 112 [D-] or Placement Test X113(1) and simultaneous enrollment in FR 199 strongly recommended.
FR 121. SURVIVAL FRENCH FOR STUDENTS
AND TRAVELERS (3). Provides practical linguistic tools for short stays in France. Basic conversation skills, pronunciation, introduction to French non-verbal language, as well as cultural tools, introduction to French etiquette, visual dictionary, and tips for avoiding cross-cultural misunderstandings common between Americans and the French.
FR 188. FRENCH STUDIES, FRENCH STUDY CENTERS (1-12). May be repeated for credit when topic varies. Section 1: Topics, French language. Section 2: Practical work (exercises). Section 3: Topics, French arts and letters. Section 4: Topics, France and French society. This course is repeatable for a maximum of 12 credits.
FR 199. SPECIAL STUDIES (1-16). Conversation pronunciation, vocabulary-building, etc. Supplements basic sequence FR 111, FR 112, FR 113. May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits.
FR 211. SECOND-YEAR FRENCH (4).
Continued development of basic language skills, pronunciation, and vocabulary acquisition;
introduction to extensive reading. Native and/or bilingual speakers of French will not receive credit for FR 211, FR 212, FR 213. Lec/rec. PREREQS: FR 113 [D-] or Placement Test X211(1) and simultaneous enrollment in FR 299 strongly recommended. FR 211, FR 212, FR 213 must be taken in order.

FR 212. SECOND-YEAR FRENCH (4).
Continued development of basic language skills, pronunciation, and vocabulary acquisition; introduction to extensive reading. Native and/or bilingual speakers of French will not receive credit for FR 211, FR 212, FR 213. Lec/rec. PREREQS: FR 211 [D-] or Placement Test X212(1) and simultaneous enrollment in FR 299 strongly recommended.
FR 213. SECOND-YEAR FRENCH (4).
Continued development of basic language
skills, pronunciation, and vocabulary acquisition; introduction to extensive reading. Completion of FR 213 with a grade of C- or better satisfies BA requirement in foreign languages. Native and/or bilingual speakers of French will not receive credit for FR 211, FR 212, FR 213. Lec/rec. PREREQS: FR 212 [D-] or Placement Test X213(1) and simultaneous enrollment in FR 299 strongly recommended.
FR 270. *FRANCE TODAY: CULTURES WITHIN
AND BEYOND ITS BORDERS (3). An exploratory study of French culture and society since 1945. Topics include: decolonization, immigration, Francophone intellectual currents, France's European vocation, and social conflict today. Conducted in English. (Bacc Core Course)
FR 270H. *FRANCE TODAY: CULTURES
WITHIN AND BEYOND ITS BORDERS (3). An exploratory study of French culture and society since 1945. Topics include: decolonization, immigration, Francophone intellectual currents, France's European vocation, and social conflict today. Conducted in English. (Bacc Core Course) PREREQS: Honors College approval required.
FR 288. FRENCH STUDIES, FRENCH STUDY CENTERS (1-12). May be repeated for credit when topic varies. Section 1: Topics, French language. Section 2: Practical work (exercises). Section 3: Topics, French arts and letters. Section 4: Topics, France and French society. This course is repeatable for a maximum of 12 credits.
FR 299. SPECIAL STUDIES (1-16). Conversation, pronunciation, vocabulary-building, etc. Supplements basic sequence FR 211, FR 212, FR 213. May not be offered every year. May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. This course is repeatable for a maximum of 16 credits.

FR 311. THIRD-YEAR FRENCH (3). A languageuse course; primary emphasis on developing oral and written proficiency; extensive practice in speaking and writing. Grammar review; vocabulary study; written assignments including original compositions. Conducted in French. PREREQS: FR 213 and departmental approval. FR 311, FR 312, FR 313 must be taken in order.

FR 312. THIRD-YEAR FRENCH (3). A languageuse course; primary emphasis on developing oral and written proficiency; extensive practice in speaking and writing. Grammar review; vocabulary study; written assignments including original compositions. Conducted in French. PREREQS: FR 311 and departmental approval.
FR 313. THIRD-YEAR FRENCH (3). A languageuse course; primary emphasis on developing oral and written proficiency; extensive practice in speaking and writing. Grammar review; vocabulary study; written assignments including original compositions. Conducted in French. PREREQS: FR 312 and departmental approval.
FR 315. FRENCH FOR BUSINESS (3). An introduction to the French business world and business language. Development of business vocabulary; discussion; practice in writing
resumes, business letters and business reports. Conducted in French. May not be offered every year. PREREQS: FR 213 or placement.

## FR 319. SELECTED TOPICS IN FRENCH

LANGUAGE (3). Skill-orientation variable. Conducted in French. May be repeated for credit when topic varies. See Schedule of Classes for current topics and prerequisites. This course is repeatable for a maximum of 9 credits.

## FR 321. FRENCH CONVERSATION FOR

 ADVANCED SPEAKERS I (1). Designed for students who would like to continue developing basic listening and speaking skills in French through independent work with a variety of media. Graded P/N. PREREQS: FR 213 [D-]FR 322. FRENCH CONVERSATION FOR ADVANCED SPEAKERS II (1). Designed for students who would like to continue developing basic listening and speaking skills in French through independent work with a variety of media. PREREQS: FR 213 [D-]
FR 323. FRENCH CONVERSATION FOR
ADVANCED SPEAKERS III (1). Designed for students who would like to continue developing basic listening and speaking skills in French through independent work with a variety of media. PREREQS: FR 213 [D-]
FR 329. *FRANCOPHONE CULTURES IN FILM (3-9). An exploration of the different cultures of France and the Francophone world through film. Students will delve into the heart of these societies and discover their socio-historical, political, economic and cultural context. Students' analytical and critical skills will be thoroughly solicited through various research and writing activities. Taught in English. (Bacc Core Course) This course is repeatable for a maximum of 9 credits.
FR 329H. *FRANCOPHONE CULTURES IN FILM (3-9). An exploration of the different cultures of France and the Francophone world through film. Students will delve into the heart of these societies and discover their socio-historical, political, economic and cultural context. Students' analytical and critical skills will be thoroughly solicited through various research and writing activities. Taught in English. (Bacc Core Course) This course is repeatable for a maximum of 9 credits. PREREQS: Honors College approval required.
FR 332. *FRENCH CULTURE AND SOCIETY SINCE THE REVOLUTION (3). Cultural life of the French people from 1789 to the present. Conducted in French. Need not be taken in order. (H) (Bacc Core Course) PREREQS: Completion of 3 credits of 300-level French or placement for FR 331 and FR 332.
FR 333. *FRENCH CULTURE AND SOCIETY SINCE THE REVOLUTION (3). Cultural life of the French people from 1789 to the present. Conducted in French. Need not be taken in order. (H) (Bacc Core Course) PREREQS: Completion of 6 credits of 300-level French or placement for FR 333.
FR 334. GENDER AND SEXUAL IDENTITIES IN THE FRANCOPHONE WORLD (3). Students will engage with a wide variety of materials (literary texts, newspaper articles, films, documentaries, etc.) in order to explore the construction of gender roles and sexual identities in France and the French-speaking world, as well as examine contemporary issues related to gender and sexuality in the French-speaking world at large. Taught in French. PREREQS: FR 312 [D-]
FR 336. QUEBEC: TEXTS AND CONTEXTS (3). Intended for intermediate and advanced students in French. Offers an introductory knowledge of Quebec. Discussions and readings cover a variety of topics, including geography, history, cinema, literature, popular culture, the language issue, American and French influences, ethnic diversity and immigration, among other topics of interest. PREREQS: FR 211 [D-]

FR 338. FRENCH FASHION AND GLAMOUR
(3). This course, taught in English, allows students who have not studied French to enter the glamorous world of French fashion, exploring its origins and history, what's new and exciting in French fashion today and French attitudes about fashion and beauty that have given them the inside track on chic for centuries. PREREQS: Sophomore standing.
FR 339. FRENCH: FRANCOPHONE STUDIES
(3). May be repeated for credit when topic varies. Not offered every year. This course is repeatable for a maximum of 9 credits.

FR 340. INTRODUCTION TO FRENCH
LITERARY STUDIES (3). Concepts and vocabulary fundamental to the study of French literature; general view of the main currents of French literary history; introduction to French versification; techniques of literary analysis; practice in literary analysis and in writing about iterature; explication de texte. Conducted in French. (H) PREREQS: FR 213 or placement.
FR 343. THE SHORT STORY: WOMEN IN THE FRANCOPHONE WORLD (3). A selection of short stories written by francophone women representing various regions of the Frenchspeaking world. These stories revolve around contemporary issues affecting and of interest particularly to women in these francophone societies. Among major themes will be immigration, conditions of women, quest for identity, tradition versus modernity, and other related topics. PREREQS: FR 311 [C]
FR 345. MULTIMODAL LITERACIES: FRENCH (2). Introduction to the analysis and production of multimodal literacies. Study of semiotic resources such as language and images across modalities such as film, manga, and social media. Required of all majors in World Languages and Cultures. Taught in French. Has to be taken in conjunction with the lecture session in English. PREREQS: FR 213 with a grade of at least C-, or equivalent, or placement test. Sophomore standing required. COREQS: WLC 345

FR 349. SELECTED TOPICS IN FRANCOPHONE LITERATURE (3). Literary works, themes, movements, or authors from French-speaking areas of the world. Conducted in French. May be repeated for credit when topic varies. See Schedule of Classes for current topics and prerequisites. Not offered every year. This course is repeatable for a maximum of 9 credits.

FR 365. MIGRANT NARRATIVES: FRENCH (2).
An examination of migration and forced displacement through the study of personal narrative in French. Includes discussion of the causes of displacement including persecution, ecological degradation, economic pressure and conflict. This is a required course for the French option in the WLC major in the Identities and Intersections thematic area. PREREQS: Thirdyear proficiency in French. COREQS: WLC 365

FR 366. LANGUAGE AND IDENTITY: FRENCH (2). Examines specific ideologies, patterns of variation, and language contact situations involving French using authentic oral and written texts. Learners carry out their own exploration in language communities. This is a required course in the French option of the WLC major in the Identities and Intersections thematic area. PREREQS: Third-year proficiency in French COREQS: WLC 366
FR 375. LITERATURES OF POWER AND RESISTANCE: FRENCH (2). An examination of the relationships between individuals or groups and institutional power (government, ecclesiastical, etc.) across different historical periods and geographies. This French-language section covers specific works dealing with such topics as colonization, forced disappearance, and social resistance. This is a required course in the French option of the WLC major in the Social Architecture and Power thematic area. PREREQS: Third-year proficiency in French. COREQS: WLC

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FR 376. EMPIRES AND GLOBALIZATION:
FRENCH (2). An examination of the history of Western imperialism and the rise of contemporary neocolonialism. Students explore the impact of colonization and the effects of neoliberalism and globalization in this French discussion sections through the use of historical source materials and current news articles focused on specific regions of the developing world. This is a required course in the French option of the WLC major in the Social Architecture and Power thematic area. PREREQS: Third-year proficiency in French COREQS: WLC 376

FR 379. PROCTOR EXPERIENCE (1-2). Supervised practicum for advanced students. Assignments as proctors or tutors in lower-division French courses. No more than 2 credits may be used to satisfy degree requirements for a major in French; may not be used to satisfy requirements for a minor in French. Graded $P / N$. This course is repeatable for a maximum of 6 credits. PREREQS: Completion of 12 upper-division credits in French, including FR 311, FR 312, FR 313 and FR 351, with a minimum 3.0 GPA and prior authorization from supervisor

FR 388. FRENCH STUDIES, FRENCH STUDY CENTERS (1-12). May be repeated when topic varies. Section 1: Topics, French language. Section 2: Practical work (exercises). Section 3: Topics, French arts and letters. Section 4: Topics, France and French society. This course is repeatable for a maximum of 12 credits.

FR 399. SPECIAL TOPICS (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course s repeatable for a maximum of 16 credits.

FR 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

FR 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

FR 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FR 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

FR 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
PREREQS: Departmental approval required.
FR 410. INTERNSHIP (1-15). This course is repeatable for a maximum of 15 credits.

FR 411. FOURTH-YEAR FRENCH (3). A
language-use course; primary emphasis on developing oral and written proficiency; extensive practice in speaking and writing. Grammar review; vocabulary study; analysis of writing styles and techniques; oral reports and original presentations in French; original compositions. Conducted in French. PREREQS: FR 313 and departmental approval.
FR 412. FOURTH-YEAR FRENCH (3). A
language-use course; primary emphasis on developing oral and written proficiency; extensive practice in speaking and writing. Grammar review; vocabulary study; analysis of writing styles and techniques; oral reports and original presentations in French; original compositions. Conducted in French. PREREQS: FR 313 and departmental approval.
FR 421. FRENCH CONVERSATION FOR
ADVANCED SPEAKERS IV (1). Designed for students who would like to continue developing listening and speaking skills in French through independent work with a variety of media. Graded P/N. PREREQS: FR 313 [D-]

FR 422. FRENCH CONVERSATIONS FOR ADVANCED SPEAKERS V (1). Designed for students who would like to continue developing listening and speaking skills in French through independent work with a variety of media. Graded P/N. PREREQS: FR 313 [D-]
FR 423. FRENCH CONVERSATION FOR ADVANCED SPEAKERS VI (1). Designed for students who would like to continue developing listening and speaking skills in French through independent work with a variety of media. PREREQS: FR 313 [D-]
FR 429. *FRENCH SOCIETY THROUGH ITS CINEMA (3). An examination of French society through its own cinema. Via the screening and study of films from the various periods of French history, students will delve into the heart of French society and will discover the socio-historical, political, economic and cultural context. (Bacc Core Course) PREREQS: Sophomore standing.
FR 429H. *FRENCH SOCIETY THROUGH ITS CINEMA (3). An examination of French society through its own cinema. Via the screening and study of films from the various periods of French history, students will delve into the heart of French society and will discover the socio-historical, political, economic and cultural context. (Bacc Core Course) PREREQS: Sophomore standing and Honors College approval required.
FR 439. ^FRENCH/FRANCOPHONE STUDIES
(3). Variable topics in language, culture, or literature. May be repeated for credit when topic varies. Conducted in French. See Schedule of Classes for current topics and prerequisites. Not offered every year. (Writing Intensive Course) This course is repeatable for a maximum of 9 credits.
FR 449. SELECTED TOPICS IN FRANCOPHONE LITERATURE (3). Conducted in French. May be repeated for credit when topic varies. See Schedule of Classes for current topics and prerequisites. Not offered every year. This course is repeatable for a maximum of 9 credits.

FR 488. FRENCH STUDIES, FRENCH STUDY CENTERS (1-12). May be repeated for credit when topic varies. Section 1: Topics, French language. Section 2: Practical work (exercises). Section 3: Topics, French arts and letters. Section 4: Topics, France and French Society. This course is repeatable for a maximum of 12 credits.
FR 499. SPECIAL TOPICS (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 9 credits.

FR 499H. SPECIAL TOPICS (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 9 credits. PREREQS: Honors College approval required.

FR 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

FR 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
FR 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
FR 505. READING AND CONFERENCE. (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

FR 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
FR 511. FOURTH-YEAR FRENCH (3). A language-use course; primary emphasis on developing oral and written proficiency; extensive practice in speaking and writing. Grammar review;
vocabulary study; analysis of writing styles and techniques; oral reports and original presentations in French; original compositions. Conducted in French. PREREQS: FR 313 and departmental approval.
FR 512. FOURTH-YEAR FRENCH (3). A
language-use course; primary emphasis on developing oral and written proficiency; extensive practice in speaking and writing. Grammar review; vocabulary study; analysis of writing styles and techniques; oral reports and original presentations in French; original compositions. Conducted in French. PREREQS: FR 511 and departmental approval.

FR 539. FRENCH/FRANCOPHONE STUDIES
(3). Variable topics in language, culture, or literature. May be repeated for credit when topic varies. Conducted in French. See Schedule of Classes for current topics and prerequisites. Not offered every year. This course is repeatable for a maximum of 12 credits.

FR 588. FRENCH STUDIES, FRENCH STUDY
CENTERS (1-12). May be repeated for credit when topic varies. Section 1: Topics, French language. Section 2: Practical work (exercises). Section 3: Topics, French arts and letters. Section 4: Topics, France and French society. This course is repeatable for a maximum of 12 credits.

## ■ GERMAN COURSES

GER 111. FIRST-YEAR GERMAN (4).
Development of basic writing, reading, listening, and speaking skills; includes cultural component. Designed solely for students with no prior training in German. Native or bilingual speakers of German will not receive credit for GER 111, GER 112, or GER 113. Lec/lab/rec. PREREQS: GER 111, GER 112, GER 113 must be taken in order.

## GER 112. FIRST-YEAR GERMAN (4).

Development of basic writing, reading, listening, and speaking skills; includes cultural component. Designed solely for students with no prior training in German. Native or bilingual speakers of German will not receive credit for GER 111, GER 112, or GER 113. Lec/lab/rec. PREREQS: GER 111 [D-] and /or placement test score.
GER 113. FIRST-YEAR GERMAN (4)
Development of basic writing, reading, listening, and speaking skills; includes cultural component. Designed solely for students with no prior training in German. Native or bilingual speakers of German will not receive credit for GER 111, GER 112, or GER 113. Lec/lab/rec. PREREQS: GER 112 [D-] and /or placement test score.
GER 188. GERMAN STUDIES, GERMAN STUDY CENTER (1-12). May be repeated for credit when topic varies. Section 1: Topics, German language. Section 2: Practical work (exercises). This course is repeatable for a maximum of 12 credits.
GER 199. SPECIAL STUDIES (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
GER 211. SECOND-YEAR GERMAN (4).
Continuing development of writing, reading, listening, and speaking skills; cultural component. Completion of second-year German or equivalent with a GPA of 2.50 or higher serves as a prerequisite for upper-division courses. Native or bilingual speakers of German will not receive credit for GER 211, GER 212 or GER 213. Lec/lab/rec. PREREQS: GER 113 [D-] and /or placement test score.
GER 212. SECOND-YEAR GERMAN (4).
Continuing development of writing, reading, listening, and speaking skills; cultural component. Completion of Second-Year German or equivalent with a GPA of 2.50 or higher serves as a prerequisite for upper-division courses. Native or bilingual speakers of German will not receive credit for GER 211, GER 212, or GER 213. Lec/
rec. PREREQS: GER 211 [D-] and /or placement test score.

GER 213. SECOND-YEAR GERMAN (4).
Continuing development of writing, reading, listening, and speaking skills; cultural component. Completion of Second-Year German or equivalent with a GPA of 2.50 or higher serves as a prerequisite for upper-division courses. Completion of GER 213 with grade of C- or better satisfies BA requirement in foreign languages. Native or bilingual speakers of German will not receive credit for GER 211, GER 212, or GER 213. Lec/rec. PREREQS: GER 212 [D-] and /or placement test score.

GER 231. *GERMAN DICTATORSHIPS: NAZIS AND COMMUNISTS (3). Introduction to the two best-known dictatorships in German society, National Socialism of the Third Reich from 19331945 and Socialism in the German Democratic Republic from 1949-1989 via the study of visual media (feature films, documentaries, newsreels, etc.) and other primary and secondary sources. (Bacc Core Course) PREREQS: Sophomore standing.
GER 231H. *GERMAN DICTATORSHIPS: NAZIS AND COMMUNISTS (3). Introduction to the two best-known dictatorships in German society, National Socialism of the Third Reich from 19331945 and Socialism in the German Democratic Republic from 1949-1989 via the study of visual media (feature films, documentaries, newsreels, etc.) and other primary and secondary sources. (Bacc Core Course) PREREQS: Sophomore standing and Honors College approval required.
GER 241. *GRIMMS' FAIRY TALES (4). We will read a selection of the most popular Grimms' fairy tales and consider why they have remained so popular. What is it about fairy tales that has made them such a lasting source of creative inspiration into our time? Students will learn to understand and critique fairy tales and their role in Western cultures through analysis of the tales and creative adaptation of a tale for a modern audience. (Bacc Core Course)

GER 261. *MASTERPIECES OF GERMAN
CINEMA (3). An introduction to the serious study of German cinema, 1920 to present. Class lectures discussing key works of German cinema will offer a variety of historical, critical and theoretical approaches. Weekly screenings of important films accompany the lectures. Taught in English. Film fee will be required. (Bacc Core Course)
GER 261H. *MASTERPIECES OF GERMAN
CINEMA (3). An introduction to the serious study of German cinema, 1920 to present. Class lectures discussing key works of German cinema will offer a variety of historical, critical and theoretical approaches. Weekly screenings of important films accompany the lectures. Taught in English. Film fee will be required. (Bacc Core Course) PREREQS: Honors College approval required.

GER 288. GERMAN STUDIES, GERMAN STUDY CENTER (1-12). May be repeated for credit when topic varies. Section 1: Topics, German language. Section 2: Practical work (exercises). Section 3: Topics, German arts and letters. Section 4: Topics, Germany and German society. This course is repeatable for a maximum of 12 credits.

GER 299. SPECIAL STUDIES (1-16). May
be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.

GER 311. THIRD-YEAR GERMAN (3). Focus on development of German writing, speaking, and listening skills. Conducted in German. Required of German majors and minors. PREREQS: GER 213 or equivalent.
GER 312. THIRD-YEAR GERMAN (3). Focus on development of German writing, speaking, and listening skills. Conducted in German. Required of

German majors and minors. PREREQS: GER 213 or equivalent.

GER 313. THIRD-YEAR GERMAN (3). Focus on development of German writing, speaking, and listening skills. Conducted in German. Both courses required of German majors and minors. PREREQS: GER 213 or equivalent.
GER 319. SELECTED TOPICS IN GERMAN LANGUAGE (3). Focus on development of German language skills and/or history of the language. Conducted in German. May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Lec/rec. Not offered every year. This course is repeatable for a maximum of 9 credits

GER 329. SELECTED TOPICS IN LITERATURE AND/OR CULTURE (3). May be repeated for credit when topic varies. See Schedule of Classes for current offerings. Not offered every year. This course is repeatable for a maximum of 9 credits. PREREQS: Sophomore standing.
GER 331. *GERMAN CULTURE (3). Aspects of history, politics, art, music, literature, and everyday life in German-speaking countries. Attention to development of German language skills. Conducted in German. (H) (Bacc Core Course) PREREQS: GER 213
GER 332. *GERMAN CULTURE (3). Aspects of history, politics, art, music, literature, and everyday life in German-speaking countries. Attention to development of German language skills. Conducted in German. (H) (Bacc Core Course) PREREQS: GER 213 [D-]
GER 339. SELECTED TOPICS IN GERMAN CULTURE (3). Focus on specific aspects of German culture. Attention to development of German language skills. Conducted in German. May be repeated for credit when topic varies. See Schedule of Classes for current offerings. Not offered every year. This course is repeatable for a maximum of 9 credits. PREREQS: Completion of 9 credits from GER 311, GER 312, GER 313.

GER 341. SURVEY OF GERMAN LITERATURE (3). Major works and literary theories of German literature in their cultural context. Attention to development of German language skills with special emphasis on reading and discussion. Conducted in German. (H) PREREQS: GER 213 or placement.

GER 342. SURVEY OF GERMAN LITERATURE (3). Major works and literary theories of German literature in their cultural context. Attention to development of German language skills with special emphasis on reading and discussion. Conducted in German. (H) PREREQS: GER 213 or placement.

GER 343. SURVEY OF GERMAN LITERATURE (3). Major works and literary theories of German literature in their cultural context. Attention to development of German language skills with special emphasis on reading and discussion. Conducted in German. (H) PREREQS: GER 213 or placement.

GER 345. MULTIMODAL LITERACIES: GERMAN (2). Introduction to the analysis and production of multimodal literacies. Study of semiotic resources such as language and images across modalities such as film, manga, and social media. Required of all majors in World Languages and Cultures. Taught in German. Has to be taken in conjunction with the lecture session in English. PREREQS: GER 213 with a grade of at least C-, or equivalent, or placement test. Sophomore standing required. COREQS: WLC 345

GER 349. SELECTED TOPICS IN GERMAN LITERATURE (3). Attention to development of German language skills. Conducted in German. May be repeated for credit when topic varies. See Schedule of Classes for current offerings. Not offered every year. This course is repeatable for a maximum of 9 credits. PREREQS: GER 213 or placement.

GER 351. GERMAN PRONUNCIATION AND
PHONETICS (3). Analysis of the fundamentals of the German sound system, including pronunciation, phonology, phonetic and contrastive analysis of sounds; phonemes, intonation, and tone patterns. Required of students working toward a teaching certificate in German Not offered every year. PREREQS: GER 213 or placement.
GER 355. TRANSLATION (3). Introduces students to translation studies in theory and practice. Students will learn problems behind translating texts and strategies to overcome these issues, before working on shorter and longer translation projects of a variety of texts. Taught in English. PREREQS: GER 312 [D-]
GER 361. CRITICAL ISSUES OF GERMAN CINEMA (3). Critique of current scholarly debates in German cinema (popular cinema, stars, institutional and cultural frameworks, cultural politics, and transnational connections) in connection with the critical viewing of a large variety of films from various periods. Taught in English.
GER 362. DIVIDED SCREEN: GERMAN CINEMA BETWEEN 1945 AND 1990 (3). Introduces German cinema between the corner dates 1945--division into East and West--and German unification in 1990. Compares and contrasts films made in East and West Germany to understand differences and similarities in the political and cultural set-up of the two states.

GER 363. CONTEMPORARY GERMAN CINEMA (3). Introduces German cinema after unification in 1990. Analyzes German films from various genres, "schools," and directors. Reflects and compares contemporary issues of Germany, Austria, and Switzerland to Hollywood cinema.

GER 365. MIGRANT NARRATIVES: GERMAN
(2). An examination of migration and forced displacement through the study of personal narrative in German. Includes discussion of the causes of displacement including persecution, ecological degradation, economic pressure and conflict. This is a required course for the German option in the WLC major in the Identities and Intersections thematic area. PREREQS: Thirdyear proficiency in German. COREQS: WLC 365
GER 366. LANGUAGE AND IDENTITY:
GERMAN (2). An examination between ideology and linguistic behavior as well as the fundamentals of structural linguistics needed to discuss variation and contact phenomena particular to German-speaking communities. This is a required course in the German option in the WLC major in the Identities and Intersections thematic area. PREREQS: Third-year proficiency in German COREQS: WLC 366

## GER 375. LITERATURES OF POWER AND

 RESISTANCE: GERMAN (2). An examination and discuss of literature in German that deals with the relationships between individuals/groups and institutional power (government, ecclesiastical, etc.) across different historical periods and geographies. Covers specific works dealing with such topics as colonization, forced disappearance, and social resistance in the German-speaking world. This is a required course in the German option of the WLC major in the Social Architecture and Power thematic area. PREREQS: Third-year proficiency in German. COREQS: WLC 375GER 376. EMPIRES AND GLOBALIZATION: GERMAN (2). An examination of the history of German imperialism and the rise of neocolonialism in Europe and other parts of the world where Germany, Austria, and Switzerland have had social, cultural, and linguistic impact. Students explore the impact of colonization and the effects of neoliberalism and globalization in German through the use of historical source materials and current news articles. This is a required course in the German option of the WLC major in the Social Architecture and Power thematic area. PREREQS: Third-year proficiency
in German. COREQS: WLC 376
GER 379. PROCTOR EXPERIENCE (1-2).
Supervised practicum for advanced students, with assignments as proctors or tutors in lower-division German language courses. No more than 2 credits may be used to satisfy degree requirements for a major in German; no credit may be used to satisfy requirements for a minor in German. Graded P/N. This course is repeatable for a maximum of 6 credits. PREREQS: Completion of 12 upperdivision credits in German, including GER 311, GER 312, GER 313 and prior authorization of supervisor.

GER 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

GER 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

GER 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GER 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GER 405. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

GER 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GER 410. INTERNSHIP (1-15). This course is repeatable for a maximum of 15 credits.
GER 411. ^FOURTH-YEAR GERMAN (3). Focus on development of German writing, speaking, and listening skills. Conducted in German. (Writing Intensive Course) PREREQS: GER 313 and departmental approval.

GER 412. FOURTH-YEAR GERMAN (3). Focus on development of German writing, speaking, and listening skills. Conducted in German. PREREQS: GER 411 and departmental approval.
GER 413. FOURTH-YEAR GERMAN (3). Focus on development of German writing, speaking, and listening skills. Conducted in German. PREREQS: GER 412 and departmental approval.

GER 421. GERMAN LANGUAGE TANDEM (1).
Optional course that can be taken to fine-tune advanced German speaking skills with the help of a native speaker. Graded P/N. This course is repeatable for a maximum of 6 credits.
GER 449. SELECTED TOPICS IN GERMAN
LITERATURE (3). May be repeated for credit when topic varies. Conducted in German. This course is repeatable for a maximum of 9 credits. PREREQS: 9 upper-division credits in German.
GER 488. GERMAN STUDIES, GERMAN STUDY CENTER (1-12). May be repeated for when topic varies. Section 1: Topics, German language. Section 2: Practical work (exercises). Section 3: Topics, German arts and letters. Section 4: Topics, Germany and German society. This course is repeatable for a maximum of 12 credits.
GER 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
GER 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GER 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
GER 505. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GER 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

PREREQS: Departmental approval required.
GER 511. FOURTH-YEAR GERMAN (3). Focus on development of German writing, speaking, and listening skills. Conducted in German. PREREQS: GER 313 and departmental approval.
GER 512. FOURTH-YEAR GERMAN (3). Focus on development of German writing, speaking, and listening skills. Conducted in German. PREREQS: GER 411 or GER 511 and departmental approval.
GER 513. FOURTH-YEAR GERMAN (3). Focus on development of German writing, speaking, and listening skills. Conducted in German. PREREQS: GER 412 or GER 512 and departmental approval.

## GER 549. SELECTED TOPICS IN GERMAN

LITERATURE (3). May be repeated for credit when topic varies. Conducted in German. This course is repeatable for a maximum of 9 credits. PREREQS: 9 upper-division credits in German.
GER 588. GERMAN STUDIES, GERMAN STUDY CENTER (1-12). May be repeated for credit when topic varies. Section 1: Topics, German language. Section 2: Practical work (exercises). Section 3: Topics, German arts and letters. Section 4: Topics, Germany and German society. This course is repeatable for a maximum of 12 credits.

## HEBREW COURSES

HEBR 111. INTRODUCTION TO HEBREW (4). Pronunciation, grammar, reading, writing, listening comprehension, speaking, conversation. Designed specifically for students with no prior training in Hebrew. Native and/or bilingual speakers of Hebrew will not receive credit for HEBR 111, HEBR 112, HEBR 113.
HEBR 112. INTERMEDIATE HEBREW (4). Pronunciation, grammar, reading, writing, listening comprehension, speaking, conversation. Designed specifically for students with on prior training in Hebrew. Native and/or bilingual speakers of Hebrew will not receive credit for HEBR 111, HEBR 112, HEBR 113. PREREQS: HEBR 111 [D-]
HEBR 113. INTERMEDIATE HEBREW II (4).
Pronunciation, grammar, reading, writing, listening comprehension, speaking, conversation. Designed specifically for students with on prior training in Hebrew. Native and/or bilingual speakers of Hebrew will not receive credit for HEBR 111, HEBR 112, HEBR 113. PREREQS: (HEBR 111 [D-] and HEBR 112 [D-] )
HEBR 211. SECOND-YEAR HEBREW I (4). Further development of listening comprehension, speaking, reading, and writing skills. Native and/ or bilingual speakers of Hebrew will not receive credit for HEBR 211. Taught via Ecampus only. PREREQS: HEBR 113 [D-]
HEBR 212. SECOND-YEAR HEBREW II (4).
Continued development of basic language skills, pronunciation, and vocabulary acquisition; introduction to extensive reading. Native and/or bilingual speakers of Hebrew will not receive credit for HEBR 211, HEBR 212, HERB 213. Taught via Ecampus only. PREREQS: HEBR 211 [D-]
HEBR 213. SECOND-YEAR HEBREW III (4).
Continued development of basic language skills, pronunciation, and vocabulary acquisition; introduction to extensive reading. Native and/or bilingual speakers of Hebrew will not receive credit for HEBR 211, HEBR 212, HEBR 213. PREREQS: HEBR 212 [D]
HEBR 231. *INTRODUCTION TO JEWISH
CULTURE (3). An overview of Jewish culture from its origins to the present day. Students will compare and contrast the lifestyles, ideologies, religious and cultural practices of Jews living in Israel and the United States; two divergent cultures that developed from similar roots. Taught in English. Taught via Ecampus only. (Bacc Core Course)

ITALIAN COURSES
IT 111. FIRST-YEAR ITALIAN (4). Development of listening comprehension, speaking, reading, and writing skills. Designed for students with no previous training in Italian. Native speakers of Italian will not receive credit for IT 111, IT 112, IT 113. Not offered every year. PREREQS: IT 111, IT 112, IT 113 must be taken in order.

IT 112. FIRST-YEAR ITALIAN (4). Development of listening comprehension, speaking, reading, and writing skills. Designed for students with no previous training in Italian. Native speakers of Italian will not receive credit for IT 111, IT 112, IT 113. Not offered every year. PREREQS: IT 111 [D-]

IT 113. FIRST-YEAR ITALIAN (4). Development of listening comprehension, speaking, reading, and writing skills. Designed for students with no previous training in Italian. Native speakers of Italian will not receive credit for IT 111, IT 112, IT 113. Not offered every year. PREREQS: IT 112 [D-]

IT 188. ITALIAN STUDIES, ITALIAN STUDY CENTER (1-12). May be repeated for credit when topic varies. Section 1: Topics, Italian language. Section 2: Practical work (exercises). This course is repeatable for a maximum of 99 credits.
IT 199. SPECIAL STUDIES (1-16). May be repeated for credit when topic varies. See schedule of classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
IT 211. SECOND-YEAR ITALIAN (4). Further development of listening comprehension, speaking, reading, and writing skills. Native speakers of Italian will not receive credit for IT 211, IT 212, IT 213. Not offered every year. PREREQS: IT 113 [D-] and /or placement. IT 211, IT 212, IT 213 must be taken in order.
IT 212. SECOND-YEAR ITALIAN (4). Further development of listening comprehension, speaking, reading, and writing skills. Native speakers of Italian will not receive credit for IT 211, IT 212, IT 213. Not offered every year. PREREQS: IT 211 [D-] and /or placement.
IT 213. SECOND-YEAR ITALIAN (4). Further development of listening comprehension, speaking, reading, and writing skills. Native speakers of Italian will not receive credit for IT 211, IT 212 IT 213. Completion of IT 213 with a grade of C - or better satisfies BA requirement in foreign languages. Not offered every year. PREREQS: IT 212 [D-] and /or placement.
IT 261. *WOMEN IN ITALIAN CINEMA (3). An exploration of filmic portrayals of women as participants in social, economic and political life in Italy. Examines Italian cinema as a reflection of Italian culture. Focuses on women as protagonists, symbolic figures and filmmakers. Analysis will be presented through a variety of historical, critical and theoretical approaches. Taught in English. (Bacc Core Course)

IT 299. SPECIAL STUDIES (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
IT 331. *ITALIAN CULTURE (3). An investigation of Italy through the wide-angle lens of social anthropology. Students will explore what is both known and unknown about Italy in its sociopolitical, broad cultural as well as regional, and media contexts (music, film, technology). Students critical skills will be thoroughly solicited through online presentation and discussion. The course is taught in English. (Bacc Core Course)
IT 360. ITALIAN CINEMA (3). A look at Italian cinema from film muto to the 21st century. Subgenres including Epic Film, Neorealism, Italian Comedy, the Spaghetti Western, and New Italian Comedy will be examined within their socio-

## historical contexts. Taught in English.

IT 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
IT 410. INTERNSHIP (1-15). This course is repeatable for a maximum of 15 credits.
IT 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

## JAPANESE COURSES

JPN 111. FIRST-YEAR JAPANESE (4). Designed to help students develop an understanding of basic language structures and to acquire the ability to use them appropriately in a variety of practical, everyday social contexts. Primary focus is on verbal and non-verbal communication skills. Native and/or bilingual speakers of Japanese will not receive credit for JPN 111, JPN 112, JPN 113. Lec/lab/rec. PREREQS: JPN 111, JPN 112, JPN 113 must be taken in order.

JPN 112. FIRST-YEAR JAPANESE (4). Designed to help students develop an understanding of basic language structures and to acquire the ability to use them appropriately in a variety of practical, everyday social contexts. Primary focus is on verbal and non-verbal communication skills. Native and/or bilingual speakers of Japanese will not receive credit for JPN 111, JPN 112, JPN 113. Lec/lab/rec. PREREQS: JPN 111 [D-]
JPN 113. FIRST-YEAR JAPANESE (4). Designed to help students develop an understanding of basic language structures and to acquire the ability to use them appropriately in a variety of practical, everyday social contexts. Primary focus is on verbal and non-verbal communication skills. Native and/or bilingual speakers of Japanese will not receive credit for JPN 111, JPN 112, JPN 113. Lec/lab/rec. PREREQS: JPN 112 [D-]

JPN 199. SPECIAL STUDIES: INTENSIVE JAPANESE (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
JPN 211. SECOND-YEAR JAPANESE
(4). Continued development of basic oral communication skills as required in a variety of social contexts. Initial development of reading skills. Native and/or bilingual speakers of Japanese will not receive credit for JPN 211, JPN 212, JPN 213. Lec/lab/rec. PREREQS: JPN 113 [D-] and /or placement.

JPN 212. SECOND-YEAR JAPANESE
(4). Continued development of basic oral communication skills as required in a variety of social contexts. Initial development of reading skills. Native and/or bilingual speakers of Japanese will not receive credit for JPN 211, JPN 212, JPN 213. Lec/lab/rec. PREREQS: JPN 211 [D-] and /or placement.
JPN 213. SECOND-YEAR JAPANESE
(4). Continued development of basic oral communication skills as required in a variety of social contexts. Initial development of reading skills. Native and/or bilingual speakers of Japanese will not receive credit for JPN 211, JPN 212, JPN 213. Completion of JPN 213 with a grade of C - or better satisfies BA requirement in foreign languages. Lec/rec. PREREQS: JPN 212 [D-] and /or placement.

JPN 299. SPECIAL STUDIES (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
JPN 311. THIRD-YEAR JAPANESE (3).
Continued development of oral communication skills as required in a variety of social contexts.

Further development of reading skills. Lec/lab/ rec. PREREQS: JPN 213 or placement and departmental approval.
JPN 312. THIRD-YEAR JAPANESE (3). Continued development or oral communication skills as required in a variety of social contexts Further development of reading skills. Lec/lab/ rec. PREREQS: JPN 311 or placement and departmental approval.

## JPN 313. THIRD-YEAR JAPANESE (3)

Continued development or oral communication skills as required in a variety of social contexts. Further development of reading skills. Lec/ rec. PREREQS: JPN 312 or placement and departmental approval.
JPN 329. SPECIAL TOPICS IN LANGUAGE, CULTURE, OR LITERATURE (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
JPN 331. *JAPANESE CULTURE (3). An introductory survey of Japanese history, arts, literature, society, and traditions from the ancient to the mid-19th century. Taught in English. JPN 331, JPN 332, JPN 333 need not be taken in order. May not be offered every year. (NC) (Bacc Core Course) PREREQS: Sophomore standing.
JPN 332. *JAPANESE CULTURE (3). An introductory survey of Japanese history, arts, literature society, and traditions from the ancient to the mid-19th century. Taught in English. JPN 331, JPN 332, JPN 333 need not be taken in order. May not be offered every year. (NC) (Bacc Core Course) PREREQS: Sophomore standing.

JPN 333. *JAPANESE CULTURE (3). A survey of Japan from the mid-19th century to the present in areas including arts, literature, business, education, society, politics, and foreign relations. Taught in English. JPN 331, JPN 332, JPN 333 need not be taken in order. May not be offered every year. (NC) (Bacc Core Course) PREREQS: Sophomore standing.

JPN 345. MULTIMODAL LITERACIES:
JAPANESE (2). Introduction to the analysis and production of multimodal literacies. Study of semiotic resources such as language and images across modalities such as film, manga, and social media. Required of all majors in World Languages and Cultures. Taught in Japanese. Has to be taken in conjunction with the lecture session in English.
PREREQS: JPN 213 COREQS: WLC 345
JPN 379. PROCTOR EXPERIENCE (1-2). Supervised practicum for advanced students, with assignment as proctor or tutor in lower-division Japanese courses. No credit may be used to satisfy requirements for a minor in Japanese Graded P/N. This course is repeatable for a maximum of 6 credits. PREREQS: Completion of third-year Japanese with a minimum 3.00 GPA in that sequence and prior authorization from supervisor.
JPN 388. JAPANESE STUDIES, JAPANESE STUDY CENTER (1-12). May be repeated for credit when topic varies. This course is repeatable for a maximum of 12 credits.
JPN 399. SPECIAL TOPICS (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
JPN 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
JPN 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

JPN 410. INTERNSHIP (1-15). This course is repeatable for a maximum of 15 credits.

JPN 411. ^FOURTH-YEAR JAPANESE (3). Designed to help students apply grammatical points and expressions that they have learned from the first through the third year. It also stresses further development of reading and writing skills. (Writing Intensive Course) PREREQS: JPN 313 [C] and or equivalent and departmental approval.
JPN 412. FOURTH-YEAR JAPANESE (3).
Further development of conversational, reading, and writing skills. Readings include excerpts from contemporary essays, short stories, novels, plays, and newspaper articles. Not offered every year. PREREQS: JPN 411 or placement and departmental approval.

JPN 413. FOURTH-YEAR JAPANESE (3). Further development of conversational, reading, and writing skills. Readings include excerpts from contemporary essays, short stories, novels, plays, and newspaper articles. Not offered every year. PREREQS: JPN 412 or placement and departmental approval.

JPN 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
JPN 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

## - KOREAN COURSES

KOR 111. FIRST-YEAR KOREAN (4). For students with no prior training in Korean. Basic language skills along with cultural understanding by introducing the history of Hangul, traditional holidays, games, songs, foods and drama. Provides the Korean alphabet (Hangul), basic vocabulary, grammar, listening, speaking, reading, and writing skills. Three areas of focus: (1) reading and writing the Korean alphabet; (2) basic colloquial expressions; and (3) cultural understanding.
KOR 112. FIRST-YEAR KOREAN (4). Basic language skills along with cultural understanding by introducing the history of Hangul, traditional holidays, games, songs, foods and drama. Provides the Korean alphabet (Hangul), basic vocabulary, grammar, listening, speaking, reading, and writing skills. Three areas of concentration: (1) reading and writing the Korean alphabet, (2) basic colloquial expressions, and (3) cultural understanding. PREREQS: KOR 111 [D-]
KOR 113. FIRST-YEAR KOREAN (4). Designed to increase fluency in listening, speaking, reading and writing skills through various topics that are relevant to students' life; sports, health, experiences, housing. Enlarge vocabulary and knowledge of grammar and sentence structure with honorifics, adjectives, connectives, and comparatives. Discuss Korean culture and literature using folk tales. PREREQS: KOR 112 [D-]
KOR 211. SECOND-YEAR KOREAN (4).
Designed to increase fluency in listening, speaking, reading, and writing skills through pragmatic topics necessary for survival in the target language culture. Topic-based lessons consist of model dialogues, narration, vocabulary, grammar and culture corresponding to the level of intermediate low (ACTFL). PREREQS: KOR 113 [D] or Placement Test K113(1) and /or equivalent language proficiency. Students must contact the instructor for placement test (test code K113 with score 70).
KOR 212. SECOND-YEAR KOREAN (4).
Designed to increase fluency in listening, speaking, reading, and writing skills through pragmatic topics necessary for survival in the target language culture. Topic-based lessons consist of model dialogues, narration, vocabulary, grammar, and culture corresponding to the level of Intermediate Mid (ACTFL). Students learn to describe favorite activities, feelings, foods, restaurants, fashions, colors, and physical
appearances. Students also learn to engage in a conversation as well as to write compositions related to daily life, making recommendations, asking for and giving directions, making a telephone call, and writing a recipe. PREREQS: KOR 211 [D] and /or equivalent language proficiency. Students must contact instructor for placement test.
KOR 213. SECOND-YEAR KOREAN (4).
Designed to increase fluency in integrated language skills through pragmatic topics necessary for survival in target language culture. Topic-based lesson consists of model dialogues, narration, vocabulary, grammar and culture corresponding to the intermediate high level. Students will learn to speak in paragraph length conversations; write compositions related to their daily lives, and such social needs as giving suggestions, making appointments and plans, giving descriptions and excuses, asking for and giving advice for a job interview. Visual media makes learning more fun and authentic. Students are required to participate in face-to-face meetings on a regular basis with a weekly partner and the instructor. PREREQS: KOR 212 [D] and /or contact instructor for approval.

## LATIN COURSES

LAT 111. FIRST-YEAR LATIN (4). Basics of the Latin language, including grammar, syntax, and vocabulary for the purpose of reading and understanding Latin texts.
LAT 112. FIRST-YEAR LATIN (4). Continues to introduce students to the basics of the Latin language, including grammar, syntax, and vocabulary for the purpose of reading and understanding Latin texts. PREREQS: LAT 111 [C-]
LAT 113. FIRST-YEAR LATIN (4). Continues to introduce students to the basics of the Latin language, including grammar, syntax, and vocabulary for the purpose of reading and understanding Latin texts. PREREQS: LAT 112 [C-]

## - LINGUISTICS COURSES

LING 111. CLASSROOM STUDY OF A LESS COMMONLY TAUGHT LANGUAGE (4). Beginning classroom-based instruction of a language otherwise not taught at OSU. Skill areas addressed include reading, writing, speaking, listening and culture. Not for students who have previous proficiency in the target language. May be repeated for credit for different languages. For a master-apprentice approach, enroll instead in the LING 114, LING 115, LING 116 sequence. This course is repeatable for a maximum of 12 credits. PREREQS: LING 111, LING 112, LING 113 must be taken in sequence.
LING 112. CLASSROOM STUDY OF A LESS COMMONLY TAUGHT LANGUAGE (4).
Beginning classroom-based instruction of a language otherwise not taught at OSU. Skill areas addressed include reading, writing, speaking, listening and culture. Not for students who have previous proficiency in the target language. May be repeated for credit for different languages. For a master-apprentice approach, enroll instead in the LING 114, LING 115, LING 116 sequence. This course is repeatable for a maximum of 12 credits. PREREQS: LING 111, LING 112, LING 113 must be taken in sequence.
LING 113. CLASSROOM STUDY OF A LESS COMMONLY TAUGHT LANGUAGE (4).
Beginning classroom-based instruction of a language otherwise not taught at OSU. Skill areas addressed include reading, writing, speaking, listening and culture. Not for students who have previous proficiency in the target language. May be repeated for credit for different languages. For a master-apprentice approach, enroll instead in the LING 114, LING 115, LING 116 sequence. This course is repeatable for a maximum of 12 credits. PREREQS: LING 111, LING 112, LING

## 113 must be taken in sequence.

LING 114. MASTER/APPRENTICE STUDY OF A LESS COMMONLY TAUGHT LANGUAGE (1-4), LING 114, LING 115, and LING 116 provides context-rich beginning language instruction, in close collaboration with a native speaker, of a language otherwise not taught at OSU. Learners work toward a level of communicative proficiency approaching the intermediate low level in each of the primary skill areas. Four credits of one language are required before moving on to the next course in the sequence. May be repeated for credit for up to three languages. Not for students who have previous proficiency in the target language. This course is repeatable for a maximum of 12 credits.
LING 115. MASTER/APPRENTICE STUDY OF A LESS COMMONLY TAUGHT LANGUAGE (1-4). LING 114, LING 115, and LING 116 provides context-rich beginning language instruction, in close collaboration with a native speaker, of a language otherwise not taught at OSU. Learners work toward a level of communicative proficiency approaching the intermediate low level in each of the primary skill areas. Four credits of one language are required before moving on to the next course in the sequence. May be repeated for credit for up to three languages. Not for students who have previous proficiency in the target language. This course is repeatable for a maximum of 12 credits.

LING 116. MASTER/APPRENTICE STUDY OF A LESS COMMONLY TAUGHT LANGUAGE (1-4). LING 114, LING 115, and LING 116 provides context-rich beginning language instruction, in close collaboration with a native speaker, of a language otherwise not taught at OSU. Learners work toward a level of communicative proficiency approaching the intermediate low level in each of the primary skill areas. Four credits of one language are required before moving on to the next course in the sequence. May be repeated for credit for up to three languages. Not for students who have previous proficiency in the target language. This course is repeatable for a maximum of 12 credits.
LING 199. SPECIAL TOPICS (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.

## LING 208. *WESTERN CULTURE STUDY

 ABROAD (3). Overseas study of the history and contemporary form of important features of Western culture. Based on at least 10 weeks of studying abroad. CROSSLISTED as ANTH 208. (Bacc Core Course) PREREQS: Must be arranged with instructor prior to registration. Simultaneous enrollment in Study Abroad program.LING 209. *CULTURAL DIVERSITY STUDY ABROAD (3). Overseas study of non-Western cultures. Based on at least 10 weeks of studying abroad. CROSSLISTED as ANTH 209. (Bacc Core Course) PREREQS: Must be arranged with instructor prior to registration. Must also be enrolled in the Study Abroad program.
LING 251. *LANGUAGES OF OREGON (3). Basic lessons in languages spoken in Oregon's minority language communities presented by native informants; discussion, language analysis, and assessment facilitated by linguistics faculty. Languages presented will vary. (Bacc Core Course)
LING 299. SPECIAL TOPICS (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
LING 359. SELECTED TOPICS IN LINGUISTICS (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year This course is repeatable for a maximum of 16
credits.
LING 399. SPECIAL TOPICS (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
LING 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
LING 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

LING 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
LING 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
LING 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

LING 410. INTERNSHIP (1-15). This course is repeatable for a maximum of 16 credits.
LING 451. GENERAL LINGUISTICS (3). Language systems; comparative philology; historical, descriptive, and structural linguistics; semantics; phonetics and phonemics. Not offered every year. PREREQS: 9 credits upper-division foreign language training or equivalent.
LING 499. SPECIAL TOPICS (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
LING 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
LING 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

LING 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
LING 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
LING 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

LING 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

LING 510. INTERNSHIP (1-15). This course is repeatable for a maximum of 15 credits. PREREQS: Departmental approval required.
LING 545. METHODS AND MATERIALS FOR SECOND LANGUAGE ACQUISITION (4).
Historical and contemporary approaches to teaching and assessment in the second language classroom; emphasis on evaluating second language teaching methods and materials. PREREQS: Departmental approval required.
LING 551. GENERAL LINGUISTICS (3). Language systems; comparative philology; historical, descriptive, and structural linguistics; semantics; phonetics and phonemics. Not offered every year. PREREQS: 9 credits upper-division foreign language training or equivalent.
LING 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## ■ PORTUGUESE COURSES

PORT 111. FIRST-YEAR PORTUGUESE (4).
Introduction to fundamental communication skills: listening, speaking, reading, and writing. Introduction to the cultures of Portuguese
speaking countries. Exploration of history, current events, film, literature, and music. Intended for students without prior training.
PORT 112. FIRST-YEAR PORTUGUESE (4).
Further development of fundamental
communication skills: listening, speaking,
reading, and writing. Introduction to the cultures of Portuguese speaking countries. Exploration of history, current events, film, literature, and music. PREREQS: PORT 111 [C-] and or placement test or equivalent.
PORT 113. FIRST-YEAR PORTUGUESE (4).
Further continuation of fundamental
communication skills: listening, speaking,
reading, and writing. Introduction to the cultures of Portuguese speaking countries. Exploration of history, current events, film, literature, and music. PREREQS: PORT 112 [C-] and or placement test or equivalent.

## ■ QUEER STUDIES COURSES

QS 262. *INTRODUCTION TO QUEER
STUDIES (3). Centering itself on activism and scholarship, this course examines homophobia's and transphobia's relationship with racism, colonialism, sexism, ableism, classism and other forms of oppression. Introduces key concepts, histories, and political frameworks within Lesbian, Gay, Bisexual, Transgender, and Queer political movements. (Bacc Core Course) CROSSLISTED as WGSS 262.

## QS 262H. *INTRODUCTION TO QUEER

STUDIES (3). Centering itself on activism and scholarship, this course examines homophobia's and transphobia's relationship with racism, colonialism, sexism, ableism, classism and other forms of oppression. Introduces key concepts, histories, and political frameworks within Lesbian, Gay, Bisexual, Transgender, and Queer political movements. (Bacc Core Course) CROSSLISTED as WGSS 262H. PREREQS: Honors College approval required.

QS 299. SPECIAL TOPICS (3). This course is repeatable for a maximum of 9 credits.

QS 321. *QUEER POP CULTURE (3). Examines the concept of Queer popular culture through film, music, TV, image, and other mediums. Seeks to disrupt dominant discourses around gender and sexuality by centralizing women of color feminisms and queer of color critiques to analyze popular representations of gender, sexuality, race, class, disability, and other social locations. CROSSLISTED as WGSS 321. (Bacc Core Course)
QS 364. *TRANSGENDER POLITICS (3). Addresses transgender politics--including transsexual, genderqueer, and gender nonconforming issues--through feminist and intersectional approaches by analyzing transgender theories, arts, and activism. (Bacc Core Course) CROSSLISTED as WGSS 364. PREREQS: Sophomore standing.

QS 364H. *TRANSGENDER POLITICS (3).
Addresses transgender politics--including transsexual, genderqueer, and gender nonconforming issues--through feminist and intersectional approaches by analyzing transgender theories, arts, and activism. (Bacc Core Course) CROSSLISTED as WGSS 364H. PREREQS: Sophomore standing. Honors College approval required.

QS 375. *ARTS AND SOCIAL JUSTICE (4). Explores concepts of structural inequality, difference, power, and discrimination through a critical survey of arts activism. Students will think critically about artwork and artists which address a number of social issues in the United States, including race, ethnicity, class, gender, sexuality, immigration, and indigeneity. CROSSLISTED as ES 375, WGSS 375.
QS 399. SPECIAL TOPICS IN QUEER STUDIES
(3). This course is repeatable for a maximum of

12 credits.
QS 409. PRACTICUM: PROJECTS IN QUEER STUDIES (1-12). Capstone projects bring theory into practice through research, design, and implementation of a project that synthesizes and demonstrates learning in the Queer Studies program. This course is repeatable for a maximum of 12 credits. PREREQS: Junior or senior standing.

QS 431. *QUEER OF COLOR CRITIQUES (4). "Queer of color critiques" refers to political theories and activism that emerge from LGBTQ people of color to examine the intersections between race, sexuality and gender. This course addresses these intersections through theory, history, and activism. (Bacc Core Course) CROSSLISTED as ES 431 and WGSS 431. PREREQS: Junior standing.
QS 432. *GENDER, SEXUALITY, AND THE PHOTOGRAPHIC IMAGE (3). A creative and discussion-based course focusing on ways in which photography can and has addressed issues of gender and sexuality. An introduction to key concepts and intersections in Women's, Gender and Sexuality Studies; Queer Studies and photography theory. Students will create written and photographic responses to artworks, texts, personal experience and pop-culture. (Bacc Core Course) PREREQS: Junior or senior standing.
QS 462. *QUEER THEORIES (4). Engages key themes and critical frameworks in queer theories. Topics include histories of sexuality; forms of oppression, including heterosexism, homophobia, and transphobia; resistance to oppression; violence against LGBTQ people; queer activism; diverse experiences of sexuality; and representations in literature, art, and popular media. (Bacc Core Course) CROSSLISTED as WGSS 462/WGSS 562.

QS 472. ${ }^{\wedge}$ INDIGENOUS TWO-SPIRIT AND QUEER STUDIES (3). "Two-spirit" refers to North American indigenous genders outside of European male/female binaries. Two-spirit communities argue for decolonization as a central political struggle, calling all people to unlearn settler colonial gender/sexuality on Native land. This course addresses indigenous two-spirit/ GLBTQ issues through theory, literature, activism, and art. CROSSLISTED as ES 472, WGSS 472 (Writing Intensive Course) PREREQS: QS 262 or ES 242 or WGSS 414 or instructor permission

QS 473. TRANSGENDER LIVES (3). Many people in our Western cultures perceive gender as bimodal and fixed from birth. Individuals whose identity of self does not match the individual's biological sex face significant social pressures to conform to gender norms. Students will be introduced to the biological, social and cultural contexts for transgendered individuals CROSSLISTED as WGSS 473/WGSS 573. PREREQS: 200-level WGSS or QS course or equivalent, or consent of instructor.

QS 476. *TRANSNATIONAL SEXUALITIES (4). Explores contemporary experiences of sexualities within transnational contexts. Analyzes themes including queer and LGBTQI organizing, samesex desires, queer transnational immigration and labor flows, sex industries and discourses of trafficking, sex tourism, and reproductive justice, using feminist, queer, and postcolonial theoretical frameworks. (Bacc Core Course) CROSSLISTED as WGSS 476/WGSS 576. PREREQS: QS 262 [D-]
QS 477. QUEER/TRANS PEOPLE OF COLOR ARTS AND ACTIVISM (4). LGBTQ people of color often engage struggles for social justice through artistic movements. This course will focus on arts by LGBTQ people of color and the way these artistic movements contribute to activism that interrupts interlocking systems of oppression. CROSSLISTED as ES 477/ES 577, WGSS 477/ WGSS 577. PREREQS: QS 262 and QS 462

QS 499. SPECIAL TOPICS IN QUEER STUDIES (4). Topics in gay, lesbian, bisexual, transgender,
and queer issues and scholarship. May be repeated for credit when topic varies. This course is repeatable for a maximum of 12 credits.

QS 524. TRANS/GENDER POLITICS (4). Addresses transgender politics--including transsexual, genderqueer, and gender nonconforming issues--through feminist and intersectional approaches by analyzing transgender theories, arts, and activism CROSSLISTED as WGSS 524. PREREQS: Graduate student standing.
QS 531. QUEER OF COLOR CRITIQUES (4) "Queer of color critiques" refers to political theories and activism that emerge from LGBTQ people of color to examine the intersections between race, sexuality and gender. This course addresses these intersections through theory, history, and activism. CROSSLISTED as ES 531 and WGSS 531. PREREQS: Junior standing
QS 532. GENDER, SEXUALITY, AND THE PHOTOGRAPHIC IMAGE (3). A creative and discussion-based course focusing on ways in which photography can and has addressed issues of gender and sexuality. An introduction to key concepts and intersections in Women's, Gender and Sexuality Studies; Queer Studies and photography theory. Students will create written and photographic responses to artworks, texts, personal experience and pop-culture. CROSSLISTED as ART 532, WGSS 532. PREREQS: Junior or senior standing.

QS 562. QUEER THEORIES (4). Engages key themes and critical frameworks in queer theories. Topics include histories of sexuality; forms of oppression, including heterosexism, homophobia, and transphobia; resistance to oppression; violence against LGBTQ people; queer activism; diverse experiences of sexuality; and representations in literature, art, and popular media. CROSSLISTED as WGSS 462/WGSS 562 PREREQS: Junior standing.
QS 569. TOPICS IN JOTERIA STUDIES (3). A space for engaging with arts, activism and scholarship emerging from queer Latin@/ Chican@ experiences and consciousness is provided. Offered winter term in odd years. CROSSLISTED as ES 569, SPAN 569, WGSS 569. This course is repeatable for a maximum of 6 credits. PREREQS: Instructor approval.

## QS 572. INDIGENOUS TWO-SPIRIT AND

 QUEER STUDIES (3). "Two-spirit" refers to North American indigenous genders outside of European male/female binaries. Two-spirit communities argue for decolonization as a central political struggle, calling all people to unlearn settler colonial gender/sexuality on Native land This course addresses indigenous two-spirit/ GLBTQ issues through theory, literature, activism, and art. CROSSLISTED as ES 572, WGSS 572 PREREQS: QS 262 or ES 242 or WGSS 414 or WGSS 514 or instructor permissionQS 573. TRANSGENDER LIVES (3). Many
people in our Western cultures perceive gender as bimodal and fixed from birth. Individuals whose identity of self does not match the individual's biological sex face significant social pressures to conform to gender norms. Students will be introduced to the biological, social and cultural contexts for transgendered individuals CROSSLISTED as WGSS 473/WGSS 573. PREREQS: 200-level WGSS or QS course or equivalent, or consent of instructor.
QS 576. TRANSNATIONAL SEXUALITIES (4). Explores contemporary experiences of sexualities within transnational contexts. Analyzes themes including queer and LGBTQI organizing, samesex desires, queer transnational immigration and labor flows, sex industries and disclosures of trafficking, sex tourism, and reproductive justice, using feminist, queer, and postcolonial theoretical frameworks. CROSSLISTED as WGSS 476/ WGSS 576. PREREQS: QS 262

QS 577. QUEER/TRANS PEOPLE OF COLOR

ARTS AND ACTIVISM (4). LGBTQ people of color often engage struggles for social justice through artistic movements. This course will focus on arts by LGBTQ people of color and the way these artistic movements contribute to activism that interrupts interlocking systems of oppression. CROSSLISTED as ES 477/ES 577, WGSS 477/ WGSS 577. PREREQS: QS 262 and QS 462

QS 599. SPECIAL TOPICS IN QUEER STUDIES (4). Topics in gay, lesbian, bisexual, transgender, and queer issues and scholarship. May be repeated for credit when topic varies. This course is repeatable for a maximum of 12 credits.

RUS 111. FIRST-YEAR RUSSIAN (4).
Pronunciation, intonation, grammar, reading, writing, listening comprehension and conversation. Designed for students with no prior training in Russian. Native and/or bilingual speakers of Russian will not receive credit for RUS 111, RUS 112, RUS 113. PREREQS: RUS 111, RUS 112, RUS 113 must be taken in order.

## ■ RUSSIAN COURSES

RUS 112. FIRST-YEAR RUSSIAN (4),
Pronunciation, intonation, grammar, reading, writing, listening comprehension and conversation. Designed for students with no prior training in Russian. Native and/or bilingual speakers of Russian will not receive credit for RUS 111, RUS 112, RUS 113. PREREQS: RUS 111 [D-]

## RUS 113. FIRST-YEAR RUSSIAN (4).

Pronunciation, intonation, grammar, reading, writing, listening comprehension and conversation. Designed for students with no prior training in Russian. Native and/or bilingual speakers of Russian will not receive credit for RUS 111, RUS 112, RUS 113. PREREQS: RUS 112 [D-]

RUS 199. SPECIAL STUDIES (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
RUS 211. SECOND-YEAR RUSSIAN (4).
Further development of listening comprehension, speaking, reading, and writing skills. Native and/or bilingual speakers of Russian will not receive credit for RUS 211, RUS 212, RUS 213. PREREQS: RUS 113 [D-] and /or placement. RUS 211, RUS 212, RUS 213 must be taken in order.
RUS 212. SECOND-YEAR RUSSIAN (4).
Further development of listening comprehension, speaking, reading, and writing skills. Native and/or bilingual speakers of Russian will not receive credit for RUS 211, RUS 212, RUS 213. PREREQS: RUS 211 [D-] and /or placement.
RUS 213. SECOND-YEAR RUSSIAN (4).
Further development of listening comprehension, speaking, reading, and writing skills. Native and/or bilingual speakers of Russian will not receive credit for RUS 211, RUS 212, RUS 213. Completion of RUS 213 with a grade of C- or better satisfies BA requirement in foreign languages. PREREQS: RUS 212 [D-] and /or placement.

RUS 231. *RUSSIAN CULTURE (3). Introduction to basic features of Russian culture originating in the past and continuing into the present. Aspects of history, politics, economics, geography, art, music, literature, and everyday life. Compares Russian culture with Western European and American culture. RUS 231: Old Russia; RUS 232: 19th Century; RUS 233: 20th Century. Taught in English. Need not be taken in order. (H) (Bacc Core Course)
RUS 232. *RUSSIAN CULTURE (3). Introduction to basic features of Russian culture originating in the past and continuing into the present. Aspects of history, politics, economics, geography, art, music, literature, and everyday life. Compares Russian culture with Western European and American culture. RUS 231: Old Russia; RUS 232: 19th Century; RUS 233: 20th Century. Taught in

English. Need not be taken in order. (H) (Bacc Core Course)
RUS 233. *RUSSIAN CULTURE (3). Introduction to basic features of Russian culture originating in the past and continuing into the present. Aspects of history, politics, economics, geography, art, music, literature, and everyday life. Compares Russian culture with Western European and American culture. RUS 231: Old Russia; RUS 232: 19th Century; RUS 233: 20th Century. Taught in English. Need not be taken in order. (H) (Bacc Core Course)
RUS 299. SPECIAL STUDIES (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
RUS 311.THIRD-YEAR RUSSIAN (3). Extensive practice in writing, reading, and speaking: refinement of grammar and pronunciation. PREREQS: RUS 213 and departmental approval. RUS 311, RUS 312, RUS 313 must be taken in order.

RUS 312. THIRD-YEAR RUSSIAN (3). Extensive practice in writing, reading, and speaking: refinement of grammar and pronunciation.
PREREQS: RUS 311 and departmental approval.
RUS 313. THIRD-YEAR RUSSIAN (3). Extensive practice in writing, reading, and speaking: refinement of grammar and pronunciation. PREREQS: RUS 312 and departmental approval.
RUS 329. SPECIAL TOPICS IN LANGUAGE, CULTURE, AND/OR LITERATURE (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course is repeatable for a maximum of 16 credits.
RUS 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
RUS 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
RUS 407. SEMINAR. (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
RUS 410. INTERNSHIP (1-15). This course is repeatable for a maximum of 15 credits.
RUS 411. FOURTH-YEAR RUSSIAN (3). Emphasis on developing writing, speaking, and listening skills for proficiency progressing from textbook Russian to real-life Russian. Includes vocabulary study and some grammar review. Conducted in Russian. PREREQS: RUS 313 and departmental approval.
RUS 412. FOURTH-YEAR RUSSIAN (3). Emphasis on developing writing, speaking, and listening skills, so that student's proficiency progresses from textbook Russian to reallife Russian. Includes vocabulary study and some grammar review. Conducted in Russian. PREREQS: RUS 411 and departmental approval.
RUS 413. FOURTH-YEAR RUSSIAN (3). Emphasis on developing writing, speaking, and listening skills, so that the student's proficiency progresses from textbook Russian to reallife Russian. Includes vocabulary study and some grammar review. Conducted in Russian. PREREQS: RUS 412 and departmental approval.
RUS 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

RUS 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
RUS 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

## SPANISH COURSES

SPAN 111. FIRST-YEAR SPANISH (4).
Development of listening comprehension, speaking, reading, and writing skills. Native speakers and bilingual speakers will not receive credit for SPAN 111, SPAN 112, SPAN 113. Lec/ rec. PREREQS: Students with previous study of Spanish are admitted only by departmental approval. SPAN 111, SPAN 112, SPAN 113 must be taken in order.
SPAN 112. FIRST-YEAR SPANISH (4).
Development of listening comprehension, speaking, reading, and writing skills. Native speakers and bilingual speakers may not receive credit for SPAN 111, SPAN 112, SPAN 113. Lec/ rec. PREREQS: SPAN 111* [D-] or Placement Test Z112(1) and students with previous study of Spanish are admitted only by departmental approval. SPAN 111, SPAN 112, SPAN 113 must be taken in order.

SPAN 113. FIRST-YEAR SPANISH (4). Development of listening comprehension, speaking, reading, and writing skills. Native speakers and bilingual speakers may not receive credit for SPAN 111, SPAN 112, SPAN 113. Lec/ rec. PREREQS: SPAN 112* [D-] or Placement Test Z113(1) and students with previous study of Spanish are admitted only by departmental approval. SPAN 111, SPAN 112, SPAN 113 must be taken in order.
SPAN 117. FIRST-YEAR SPANISH-COMPLETE SEQUENCE (12). Introduction to Spanish. Listening, speaking, reading, and writing skills developed. Students must take all twelve credits. Entire first-year sequence in eight weeks. PREREQS: Students with previous study of Spanish are admitted only by approval of the School of Language, Culture, and Society.
SPAN 188. HISPANIC STUDIES, HISPANIC STUDY CENTERS (1-12). Section 1: Topics, Hispanic language. Section 2: Practical work (exercises); Section 3: Topics, Hispanic arts and letters. Section 4: Topics, Hispanic society.
SPAN 199. SPECIAL STUDIES (1-3). This course is repeatable for a maximum of 9 credits.
SPAN 211. SECOND-YEAR SPANISH (4).
Further development of listening comprehension, speaking, reading, and writing skills. Native speakers will not receive credit for SPAN 211, SPAN 212, SPAN 213. PREREQS: SPAN 113 [D-] or Placement Test Z211(1) and SPAN 211, SPAN 212, SPAN 213 must be taken in order.
SPAN 212. SECOND-YEAR SPANISH (4).
Further development of listening comprehension, speaking, reading, and writing skills. Native speakers may not receive credit for SPAN 211, SPAN 212, SPAN 213. PREREQS: SPAN 211 [D-] or Placement Test Z212(1)
SPAN 213. SECOND-YEAR SPANISH (4).
Further development of listening comprehension, speaking, reading, and writing skills. Native speakers may not receive credit for SPAN 211, SPAN 212, SPAN 213. Completion if SPAN 213 with a grade of C- or better satisfies BA requirement for foreign languages. PREREQS: SPAN 212 [D-] or Placement Test Z213(1)
SPAN 214. SECOND-YEAR SPANISH FOR NATIVE SPEAKERS (4). Designed for native speakers who learned Spanish in a home environment. Introduction to written Spanish PREREQS: SPAN 214, SPAN 215, SPAN 216 must be taken in order.
SPAN 215. SECOND-YEAR SPANISH FOR NATIVE SPEAKERS (4). Designed for native speakers who learned Spanish in a home environment. Introduction to written Spanish PREREQS: SPAN 215
SPAN 216. SECOND-YEAR SPANISH FOR NATIVE SPEAKERS (4). Designed for native speakers who learned Spanish in a home environment. Introduction to written Spanish.

Completion of SPAN 216 with a grade of C- or better satisfies BA requirement for foreign languages. PREREQS: SPAN 216

## SPAN 217. SECOND-YEAR SPANISH-

COMPLETE SEQUENCE (12). Intermediate
Spanish. Listening, speaking, reading, and writing skills developed. Students must take all 12 credits. Entire second-year sequence in eight weeks. PREREQS: SPAN 113 or SPAN 117

SPAN 221. SPANISH FOR MEDICAL
PROFESSIONS I (4). Provides students in health science and pre-professional disciplines with a working knowledge of Spanish used in health sciences and cultural competency needed to serve Latino populations. PREREQS: SPAN 113 [C-] and /or equivalent proficiency
SPAN 222. SPANISH FOR MEDICAL
PROFESSIONS II (4). Provides students in health science and pre-professional disciplines with a working knowledge of Spanish used in health sciences and cultural competency needed to serve Latino populations. PREREQS: SPAN 221 [C-] and /or equivalent proficiency.
SPAN 236. *CONTEMPORARY LATIN
AMERICAN CULTURE (3). Students will examine the main currents of modern Latin American culture since the beginning of the 20th century. Key subjects covered include the mural movement, "magical realism" in postwar literature, syncretism in the region's music and religion, and environmentalism in literature and the arts. (Bacc Core Course)
SPAN 237. *U.S. LATINO/A IDENTITIES AND
CULTURES (3). An introduction to past and contemporary experiences of Latinos/as in the U.S. related to patterns of (im)migration as well as sociohistorical and political events that have shaped U.S. Latino identities. In addition, the course will explore the current social, political, economic and cultural status and experiences of Latinos/as in different regions of the United States (Taught in English) (Bacc Core Course)
SPAN 288. HISPANIC STUDIES, HISPANIC STUDY CENTERS (1-12). Section 1: Topics, Hispanic language; Section 2: Practical work (exercises); Section 3: Topics, Hispanic arts and letters; Section 4: Topics, Hispanic society. This course is repeatable for a maximum of 12 credits.
SPAN 299. SPECIAL STUDIES (1-3). This course is repeatable for a maximum of 9 credits.

## SPAN 311. ADVANCED SPANISH GRAMMAR

(3). Students further develop language skills acquired in earlier courses while studying more complex structural aspects of the language through the application of grammar concepts in composition and other language tasks. PREREQS: SPAN 213 or passing score on placement tests.
SPAN 312. INTERMEDIATE WRITING SKILLS
(3). Focuses on written communication in Spanish. Authentic texts are used to identify writing processes and products and see how composition is informed by cultural considerations. Special attention will be paid to the author's purpose and the distinctiveness of the target audience. Students will create original written works and reinforce oral communication skills through class discussions. PREREQS: SPAN 213 or passing score on placement tests.

## SPAN 313. SPANISH LANGUAGE THROUGH

 CULTURE (3). Development of Spanish language through an exploration of cultural products, perspectives and practices of Spanish-speaking communities around the world. PREREQS: SPAN 213 or passing score on placement tests.SPAN 314. THIRD-YEAR SPANISH FOR NATIVE SPEAKERS (3). Extensive practice in reading, writing, and speaking; refinement of spelling, grammar and vocabulary within a dynamic cultural context. Native speakers should take SPAN 314, SPAN 315, SPAN 316 instead of SPAN 311, SPAN 312, SPAN 313; credit is not allowed for both.

PREREQS: SPAN 216 or placement. SPAN 314, SPAN 315, SPAN 316 must be taken in order.

SPAN 315. THIRD-YEAR SPANISH FOR NATIVE SPEAKERS (3). Extensive practice in reading, writing, and speaking; refinement of spelling, grammar and vocabulary within a dynamic cultural context. Native speakers should take SPAN 314, SPAN 315, SPAN 316 instead of SPAN 311, SPAN 312, SPAN 313; credit is not allowed for both. PREREQS: SPAN 314 or placement. SPAN 314 SPAN 315, SPAN 316 must be taken in order.
SPAN 316. THIRD-YEAR SPANISH FOR NATIVE SPEAKERS (3). Extensive practice in reading, writing, and speaking; refinement of spelling, grammar and vocabulary within a dynamic cultura context. Native speakers should take SPAN 314, SPAN 315, SPAN 316 instead of SPAN 311, SPAN 312, SPAN 313; credit is not allowed for both. PREREQS: SPAN 315 or placement. SPAN 314 SPAN 315, SPAN 316 must be taken in order.

## SPAN 317. DIRECTED READING AND

WRITING IN SPANISH (3). Emphasis on reading comprehension and improving writing ability. Students will build on their language skills and cultural awareness using different forms of literary expression from the Spanish-speaking world. PREREQS: 9 credits of upper-division SPAN.

SPAN 318. INTRODUCTION TO SPANISH LANGUAGE LITERATURE (3). Provides the literary background and analytical tools for students to discuss Spanish language literature with some depth and prepares students for more advanced literature courses. Some discussion of Latin American and Spanish history, politics and culture will provide a context for the readings. PREREQS: 9 credits of upper-division Spanish or instructor approval.
SPAN 319. SPANISH FOR BUSINESS (3). Introduction to the Spanish business world and commercial language. Development of business vocabulary, discussion, practice in writing resumes, business letters and reports. Conducted in Spanish. May not be offered every year. PREREQS: SPAN 312 or instructor approval required.

## SPAN 320. SPANISH CONVERSATION (3).

Extensive listening and speaking practice in Spanish, and systematic contact with Latin culture. Emphasis on vocabulary, pronunciation, intonation, and comprehension. Native speakers of Spanish are not eligible to take this course. May be used to satisfy requirements for the major or minor. PREREQS: 6 credits of upper-division Spanish.

## SPAN 327. MEXICAN-AMERICAN LITERATURE

 AND COMPREHENSION FOR SPANISH HERITAGE LANGUAGE LEARNERS (3).Combines the study of fiction, drama, and poetry in Spanish language produced by people of Mexican origin in what is today the United States, with intensive practice in the writing of formal Spanish. Students are encouraged to develop their independent thinking and analytical ability. Designed for students from a Spanish-speaking background. PREREQS: SPAN 316 or instructor approval.
SPAN 331. *THE CULTURES OF SPAIN AND
PORTUGAL (3). Historical development of the cultures and societies of the Iberian Peninsula. Taught in Spanish. (H) (Bacc Core Course) PREREQS: Completion of 9 credits from SPAN 311, SPAN 312, SPAN 313, SPAN 317, SPAN 318
SPAN 332. *THE CULTURES OF SPAIN AND PORTUGAL (3). Historical development of the cultures and societies of the Iberian Peninsula. Taught in Spanish. (H) (Bacc Core Course) PREREQS: Completion of 9 credits from SPAN 311, SPAN 312, SPAN 313, SPAN 317, SPAN 318

## SPAN 333. CULTURES OF SPAIN AND

PORTUGAL (3). Historical development of the cultures and societies of today's Iberian Peninsula Taught in Spanish. PREREQS: Completion of 9 credits from SPAN 311, SPAN 312, SPAN 313 ,

SPAN 317, SPAN 318
SPAN 336. *LATIN AMERICAN CULTURE
(3). Historical development of the cultures and societies of Latin America, with an emphasis on Spanish- and Portuguese-speaking peoples. Taught in Spanish. (H) (Bacc Core Course) PREREQS: Completion of 9 credits from SPAN 311, SPAN 312, SPAN 313, SPAN 317, SPAN 318.

## SPAN 337. *LATIN AMERICAN CULTURE

(3). Historical development of the cultures and societies of Latin America, with an emphasis on Spanish- and Portuguese-speaking peoples. Taught in Spanish. (H) (Bacc Core Course) PREREQS: Completion of 9 credits from SPAN 311, SPAN 312, SPAN 313, SPAN 317, SPAN 318.

## SPAN 338. *LATIN AMERICAN CULTURE

(3). Historical development of the cultures and societies of Latin America, with an emphasis on Spanish- and Portuguese-speaking peoples. Taught in Spanish. (H) (Bacc Core Course) PREREQS: Completion of 9 credits from SPAN 311, SPAN 312, SPAN 313, SPAN 317, SPAN 318.

## SPAN 339. MEXICAN IMMIGRANT

EXPERIENCE IN THE UNITED STATES (3). An interdisciplinary analysis of the immigration from Mexico to the United States. It will include discussions of literary, cultural and political accounts. Emphasis on the development of presentational communication skills in Spanish. Taught in Spanish. PREREQS: 12 credits from SPAN 314, SPAN 315, SPAN 316, SPAN 317, SPAN 318, SPAN 331, SPAN 332, SPAN 336, SPAN 337, SPAN 338.
SPAN 344. SELECTED TOPICS IN LITERATURE (3). Taught in Spanish. May be repeated for credit when topic varies. See Schedule of Classes for current term offering. This course is repeatable for a maximum of 9 credits. PREREQS: Completion of 9 credits from SPAN 311, SPAN 312, SPAN 313, SPAN 317, SPAN 318.

## SPAN 345. MULTIMODAL LITERACIES:

SPANISH (2). Introduction to the analysis and production of multimodal literacies. Study of semiotic resources such as language and images across modalities such as film, manga, and social media. Required of all majors in World Languages and Cultures. Taught in Spanish. Has to be taken in conjunction with the lecture session in English. PREREQS: SPAN 213 or SPAN 216 or SPAN 217 with a grade of at least C-, or equivalent, or placement test. Sophomore standing required. COREQS: WLC 345

SPAN 350. PHONETICS AND PRONUNCIATION (3). An exploration of the organs of speech and hearing, acoustic analysis, and transcription of native and learner Spanish speech samples. PREREQS: 3 credits of upper-division Spanish.
SPAN 351. HISPANIC LINGUISTICS (3).
Scientific approach to the structure of the Spanish language: syntax, phonology, word formation, dialectal differences. Taught in Spanish. Recommended for teacher certification. PREREQS: SPAN 350
SPAN 361. *MODERN SPAIN THROUGH SPANISH CINEMA (3). Examines the history of modern Spain and its cinematography via the study of key Spanish films and cineastes in the twentieth and twenty-first centuries. (Bacc Core Course) PREREQS: Sophomore standing
SPAN 365. MIGRANT NARRATIVES: SPANISH (2). An examination of migration and forced displacement through the study of personal narrative in Spanish. Includes discussion of the causes of displacement including persecution, ecological degradation, economic pressure, and conflict. This as a required course for the Spanish option in the WLC major in the Identities and Intersections thematic area. PREREQS: Thirdyear proficiency in Spanish. COREQS: WLC 365

SPAN 366. LANGUAGE AND IDENTITY: SPANISH (2). Examines specific ideologies, patterns of variation, and language contact
situations involving Spanish using authentic oral and written texts. Learners carry out their own exploration in language communities. This is a required course in the Spanish option of the WLC major in the Identities and Intersections thematic area. PREREQS: Third-year proficiency in Spanish. COREQS: WLC 366
SPAN 375. LITERATURES OF POWER AND RESISTANCE: SPANISH (2). An examination of the relationships between individuals or groups and institutional power (government, ecclesiastical, etc.) across different historical periods and geographies. This Spanish-language course covers specific works dealing with such topics as colonization, forced disappearance, and social resistance. This is a required course in the Spanish option of the WLC major in the Social Architecture and Power thematic area. PREREQS: Third-year proficiency in Spanish. COREQS: WLC 375
SPAN 376. EMPIRES AND GLOBALIZATION:
SPANISH (2). An examination of the history of Western imperialism and the rise of contemporary neocolonialism. Students explore the impact of colonization and the effects of neoliberalism and globalization in this Spanish discussion section through the use of historical source materials and current news articles focused on specific regions of the developing world. This is a required course in the Spanish option of the WLC major in the Social Architecture and Power thematic area. PREREQS: Third-year proficiency in Spanish. COREQS: WLC 376
SPAN 379. PROCTOR EXPERIENCE (1).
Supervised practicum for advanced students, with assignments as proctors or tutors in lower-division Spanish language courses. No more than 2 credits may be used to satisfy degree requirements for a major in Spanish; no credit may be used to satisfy requirements for a minor in Spanish. Graded P/N. This course is repeatable for a maximum of 3 credits. PREREQS: Completion of 21 upperdivision credits in Spanish with a minimum 3.00 GPA.
SPAN 388. HISPANIC STUDIES, HISPANIC STUDY CENTERS (1-12). Section 1:Topics, Hispanic language. Section 2: Practical work (exercises). Section 3: Topics, Hispanic arts and letters. Section 4: Topics, Hispanic society. This course is repeatable for a maximum of 12 credits.
SPAN 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
SPAN 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
SPAN 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SPAN 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
SPAN 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SPAN 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SPAN 410. INTERNSHIP (1-15). This course is repeatable for a maximum of 15 credits.
SPAN 411. SPECIALIZED GRAMMAR OR LINGUISTICS TOPICS (3). Students develop an in-depth knowledge of various linguistic aspects of Spanish, particularly in regard to problematic grammatical structures and the development of writing proficiency. The main focus is on integrating a thorough understanding of grammatical structures into writing using selected literary works as models. Students analyze their own linguistic progress and apply this metaknowledge to their writing. PREREQS: 18 credits of upper-division Spanish.

SPAN 412. ADVANCED COMPOSITION (3)
Emphasis on creative writing. Students will read and discuss a series of stories with the same theme, then write their own. The subjunctive and other advanced grammar topics will be reviewed and incorporated into the writing activities. Taught in Spanish. PREREQS: 18 credits of upperdivision Spanish or instructor approval.

## SPAN 413. ADVANCED COMMUNICATION

 SKILLS (3). Contextualized exploration of skills outlined in the National Standards Project's PREREQS: 18 credits of upper-division Spanish or instructor approval.
## SPAN 435. SPECIAL TOPICS IN LATIN

AMERICAN CULTURE (3). Historical and contemporary aspects of the cultures of Latin America. May include material relevant to Spain and U.S. Latinos. See Schedule of Classes for current term offering. May be repeated for credit when topic varies. This course is repeatable for a maximum of 9 credits. PREREQS: 18 credits of upper-division Spanish or instructor approval.
SPAN 438. ^SELECTED TOPICS IN LUSO-
HISPANIC CULTURE (3). Contemporary aspects of the cultures of Spain, Portugal, or Latin America with a cross-cultural perspective. Topics and language of instruction vary. See Schedule of Classes for current term offering. May be repeated for credit when topic varies. (Writing Intensive Course) This course is repeatable for a maximum of 9 credits. PREREQS: Completion of 6 credits from SPAN 331, SPAN 332, SPAN 333, SPAN 336, SPAN 337, SPAN 338.

## SPAN 439. ^TOPICS IN MEXICAN CULTURE

 AS EVIDENCED THROUGH MEXICAN FILM (3). Critical analysis and evaluation of films as cultural texts that open up a window into Mexican society. Movies with strong sexual content, explicit violence, language, and/or drug use will be viewed in the class. Taught in Spanish with some readings in English. May be repeated for credit when topic varies. Not offered every year. (Writing Intensive Course) This course is repeatable for a maximum of 9 credits. PREREQS: Course is designed for Spanish heritage learners and advanced students of Spanish as a second language who have completed 12 credits from SPAN 316, SPAN 317, SPAN 318, SPAN 331, SPAN 332, SPAN 333, SPAN 336, SPAN 337, SPAN 338, SPAN 339, SPAN 411, SPAN 412, SPAN 413 with a grade of $B$ - or better.SPAN 441. CONTEMPORARY SHORT STORY (3). An exploration and comparison of the short story in its various manifestations across the Spanish-speaking world in the 20th and 21st centuries. Themes such as identity, discrimination, class conflict, language, power, resistance, and marginalization will be analyzed within the sociohistorical contexts in which the literary works were created. PREREQS: At least 12 credits of upperdivision Spanish

## SPAN 444. SELECTED TOPICS IN THE

LITERATURE OF SPAIN (3). Representative Spanish prose, poetry, and drama, with an emphasis on the 19th and 20th centuries. Taught in Spanish. See Schedule of Classes for current term offering. May be repeated for credit when topic varies. Not offered every year. This course is repeatable for a maximum of 12 credits. PREREQS: Completion of 21 upper-division credits in Spanish.

## SPAN 445. SELECTED TOPICS IN THE

LITERATURE OF LATIN AMERICA (3).
Representative prose, poetry, and drama of Spanish America and/or Brazil, with an emphasis on the mid-19th century to the present. Topics and language of instruction may vary. See Schedule of Classes for current term offering. May be repeated for credit when topic varies. Not offered every year. This course is repeatable for a maximum of 18 credits. PREREQS: Completion of 21 upperdivision credits in Spanish.
SPAN 446. RECENT LATIN AMERICAN
LITERATURE (3). Recent fiction that goes beyond

Magical Realism. Discussion includes literary techniques, as well as Latin American history, politics and cultural values. Taught in Spanish. PREREQS: Completion of 21 upper-division credits of Spanish.
SPAN 447. MEXICAN WOMEN WRITERS
(3). Fiction by contemporary Mexican women, emphasizing how the writing reflects the authors lives, as well as Mexican history, politics and cultural values. Taught in Spanish. PREREQS: Completion of 21 upper-division credits of Spanish.
SPAN 448. LATIN AMERICAN GREAT WORKS
(3). Major works by Latin American writers, concentrating on literary style and technique, as well as Latin American history, politics and culture. Taught in Spanish. PREREQS: Completion of 21 upper-division credits of Spanish.
SPAN 453. SPANISH SOCIOLINGUISTICS (3). Provides a foundation of sociolinguistic theory from which various topics can be analyzed, discussed and applied to language situations that are specific to Spanish. These include language contact, Spanish varieties, language policy, and anguage attitudes. All topics are presented within the context of speech communities and the external and internal variables that affect these communities. PREREQS: SPAN 350 [C-]

## SPAN 455. INTRODUCTION TO SPANISH

 TRANSLATION (3). Combines beginning translation theory with hands-on practice using a variety of activities from several areas of professional specialization. Includes a brief introduction to simultaneous interpretation as it is done in professional conference or broadcast media settings. Participants must be highly proficient in both English and Spanish. PREREQS: 12 credits of upper-division Spanish.
## SPAN 456. SPANISH IN THE UNITED STATES

(3). Provides a foundation for the study of Spanish in the United States. Focuses on the diverse identities of Latino/as and Spanish speakers as they define what it means to be bilingual locally, regionally, and nationally. Spanish and SpanishEnglish bilingualism will be studied from critical sociolinguistic, historical and political perspectives PREREQS: SPAN 350 [C-]
SPAN 461. FIFTH-YEAR SPANISH (3). Continued development of listening comprehension, speaking, and writing skills. Introduction to debate and platform speaking in Spanish, and to specialized interests of students, e.g., methods and philosophies of interpretation and translation, business Spanish, creative writing. PREREQS: SPAN 413 or placement, and departmental approval required. SPAN 461, SPAN 462, SPAN 463 must be taken in order.

SPAN 462. FIFTH-YEAR SPANISH (3). Continued development of listening comprehension, speaking, and writing skills. Introduction to debate and platform speaking in Spanish, and to specialized interests of students, e.g., methods and philosophies of interpretation and translation, business Spanish, creative writing. PREREQS: SPAN 461 or placement, and departmental approval required.
SPAN 463. FIFTH-YEAR SPANISH (3). Continued development of listening comprehension, speaking, and writing skills. Introduction to debate and platform speaking in Spanish, and to specialized interests of students, e.g., methods and philosophies of interpretation and translation, business Spanish, creative writing. PREREQS: SPAN 462 or placement, and departmental approval required.

## SPAN 470. *ADVANCED SPANISH

COORDINATED STUDIES (1-30). Interdisciplinary examination of a topic related to points of contact between Spanish- and English-speaking populations in Oregon and beyond. Includes the study of literature, culture, language skills, and a service-learning component. Constitutes a fulltime course load. Taught in Spanish. (Bacc Core

Course) This course is repeatable for a maximum of 30 credits.

SPAN 488. HISPANIC STUDIES, HISPANIC STUDY CENTERS (1-12). Section 1: Topics, Hispanic language. Section 2: Practical work (exercises). Section 3: Topics, Hispanic arts and letters. Section 4: Topics, Hispanic society. This course is repeatable for a maximum of 12 credits.

SPAN 499. SPECIAL TOPICS (1-16). May be repeated for credit when topic varies. See Schedule of Classes for current offerings and prerequisites. Not offered every year. This course s repeatable for a maximum of 99 credits.
SPAN 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SPAN 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Departmental approval required.

SPAN 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
SPAN 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SPAN 506. SPECIAL PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

SPAN 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SPAN 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
SPAN 510. INTERNSHIP (1-15). This course is repeatable for a maximum of 15 credits.
SPAN 511. SPECIALIZED GRAMMAR OR LINGUISTICS TOPICS (3). Students develop an in-depth knowledge of various linguistic aspects of Spanish, particularly in regard to problematic grammatical structures and the development of writing proficiency. The main focus is on integrating a thorough understanding of grammatical structures into writing using selected literary works as models. Students analyze their own linguistic progress and apply this metaknowledge to their writing. PREREQS: 18 credits of upper-division Spanish.
SPAN 512. ADVANCED COMPOSITION (3).
Emphasis on creative writing. Students will read and discuss a series of stories with the same theme, then write their own. The subjunctive and other advanced grammar topics will be reviewed and incorporated into the writing activities. Taught in Spanish. PREREQS: 18 credits of upperdivision Spanish or instructor approval.
SPAN 513. ADVANCED COMMUNICATION
SKILLS (3). Contextualized exploration of skills outlined in the National Standards Project's PREREQS: 18 credits of upper-division Spanish or instructor approval.

## SPAN 535. SPECIAL TOPICS IN LATIN

AMERICAN CULTURE (3). Historical and
contemporary aspects of the cultures of Latin America. May include material relevant to Spain and U.S. Latinos. See Schedule of Classes for current term offering. May be repeated for credit when topic varies. This course is repeatable for a maximum of 9 credits. PREREQS: 18 credits of upper-division Spanish or instructor approval.

## SPAN 538. SELECTED TOPICS IN LUSO-

HISPANIC CULTURE (3). Contemporary aspects of the cultures of Spain, Portugal, or Latin America with a cross-cultural perspective. Topics and language of instruction vary. Not offered every year. See Schedule of Classes for current term offering. May be repeated for credit when topic varies. This course is repeatable for a maximum of 9 credits. PREREQS: Completion of 6 credits from SPAN 331, SPAN 332, SPAN 333 , SPAN 336 ,

SPAN 337, SPAN 338
SPAN 544. SELECTED TOPICS IN THE LITERATURE OF SPAIN (3). Representative Spanish prose, poetry, and drama, with an emphasis on the 19th and 20th centuries. Taught in Spanish. Not offered every year. See Schedule of Classes for current term offering. May be repeated for credit when topic varies. This course is repeatable for a maximum of 12 credits. PREREQS: Completion of 21 upper-division credits in Spanish.

## SPAN 545. SELECTED TOPICS IN THE

LITERATURE OF LATIN AMERICA (3).
Representative prose, poetry, and drama of Spanish America and/or Brazil, with an emphasis on the mid-19th century to the present. Topics and language of instruction may vary. Not offered every year. See Schedule of Classes for current term offering. May be repeated for credit when topic varies. This course is repeatable for a maximum of 18 credits. PREREQS: Completion of 21 upperdivision credits in Spanish.

## SPAN 546. RECENT LATIN AMERICAN

LITERATURE (3). Recent fiction that goes beyond Magical Realism. Discussion includes literary techniques, as well as Latin American history, politics and cultural values. Taught in Spanish. PREREQS: Completion of 21 upper-division credits in Spanish.

## SPAN 547. MEXICAN WOMEN WRITERS

(3). Fiction by contemporary Mexican women, emphasizing how the writing reflects the authors lives, as well as Mexican history, politics and cultural values. Taught in Spanish. PREREQS: 21 upper-division credits of Spanish.

## SPAN 548. LATIN AMERICAN GREAT WORKS

(3). Major works by Latin American writers, concentrating on literary style and technique, as well as Latin American history, politics and culture. Taught in Spanish. PREREQS: 21 upper-division credits of Spanish

## SPAN 552. INTRODUCTION TO SPANISH

SOCIOLINGUISTICS (3). Provides a foundation of sociolinguistic theory in order to analyze, discuss and apply the theory to Spanish language situations, such as language contact, Spanish varieties, language politics, and language attitudes; all within the context of a speech community and the external and internal variables that affect it.
SPAN 553. SPANISH SOCIOLINGUISTICS (3).
Provides a foundation of sociolinguistic theory from which various topics can be analyzed, discussed and applied to language situations that are specific to Spanish. These include language contact, Spanish varieties, language policy, and language attitudes. All topics are presented within the context of speech communities and the external and internal variables that affect these communities. PREREQS: SPAN 350

## SPAN 555. INTRODUCTION TO SPANISH

TRANSLATION (3). Combines beginning translation theory with hands-on practice using a variety of activities from several areas of professional specialization. Includes a brief introduction to simultaneous interpretation as it is done in professional conference or broadcast media settings. Participants must be highly proficient in both English and Spanish. PREREQS: 12 credits of upper-division Spanish.

## SPAN 556. SPANISH IN THE UNITED STATES

(3). Provides a foundation for the study of Spanish in the United States. Focuses on the diverse identities of Latino/as and Spanish speakers as they define what it means to be bilingual locally, regionally, and nationally. Spanish and SpanishEnglish bilingualism will be studied from critical sociolinguistic, historical and political perspectives PREREQS: SPAN 350
SPAN 561. FIFTH-YEAR SPANISH (3). Continued development of listening comprehension,
speaking, and writing skills. Introduction to debate and platform speaking in Spanish, and to
specialized interests of students, e.g., methods and philosophies of interpretation and translation, business Spanish, creative writing. PREREQS: SPAN 413 or placement, and departmental authorization. SPAN 561, SPAN 562, SPAN 563 must be taken in order.
SPAN 562. FIFTH-YEAR SPANISH (3). Continued development of listening comprehension, speaking, and writing skills. Introduction to debate and platform speaking in Spanish, and to specialized interests of students, e.g., methods and philosophies of interpretation and translation, business Spanish, creative writing. PREREQS: SPAN 561 or placement, and departmental authorization.

SPAN 563. FIFTH-YEAR SPANISH (3). Continued development of listening comprehension, speaking, and writing skills. Introduction to debate and platform speaking in Spanish, and to specialized interests of students, e.g., methods and philosophies of interpretation and translation, business Spanish, creative writing. PREREQS: SPAN 562 or placement, and departmental authorization.
SPAN 569. TOPICS IN JOTERIA STUDIES
(3). A space for engaging with arts, activism and scholarship emerging from queer Latin @/ Chican@ experiences and consciousness is provided. Offered winter term in odd years. CROSSLISTED as ES 569, QS 569, WGSS 569. This course is repeatable for a maximum of 6 credits. PREREQS: Instructor approval.

SPAN 570. GRADUATE SPANISH COORDINATED STUDIES (1-15). An intensive, team-taught course in which learners engage in advanced exploration of issues of importance to Spanish-speaking communities in Oregon and facilitate the learning of undergraduate native speaker and second language students. Topics change regularly. The course addresses all communicative areas (reading, writing, speaking and listening) and includes content in the areas of literature, linguistics, culture, civic engagement, and service-learning. Successful completion of the full 15 credits with a grade of $B$ or higher meets requirements for the graduate minor in Contemporary Hispanic Studies. This course is repeatable for a maximum of 30 credits. PREREQS: Completion of SPAN 599, Special Topics: "Developing a Learning Community".
SPAN 588. HISPANIC STUDIES, HISPANIC STUDY CENTERS (1-12). Section 1: Topics, Hispanic language. Section 2: Practical work (exercises). Section 3: Topics, Hispanic arts and letters. Section 4: Topics, Hispanic society.

SPAN 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 99 credits.

SPAN 808. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

## WOMEN, GENDER, AND SEXUALITY STUDIES COURSES

WGSS 199. SPECIAL STUDIES (1-3). Special topics of contemporary relevance to research of women and gender role issues. For students who seek an elementary introduction to a specific realm of women, gender, and sexuality studies. May be repeated for credit when topic varies. This course is repeatable for a maximum of 9 credits.
WGSS 223. *WOMEN: SELF AND SOCIETY (3). Multidisciplinary introduction to women, gender, and sexuality studies. Focuses on the lives and status of women in society and explores ways institutions such as family, work, media, law and religion affect different groups of women. Explores issues of gender, race, class, age, sexual orientation, size and ability. (SS) (Bacc Core Course)
WGSS 223H. *WOMEN: SELF AND SOCIETY (3). Multidisciplinary introduction to women, gender, and sexuality studies. Focuses on the lives and status of women in society and explores
ways institutions such as family, work, media, law and religion affect different groups of women. Explores issues of gender, race, class, age, sexual orientation, size and ability. (SS) (Bacc Core Course) PREREQS: Honors College approval required.
WGSS 224. *WOMEN: PERSONAL AND
SOCIAL CHANGE (3). Examines the way the questioning of traditional gender roles and their accompanying power structures can lead to change in women's personal and public lives. Explores women's heritage and contributions and focuses on issues of self-growth and social movements for change. (SS) (Bacc Core Course)

WGSS 230. *WOMEN IN THE MOVIES (3). Examines ways women are depicted in the movies and how those depictions are created by and create larger social constructions of women. Special attention is given to the intersections of race, class, sexual identity, and age with gender. (Bacc Core Course)

WGSS 230H. *WOMEN IN THE MOVIES (3). Examines ways women are depicted in the movies and how those depictions are created by and create larger social constructions of women. Special attention is given to the intersections of race, class, sexual identity, and age with gender (Bacc Core Course) PREREQS: Honors College approval required.
WGSS 235. *WOMEN IN WORLD CINEMA (3). Explores constructions and practices of gender in a transnational, multi-religious, and global framework by examining a wide variety of films about women around the world. (Bacc Core Course)
WGSS 235H. *WOMEN IN WORLD CINEMA
(3). Explores constructions and practices of gender in a transnational, multi-religious, and global framework by examining a wide variety of films about women around the world. (Bacc Core Course) PREREQS: Honors College approval required.
WGSS 240. *GENDER AND SPORT (3). Focuses on sport as a gendered institution. Drawing from cultural, psychosocial, and political perspectives, the course examines intersections of gender with age, sexual orientation, social class, gender identity, race and ethnicity and politics. (Bacc Core Course)
WGSS 262. *INTRODUCTION TO QUEER
STUDIES (3). Centering itself on activism and scholarship, this course examines homophobia's and transphobia's relationship with racism, colonialism, sexism, ableism, classism and other forms of oppression. Introduces key concepts, histories, and political frameworks within Lesbian, Gay, Bisexual, Transgender, and Queer political movements. (Bacc Core Course) CROSSLISTED as QS 262.

WGSS 262H. *INTRODUCTION TO QUEER
STUDIES (3). Centering itself on activism and scholarship, this course examines homophobia's and transphobia's relationship with racism, colonialism, sexism, ableism, classism and other orms of oppression. Introduces key concepts, histories, and political frameworks within Lesbian, Gay, Bisexual, Transgender, and Queer political movements. (Bacc Core Course) CROSSLISTED as QS 262H. PREREQS: Honors College approval required.

WGSS 270. VIOLENCE AGAINST WOMEN (3).
Addresses issues of domestic violence, rape, dating violence, as well as contemporary social debates about pornography and the media's impact on increasing violence against women. (SS)
WGSS 280. *WOMEN WORLDWIDE (3). Focuses on women's experiences throughout the world and examines women's issues and status crossculturally. (Bacc Core Course)
WGSS 280H. *WOMEN WORLDWIDE (3).
Focuses on women's experiences throughout the
world and examines women's issues and status cross-culturally. (Bacc Core Course) PREREQS: Honors College approval required.
WGSS 295. *FEMINISM AND THE BIBLE (3). Examines feminist interpretations of the Bible and pays special attention to intersections of race, social class, sexual identity, and nation in biblical interpretation. (Bacc Core Course) CROSSLISTED as ENG 295, PHL 295.

WGSS 295H. *FEMINISM AND THE BIBLE (3). Examines feminist interpretations of the Bible and pays special attention to intersections of race, social class, sexual identity, and nation in biblical interpretation. (Bacc Core Course) CROSSLISTED as ENG 295, ENG 295H, PHL 295, PHL 295H.

## WGSS 299. TOPICS IN WOMEN, GENDER,

 AND SEXUALITY STUDIES (1-6). Current topics related to women, gender and sexuality. Description and analysis of different realms of knowledge about gender issues. This course is repeatable for a maximum of 12 credits.WGSS 320. *GENDER AND TECHNOLOGY (3). Explores women's contributions and focuses in technology fields. Analyzes gendered nature of technology. Theory and practice of technologies. (Bacc Core Course)
WGSS 321. *QUEER POP CULTURE (3). Examines the concept of Queer popular culture through film, music, TV, image, and other mediums. Seeks to disrupt dominant discourses around gender and sexuality by centralizing women of color feminisms and queer of color critiques to analyze popular representations of gender, sexuality, race, class, disability, and other social locations. CROSSLISTED as QS 321. (Bacc Core Course)
WGSS 325. *DISNEY: GENDER, RACE, EMPIRE (3). Explores constructions of gender, race, class, sexuality, and nation in the animated films of Walt Disney; introduces concepts in film theory and criticism, and develops analyses of the politics of representation. (Bacc Core Course)

## WGSS 325H. *DISNEY: GENDER, RACE

EMPIRE (3). Explores constructions of gender, race, class, sexuality, and nation in the animated films of Walt Disney; introduces concepts in film theory and criticism, and develops analyses of the politics of representation. (Bacc Core Course) PREREQS: Honors College approval required.

WGSS 340. *GENDER AND SCIENCE (3). Analyzes the relationship between society and science by explaining technology and science as gendered practices and bodies of knowledge. Focuses on the ways the making of women and men affect the making of science and explores the roles of women in scientific pursuits. (SS) (Bacc Core Course)
WGSS 340H. *GENDER AND SCIENCE (3). Analyzes the relationship between society and science by explaining technology and science as gendered practices and bodies of knowledge. Focuses on the ways the making of women and men affect the making of science and explores the roles of women in scientific pursuits. (SS) (Bacc Core Course)
WGSS 350. *POLITICS OF MOTHERHOOD IN A GLOBAL CONTEXT (3). Introduces students to the politics of motherhood in global contexts, focusing on politics of transnational adoption; motherhood, surrogacy, and biotechnologies; effects of globalization on mothering across borders; mothering in the global welfare state; movements for reproductive justice; and transnational representations of motherhood. (Bacc Core Course)
WGSS 360. *MEN AND MASCULINITIES IN A GLOBAL CONTEXT (3). Students will become familiar with central topics in global masculinity studies, analyze texts in diverse media, develop original arguments, and engage with issues of masculinity and representation through written
and creative work. (Bacc Core Course)
WGSS 360 H . *MEN AND MASCULINITIES (3).
Students will become familiar with central topics in global masculinity studies, analyze texts in diverse media, develop original arguments, and engage with issues of masculinity and representation through written and creative work. (Bacc Core Course) PREREQS: Honors College approval required.

WGSS 364. *TRANSGENDER POLITICS
(3). Addresses transgender politics--including transsexual, genderqueer, and gender nonconforming issues--through feminist and intersectional approaches by analyzing transgender theories, arts, and activism. (Bacc Core Course) CROSSLISTED as QS 364 PREREQS: Sophomore standing.
WGSS 364H. *TRANSGENDER POLITICS
(3). Addresses transgender politics--including transsexual, genderqueer, and gender nonconforming issues--through feminist and intersectional approaches by analyzing transgender theories, arts, and activism. (Bacc Core Course) CROSSLISTED as QS 364 H . PREREQS: Sophomore standing. Honors College approval required.
WGSS 373. APPROACHES TO SOCIAL
JUSTICE (3). Students study various ways of thinking about social justice and evaluate these in case studies and current events. As a basis for the Social Justice minor, students write a research paper on the theoretical and practical aspects of a social justice issue. CROSSLISTED as ANTH 373 ES 373, WLC 373.

WGSS 375. *ARTS AND SOCIAL JUSTICE (4). Explores concepts of structural inequality, difference, power, and discrimination through a critical survey of arts activism. Students will think critically about artwork and artists which address a number of social issues in the United States, including race, ethnicity, class, gender, sexuality, immigration, and indigeneity. CROSSLISTED as ES 375, QS 375
WGSS 380. *MUSLIM WOMEN (3). Examines the lives and experiences of Muslim women in Islamic communities around the world from a variety of perspectives in order to highlight issues significant for contemporary Muslim women: family, education, work, politics, health, marriage, divorce, war, and violence. (Bacc Core Course)
WGSS 399. TOPICS IN WOMEN, GENDER, AND SEXUALITY STUDIES (1-6). Current topics in women, gender, and sexuality. May be repeated for credit when topic varies. This course is repeatable for a maximum of 12 credits.

WGSS 399H. TOPICS IN WOMEN, GENDER, AND SEXUALITY STUDIES (1-6). Current topics in women, gender, and sexuality. May be repeated for credit when topic varies. This course is repeatable for a maximum of 12 credits. PREREQS: Honors College approval required.

WGSS 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
WGSS 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
WGSS 407. SEMINAR (3). This course is repeatable for a maximum of 99 credits.
WGSS 409. PRACTICUM (1-12). This course is repeatable for a maximum of 12 credits. PREREQS: Junior or senior standing.
WGSS 410. INTERNSHIP (1-16). The internship experience provides the opportunity to gain experience within an off-campus private, public, or community agency or organization which has as one of its goals the improvement of the status of women in society. Students work with an on-site mentor who guides their field experience in collaboration with the internship coordinator in the WGSS program. Only 6 credits will count
toward the Women, Gender, and Sexuality Studies major. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
WGSS 414. *SYSTEMS OF OPPRESSION IN
WOMEN'S LIVES (4). Explores the ways different systems of oppression and discrimination impact women's lives. Examines sexism, classism, racism, and anti-Jewish oppression, as well as discrimination against queer women, older women, and those who differ in ability and appearance. (SS) (Bacc Core Course) PREREQS: WGSS 223 [D-] or WGSS 223H [D-] and /or instructor approval required.

WGSS 416. THEORIES OF FEMINISM (4).
Explores feminist conceptions about the nature of the world, women's reality and visions for change. Analyzes major issues raised by the women's movement and the development of feminist ideas, as well as provides a critical examination of feminist thought and different theories which comprise it. PREREQS: WS 223 [D-] or WS 223H [D-] or WS 224 [D-] or WGSS 223 [D-] or WGSS 223H [D-] or WGSS 224 [D-] and /or instructor approval required.

WGSS 417. FEMINIST PHILOSOPHIES (3).
Diverse forms of feminist philosophy, including a variety of critiques, especially those based on race and class, with in-depth consideration of selected social issues, such as rape and pornography. CROSSLISTED as PHL 417/PHL 517. PREREQS: 6 credits of philosophy or upper-division standing.

## WGSS 418. FEMINIST RESEARCH METHODS

(4). Introduces feminist research methods associated with research design, analysis, and interpretation. It utilizes feminist social justice frameworks and focuses on in-depth interviewing and focus groups, oral histories, ethnography, and visual and textual analysis, as well as survey design and community-based participatory research. PREREQS: WGSS 414 [C-] and junior standing
WGSS 430. WOMEN OF COLOR FEMINISMS
(4). Explores the contemporary experiences of women of color, as well as the theoretical and practical frameworks of women of color feminisms Analyses key themes in women of color feminisms, including politics of representation, multiple forms of state and interpersonal violence, intersecting forms of oppression, economic justice, reproductive justice, and strategies of resistance. PREREQS: WS 223 [D-] or WS 223H [D-] or WGSS 223 [D-] or WGSS 223 H [D-] and WGSS 223 or WGSS 223H or WS 223 or WS 223H
WGSS 431. *QUEER OF COLOR CRITIQUES
(4). "Queer of color critiques" refers to political theories and activism that emerge from LGBTQ people of color to examine the intersections between race, sexuality and gender. This course addresses these intersections through theory, history, and activism. (Bacc Core Course) CROSSLISTED as ES 431 and QS 431. PREREQS: Junior standing.
WGSS 432. *GENDER, SEXUALITY, AND THE PHOTOGRAPHIC IMAGE (3). A creative and discussion-based course focusing on ways in which photography can and has addressed issues of gender and sexuality. An introduction to key concepts and intersections in Women's, Gender and Sexuality Studies; Queer Studies and photography theory. Students will create written and photographic responses to artworks, texts, personal experience and pop-culture. (Bacc Core Course) CROSSLISTED as ART 432, QS 432 PREREQS: Junior or senior standing.
WGSS 440. *WOMEN AND NATURAL
RESOURCES (3). Explores the relationship between women and natural resources. In particular, the course examines the roles of policy, technology, culture, and management in women's use and control of natural resources. (Bacc Core Course)

WGSS 450. ECOFEMINISM (3). Focuses on the ecological and feminist principles that mediate humanity's relationship with nature. (See Schedule Comment regarding Bacc Core status.) PREREQS: Upper-division standing.
WGSS 460. ${ }^{\wedge}$ WOMEN AND SEXUALITY (3). Explores the historical, theoretical, and political dimensions of female sexuality. The course also examines the basic assumptions about the meaning of female sexuality, how it has been shaped and controlled, and why women's sexuality has been/is a source of both women's liberation and subjugation. (SS) (Writing Intensive Course) PREREQS: WS 223 [D-] or WS 223H [D-] or WS 224 [D-] or WGSS 223 [D-] or WGSS 223H [D-] or WGSS 224 [D-] and /or instructor approval required.
WGSS 462. *QUEER THEORIES (4). Engages key themes and critical frameworks in queer theories. Topics include histories of sexuality forms of oppression including heterosexism, homophobia, and transphobia; resistance to oppression; violence against LGBTQ people; queer activism; diverse experiences of sexuality; and representations in literature, art, and popular media. (Bacc Core Course) CROSSLISTED as QS 462/QS 562. PREREQS: Junior standing.

## WGSS 463. *GLOBAL SEX WORK AND

TRAFFICKING (3). Examination of sex work and trafficking, cross culturally drawing upon case studies from Africa, Asia, the Americas, and Europe. It explores legal and regulatory debates diversity of sex work-related experiences, and sex work-related social activism to uncover the gendered intersections of power and privilege from a global perspective. (Bacc Core Course) PREREQS: WGSS 223 [D-] or WS 223 [D-] or WGSS 224 [D-] or WS 224 [D-]
WGSS 465. WOMEN, WEIGHT, AND BODY IMAGE (4). Focuses on women's increasing struggles with weight, eating disorders, and broader body image issues in contemporary society. Explores how social institutions such as media, medicine, and government contribute to weight bias and unhealthy standards for appearance. Examines weightism as a system of oppression that intersects with other systems oppression including sexism, racism, classism, heterosexism, ableism, and ageism. CROSSLISTED as PSY 465/PSY 565.

WGSS 466. *FAT STUDIES (4). Examines body weight, shape, and size as an area of human difference subject to privilege and discrimination that intersects with other systems of oppression based on gender, race, class, age, sexual orientation, and ability. Employs a multi-disciplinary approach spanning the behavioral sciences and humanities. Frames weight-based oppression as a social justice issue, exploring forms of activism used to counter weightism perpetuated throughout various societal institutions. CROSSLISTED as PSY 466/PSY 566 (Bacc Core Course) PREREQS: WS 223 [D-] or WS 223H [D-] or WS 224 [D-] or WGSS 240 [D-] or WGSS 262 [D-] or WGSS 262H [D-] or WGSS 270 [D-] or WGSS 280 [D-] or WGSS 280H [D-] or WGSS 321 [D-] or WGSS 325 [D-] or WGSS 325H [D-] or WGSS 340 [D-] or WGSS 340 H [D-] or WGSS 350 [D-] or WGSS 360 [D-] or WGSS 360H [D-] or WGSS 364 [D-] or WGSS 364H [D-] or WGSS 373 [D-] or WGSS 375 [D-] or WGSS 380 [D-] or WGSS 380H [D-]
WGSS 472. ^INDIGENOUS TWO-SPIRIT AND QUEER STUDIES (3). "Two-spirit" refers to North American indigenous genders outside of European male/female binaries. Two-spirit communities argue for decolonization as a central political struggle, calling all people to unlearn settler colonial gender/sexuality on Native land.
This course addresses indigenous two-spirit/ GLBTQ issues through theory, literature, activism, and art. CROSSLISTED as ES 472, QS 472. PREREQS: QS 262 or ES 242 or WGSS 414 or instructor permission

WGSS 473. TRANSGENDER LIVES (3). Many people in our Western cultures perceive gender as bimodal and fixed from birth. Individuals whose identity of self does not match the individual's biological sex face significant social pressures to conform to gender norms. Students will be introduced to the biological, social and cultural contexts for transgendered individuals. CROSSLISTED as QS 473/QS 573. PREREQS: 200-level WGSS or QS course or equivalent, or consent of instructor.
WGSS 476. *TRANSNATIONAL SEXUALITIES (4). Explores contemporary experiences of sexualities within transnational contexts. Analyzes themes including queer and LGBTQI organizing, same-sex desires, queer transnational immigration and labor flows, sex industries and discourses of trafficking, sex tourism, and reproductive justice, using feminist, queer, and postcolonial theoretical frameworks. (Bacc Core Course) CROSSLISTED as QS 476/QS 576. PREREQS: QS 262 [D-]
WGSS 477. QUEER/TRANS PEOPLE OF COLOR ARTS AND ACTIVISM (4). LGBTQ people of color often engage struggles for social justice through artistic movements. This course will focus on arts by LGBTQ people of color and the way these artistic movements contribute to activism that interrupts interlocking systems of oppression. CROSSLISTED as ES 477/ES 577, QS 477/QSS 577. PREREQS: QS 262 and QS 464

WGSS 480. *INTERNATIONAL WOMEN (3). Examines the lives and experiences of women in different parts of the world, looking at work, education, the family, the arts and social movements. Explores the comparative realities of various women's struggles for social justice and studies key definitions and theoretical assumptions relevant to the subject of global feminism. (NC) (Bacc Core Course) PREREQS: WS 223 [D-] or WS 223H [D-] or WS 224 [D-] or WGSS 223 [D-] or WGSS 223H [D-] or WGSS 224 [D-] and /or instructor approval.

## WGSS 480H. *INTERNATIONAL WOMEN

(3). Examines the lives and experiences of women in different parts of the world, looking at work, education, the family, the arts and social movements. Explores the comparative realities of various women's struggles for social justice and studies key definitions and theoretical assumptions relevant to the subject of global feminism. (NC) (Bacc Core Course) PREREQS: WS 223 [D-] or WS 223H [D-] or WS 224 [D-] or WGSS 223 [D-] or WGSS 223H [D-] or WGSS 224 [D-] and /or instructor approval. Honors College approval required.
WGSS 482. GLOBAL PERSPECTIVES ON WOMEN'S HEALTH (4). Women's health issues are examined from a global perspective in the context of a woman's life and through a feminist political lens. Central to our discussions will be an analysis of the interplay among race, class, and gender in shaping particular health care outcomes. The course stresses the potential for women's agency and autonomy with respect to improving their health and environments.

WGSS 483. RACE, GENDER, AND HEALTH
JUSTICE (4). Based on a social justice framework, this course explores the intersections of race, gender, ethnicity, disability and sexuality to provide a deeper understanding of how these factors shape health inequities in diverse communities nationally and globally.

WGSS 485. CAPSTONE IN SOCIAL JUSTICE (2). Working with an advisor from the Social Justice minor, students conduct research to synthesize and extend analysis of a particular social justice issue, building on three previous papers or projects. Results are presented in a 1015 page paper and a public poster, presentation or website. CROSSLISTED as ANTH 485, ES 485, WLC 485. This course is repeatable for a maximum of 4 credits. PREREQS: (ANTH 373 [D-] or ES 373 [D-] or WGSS 373 [D-] or WLC 373 [D-]
) and (ANTH 410 [D-] or ES 410 [D-] or WGSS 410 [D-] or WLC 410 [D-] )
WGSS 486. GLOBAL EXPERIENCE I (1).
Prepares students to participate in a shortterm study abroad experience that emphasizes volunteer experiences in women's organizations and analysis from transnational feminist perspectives.

WGSS 487. GLOBAL EXPERIENCE II (1).
Engages students in a short-term study abroad experience that emphasizes volunteer experiences in women's organizations and analysis from transnational feminist perspectives. PREREQS: WS 486 [D-] or WS 586 [D-] or WGSS 486 [D-] or WGSS 586 [D-]

WGSS 488. GLOBAL EXPERIENCE III (1).
Students reflect on their short-term study abroad experience by engaging in in-depth transnational feminist analysis of particular aspects of the study abroad experience. PREREQS: WS 486 [D-] or WS 487 [D-] or WGSS 486 [D-] or WGSS 487 [D-]
WGSS 490. SELF-ESTEEM AND PERSONAL
POWER (3). Explores ways to improve selfesteem and develop personal power. Focuses on issues of self and identity, contextualizing these in the ways gender is constructed in society. (SS) PREREQS: Upper-division standing.
WGSS 495. *GLOBAL FEMINIST THEOLOGIES
(4). Explores the connections between women's religious experiences around the world and the global problems addressed by feminist theology and spirituality. (Bacc Core Course) PREREQS: WS 223 or WS 223H or WS 224 or WGSS 223 or WGSS 223H or WGSS 224 and junior standing.

## WGSS 495H. *GLOBAL FEMINIST

THEOLOGIES (3). Explores the connections between women's religious experiences around the world and the global problems addressed by feminist theology and spirituality. (Bacc Core Course) PREREQS: WS 223 or WS 223H or WS 224 or WGSS 223 or WGSS 223H or WGSS 224 and junior standing. Honors College approval required.

WGSS 496. *FEMINIST THEOLOGIES IN THE
UNITED STATES (4). Explores U.S.-based feminist critiques of traditional theologies and examines feminist constructions of theologies rooted in diverse human experiences. (Bacc Core Course) PREREQS: WS 223 or WS 223H or WS 224 or WGSS 223 or WGSS 223H or WGSS 224 and junior standing.
WGSS 496H. *FEMINIST THEOLOGIES IN THE UNITED STATES (4). Explores U.S.-based feminist critiques of traditional theologies and examines feminist constructions of theologies rooted in diverse human experiences. (Bacc Core Course) PREREQS: (WS 223 or WS 223H or WS 224 or WGSS 223 or WGSS 223H or WGSS 224) and junior standing and Honors College approval required.

WGSS 498. SENIOR SEMINAR (4). For graduating seniors in women, gender, and sexuality studies. Building on knowledge and experiences acquired in required and elective women, gender, and sexuality studies courses, it focuses on central questions for feminist research. In particular, the course helps students identify their approaches to women's studies scholarship and develop deeper understandings of the process of generating feminist knowledge, especially in relation to gender, race, class, sexuality, and national belonging. PREREQS: (WS 414 [D-] and WS 416 [D-] ) or (WGSS 414 [D-] and WGSS 416 [D-] )
WGSS 499. TOPICS (1-6). Topics on contemporary research in women, gender, and sexuality studies. May be repeated for credit when topic varies. This course is repeatable for a maximum of 12 credits. PREREQS: Upper-division standing.
WGSS 501. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum
of 16 credits.
WGSS 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required

WGSS 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

WGSS 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
WGSS 510. INTERNSHIP (1-16). The internship experience provides the opportunity to gain experience within on off-campus private, public, or community agency or organization which has as one of its goals the improvement of the status of women in society. Students work with an on-site mentor who guides their field experience in collaboration with the internship coordinator in the Women, Gender, and Sexuality Studies program. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

## WGSS 511. ORIENTATION AND

PROFESSIONALIZATION I (1). The WGSS
511, 512,513 sequence prepares Women,
Gender, and Sexuality Studies graduate students to succeed in their courses of study and in their chosen profession. WGSS 511 provides knowledge about Women, Gender, and Sexuality Studies as a discipline and as a course of study that helps students manage the transition to graduate school. Graded P/N.

## WGSS 512. ORIENTATION AND

PROFESSIONALIZATION II (1). The WGSS 511, 512, 513 sequence prepares Women, Gender, and Sexuality Studies graduate students to succeed in their courses of study and in their chosen profession. WGSS 512 guides students in the development of an intellectual life with a focus on thriving and surviving as a scholar in Women, Gender, and Sexuality Studies. Graded P/N.

## WGSS 513. ORIENTATION AND

PROFESSIONALIZATION III (1). The WGSS 511, 512,513 sequence prepares Women, Gender, and Sexuality Studies graduate students to succeed in their courses of study and in their chosen profession. WGSS 513 focuses on helping students shape a future that utilizes the graduate degree in Women, Gender, and Sexuality Studies. It helps students manage the transition to life after the Women, Gender, and Sexuality Studies Master's program at OSU. Graded P/N.
WGSS 514. SYSTEMS OF OPPRESSION IN WOMEN'S LIVES (4). Explores the ways different systems of oppression and discrimination impact women's lives. Examines sexism, classism, racism, and anti-Jewish oppression, as well as discrimination against queer women, older women, and those who differ in ability and appearance. PREREQS: WS 223 or WS 224 or WGSS 223 or WGSS 224 or instructor approval required.

## WGSS 515. ADVANCED RESEARCH

LITERATURE REVIEW (3). Provides graduate students with knowledge and experience in the advanced literature review process including construction of the literature review as product. One of the primary skills graduate students must master is advanced review of a body of literature for the research project. Mastery of the literature review process influences quality and sophistication of claims developed to justify research, with the written review clearly delineating the unique contribution of the student's research and the knowledge gap that it fills. The literature review as a product is a strong written argument that builds a case from credible evidence based on previous research CROSSLISTED as ANTH 515, CSSA 515, ES 515. PREREQS: Graduate standing

WGSS 516. THEORIES OF FEMINISM (4).
Explores feminist conceptions about the nature of the world, women's reality and visions for change. Analyzes major issues raised by the women's
movement and the development of feminist ideas, as well as provides a critical examination of feminist thought and different theories which comprise it. PREREQS: WS 223 or WS 223H or WS 224 or WGSS 223 or WGSS 223H or WGSS 224 or instructor approval required.

## WGSS 517. FEMINIST PHILOSOPHIES (3).

Diverse forms of feminist philosophy, including a variety of critiques, especially those based on race and class, with in-depth consideration of selected social issues, such as rape and pornography. CROSSLISTED as PHL 417/PHL 517. PREREQS: 6 credits of philosophy or upper-division standing.
WGSS 518. FEMINIST RESEARCH (4). Explores
the socio-political and historical context out of which traditional research methodologies emerge and the relationship of gender to scientific pursuits. Teaches what it means to do emancipatory antisexist and participatory research.
WGSS 521. FEMINIST LEADERSHIP (4).
Examines theories of feminist leadership and applications in non-profit, governmental, and higher education institutions.

## WGSS 522. GRANT AND FUND DEVELOPMENT

 FOR FEMINIST ORGANIZATIONS (4). Provides students with the skills needed to be successful in grant-writing and fundraising for feminist organizations. Students will address the politics of grant writing and fund raising in relation to the feminist movement's aims and goals. They will also work directly with agencies to understand the trade-offs and value/need of securing funding for social change organizations.WGSS 523. COMMUNITY ORGANIZING AND COLLECTIVE ACTION (2). Addresses relationships between theory and action in feminist context. Explores both social change activism in terms of individual and collective action strategies and social movement theory in historical and contemporary perspectives.

## WGSS 524.TRANS/GENDER POLITICS

(4). Addresses transgender politics--including transsexual, genderqueer, and gender nonconforming issues--through feminist and intersectional approaches by analyzing transgender theories, arts, and activism. CROSSLISTED as QS 524. PREREQS: Graduate student standing.
WGSS 525. GENDER AND TECHNOLOGY (3).
Explores women's contributions and focuses in technology fields. Analyzes gendered nature of technology. Theory and practice of technologies for change and activism.
WGSS 530. WOMEN OF COLOR FEMINISMS
(4). Explores the contemporary experiences of women of color, as well as the theoretical and practical frameworks of women of color feminisms. Analyses key themes in women of color feminisms, including politics of representation, multiple forms of state and interpersonal violence, intersecting forms of oppression, economic justice, reproductive justice, and strategies of resistance. PREREQS: WGSS 223 or WGSS 223H or WS 223 or WS 223H
WGSS 531. QUEER OF COLOR CRITIQUES (4).
"Queer of color critiques" refers to political theories and activism that emerge from LGBTQ people of color to examine the intersections between race, sexuality and gender. This course addresses these intersections through theory, history, and activism. CROSSLISTED as ES 531 and QS 531. PREREQS: Junior standing.
WGSS 532. GENDER, SEXUALITY, AND THE PHOTOGRAPHIC IMAGE (3). A creative and discussion-based course focusing on ways in which photography can and has addressed issues of gender and sexuality. An introduction to key concepts and intersections in Women's, Gender and Sexuality Studies; Queer Studies and photography theory. Students will create written and photographic responses to artworks, texts, personal experience and pop-culture. CROSSLISTED as ART 532, QS 532. PREREQS:

Junior or senior standing.
WGSS 535. FEMINIST TEACHING AND
LEARNING (4). Focuses on the experiences and practices of the feminist classroom. Key components of the class include issues associated with the identity and development of the teacher, as well as the development of skills to help facilitate understanding, empowerment, and the personal and social agency of students.

WGSS 536. FEMINIST MEDIA STUDIES (4). Examination of print, radio, television, and new media from feminist perspectives.
WGSS 540. WOMEN AND NATURAL
RESOURCES (3). Explores the relationship between women and natural resources. In particular, the course examines the roles of policy, technology, culture, and management in women's use and control of natural resources.

## WGSS 542. THE INCLUSIVE CLASSROOM:

## DIFFERENCE, POWER AND DISCRIMINATION

(3). An examination of multidisciplinary scholarship on difference, power, and discrimination; critical pedagogies; and curriculum transformation. Discussions of theory and research are coupled with practical hands-on opportunities for students to develop and hone their teaching and course development skills. CROSSLISTED as GRAD 542. PREREQS: Graduate level standing.
WGSS 550. ECOFEMINISM (3). Focuses on the ecological and feminist principles that mediate humanity's relationship with nature. PREREQS: Upper-division standing.

## WGSS 555. FEMINIST TEXTUAL AND

DISCOURSE ANALYSIS (4). Graduate students are introduced to current methods and modes of feminist literary, visual culture, performance, new media, and film studies with a focus on application. In doing so, the course focuses on feminist approaches to key topics within textual studies (such as form, authors, and readers) as well as distinct methodological approaches to various genres and mediums (including poems, performances, photographs, and films). PREREQS: Graduate standing
WGSS 560. WOMEN AND SEXUALITY (3). Explores the historical, theoretical, and political dimensions of female sexuality. The course also examines the basic assumptions about the meaning of female sexuality, how it has been shaped and controlled, and why women's sexuality has been/is a source of both women's liberation and subjugation. PREREQS: WS 223 or WS 223H or WS 224 or WGSS 223 or WGSS 223H or WGSS 224 or instructor approval required.

WGSS 562. QUEER THEORIES (4). Engages key themes and critical frameworks in queer theories. Topics include histories of sexuality; forms of oppression including heterosexism, homophobia, and transphobia; resistance to oppression; violence against LGBTQ people; queer activism; diverse experiences of sexuality; and representations in literature, art, and popular media. CROSSLISTED as QS 462/QS 562. PREREQS: Junior standing.

WGSS 566. FAT STUDIES (4). Examines body weight, shape, and size as an area of human difference subject to privilege and discrimination that intersects with other systems of oppression based on gender, race, class, age, sexual orientation, and ability. Employs a multi-disciplinary approach spanning the behavioral sciences and humanities. Frames weight-based oppression as a social justice issue, exploring forms of activism used to counter weightism perpetuated throughout various societal institutions. CROSSLISTED as PSY 466/ PSY 566. PREREQS: WS 223 or WS 223H or WS 224 or WGSS 240 or WGSS 262 or WGSS 262H or WGSS 270 or WGSS 280 or WGSS 280H or WGSS 321 or WGSS 325 or WGSS 325H or WGSS 340 or WGSS 340H or WGSS 350 or WGSS 360 or WGSS 360H or WGSS 364 or WGSS 364H or WGSS 373 or WGSS 375 or

WGSS 380 or WGSS 380H
WGSS 569. TOPICS IN JOTERIA STUDIES
(3). A space for engaging with arts, activism and scholarship emerging from queer Latin@/ Chican@ experiences and consciousness is provided. Offered winter term in odd years. CROSSLISTED as ES 569, QS 569, SPAN 569. This course is repeatable for a maximum of 6 credits. PREREQS: Instructor approval.
WGSS 572. INDIGENOUS TWO-SPIRIT AND QUEER STUDIES (3). "Two-spirit" refers to North American indigenous genders outside of European male/female binaries. Two-spirit communities argue for decolonization as a central political struggle, calling all people to unlearn settler colonial gender/sexuality on Native land. This course addresses indigenous two-spirit/ GLBTQ issues through theory, literature, activism, and art. CROSSLISTED as ES 572, QS 572. PREREQS: QS 262 or ES 242 or WGSS 414 or WGSS 514 or instructor permission

WGSS 573. TRANSGENDER LIVES (3). Many people in our Western cultures perceive gender as bimodal and fixed from birth. Individuals whose identity of self does not match the individual's biological sex face significant social pressures to conform to gender norms. Students will be introduced to the biological, social and cultural contexts for transgendered individuals. CROSSLISTED as QS 473/QS 573. PREREQS: 200-level WGSS or QS course or equivalent, or consent of instructor.

WGSS 575. CRITICAL RACE FEMINISM AND OUTSIDER JURISPRUDENCE (4). Critical exploration of critical legal justice movements and their relationship to social identities. Seminar emphasizes specific legal cases, federal and state laws, and constitutional issues that impact groups deemed outsiders in legal discourse as well as their social implications. The critical justice movement and anti-subordination struggles will be explored via case analyses that shape race, class, gender, sexuality, and disability relations. Theoretical contributions of law and society, critical race theory, LatCrit, and critical race feminism, critical white studies, critical mixed race studies, OutCrit, ClassCrit, and critical disability studies applied to historical precedent and current attempts at marginalizing/ empowering communities. CROSSLISTED as ES 575.
WGSS 576. TRANSNATIONAL SEXUALITIES (4). Explores contemporary experiences of sexualities within transnational contexts. Analyzes themes including queer and LGBTQI organizing, same-sex desires, queer transnational immigration and labor flows, sex industries and discourses of trafficking, sex tourism, and reproductive justice, using feminist, queer, and postcolonial theoretical frameworks. CROSSLISTED as QS 476/QS 576. PREREQS: QS 262

WGSS 577. QUEER/TRANS PEOPLE OF COLOR ARTS AND ACTIVISM (4). LGBTQ people of color often engage struggles for social justice through artistic movements. This course will focus on arts by LGBTQ people of color and the way these artistic movements contribute to activism that interrupts interlocking systems of oppression. CROSSLISTED as ES 477/ES 577 QS 477/QS 577. PREREQS: QS 262 and QS 464
WGSS 582. GLOBAL PERSPECTIVES ON WOMEN'S HEALTH (4). Women's health issues are examined from a global perspective in the context of a woman's life and through a feminist political lens. Central to our discussions will be an analysis of the interplay among race, class, and gender in shaping particular health care outcomes. The course stresses the potential for women's agency and autonomy with respect to improving their health and environments.

WGSS 583. RACE, GENDER, AND HEALTH JUSTICE (4). Based on a social justice framework, this course explores the intersections of race, gender, ethnicity, disability and sexuality to provide a deeper understanding of how
these factors shape health inequities in diverse communities nationally and globally.

WGSS 585. TRANSNATIONAL FEMINISMS (4). Introduces students to themes and theoretical principles of transnational feminisms, with special emphasis placed on feminist movements of the global South. We will explore colonialism, globalization, nation-building, representation, global economies, militarism, human rights, and politics of gender, race, class, sexuality, and nation.
WGSS 586. GLOBAL EXPERIENCE I (1). Prepares students to participate in a short term study abroad experience that emphasizes volunteer experiences in women's organizations and analysis from transnational feminist perspectives.
WGSS 587. GLOBAL EXPERIENCE II (1).
Engages students in a short-term study abroad experience that emphasizes volunteer experiences in women's organizations and analysis from transnational feminist perspectives PREREQS: WS 486 or WS 586 or WGSS 486 or WGSS 586
WGSS 588. GLOBAL EXPERIENCE III (1).
Students reflect on their short-term study abroad experience by engaging in in-depth transnational feminist analysis of particular aspects of the study abroad experience. PREREQS: (WS 586 and WS 587) or (WGSS 586 and WGSS 587)

## WGSS 595. GLOBAL FEMINIST THEOLOGIES

(4). Explores the connections between women's religious experiences around the world and the global problems addressed by feminist theology and spirituality PREREQS: WS 223 or WS 223H or WS 224 or WGSS 223 or WGSS 223H or WGSS 224 and junior standing.
WGSS 596. FEMINIST THEOLOGIES IN THE UNITED STATES (4). Explores U.S.-based feminist critiques of traditional theologies and examines feminist constructions of theologies rooted in diverse human experiences. PREREQS: WS 223 or WS 223H or WS 224 or WGSS 223 or WGSS 223H or WGSS 224
WGSS 599. TOPICS (1-6). Topics on contemporary research in women, gender, and sexuality. May be repeated for credit when topic varies. This course is repeatable for a maximum of 12 credits. PREREQS: Upper-division standing.

WGSS 603. THESIS (1-12). Graded P/N. This course is repeatable for a maximum of 999 credits.
WGSS 610. INTERNSHIP (1-6). The internship experience provides opportunities to gain experience in a private, public, or community agency or organization, which has social justice advocacy as one of its goals. Students work with an on-site mentor who guides their field experience in collaboration with the internship coordinator in the WGSS program. One feature of graduate internships is the opportunity to shadow key personnel in order to meet internship goals. Graded P/N. This course is repeatable for a maximum of 6 credits. PREREQS: Post-master's level standing.
WGSS 611. COLLOQUIUM (1). Provides presentations of feminist research by OSU faculty and graduate students and faculty members from other institutions. Graded P/N. This course is repeatable for a maximum of 4 credits

WGSS 616. MULTIRACIAL, TRANSNATIONAL, AND QUEER FEMINISMS I (4). Introduces doctoral students to foundational and emerging themes and texts in women, gender, and sexuality studies, with particular emphases on women of color feminisms, transnational feminisms, and queer feminist critiques. The first seminar in a twopart sequence (WGSS 616 and 617).
WGSS 617. MULTIRACIAL, TRANSNATIONAL, AND QUEER FEMINISMS II (4). Introduces doctoral students to foundational and emerging themes and texts in women, gender, and sexuality studies, with particular emphases on women of
color feminisms, transnational feminisms, and queer feminist critiques. The second seminar in a two-part sequence (WGSS 616 and 617). PREREQS: WGSS 616 [B]

WGSS 618. FEMINIST PARTICIPATORY ACTION RESEARCH (4). An examination of theories, principles and strategies of PAR, and appreciation of advantages and limitations of this approach and skills necessary for participating effectively in PAR projects. PREREQS: Any upper-division graduate level course in research methods.
WGSS 619. DECOLONIZING METHODS (4).
Navigates from feminist philosophy of science interventions to postcolonial, Chicana/Latina, and critical race criticisms of methodological stances in "normal" science. Standpoint methodologies, racialized and gendered origins of modern statistical methods, longstanding affinity between colonial inequalities and Eurocentric scientific inquiry, and successor sciences/sciences from below constitute the main themes of the course.

WGSS 620. SOCIAL JUSTICE THEORY AND PRACTICE (4). An examination of social justice theories and practices. Specifically engages with issues of power and privilege, systems of oppression, intersectionality, and social activism. Explores the practices of social justice movements. PREREQS: Graduate student standing.

## ■ WORLD LANGUAGES AND CULTURES COURSES

WLC 159. *LANGUAGE, RACE AND RACISM IN THE US: AN INTRODUCTION (4). Students in this course will unpack language, race and racism--as well as the intersections between those ideas-- as cornerstones to understanding identity and society as inherently socially constructed notions. (Bacc Core Course) CROSSLISTED as ANTH 159 and ES 159.

WLC 221. *MASTERPIECES OF GERMAN
CINEMA (3). An introduction to the serious study of German cinema, 1920 to present. Class lectures discussing key works of German cinema will offer a variety of historical, critical and theoretical approaches. Weekly screenings of important films accompany the lectures. Taught in English. Film fee will be required. (Bacc Core Course)
WLC 221H. *MASTERPIECES OF GERMAN
CINEMA (3). An introduction to the serious
study of German cinema, 1920 to present. Class lectures discussing key works of German cinema will offer a variety of historical, critical and theoretical approaches. Weekly screenings of important films accompany the lectures. Taught in English. Film fee will be required. (Bacc Core Course) PREREQS: Honors College approval required.

WLC 222. *WOMEN IN ITALIAN CINEMA (3). An exploration of filmic portrayals of women as participants in social, economic and political life in Italy. Examines Italian cinema as a reflection of Italian culture. Focuses on women as protagonists, symbolic figures and filmmakers. Analysis will be presented through a variety of historical, critical and theoretical approaches. Taught in English. (Bacc Core Course)

## WLC 230. *FRANCE TODAY: CULTURES

WITHIN AND BEYOND ITS BORDERS (3). An exploratory study of French culture and society since 1945. Topics include: decolonization, immigration, Francophone intellectual currents, France,s European vocation, and social conflict today. Conducted in English. (Bacc Core Course)
WLC 230H. *FRANCE TODAY: CULTURES WITHIN AND BEYOND ITS BORDERS (3). An exploratory study of French culture and society since 1945. Topics include: decolonization, immigration, Francophone intellectual currents, France,s European vocation, and social conflict today. Conducted in English. (Bacc Core Course) PREREQS: Honors College approval required.

WLC 231. *GERMAN DICTATORSHIPS: NAZIS AND COMMUNISTS (3). Introduction to the two best-known dictatorships in German society, National Socialism of the Third Reich from 1933 1945 and Socialism in the German Democratic Republic from 1949-1989 via the study of visual media (feature films, documentaries, newsreels, etc.) and other primary and secondary sources. (Bacc Core Course) PREREQS: Sophomore standing
WLC 231H. *GERMAN DICTATORSHIPS: NAZIS AND COMMUNISTS (3). Introduction to the two best-known dictatorships in German society, National Socialism of the Third Reich from 1933 1945 and Socialism in the German Democratic Republic from 1949-1989 via the study of visual media (feature films, documentaries, newsreels, etc.) and other primary and secondary sources. (Bacc Core Course) PREREQS: Sophomore standing and Honors College approval required.

## WLC 232. *INTRODUCTION TO JEWISH

 CULTURE (3). An overview of Jewish culture from its origins to the present day. Students will compare and contrast the lifestyles, ideologies, religious and cultural practices of Jews living in Israel and the United States; two divergent cultures that developed from similar roots. Taught in English. Taught via Ecampus only. (Bacc Core Course)WLC 233. *RUSSIAN CULTURE I (3). Introduction to basic features of Russian culture originating in the past and continuing into the present. Aspects of history, politics, economics, geography, art, music, literature, and everyday life. Compares Russian culture with Western European and American culture. WLC 233: Old Russia; WLC 234: 19th Century; WLC 235: 20th Century. Taught in English. (H) (Bacc Core Course) PREREQS: WLC 233, WLC 234, WLC 235 need not be taken in order.
WLC 234. *RUSSIAN CULTURE II (3). Introduction to basic features of Russian culture originating in the past and continuing into the present. Aspects of history, politics, economics, geography, art, music, literature, and everyday life. Compares Russian culture with Western European and American culture. WLC 233: Old Russia; WLC 234: 19th Century; WLC 235: 20th Century. Taught in English. (H) (Bacc Core Course) PREREQS: WLC 233, WLC 234, WLC 235 need not be taken in order.
WLC 235. *RUSSIAN CULTURE III (3).
Introduction to basic features of Russian culture originating in the past and continuing into the present. Aspects of history, politics, economics, geography, art, music, literature, and everyday life. Compares Russian culture with Western European and American culture. WLC 233: Old Russia; WLC 234: 19th Century; WLC 235: 20th Century. Taught in English. (H) (Bacc Core Course) PREREQS WLC 233, WLC 234, WLC 235 need not be taken in order
WLC 241. *GRIMMS' FAIRY TALES (4). We will read a selection of the most popular Grimms' fairy tales and consider why they have remained so popular. What is it about fairy tales that has made them such a lasting source of creative inspiration into our time? Students will learn to understand and critique fairy tales and their role in Western cultures through analysis of the tales and creative adaptation of a tale for a modern audience. (Bacc Core Course)

WLC 261. *MASTERPIECES GERMAN CINEMA (3). An introduction to the serious study of German cinema, 1920 to present. Class lectures discussing key works of German cinema will offer a variety of historical, critical and theoretical approaches. Weekly screenings of important films accompany the lectures. Taught in English. Film fee will be required. (Bacc Core Course)

WLC 261H. *MASTERPIECES GERMAN
CINEMA (3). An introduction to the serious
study of German cinema, 1920 to present.
Class lectures discussing key works of German
cinema will offer a variety of historical, critical and theoretical approaches. Weekly screenings of important films accompany the lectures. Taught in English. Film fee will be required. (Bacc Core Course) PREREQS: Honors College approval required.
WLC 301. *INTRODUCTION TO WORLD LANGUAGE AND CULTURE STUDIES (4). Addresses the structure, histories, and cultures associated with world languages and presents skills for learning languages more effectively Includes related topics such as globalization, colonialism, and language justice; language policy, linguistic diversity, and language death; immigration and migration; race and racism. This is a required course in the WLC major in the Literacies thematic area. (Bacc Core Course)
WLC 320. *FRANCOPHONE CULTURES IN FILM (3-9). An exploration of the different cultures of France and the Francophone world through film. Students will delve into the heart of these societies and discover their socio-historical, political, economic and cultural context. Students, analytical and critical skills will be thoroughly solicited through various research and writing activities. Taught in English. (Bacc Core Course) This course is repeatable for a maximum of 9 credits.
WLC 320H. *FRANCOPHONE CULTURES IN FILM (3-9). An exploration of the different cultures of France and the Francophone world through film. Students will delve into the heart of these societies and discover their socio-historical, political, economic and cultural context. Students, analytical and critical skills will be thoroughly solicited through various research and writing activities. Taught in English. (Bacc Core Course) This course is repeatable for a maximum of 9 credits. PREREQS: Honors College approval required.
WLC 321. *MODERN SPAIN THROUGH SPANISH CINEMA (3). Examines the history of modern Spain and its cinematography via the study of key Spanish films and cineastes in the twentieth and twenty-first centuries. (Bacc Core Course)
WLC 331. *CHINESE CULTURE I (3). Introduction to basic features of Chinese culture from ancient times to the 9th century. Topics include philosophy and religion, the Chinese language, literature and the arts, science and technology, government, family and gender, social and economic conditions, contacts with the outside world. Taught in English. Open to all students. (NC) (Bacc Core Course) PREREQS: WLC 331, WLC 332, WLC 333 need not be taken in order.

WLC 332. *CHINESE CULTURE II (3). Introduction to basic features of Chinese culture from the 10th through the 19th centuries. Topics include philosophy and religion, literature and the arts, science and technology, government, family and gender, social and economic conditions, daily life, and contacts with the outside world. Taught in English. Open to all students. (NC) (Bacc Core Course) PREREQS: WLC 331, WLC 332, WLC 333 need not be taken in order.
WLC 333. *CHINESE CULTURE III (3). Survey of important developments of Chinese society and culture from the early 20th century to the present. Topics include wars and revolutions, economic, political, and social conditions, the new culture movement, changing family structure and women's status, relationships within greater China (Mainland China, Taiwan, and Hong Kong). Taught in English. Open to all students. (NC) (Bacc Core Course) PREREQS: WLC 331, WLC 332, WLC 333 need not be taken in order.

## NLC 334. FRENCH FASHION AND GLAMOUR

 (3). This course, taught in English, allows students who have not studied French to enter the glamorous world of French fashion, exploring its origins and history, what/s new and exciting in French fashion today and French attitudes about fashion and beauty that have given them
## the inside track on chic for centuries. PREREQS

 Sophomore standing.WLC 335. *JAPANESE CULTURE I (3). An introductory survey of Japanese history, arts, literature, society, and traditions from the ancient to the mid-19th century. Taught in English. May not be offered every year. (NC) (Bacc Core Course) PREREQS: Sophomore standing. WLC 335, WLC 336, WLC 337 need not be taken in order.

WLC 336. *JAPANESE CULTURE II (3). An introductory survey of Japanese history, arts, literature society, and traditions from the ancient to the mid-19th century. May not be offered every year. (NC) (Bacc Core Course) PREREQS: Sophomore standing. WLC 335, WLC 336, WLC 337 need not be taken in order

WLC 337. *JAPANESE CULTURE III (3). A survey of Japan from the mid-19th century to the present in areas including arts, literature, business, education, society, politics, and foreign relations. Taught in English. May not be offered every year. (NC) (Bacc Core Course) PREREQS: Sophomore standing. WLC 335, WLC 336, WLC 337 need not be taken in order.

## WLC 345. MULTIMODAL LITERACIES IN

 WORLD LANGUAGES AND CULTURES (2). Introduction to the analysis and production of multimodal literacies. Study of semiotic resources such as language and images across modalities such as film, manga, and social media. Required of all majors in World Languages and Cultures. Taught in English. PREREQS: CHN 213 [D-] or FR 213 [D-] or GER 213 [D-] or JPN 213 [D-] or SPAN 213 [D-] or SPAN 216 [D-] or SPAN 217 [D-] and COREQS: CHN 345 or FR 345 or GER 345 or JPN 345 or SPAN 345.WLC 360. INTERNATIONAL FILM FESTIVAL (3). Critical study of a selection of films screened at the Oregon State University's International Film Festival. Topics include acting, sound, special effects, cinematography. CROSSLISTED as FILM 360. This course is repeatable for a maximum of 9 credits. PREREQS: Sophomore standing or higher.

## WLC 361. (RE)FRAMING RACE THROUGH

FILM PRODUCTION (4). A critical engagement of ways race and ethnicity are treated in nonfiction short film as students produce their own short film as a means of challenging dominant racial representations and narratives. Requires a basic understanding of ways that notions about race and ethnicity combine with ideologies about gender, sexuality, ability, class, etc. to perpetuate unjust systems and institutions. Prior filmmaking experience is welcome but not required. CROSSLISTED as ES 361, QS 361, WGSS 361.
WLC 365. MIGRANT NARRATIVES (2). An examination of migration and forced displacement through the study of personal narrative. Includes discussion of the causes of displacement including persecution, ecological degradation, economic pressure and conflict. This is a required course in the WLC major in the Identities and Intersections thematic area. PREREQS: FR 365* [D-] or GER 365* [D-] or SPAN 365* [D-] and Third-year proficiency in French, German, or Spanish.
WLC 366. LANGUAGE AND IDENTITY (2). An examination of the connections between ideology and linguistic behavior as well as the undamentals of structural linguistics needed to discuss variation and contact phenomena. This is a required course in the WLC major in the Identities and Intersections thematic area. PREREQS: FR 366* [D-] or GER 366* [D-] or SPAN 366* [D-] and third-year proficiency in French, German, or Spanish

WLC 373. APPROACHES TO SOCIAL JUSTICE (3). Students study various ways of thinking about social justice and evaluate these in case studies and current events. As a basis for the Social Justice minor, students write a research paper on the theoretical and practical aspects of a social justice issue. CROSSLISTED as ANTH 373, ES

373, WGSS 373.
WLC 375. LITERATURES OF POWER AND RESISTANCE (2). An examination of the relationships between individuals or groups and institutional power (government, ecclesiastical, etc.) across different historical periods and geographies Language-specific discussion sections cover specific works dealing with such topics as colonization, forced disappearance, and social resistance. This is a required course in the WLC major in the Social Architecture and Power thematic area. PREREQS: FR 375* or GER 375* or SPAN 375* and third-year proficiency in French, German, or Spanish.
WLC 376. EMPIRES AND GLOBALIZATION (2). An examination of the history of Western imperialism and the rise of contemporary neocolonialism. Students explore the impact of colonization and the effects of neoliberalism and globalization through the use of historical source materials and current news articles focused on specific regions of the developing world. This is a required course in the WLC major in the Social Architecture and Power thematic area. PREREQS: FR 376 [C-] or GER 376 [C-] or SPAN 376 [C-] and third-year proficiency in French, German, or Spanish.
WLC 399. SPECIAL TOPICS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

## WLC 410. WORLD LANGUAGE INTERNSHIP

(1-12). Opportunities for juniors and seniors to apply skills in world language and knowledge of world culture at selected government, industry, or business placement sites. Allows students to prepare for transition from academic to work world. Interns are supervised and evaluated by employer and faculty coordinator. See also Oregon International Internships in the catalog section on International Programs. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Completion of 90 credits with 2.75 GPA or higher; completion of the third-year language course in one foreign language with 3.00 GPA or better, with at least three terms of study in the OSU School of Language, Culture, and Society.
WLC 429. *FRENCH SOCIETY THROUGH ITS CINEMA (3). An examination of French society through its own cinema. Via the screening and study of films from the various periods of French history, students will delve into the heart of French society and will discover the socio-historical, political, economic and cultural context. (Bacc Core Course) PREREQS: Sophomore standing.

## WLC 429H. *FRENCH SOCIETY THROUGH ITS

CINEMA (3). An examination of French society through its own cinema. Via the screening and study of films from the various periods of French history, students will delve into the heart of French society and will discover the socio-historical, political, economic and cultural context. (Bacc Core Course) PREREQS: Sophomore standing and Honors College approval required.

WLC 459. LANGUAGE, RACE AND RACISM IN THE U.S.: ADVANCED STUDY (4). Students in this course will unpack language, race and racism--as well as the intersections between those ideas-as cornerstones to understanding identity and society as inherently socially constructed ideas. The goal of this course is to better understand how racism is produced and reproduced in talk and text (this will include symbols and signs), especially in the context of the denial of racism. Our course will specifically focus on the language of racism, and, more specifically, types of discourse that construct Whiteness as dominant over Color. CROSSLISTED as ANTH 459/ANTH 559, ES 459/ES 559.
WLC 473. COMMUNITY-BASED LEARNING (3). A service-learning course that allows students to apply the theory and skills acquired in advanced linguistics, culture, and literature courses to specific needs of populations that speak a language taught in the department. It combines 80 hours of community-supervised fieldwork with an online academic component consisting of assigned readings, independent research, and ongoing reflective writing. Each student is expected to make significant contributions toward the completion of a deliverable product that benefits a native speaker community. Preadvanced oral proficiency required. This course is repeatable for a maximum of 6 credits.

## WLC 483. CUBAN CULTURE, POLITICS

AND ARTS (4). One of two courses that comprise the Cuba Study Abroad Program. It introduces students to Cuban culture, politics (and particularly Cuba-U.S. relations during and after the Revolution) and arts via a combination of lectures/lessons led by invited specialists in their fields, readings, films and student activities. Students will learn about a variety of topics including migration, agriculture, health care, education, economics, religion/spirituality, gender, race, and the arts (literature, music and other performance). Given the interdisciplinary approach to this course, students will also be able to focus on other topics of interest to them/their program of study. CROSSLISTED as ENG 483, PS 483. PREREQS: Sophomore standing and acceptance into the OSU Cuba Study Abroad Program.
WLC 485. CAPSTONE IN SOCIAL JUSTICE (2). Working with an advisor from the Social Justice minor, students conduct research to synthesize and extend analysis of a particular social justice issue, building on three previous papers or projects. Results are presented in a 10-15 page paper and a public poster, presentation or website. CROSSLISTED as ANTH 485, ES 485, WGSS 485. This course is repeatable for a maximum of 4 credits. PREREQS: (ANTH 373 [D-] or ES 373 [D-] or WGSS 373 [D-] or WLC 373 [D-] ) and (ANTH 410 [D-] or ES 410 [D-] or WGSS 410 [D-] or WLC 410 [D-] )
WLC 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

WLC 499H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
WLC 510. WORLD LANGUAGE INTERNSHIP (1-12). Opportunities for juniors and seniors to apply skills in world language and knowledge of world culture at selected government, industry, or business placement sites. Allows students to prepare for transition from the academic world to the work world. Interns are supervised and evaluated by the employer and a faculty coordinator. See also Oregon International Internships in the catalog section on International Programs. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Completion of 90 credits with 2.75 GPA or higher; completion of the third-year language course in one foreign language with 3.00 GPA or better, with at least three terms of study in the OSU School of Language, Culture, and Society.
WLC 559. LANGUAGE, RACE AND RACISM IN THE U.S.: ADVANCED STUDY (4). Students in this course will unpack language, race and racism--as well as the intersections between those ideas-as cornerstones to understanding identity and society as inherently socially constructed ideas. The goal of this course is to better understand how racism is produced and reproduced in talk and text (this will include symbols and signs), especially in the context of the denial of racism. Our course will specifically focus on the language of racism, and, more specifically, types of discourse that construct Whiteness as dominant over Color. CROSSLISTED as ANTH 459/ANTH 559, ES 459/ES 559.
WLC 583. CUBAN CULTURE, POLITICS
AND ARTS (4). One of two courses that comprise the Cuba Study Abroad Program. It introduces students to Cuban culture, politics (and particularly Cuba-U.S. relations during and after the Revolution) and arts via a combination of lectures/lessons led by invited specialists in their fields, readings, films and student activities. Students will learn about a variety of topics including migration, agriculture, health care, education, economics, religion/spirituality, gender, race, and the arts (literature, music and other performance). Given the interdisciplinary approach to this course, students will also be able to focus on other topics of interest to them/their program of study. CROSSLISTED as ENG 583, PS 583. PREREQS: Sophomore standing and acceptance into the OSU Cuba Study Abroad Program.
WLC 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## SCHOOL OF PSYCHOLOCICAL SCIENCES

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Oregon State University
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541-737-2311
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## FACULTY

Professors Bernieri, Edwards, Lien, McCarley
Associate Professors Kerr, Ryan, Sherman, Watkins
Assistant Professors Becker-Blease, Bogart, Cservenka, Macuga, Sanchez
Assistant to the Director Mann

## Undergraduate Major

Psychology (BA, BS, HBA, HBS)

## Minor

Psychology

## Graduate Major

Psychology (MS, PhD)
Graduate Area of Concentration
Applied Cognition
Engineering Psychology
Health Psychology

## Graduate Minor-MAIS

 Psychology
## Graduate Area of Concentration

General Psychology

The psychology curriculum explores scientific approaches to a wide range of psychological phenomena. Courses meet the needs of students desiring a knowledge of psychology as part of their general education or professional background, planning to secure entry-level jobs in human services occupations, or preparing for graduate study in psychology or related fields. The department offers a major program leading to a BA or BS degree in Psychology, a minor program for undergraduate students with majors in other disciplines, and participates in the Master of Arts in Interdisciplinary Studies (MAIS) degree program offered by the Graduate School.

Graduates with bachelor degrees in psychology often find entry-level career positions in human services, law enforcement, business, education, management, sales, and also may go on to graduate study in such fields as psychology, counseling, social work, public and business administration, and law.

## MASTER OF ARTS IN

INTERDISCIPLINARY STUDIES
Students design their own MAIS program around three fields or areas of study, and may use specific areas of psychology for up to two of their fields. At least three courses must be in each field. Students wishing to include psychology as a specialty area in a MAIS program should submit the following to the Graduate School:

1. Graduate Record Exam (GRE) scores for the verbal, quantitative, and analytic segments of the examination
2. Overall GPA
3. A list of psychology courses taken and the grades achieved in each
4. Transcripts of all previous university work
5. Names of two references who can be contacted by the department
6. A one- or two-page statement of the purpose for including psychology in their graduate program.
To be admitted to a psychology component of the MAIS program students must obtain written consent of a faculty member in this department who agrees to serve as the field or area advisor, as well as meeting general Graduate School entrance requirements.

## PSYCHOLOGY (BA, BS, CRED, HBA, HBS)

Also available at OSU-Cascades and via Ecampus.
Major Requirements (65)
Core (29)
BI 102, BI 103. *General Biology (4,4) or BI 212, BI 213. *Principles of Biology $(4,4)$
PHL 121. *Reasoning and Writing (3)
or WR 327. *Technical Writing (3)
PSY 201, PSY 202. *General Psychology $(3,3)$
PSY 301. Research Methods in Psychology (4)
ST 351. Introduction to Statistical Methods (4)

ST 352. Introduction to Statistical Methods (4)

## Survey (16)

Select four courses from below:
PSY 330. Brain and Behavior (4)
or PSY 340. Cognition (4)
PSY 350. Human Lifespan Development (4)
or PSY 360 . Social Psychology (4)
PSY 370. Personality (4)
or PSY 381. Abnormal Psychology (4)
Plus any one additional course from above.

## Advanced and Variable Courses (16) <br> \section*{Select four courses from below}

(includes variable credit courses):
PSY 426. *Psychology of Gender (4)
PSY 432. Physiological Psychology (4)
PSY 433. Psychopharmacology (4)
PSY 437. Motivation (4)
PSY 442. Perception (4)
PSY 444. Learning and Memory (4)
PSY 448. Consciousness (4)
PSY 454. Cognitive Development (4)

PSY 456. Social Development (4)
PSY 458. Language Acquisition (4)
PSY 464. Social Cognition (4)
PSY 465: Women, Weight, and Body Image (4)

PSY/WGSS 466. *Fat Studies (4)
PSY 468. The Psychology of Close
Relationships (4) Ecampus only.
PSY 482. Psychotherapy (4)
PSY 483. Developmental Psychopathology (4)
PSY 485. Behavior Modification (4)
PSY 492. Conservation Psychology (4)
PSY 493 Positive Psychology (4)
PSY 494. Engineering Psychology (4)
PSY 496. Industrial and Organizational
Psychology (4)
PSY 498. Health Psychology (4)
PSY 499. Special Topics (4)
Variable Credit Courses (*maximum

## 4 credits):

PSY 401. Research (1-16)
PSY 402. Independent Study (1-16)
PSY 403. Thesis (1-16)
PSY 405. Reading and Conference (1-16)
PSY 406. Projects (1-16)
PSY 407. Seminar (1-16)
PSY 408. Workshop (1-16)
PSY 410. Field Experience in Human Services (1-16)

## Writing Intensive Course (WIC)

Select one from below (4)
PSY 434. ${ }^{\wedge}$ Brain and Behavior Methods (4)
PSY 440. ${ }^{\wedge}$ Cognition Research (4)
PSY 460. ^Advanced Social Research Methods (4)
PSY 470. ^Psychometrics and Psychological Testing (4)
PSY 480. ${ }^{\wedge}$ Clinical Research Methods (4)

## Footnotes:

1. Students must receive a grade of C- or better in any course applied toward the major. Such courses cannot be taken with $\mathrm{S} / \mathrm{U}$ grading.
2. A maximum of 4 credits of individualized course work (PSY 401-PSY 410) can be applied to the major.

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Courses (WIC)


## Major Code: 965

## PSYCHOLOGY MINOR

## Also available via Ecampus.

Core (6)
PSY 201, PSY 202. *General Psychology $(3,3)$
Survey (8)
Select two of the following courses (8):
PSY 330. Brain and Behavior (4)
PSY 340. Cognition (4)
PSY 350. Human Lifespan Development (4)
PSY 360. Social Psychology (4)
PSY 370. Personality (4)
PSY 381. Abnormal Psychology (4)
Advanced/Variable Courses (16)
a. At least two must be at the 400 level.
b. No more than 4 credits of individualized research and field experience may be applied to the minor.

## Total=30

Note: Students should consult their major advisors to see if specific courses are required for their major. Students
must receive a grade of C - or better in any course applied toward the minor. Such courses cannot be taken with S/U grading.

## Footnote:

* Baccalaureate Core Course (BCC)


## Minor Code: 965

## PSYCHOLOGY (MS, PhD, MAIS)

## Graduate Areas of Concentration

Applied cognition, engineering psychology, health psychology
The MS and PhD program is a doctoral program with a master's degree component that is obtained en route to the PhD. The MS portion of the program assures that students have experience designing and conducting research prior to the dissertation stage. The program has a strong research component, ensuring that graduates have the tools to tackle a variety of applied problems. This entails both classwork in research methods and statistics and a continuing emphasis on student research.
The program's general focus is on the application of psychological research methods, theories, and principles to solving practical problems. The program has three areas of concentration: applied cognition, engineering psychology, and health psychology.

Applied cognition is the application of research on thinking, learning, decision-making, perception, social judgment, and other cognitive processes to applied issues. Examples of relevant application areas include the psychology of teaching and learning, the effects of contemplative practice, and risk perception.
Engineering psychology refers to research at the intersection of psychology and technology. Relevant topics include such things as the improvement of technology, human-machine interfaces, transportation, information systems, and work and living environments (as in the Mission of Division 21 of the American Psychological Association).

Health psychology concerns the relations between psychological factors (e.g., cognition, motivation, individual and interpersonal behavior, emotion) and human wellness broadly defined (as in the mission of the APA Division 38).
Graduates of the Psychology MS, PhD program will be qualified to define, assess, analyze and evaluate problems in both the private and public sector that are behavior based. Graduates will be trained to apply the scientific method and use evidence-based information to design educational programs, work environments, management teams, information delivery systems, technology-based tools. Additionally, all graduates will be equipped to train the next generation of teachers, researchers, and practitioners in
the concentration areas.

## Admission Requirements

Bachelor's or Master's degree from an accredited institution; minimum undergraduate GPA of 3.2/4.0 or graduate GPA of 3.5/4.0; GREs; TOEFL score of at least 600 (paper exam) 250 (computer exam), or 100 (internet exam); three letter of recommendation; personal statement.

## Requirements

The Psychology PhD program requires a minimum of 111 credits, including at least 36 credits of dissertation. The program is organized into core requirements for all students, along with additional work in a concentration area composed of electives, the nature of which is defined primarily by the student's research focus.

The core requirements are in research methods, professional issues, and basic content in psychology. The required core curriculum provides a critical foundation in quantitative and research methods, core theory in psychological science, ethics, and professional issues.
No more than 15 credits of blanketnumbered classes, excluding dissertation, thesis, or internship credit, may be used towards the 111 credit minimum.

## Methods Core (20)

ST 511. Methods of Data Analysis (4)
ST 512. Methods of Data Analysis (4)
ST 513. Methods of Data Analysis (4)
PSY 514. Research Methods I (4)
PSY 571. Graduate Psychometrics (4)

## Professional Core (4)

PSY 521. Issues in Professional Psychology (1,1,1)
PSY 523. Ethics in Psychological Research (1)

## Basic Content Core (12)

Select 3 courses from below for 12 credits
PSY 531. Graduate Behavioral Neuroscience (4)

PSY 541. Graduate Seminar in Cognition (4) [Pending approval]
PSY 551. Graduate Seminar in Lifespan Developmental Science (4)[Pending submission and approval]
PSY 561. Graduate Social Psychology (4)
PSY 581. Graduate Seminar in Clinical Research and Theory (4)
PSY 591. Graduate Seminar in Health Psychology (4)
Concentration Electives (24)
Select 6 courses from below for 24 credits
PSY 510. Field Experience in Human Services (1-6)
PSY 526. Psychology of Gender (4)
PSY 533. Psychopharmacology (4)
PSY 537. Motivation (4)
PSY 542. Perception (4)
PSY 544. Learning and Memory (4)
PSY 548. Consciousness (4)
PSY 554. Cognitive Development (4)
PSY 556. Social Development (4)
PSY 558. Language Acquisition (4)

PSY 564. Social Cognition (4)
PSY 566. Fat Studies (4)
PSY 582. Psychotherapy (4)
PSY 583. Developmental Psychopathology (4)

PSY 585. Behavior Modification (4)
PSY 592. Conservation Psychology (4)
PSY 594. Engineering Psychology (4)
PSY 595. Psychology of Meditation (4)
[Pending submission and approval]
PSY 596. Industrial and Organizational
Psychology (4)
PSY 599. Special Topics (4)
PSY 613. Advanced Quantitative Methods
(4)[Pending submission and approval]

PSY 643. Applied Cognition (4)[Pending approval]
PSY 649. Advanced Engineering Psychology
(4)[Pending submission and approval]

PSY 697. Psychological Science of Teaching
and Learning (4) [Pending approval]
PSY 698. Health Psychology Across the Lifespan (4) [Pending submission and approval]
PSY 699. Special Topics (4)[Pending submission and approval]

## Research/Dissertation (51)

PSY 501. Research (9)
PSY 503. Thesis (6)
PSY 603. Dissertation (36 minimum)
[Pending submission and approval]

## Total=111

Major Code: 9700

## PSYCHOLOGY GRADUATE MINOR

## Graduate Areas of Concentration General psychology

Graduate work in the School of Psychological Sciences may apply to the Master of Arts in Interdisciplinary Studies degree or to minors in other advanced degree programs.

## Minor Code: 9650

## ■ PSYCHOLOGY COURSES

PSY 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PSY 201. *GENERAL PSYCHOLOGY (3).
Scientific study of behavior and experience.
Biological bases of behavior; sensation and perception; conditioning, learning and memory; thinking, problem solving, language, and consciousness; cognitive, personal and social development. (SS) (Bacc Core Course)
PSY 202. *GENERAL PSYCHOLOGY (3).
Motivation and emotion; personality;
measurement of human differences; adjustment, psychopathology and psychotherapy; attitudes and social behavior. (SS) (Bacc Core Course)
PSY 301. RESEARCH METHODS IN
PSYCHOLOGY (4). Study of scientific methodology in psychology, including experimental and observational techniques. Topics include problem identification and hypothesis formation, research design, application of statistics, collection and interpretation of data, computer usage, and research report writing. Lec/ lab. PREREQS: PSY 201 [D-] and PSY 202 [D-] and (ST 351 [D-] or ST 351H [D-] )
PSY 330. BRAIN AND BEHAVIOR (4).
Introduction to the relationships of the structure and functioning of the human brain to behavior. Information from neuroanatomy, neurochemistry, neurosurgery and neurology is combined with
psychological research on both normal and abnormal human behavior. (SS) PREREQS: PSY 201 [D-] and PSY 202 [D-]
PSY 340. COGNITION (4). Theories, research and applications concerning cognition. Topics include perception, attention, memory, learning, thinking and language. (SS) PREREQS: PSY 201 [D-] and PSY 202 [D-]
PSY 350. HUMAN LIFESPAN DEVELOPMENT
(4). An introduction to physical, social, cognitive and linguistic development with an emphasis on theory and methodology. (SS) PREREQS: PSY 201 [D-] and PSY 202 [D-]
PSY 360. SOCIAL PSYCHOLOGY (4). The study of behavior and experience in a social context. Topics include person perception, attribution, attraction and love, attitudes and attitude change, aggression, social influence and group dynamics. Applications of social psychological principles to other fields, e.g., law, health care, etc. (SS) PREREQS: PSY 201 [D-] and PSY 202 [D-]
PSY 360H. SOCIAL PSYCHOLOGY (4). The study of behavior and experience in a social context. Topics include person perception, attribution, attraction and love, attitudes and attitude change, aggression and social influence and group dynamics. Applications of social psychological principles to other fields, e.g., law, health care, etc. (SS) PREREQS: PSY 201 [D-] and PSY 202 [D-] and Honors College approval required.
PSY 370. PERSONALITY (4). An overview of major theories of personality is followed by an introduction to personality testing and research. (SS) PREREQS: PSY 201 [D-] and PSY 202 [D-]
PSY 381. ABNORMAL PSYCHOLOGY (4).
Survey of various forms of psychological disorders; theories regarding etiology and treatment. Special emphasis on research approaches to such disorders. PREREQS: PSY 201 [D-] and PSY 202 [D-]
PSY 399. SPECIAL TOPICS (1-6). This course is repeatable for a maximum of 6 credits.
PSY 399H. SPECIAL TOPICS (1-6). This course is repeatable for a maximum of 6 credits. PREREQS: Honors College approval required.

PSY 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
PSY 402. INDEPENDENT STUDY (1-16). Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PSY 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

PSY 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PSY 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PSY 407. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits PREREQS: Departmental approval required.

PSY 408. WORKSHOP (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

PSY 410. FIELD EXPERIENCE IN HUMAN
SERVICES (1-16). Practicum/internship
placement in community human service agencies.
Includes regular on-site supervision, relevant readings, projects, and faculty site visits. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PSY 426. *PSYCHOLOGY OF GENDER (4).
Survey of theories, life cycles and contemporary
problems of women and men in a social context. Scientific examination of gender related to psychological functioning and behavior. Topics can include psychological research on human similarities and differences in gender attitudes, relationships, sexuality, violence, employment, and mental health. (Bacc Core Course) PREREQS: PSY 202 [D-]
PSY 432. PHYSIOLOGICAL PSYCHOLOGY (4). Basic vertebrate neurophysiology and neuroanatomy in relation to behavior. Neural and hormonal correlates of sensation, learning, memory and motivation. PREREQS: PSY 330 [D-] and /or equivalent biological science background.
PSY 433. PSYCHOPHARMACOLOGY (4). Drug-brain-behavior interactions. Psychoactive drugs and their relationships to normal and abnormal behavior in humans. PREREQS: Upper-division standing. Biological science background helpful.
PSY 434. ^BRAIN AND BEHAVIOR METHODS
(4). Methodology primarily in the area of neuropsychological research. Topics include the finding and interpretation of background literature, critical evaluation of research, hypothesis formulation, experimental design, data interpretation, reporting of results and methods, and weaving a conclusion and review article. (Writing Intensive Course) PREREQS: PSY 301 [D-] and PSY 330 [D-]
PSY 437. MOTIVATION (4). Biological, learning, and cognitive approaches to human and animal motivation. Topics include evolution, homeostasis, drive, arousal, incentive motivation, achievement motivation, and social motivation. PREREQS: (PSY 330 [D-] or PSY 340 [D-] ) and PSY 301 [D-] PSY 440. ^COGNITION RESEARCH (4). Advanced scientific methodology primarily in the areas of attention, learning, memory, and thinking. Students will design their own research projects, collect and analyze data, and write a professional report. (Writing Intensive Course) PREREQS: PSY 301 [D-] and PSY 340 [D-]
PSY 442. PERCEPTION (4). Fundamental concepts of animal and human sensation and perception, with emphasis on audition and vision. Applications of psychophysical methods to research in all sensory modalities. Includes review workshops on basic mathematical, physical and physiological concepts necessary to interpret research in this field. PREREQS: PSY 301 [D-] and (PSY 330 [D-] or PSY 340 [D-])
PSY 444. LEARNING AND MEMORY (4).
Experimental and theoretical work on learning, conditioning, and memory in animals and humans. PREREQS: PSY 301 [D-] and PSY 340 [D-]
PSY 448. CONSCIOUSNESS (4). Psychological, phenomenological, and physiological approaches to the content and processes of subjective awareness. Topics include philosophical issues, cortical and reticular neurophysiology, sleeping and dreaming, selective attention, imagery, and self-awareness. PREREQS: PSY 301 [D-] and PSY 340 [D-]
PSY 454. COGNITIVE DEVELOPMENT (4).
Discusses intellectual development from infancy to adulthood. Topics include the origin of thinking, the development of perception, attention, memory, problem solving, language, academic skills, and social cognition. Piaget, Vygotsky, and information processing approaches will be discussed.
PREREQS: PSY 350 [D-]
PSY 456. SOCIAL DEVELOPMENT (4). Covers theories and research concerning human social development. Topics include theories of socialization; the development of social relationships; the self-concept; emotion; sex roles; social cognition; pro-social behavior; morality; selfcontrol; and aggression. PREREQS: PSY 350 [D-]
PSY 458. LANGUAGE ACQUISITION (4).
Psychological processes involved in the acquisition and use of language throughout childhood. Biological, cognitive, and social
influences on language will be discussed, as well as personal uses of language, such as language in thought and reading. PREREQS: PSY 350 [D-]

## PSY 460. ^ADVANCED SOCIAL RESEARCH

METHODS (4). Advanced experimental
research methods in the social sciences. Issues in psychological construct operationalization, experimental design, data collection, analysis, and report writing will be emphasized. (Writing Intensive Course) PREREQS: PSY 301 [D-] and PSY 360 [D-]
PSY 464. SOCIAL COGNITION (4). Research and theory concerning cognitive structures and processes underlying social judgment and social behavior. Topics include attribution theory, social inference, person memory, schema-based information processing. PREREQS: PSY 360 [D-]
PSY 465. WOMEN, WEIGHT, AND BODY IMAGE
(4). Focuses on women's increasing struggles with weight, eating disorders, and broader body image issues in contemporary society. Explores how social institutions such as media, medicine, government contribute to weight bias and unhealthy standards for appearance. Examines weightism as a system of oppression that intersects with other systems of oppression including sexism, racism, classism, heterosexism, ableism, and ageism. CROSSLISTED as WGSS 465.

PSY 466. *FAT STUDIES (4). Examines body weight, shape, and size as an area of human difference subject to privilege and discrimination hat intersects with other systems of oppression based on gender, race, class, age, sexual orientation, and ability. Employs a multidisciplinary approach spanning the behavioral sciences and humanities. Frames weight-based oppression as a social justice issue, exploring forms of activism used to counter weightism perpetuated throughout various societal institutions. CROSSLISTED as WGSS 466/WGSS 566. (Bacc Core Course) PREREQS: WGSS 223 [D-] or WGSS 223H [D-] or WGSS 224 [D-] or WGSS 240 [D-] or WGSS 262 [D-] or WGSS 262H [D-] or WGSS 270 [D-] or WGSS 280 [D-] or WGSS 280H [D-] or WGSS 321 [D-] or WGSS 325 [D-] or WGSS 325H [D-] or WGSS 340 [D-] or WGSS 340H [D-] or WGSS 350 [D-] or WGSS 360 [D-] or WGSS 360H [D-] or WGSS 364 [D-] or WGSS 364H [D-] or WGSS 373 [D-] or WGSS 375 [D-] or WGSS 380 [D-] or WGSS 380H [D-]
PSY 468. THE PSYCHOLOGY OF CLOSE
RELATIONSHIPS (4). Explores the research and theory on the development, maintenance, and dissolution of human relationships. The course will examine various directions to the study of interpersonal relationships, including attachment, evolutionary-biological, cognition, and interdependence. Topics will also include physical attraction, love, friendship, communication, trust, jealousy, and several issues that are specific to troubled dyadic relations. PREREQS: PSY 360 [D-]
PSY 470. ^PSYCHOMETRICS AND
PSYCHOLOGICAL TESTING (4). An introduction
to psychological measurement is provided with emphasis on the notions of reliability and validity; advanced correlation techniques are introduced. These methods are applied to contemporary tests of personality, aptitude, and achievement. (Writing Intensive Course) PREREQS: PSY 301 [D-] and (PSY 340 [D-] or PSY 370 [D-] or PSY 380 [D-] or PSY 381 [D-] or PSY 481 [D-] )
PSY 480. ^CLINICAL RESEARCH METHODS
(4). Advanced research methods used in clinical psychology research. Design of studies, assessment, data collection, and interpretation will be discussed. The clinical content area focused on will vary. (Writing Intensive Course) PREREQS: (PSY 301 [D-] and (PSY 380 [D-] or PSY 381 [D-] or PSY 481 [D-] ))
PSY 482. PSYCHOTHERAPY (4). Survey of the theory, techniques and research on the major contemporary systems of psychotherapy.

PREREQS: PSY 370 [D-] or PSY 380 [D-] or PSY 381 [D-] or PSY 481 [D-]

## PSY 483. DEVELOPMENTAL

PSYCHOPATHOLOGY (4). Developmental perspective on child and adolescent psychological disorders including causal factors, associated features, and research-supported interventions. PREREQS: PSY 350 [D-] or PSY 381 [D-] or PSY 481 [D-] and /or equivalent.

## PSY 485. BEHAVIOR MODIFICATION (4),

Review of basics of operant and classical conditioning. Research on behavior modification and behavior therapy with both normal and abnormal animals, human adults, and children. Application areas include behavior problems, handicaps, eating disorders, time management, self-control stress management, contingency contracts, and cognitive therapies. PREREQS: PSY 350 [D-] or PSY 380 [D-] or PSY 381 [D-] or PSY 481 [D-] and /or equivalent work in family life or education.

PSY 492. CONSERVATION PSYCHOLOGY (4). Explores connections between the study of human behavior and the achievement of conservation goals. Understanding how people think about and interact with nature is crucial for promoting environmental sustainability and human wellbeing. Students will examine theory and research on human cognitive, emotional, and behavioral responses to nature. PREREQS: PSY 201 [D-] and PSY 202 [D-]
PSY 493. POSITIVE PSYCHOLOGY (4).
Psychological theory, research, and interventions directed at how humans can flourish and identify and enhance positive strengths. Topics include positive emotional and cognitive states and processes, prosocial behavior, positive school and work environments, and discovering meaning in life. PREREQS: PSY 360 [D-] or PSY 370 [D-]
PSY 494. ENGINEERING PSYCHOLOGY (4). Survey human capabilities and limitations in human-machine interaction, including vision, memory, attention, motor control, and human error. Emphasis on theory and implications for system designs. PREREQS: (PSY 301 [D-] and PSY 340 [D-])
PSY 496. INDUSTRIAL AND ORGANIZATIONAL PSYCHOLOGY (4). Survey of psychological research and theory relevant to organizations, industry, and other work settings. Topics include training, employee selection, performance evaluation, work attitudes, and motivation. PREREQS: PSY 360 [D-] or PSY 370 [D-]
PSY 498. HEALTH PSYCHOLOGY (4).
Psychological factors in the maintenance of good health and in the prevention of, treatment of, and recovery from illness: Behavioral contributions to illness, life-style risk factors, stress and the immune system, psychological response to symptoms and care-givers, health habits and self-care, management of pain and chronic illness, disability and terminal illness. PREREQS: PSY 330 [D-] or PSY 340 [D-] or PSY 350 [D-] or PSY 360 [D-] or PSY 370 [D-] or PSY 381 [D-] or PSY 481 [D-]
PSY 499. SPECIAL TOPICS (1-16). Newly emerging or specialized topics that can only be offered occasionally or for particular purposes. Each offering will be structured with a syllabus. This course is repeatable for a maximum of 30 credits. PREREQS: To be determined for each offering.
PSY 499H. SPECIAL TOPICS (1-16). Newly emerging or specialized topics that can only be offered occasionally or for particular purposes. Each offering will be structured with a syllabus. PREREQS: To be determined for each offering and Honors College approval.

PSY 501. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PSY 502. INDEPENDENT STUDY (1-16). Graded
$\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PSY 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits PREREQS: Departmental approval required.
PSY 505. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PSY 506. PROJECTS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PSY 507. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PSY 508. WORKSHOP (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PSY 510. FIELD EXPERIENCE IN HUMAN SERVICES (3-15). Practicum/internship placement in community human service agencies. Includes regular on-site supervision, relevant readings, projects, and faculty site visits. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

PSY 514. RESEARCH METHODS I (4). An
introduction to the tools and methods that psychologists use to examine the processes that underlie human behavior. Emphasis is on the skills necessary for completing a research study: hypothesis formulation, design criteria, data collection, analysis, interpretation, write-up, and presentation of results. Utilizes a combination of readings, discussions, and class exercises. Course culminates in an independent research project proposal. PREREQS: ST 511 [B-] and graduate standing

PSY 521. ISSUES IN PROFESSIONAL PSYCHOLOGY (1). Professional development seminar focused on professional issues specific to the field of research-based psychology. Includes writing for publication, professional speaking, professional development and leadership, and current professional and research controversies. Each iteration of the course over the academic year will have a different focus. Graded P/N. This course is repeatable for a maximum of 3 credits. PREREQS: Enrollment limited to PSY doctoral students.

PSY 523. ETHICS IN PSYCHOLOGICAL RESEARCH (1). Covers research ethics in psychology. Topics include the history of research-oriented ethical guidelines, ethical principles, working with an IRB, questionable research practices, and fraud. Meets OSU's Learning Outcome regarding the ethical conduct of research. PREREQS: An undergraduatelevel psychological research methods course. Registration is restricted to graduate students.
PSY 526. PSYCHOLOGY OF GENDER (4).
Survey of theories, life cycles and contemporary problems of women and men in a social context. Scientific examination of gender related to psychological functioning and behavior. Topics can include psychological research on human similarities and differences in gender attitudes, relationships, sexuality, violence, employment, and mental health. PREREQS: PSY 202

## PSY 531. GRADUATE BEHAVIORAL

NEUROSCIENCE (4). Neurobiological underpinnings of behavior examining animal and human research on neural structure and function in relation to typical and atypical behavior, including psychiatric disorders. PREREQS: Graduate standing.
PSY 532. PHYSIOLOGICAL PSYCHOLOGY
(4). Basic vertebrate neurophysiology and neuroanatomy in relation to behavior. Neural and hormonal correlates of sensation, learning, memory and motivation. PREREQS: PSY 330 or
equivalent biological science background.
PSY 533. PSYCHOPHARMACOLOGY (4). Drug-
brain-behavior interactions. Psychoactive drugs and their relationships to normal and abnormal behavior in humans. PREREQS: Graduate standing. Biological science background helpful.
PSY 534. BRAIN AND BEHAVIOR METHODS
(4). Methodology primarily in the area of neuropsychological research. Topics include the finding and interpretation of background literature, critical evaluation of research, hypothesis formulation, experimental design, data interpretation, reporting of results and methods, and weaving a conclusion and review article. PREREQS: PSY 301 and PSY 330

PSY 537. MOTIVATION (4). Biological, learning, and cognitive approaches to human and animal motivation. Topics include evolution, homeostasis, drive, arousal, incentive motivation, achievement motivation, and social motivation. PREREQS: PSY 301 and (PSY 330 or PSY 340)
PSY 540. COGNITION RESEARCH (4).
Advanced scientific methodology primarily in the areas of attention, learning, memory, and thinking Students will design their own research projects, collect and analyze data, and write a professional report. PREREQS: PSY 301 and PSY 340
PSY 541. GRADUATE SEMINAR IN COGNITION
(4). Cognitive psychology studies the processes by which human beings notice, encode, remember, and use information. A graduate-level survey that covers the history, methods, important findings, and major theories of the field, with an emphasis on reading and critically analyzing articles from the primary research literature. Topics of interest will include perception and object recognition, attention, working memory, long-term memory, concepts and categorization, and judgment and decision making. PREREQS: Graduate standing.
PSY 542. PERCEPTION (4). Fundamental concepts of animal and human sensation and perception, with emphasis on audition and vision. Applications of psychophysical methods to research in all sensory modalities. Includes review workshops on basic mathematical, physical and physiological concepts necessary to interpret research in this field. PREREQS: PSY 301 and (PSY 330 or PSY 340)
PSY 544. LEARNING AND MEMORY (4).
Experimental and theoretical work on learning, conditioning, and memory in animals and humans. PREREQS: PSY 301 and PSY 340
PSY 548. CONSCIOUSNESS (4). Psychological, phenomenological, and physiological approaches to the content and processes of subjective awareness. Topics include philosophical issues, cortical and reticular neurophysiology, sleeping and dreaming, selective attention, imagery, and self-awareness. PREREQS: PSY 301 and PSY 340

PSY 554. COGNITIVE DEVELOPMENT (4). Discusses intellectual development from infancy to adulthood. Topics include the origin of thinking, the development of perception, attention, memory, problem solving, language, academic skills, and social cognition. Piaget, Vygotsky, and information processing approaches will be discussed. PREREQS: PSY 350 and graduate standing.
PSY 556. SOCIAL DEVELOPMENT (4). Covers theories and research concerning human social development. Topics include theories of socialization; the development of social relationships; the self-concept; emotion; sex roles; social cognition; pro-social behavior; morality; selfcontrol; and aggression. PREREQS: PSY 350 and graduate standing.
PSY 558. LANGUAGE ACQUISITION (4).
Psychological processes involved in the acquisition and use of language throughout childhood. Biological, cognitive, and social influences on language will be discussed, as well
as personal uses of language, such as language in thought and reading. PREREQS: PSY 350
PSY 560. ADVANCED SOCIAL RESEARCH
METHODS (4). Advanced experimental research methods in the social sciences. Issues in psychological construct operationalization, experimental design, data collection, analysis, and report writing will be emphasized. PREREQS: PSY 301 and PSY 360

PSY 561. GRADUATE SOCIAL PSYCHOLOGY (4). A graduate level survey course of the theories, methods, and empirical findings that constitute the field of social psychology. Topics will include, but not be limited to, person perception, social cognition, attitudes, attitude change, persuasion, interpersonal attraction, relationships, small-group processes, altruism, and aggression. PREREQS: Graduate standing
PSY 564. SOCIAL COGNITION (4). Research and theory concerning cognitive structures and processes underlying social judgment and social behavior. Topics include attribution theory, social inference, person memory, schema-based information processing. PREREQS: PSY 360 and graduate standing.
PSY 565. WOMEN, WEIGHT, AND BODY IMAGE
(4). Focuses on women's increasing struggles with weight, eating disorders, and broader body image issues in contemporary society. Explores how social institutions such as media, medicine, government contribute to weight bias and unhealthy standards for appearance. Examines weightism as a system of oppression that intersects with other systems of oppression including sexism, racism, classism, heterosexism, ableism, and ageism.
PSY 566. FAT STUDIES (4). Examines body weight, shape, and size as an area of human difference subject to privilege and discrimination that intersects with other systems of oppression based on gender, race, class, age, sexual orientation, and ability. Employs a multidisciplinary approach spanning the behavioral sciences and humanities. Frames weight-based oppression as a social justice issue, exploring forms of activism used to counter weightism perpetuated throughout various societal institutions. CROSSLISTED as WGSS 466/WGSS 566 PREREQS: WGSS 223 or WGSS 223H or WGSS 224 or WGSS 240 or WGSS 262 or WGSS 262H or WGSS 270 or WGSS 280 or WGSS 280 H or WGSS 321 or WGSS 325 or WGSS 325 H or WGSS 340 or WGSS 340 H or WGSS 350 or WGSS 360 or WGSS 360H or WGSS 364 or WGSS 364H or WGSS 373 or WGSS 375 or WGSS 380 or WGSS 380H

## PSY 570. PSYCHOMETRICS AND

PSYCHOLOGICAL TESTING (4). An introduction to psychological measurement is provided, with emphasis on the notions of reliability and validity; advanced correlational techniques are introduced. These methods are applied to contemporary tests of personality, aptitude, and achievement.
PREREQS: PSY 301 and (PSY 340 or PSY 370)
PSY 571. GRADUATE PSYCHOMETRICS (4). A graduate level introduction to psychological testing theory and practice, and to ethical, sociopolitical, psychological, and psychometric issues in the use of psychological tests. Particularly emphasizes basic psychometric principles that are important in scale construction, test evaluation, and practical assessment. PREREQS: ST 511 [B-] and ST 512 [B-]
PSY 580. CLINICAL RESEARCH METHODS (4).
Advanced research methods used in clinical psychology research. Design of studies, assessment, data collection, and interpretation will be discussed. The clinical content area focused on will vary. PREREQS: PSY 301 and (PSY 380 or PSY 381 or PSY 481)

PSY 581. GRADUATE SEMINAR IN CLINICAL
RESEARCH AND THEORY (4). Focuses on major concepts, theory, and empirical findings on the
causes and treatment of psychological disorders
The seminar emphasizes culture, context, bias, and stigma, as well as application of principles of clinical science to students' graduate program research agendas. PREREQS: Graduate standing
PSY 582. PSYCHOTHERAPY (4). Survey of the theory, techniques and research on the major contemporary systems of psychotherapy. PREREQS: PSY 370 or PSY 381

PSY 583. DEVELOPMENTAL
PSYCHOPATHOLOGY (4). Developmental perspective on child and adolescent psychological disorders including causal factors, associated features, and research-supported interventions. PREREQS: PSY 350 or PSY 381 or PSY 481
PSY 585. BEHAVIOR MODIFICATION (4).
Review of basics of operant and classical conditioning. Research on behavior modification and behavior therapy with both normal and abnormal animals, human adults, and children. Application areas include: behavior problems, handicaps, eating disorders, time management, self-control, stress management, contingency contracts, and cognitive therapies. PREREQS: PSY 350 or equivalent work in family life or education.
PSY 591. GRADUATE SEMINAR IN HEALTH PSYCHOLOGY (4). Covers the theories, methods and empirical findings that constitute the field of health psychology. Topics include, but are not limited to, the interaction of multiple factors involved in etiology, prevention, treatment, and course of illness and disability; health behavior, health promotion, and health risks; stress and coping in health; long-term care and adaptation to chronic illness or disability; practice of institutional healthcare. PREREQS: Graduate standing.
PSY 592. CONSERVATION PSYCHOLOGY (4).
Explores connections between the study of human behavior and the achievement of conservation goals. Understanding how people think about and interact with nature is crucial for promoting environmental sustainability and human wellbeing. Students will examine theory and research on human cognitive, emotional, and behavioral responses to nature. PREREQS: PSY 201 and PSY 202

PSY 593. POSITIVE PSYCHOLOGY (4).
Psychological theory, research, and interventions directed at how humans can flourish and identify and enhance positive strengths. Topics include positive emotional and cognitive states and processes, prosocial behavior, positive school and work environments, and discovering meaning in life. PREREQS: PSY 360 or PSY 370
PSY 594. ENGINEERING PSYCHOLOGY (4). Survey human capabilities and limitations in human-machine interaction, including vision, memory, attention, motor control, and human error. Emphasis on theory and implications for system designs. PREREQS: (PSY 301 and PSY 340)

PSY 596. INDUSTRIAL AND ORGANIZATIONAL PSYCHOLOGY (4). Survey of psychological research and theory relevant to organizations, industry, and other work settings. Topics include training, employee selection, performance evaluation, work attitudes, and motivation. PREREQS: PSY 360 and PSY 370
PSY 598. HEALTH PSYCHOLOGY (4).
Psychological factors in the maintenance of good health and in the prevention of, treatment of, and recovery from illness: Behavioral contributions to illness, life-style risk factors, stress and the immune system, psychological response to symptoms and care-givers, health habits and self-care, management of pain and chronic illness, disability and terminal illness. PREREQS: 300 -level course in psychology.
PSY 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 99 credits. PREREQS: To be determined for each offering.

## SCHOOL OF PUBLIC POLCY

## Denise Lach, Director

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## Sociology Advisor:

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## Ecampus Economics/Sociology

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Policy is about the way we make decisions in both private and public contexts. Faculty and students in the School of Public Policy are interested in a wide variety of decision contexts and are particularly interested in advancing the social and policy-related dimensions of OSU's three areas of distinction: sustainable ecosystems, health and wellness, and economic growth and progress. The

School of Public Policy offers undergraduate majors and minors in economics, political science, and sociology, as well as the Master of Public Policy (MPP) degree, PhD in Public Policy, and graduate minors in political science and sociology. School faculty members also participate in the Master of Arts in Interdisciplinary Studies (MAIS) program.

## FACULTY

Professors Conway, M. Edwards, Emerson, Färe, Gallagher, Lach, Plaza, Ray, Steel, C. Tremblay, V. Tremblay, Warner, Weber
Associate Professors Akins, Below, Cramer, Hammer, Henderson, Inderbitzen, Li, Loges, Meng, Ortiz, Schroeder, Solberg, Valls
Assistant Professors Baker, Bernell, Boudet, Burkhardt, Eisenhuth, Hurst, Johnston, Jones, Kretschmer, Lin, Pugatch, Spalding, Stout, Thompson, Vue Instructors Andersen, Chesbro, Clark, C. Soltau Nelson, M. Nelson, Stanley, Wolters
Professor Emeriti Clinton, Cordray, Foster, Grosskopf, Lunch, Sahr

## Undergraduate Majors

Economics (BA, BS, HBA, HBS)
Options
Law, Economics and Policy
Managerial Economics
Mathematical Economics
Political Science (BA, BS, HBA, HBS)
Options
Environmental and Energy Politics
International Affairs
Law and Politics
Sociology (BA, BS, HBA, HBS)
Options
Crime and Justice
Environmental and Natural Resource Sociology
Social Science (BA, BS) (OSU-Cascades only)
Option
Community Development and Leadership

## Minors

Asian Studies

## Economics

Political Science
Sociology

## Graduate Major

Public Policy (MPP, PhD)

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Graduate Areas of Concentration
Energy Policy
Environmental Policy
International Policy
    Law, Crime, and Policy
    Rural Policy
    Science and Technology Policy
    Social Policy
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## Graduate Minors

Political Science
Sociology

## Master of Arts in Interdisciplinary

## Studies

(See http://liberalarts.oregonstate. edu/spp/sociology/programs/ master-arts-interdisciplinary-studies-mais)

## UNDERGRADUATE PROGRAMS

The School of Public Policy offers undergraduate major and minor programs in economics, political science, and sociology.

## Economics Program

The economics program is an excellent choice for students interested in:

- Law school or graduate programs in business, economics, public administration or other social sciences.
- Careers in business or public management.
- Becoming wiser consumers and better-informed citizens.
The study of economics provides a framework for logical thought that can be used to address a wide variety of practical problems and situations. It can provide uncommon insights into society itself. Indeed, people holding degrees in economics are increasingly sought for positions of responsibility and authority in government, business, and industry. The economics major is useful preparation for various careers and for graduate study in many fields, primarily because it does not lead simply to the accumulation of facts but rather develops analytical skills that can be used in many ways.


## Political Science Program

Graduates of the political science program pursue:

- Careers in all levels of government, foreign service, national and international nongovernmental organizations, journalism, business or public management.
- Law school or graduate programs in political science, public administration, public policy, business, or other social sciences.
- Elected office.

Students can focus their interests in different subfields, including American politics, public law, political theory, international relations, and comparative politics (for example, Asia, Latin America, Western Europe, Russia). Political science majors are encouraged to incorporate a minor in other social science fields such as economics, psychology, or sociology, or in a field of interest related
to their specialization in political science.
For example, students with an interest in international relations or comparative politics may choose to minor in a language or in history, emphasizing a specific part of the world. Political science majors also are encouraged to consider the International Degree and $\mathrm{IE}_{3}$ Global Internships.

## Sociology Program

Graduates of the sociology program pursue:

- Careers in community development, criminal justice, business, public administration, social services, recreation, and research and teaching.
- Graduate programs in sociology, criminology, public policy, social services, human resources, law, social work and other social sciences.
Sociology is the study of human social behavior and sociologists examine interactions within and between groups and resulting social institutions. The undergraduate program in sociology provides a general analysis and broad understanding of human societies and culture for persons in all fields. Selecting courses around a topic or theme of interest adds meaning to one's education and strengthens the base of understanding from which one can pursue a career or further education. Two options are currently available for those interested - Crime and Justice, and Environmental and Natural Resource Sociology - although students can shape a custom theme such as international development or social policy.


## GRADUATE PROGRAMS

The School of Public Policy offers a Master of Public Policy (MPP) degree, PhD in Public Policy, and graduate minors in Political Science and Sociology, and courses applicable toward the graduate degree in Applied Economics. Faculty members also participate in the Master of Arts in Interdisciplinary Studies (MAIS) program.

## Master of Public Policy (MPP)

Graduates of the MPP program:

- Are employed at all levels of government as policy analysts, project managers, and managers.
- Work in national and international nongovernmental organizations like the United Nations.
- Pursue further graduate training in law, public administration, public affairs, public policy, and other social science disciplines.
Policy students at OSU focus their studies around environmental and natural resource policy, international policy, social policy, and rural policy, working with strong researchers around campus. Internships with agencies and organizations give policy students real world ex-
perience and networks to enhance their classroom education.


## PhD in Public Policy

The PhD in Public Policy prepares students for academic or nonacademic research careers in the public, private, and nongovernmental sectors. The Public Policy Graduate Program accepts students with backgrounds in related academic disciplines. Like the MPP, the PhD program offers concentrations in energy policy; international policy; law, crime, and policy; rural policy; science and technology policy; and/or social policy.

## Master of Arts in Interdisciplinary

 Studies (MAIS)The MAIS program is designed to meet the particular needs and interests of individual students and features collaborative work in any two or three pertinent departments or schools. Political science and sociology faculty members may serve as one or two of the minor fields of concentration.

## GRADUATE MINORS

## Political Science

Master's or PhD students interested in adding a Political Science minor should follow the guidelines within their major program in declaring a minor. All students declaring political science as a graduate minor must contact the program coordinator prior to doing so. See the Political Science website http://gradschool.oregonstate.edu/programs/9600 for a listing of requirements for the minor concentration.

## Sociology

Master's or PhD students interested in adding a Sociology minor should follow the guidelines within their major program in declaring a minor. The minimum number of credits for sociology is 15 or higher if required by the major. All students declaring sociology as a graduate minor must contact the program coordinator prior to doing so. See the Sociology website http://liberalarts. oregonstate.edu/spp/sociology/programs/ graduate-programs/graduate-minor for a listing of requirements for the minor concentration.

## UNDERGRADUATE MAJORS WITH OPTIONS

ECONOMICS (BA, BS, CRED, HBA, HBS)

## Also available via Ecampus.

Businesses want employees who can think, communicate orally, write, and solve problems and who are comfortable with quantitative analysis. The traditional economics major perfectly prepares students to meet these demands.
Economics Core Curriculum (32)
ECON 201. *Introduction to

Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 411. Advanced Microeconomic
Theory (4)
or ECON 311. Intermediate
Microeconomic Theory (4)
ECON 415. Advanced Macroeconomic
Theory (4)
or ECON 315. Intermediate
Macroeconomic Theory (4)
ECON 423. Econometrics I (4)
ECON 427. Econometrics II (4)
or ECON 424. Introduction to
Econometrics (4)
ECON 428. ${ }^{\wedge}$ Introduction to Economic Research (4)
or ECON 439. ^Public Policy Analysis (4) or ECON 466. ${ }^{\wedge}$ Economics of Traditional and Renewable Energy (4)
MTH 241. *Calculus for Management and Social Science (4)
or MTH 251. *Differential Calculus (4)

## Additional Requirements (19)

19 credits of additional approved economics courses at the 300 level or above, at least 4 credits of which must be in courses numbered 411 or higher.

## Total credits=51

All students must receive a grade of "C" (2.00) or better in all upper-division required courses and must maintain an overall grade-point average (GPA) of 2.00 in all courses taken toward the Economics major. None of the 51 credits may be taken $\mathrm{S} / \mathrm{U}$. Students cannot receive credit toward the major for both ECON 311 and ECON 411, for both ECON 315 and ECON 415, and for both ECON 424 and ECON 427. No more than 4 credits of self-study courses (ECON 401-ECON 410) may be counted towards the 51 credit requirement.

## A recommended program of study

 for economics majors:Freshman Year or Sophomore Year
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
MTH 241. *Calculus for Management and
Social Science (4)
or MTH 251. *Differential Calculus (4)

## Sophomore or Junior Year

ECON 411. Advanced Microeconomic
Theory (4)
or ECON 311. Intermediate
Microeconomic Theory (4)
ECON 415. Advanced Macroeconomic Theory (4)
or ECON 315. Intermediate
Macroeconomic Theory (4)
ECON 423. Econometrics I (4)
ECON 427. Econometrics II (4)
or ECON 424. Introduction to
Econometrics (4)
Economics electives

## Junior or Senior Year

ECON 428. ^Introduction to Economic Research (4)
or ECON 439. $\wedge$ Public Policy Analysis (4) or ECON 466. ${ }^{\wedge}$ Economics of Traditional and Renewable Energy (4)

## Economics electives

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: $\mathbf{8 8 5}$

## OPTIONS

## LAW, ECONOMICS AND POLICY OPTION

## Also available via Ecampus.

The Law, Economics and Policy option is an interdisciplinary program drawing from political science and philosophy courses as well as economics. This option serves students interested in public service or advanced study in law or public policy.

## Economics Core Curriculum (28)

ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 311. Intermediate Microeconomic Theory (4)
or ECON 411. Advanced Microeconomic Theory (4)
ECON 315. Intermediate Macroeconomic Theory 4)
or ECON 415. Advanced Macroeconomic Theory (4)
ECON 424. Introduction to Econometrics (4) or ECON 427. Econometrics II (4)
ECON 428. ^Introduction to Economic Research (4)
or ECON 439. ^Public Policy Analysis (4) or ECON 466. ${ }^{\wedge}$ Economics of Traditional and Renewable Energy (4)
ST 351. Introduction to Statistical Methods (4)
or ECON 423. Econometrics I (4)
Law, Economics and Policy Option
Additional Requirements (23)
A. Four of the following courses, at least two must be from economics:
ECON 414. Behavioral Economics (4)
ECON 435. Public Economics (4)
ECON 439. ^Public Policy Analysis (4)
(Cannot use here if used for WIC)
ECON 461. Law, Economics, and Regulation (4)

ECON 466. ${ }^{\wedge}$ Economics of Traditional and Renewable Energy (4) (Cannot use here if used for WIC)
ECON 480. Labor Economics (4)
PHL 321. Deductive Logic (4)
PS 321. Constitutional Law: Government Powers and Constraints (4)
PS 326. Judicial Process and Politics (4)
PS 371. Public Policy Problems (4)
PS 479. Topics in Public Policy and Public Administration (4)
B. Two additional courses in economics at the $\mathbf{3 0 0}$ - or 400 -level

## Total Credits=51

All students must receive a grade of "C"
(2.00) or better in all upper-division
required courses and must maintain an overall grade-point average (GPA) of 2.00 in all courses taken toward the Law, Economics and Policy option. None of the 51 credits may be taken $\mathrm{S} / \mathrm{U}$. Students cannot receive credit toward the option for both ECON 311 and ECON 411, for both ECON 315 and ECON 415, and for both ECON 424 and ECON 427. No more than 4 credits of self-study courses (ECON 401-ECON 410) may be counted toward the 51 credit requirement.

## Footnotes:

* Bacc Core Course
^ Writing Intensive Course (WIC)
Option Code: 889


## MANAGERIAL ECONOMICS

 OPTION
## Also available via Ecampus.

The Managerial Economics option is an interdisciplinary program which allows students to use business classes toward the requirements of the economics degree. The Managerial Economics option is suited for students interested in pursuing jobs or graduate study in business with a strong economics background.

## Economics Core Curriculum (32)

ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 311. Intermediate Microeconomic Theory (4)
or ECON 411. Advanced Microeconomic Theory (4)
ECON 315. Intermediate Macroeconomic Theory (4)
or ECON 415. Advanced Macroeconomic Theory (4)
ECON 424. Introduction to Econometrics (4)
or ECON 427. Econometrics II (4)
ECON 428. ${ }^{\wedge}$ Introduction to Economic Research (4)
or ECON 439. ${ }^{\wedge}$ Public Policy Analysis (4) or ECON 466. ${ }^{\wedge}$ Economics of Traditional and Renewable Energy (4)
MTH 241. *Calculus for Management and Social Science (4)
or MTH 251. *Differential Calculus (4)
ST 351. Introduction to Statistical Methods (4)
or ECON 423. Econometrics I (4)
Additional Requirements (19-23)
ECON 462. Managerial Economics (4) or ECON 460. Industrial Organization Theory and Policy (4)
BA 215. Fundamentals of Accounting (4) or BA 211. Financial Accounting (4) and BA 213. Managerial Accounting (4)
BA 360. Introduction to Financial Management (4)
Plus any two courses below (8):
BA 351. Managing Organizations (4)
BA 357. Operations Management (4)
BA 390. Marketing (4)
ECON 330. Money and Banking (4)
ECON 340. International Economics (4)
ECON 460. Industrial Organization Theory
and Policy (4) (Cannot be used here if used above.)
ECON 463. ${ }^{\wedge}$ Efficiency and Productivity Analysis (4)
ECON 466. ${ }^{\wedge}$ Economics of Traditional and Renewable Energy (4) (Cannot use here if used for WIC.)
ECON 480. Labor Economics (4)
All students must receive a grade of "C" (2.00) or better in all upper-division required courses and must maintain an overall grade-point average (GPA) of 2.00 in all courses taken toward the Managerial Economics option. None of the 51 credits may be taken $S / U$. Students cannot receive credit toward the option for both ECON 311 and ECON 411, for both ECON 315 and ECON 415, and for both ECON 424 and ECON 427. No more than 4 credits of self-study courses (ECON 401-ECON 410) may be counted toward the 51 credit requirement.

## Total=51-55

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)


## Option Code: $\mathbf{8 8 6}$

## MATHEMATICAL ECONOMICS OPTION

As the economics profession becomes increasingly mathematical, economics majors who plan to go to graduate school need a strong math background. The Mathematical Economics option provides the necessary mathematical preparation for graduate school bound economics majors. It also serves students who desire a more quantitative program or who come into the major with significant math preparation to apply math toward their degrees in economics.

## Economics Core Curriculum (32)

ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 411. Advanced Microeconomic Theory (4)
ECON 415. Advanced Macroeconomic Theory (4)
ECON 423. Econometrics I (4)
ECON 427. Econometrics II (4)
ECON 428. ${ }^{\wedge}$ Introduction to Economic Research (4)
or ECON 439. ${ }^{\wedge}$ Public Policy Analysis (4) or ECON 466. ${ }^{\wedge}$ Economics of Traditional and Renewable Energy (4)
MTH 241. *Calculus for Management and Social Science (4)
or MTH 251. *Differential Calculus (4)

## Additional Requirements (19)

ECON 329. Introduction to Mathematical Economics (4)
MTH 252. Integral Calculus (4)
MTH 254. Vector Calculus I (4)
MTH 341. Linear Algebra I (3)
MTH 342. Linear Algebra II (4)
Total credits=51
All students must receive a grade of "C"
(2.00) or better in all upper-division required courses and must maintain an overall grade point average (GPA) of 2.00 in all courses taken toward the Mathematical Economics option. None of the 51 credits may be taken S/U. Students cannot receive credit toward the option for both ECON 311 and ECON 411, for both ECON 315 and ECON 415, and for both ECON 424 and ECON 427. No more than 4 credits of self-study courses (ECON 401-410) may be counted toward the 51 credit requirement.

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Option Code: 888


## POLITICAL SCIENCE (BA, BS, CRED, HBA, HBS)

## Also available via Ecampus.

Political Science is the systematic study of politics wherever it takes place-in governmental institutions, the international arena, and civil society. Political science majors at Oregon State may choose the general political science major, or one of the three options that focus on law and politics, international affairs, or environmental and energy politics. All political science majors learn to think critically, write clearly and speak persuasively. They learn the ideas of great political thinkers, learn the political fundamentals behind the headlines, and have engaging discussions from all points of view with other students and professors.

Students selecting the Political Science major must complete 52 credits of political science course work, of which at least 36 credits must be upper-division courses. As part of these overall credit totals, Political Science majors must complete:

## I. Foundation Courses Three of the four introductory courses:

The school encourages students to take the foundation courses in their first or second year.
PS 201. *Introduction to United States Government and Politics (4)
PS 204. *Introduction to Comparative Politics (4)
PS 205. *Introduction to International Relations (4)
PS 206. *Introduction to Political Thought (4)

Students who choose to specialize in one of the options for the major are required to take two of the introductory courses as specified for the option and choose the third introductory course.

Few upper-division political science courses have enforced prerequisites, but taking the corresponding intro course is often good preparation (for example, PS 201 Introduction to United States Government would assist with PS 321 Con-
stitutional Law: Government Powers and Constraints).

## II. Methods/WIC

The research methods and WIC course. The school encourages students to take the Methods/WIC course late in their second or early in their third year. PS 300. ^Research Methods (4)

## III. Upper-Division Subfield Courses

A. For the general major, students must take:
One course each from at least three of the four following subfields:

1. American national government and politics, to include the judiciary, state and local government, public policy, public administration: PS 311, 312, 313, 314, 315, 316, 317, 321, 322, 323, 326, 328, 331, 371, 374, 375, $425,455,473,475,476,477,478$.
2. Comparative politics: PS 340,341 , $343,344,345,348,350,441,446$, 449.
3. International relations: PS 351, 356, $454,455,457,458,470,477$.
4. Political philosophy: PS 361, 362, 363, 365, 461, 462.
5. B. For the options, students choose from a list of courses approved for the option.

## IV. Potential for Specialization

Students may choose a general political science major or may choose from one of three transcript-visible options:

1. Environmental Politics and Policy 2. International Affairs
2. Law, Politics, and Society

## V. Potential for Learning Outside the Classroom.

Political science majors are strongly encouraged to pursue experiential learning and other educational opportunities outside of the classroom, and these experiences can be used to fulfill some political science graduation requirements. Such experiences can include research, thesis writing, projects, or internship. Credits will be placed in the appropriate PS 401-PS 410 designator. A maximum of 8 credits from any combination of PS 401-PS 410 may be applied to the major, although additional credits from courses in this range may be applied to general graduation requirements. Additional experiential learning opportunities include "field schools" and study abroad. Students should discuss all of these opportunities with the political science undergraduate advisor.

## VI. Additional Requirements for the Major

- Majors are required to maintain a minimum cumulative 2.00 gradepoint average for all political science course work.
- Majors must earn a C- grade or better in PS 300.
- Students must complete the BA or BS requirements specified by the College of Liberal Arts.
Footnotes:
* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: 960

## OPTIONS

## ENVIRONMENTAL AND ENERGY POLITICS OPTION

The Environmental and Energy Politics option under the Political Science major provides students with the opportunity to focus their undergraduate studies on topics involving:

- Historical and contemporary environmental problems
- Governmental and nongovernmental efforts to address problems at the local, state, federal and international levels
- Interactions between key actors and institutions involved in environmental policymaking in the United States and internationally


## Foundation Courses (12 credits)

PS 201. *Introduction to United States Government and Politics (4)
PS 205. *Introduction to International Relations (4)
PS 204. *Introduction to Comparative Politics (4)
or PS 206. *Introduction to Political Thought (4)

## Methods/WIC (4 credits)

PS 300. ${ }^{\wedge}$ Research Methods (4)

## Upper-Division Option Courses (24 credits)

16 to 24 credits from the political science courses listed below. Up to 8 upperdivision credits can come from classes listed below in economics and sociology. Credits from all courses below must add up to at least 24 . Other courses applied to this total must be approved by the department.
PS 314. Interest Group Politics (4)
PS 331. *State and Local Politics (4)
PS 371. Public Policy Problems (4)
PS 372. Public Administration (4)
PS 374. *Sustainable Living: Practices and Policies (4)
PS 449. ^Topics in Comparative Politics (4)
PS 455. *The Politics of Climate Change (4)
PS 461. Environmental Political Theory (4)
PS 470. Global Food Politics and Policy (4)
PS 473. US Energy Policy (4)
PS 475. Environmental Politics and Policy (4)
PS 476. *Science and Politics (4)
PS 477. International Environmental Politics and Policy (4)
PS 478. Renewable Energy Policy (4)
Up to 8 credits from the list below:
ECON/AEC 352. *Environmental
Economics and Policy (3)
ECON 466. ${ }^{\wedge}$ Economics of Traditional and
Renewable Energy (4)
SOC 381. Social Dimensions of

Sustainability (4)
SOC 456. *Science and Technology in Social Context (4)
SOC 475. Rural Sociology (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/ANS/FES/FW 485. *Consensus and Natural Resources (3)
Political Science Electives (12 credits)
Any other political science courses may be taken to reach the minimum of 52 total credits in the major with at least 36 of these at the upper-division level.
Potential for Learning Outside the

## Classroom

Political science majors are strongly encouraged to pursue experiential learning and other educational opportunities outside of the classroom, and these experiences can be used to fulfill some political science graduation requirements. Such experiences can include research, thesis writing, projects, or internship. Credits will be placed in the appropriate PS 401-PS 410 designator. A maximum of 8 credits from any combination of PS 401-PS 410 may be applied to the major, although additional credits from courses in this range may be applied to general graduation requirements. Additional experiential learning opportunities include "field schools" and study abroad. Students should discuss all of these opportunities with the political science undergraduate advisor.

## Footnotes:

* Baccalaureate Core Course (BCC). Major courses cannot double count for Baccalaureate Core requirements.
$\wedge$ Writing Intensive Course (WIC)


## Option Code: 691

## INTERNATIONAL AFFAIRS

## OPTION

The International Affairs option provides students with the opportunity to focus their undergraduate studies on topics involving:

- The political systems and dynamics of different countries and regions around the world
- Relations among countries and nonstate actors
- Global issues, problems, and institutions


## Foundation Courses (12 credits)

PS 204. *Introduction to Comparative
Politics (4)
PS 205. *Introduction to International Relations (4)
And either PS 201. *Introduction to United States Government and Politics (4) or PS 206. *Introduction to Political Thought (4)

## Research Methods/WIC (4 credits)

PS 300. ${ }^{\wedge}$ Research Methods (4)
Upper-Division Option Courses (24 credits)
Select 16 to 24 credits from the politi-
cal science courses listed below. Up to 8 upper-division credits can come from classes listed below in economics and sociology. Credits from all courses below must add up to at least 24. Other courses applied to this total must be approved by the department.

## PS 340. Eastern and Central European

 Politics (4)PS 341. *European and EU Politics (4)
PS 343. *Russian Politics (4)
PS 344. *Latin American Politics (4)
PS 345. *Politics of Developing Nations (4)
PS 348. Chinese Politics (4)
PS 350. *Japanese Politics (4)
PS 351. American Foreign Policy (4)
PS 356. International Politics of Asia Pacific (4)

PS 441. Democratization (4)
PS 446. East Asian Political Economy (4)
PS 454. International Law and
Organizations (4)
PS 455. *The Politics of Climate Change (4)
PS 457. US-China Relations (4)
PS 458. *International Political Economy (4)
PS 470. Global Food Politics and Policy (4)
PS 477. International Environmental Politics and Policy (4)

## Select up to 8 credits from:

ECON 340. International Economics (4)
ECON 440. Economics of Globalization (4)
ECON 441. International Finance Theory and Policy (4)
ECON 455. Economic Development (4)
SOC 360. *Population Trends and Policy (4)
SOC 460. The Sociology of Globalization (4) SOC 466. International Development: Gender Issues (4)

## Political Science Electives (12 credits)

Any other political science courses may be taken to reach the minimum of 52 total credits in the major with at least 36 of these at the upper-division level.

## Potential for Learning Outside the Classroom

Political science majors are strongly encouraged to pursue experiential learning and other educational opportunities outside of the classroom, and these experiences can be used to fulfill some political science graduation requirements. Such experiences can include research, thesis writing, projects, or internship. Credits will be placed in the appropriate PS 401-PS 410 designator. A maximum of 8 credits from any combination of PS 401-PS 410 may be applied to the major, although additional credits from courses in this range may be applied to general graduation requirements. Additional experiential learning opportunities include "field schools" and study abroad. Students should discuss all of these opportunities with the political science undergraduate advisor.

## Footnotes:

* Baccalaureate Core Course. Major courses cannot double count for baccalaureate core requirements.
${ }^{\wedge}$ Writing Intensive Course


## Option Code: 471

## LAW AND POLITICS OPTION

The Law and Politics option offers students the opportunity to focus their undergraduate studies on topics involving:

- Constitutional principles and interpretation.
- Judicial politics and how it shapes the law.
- Relationships between the various branches and levels of government in the United States.
- Normative arguments regarding justice and equality in theory and in practice.


## Foundation Courses (12 credits)

PS 201. *Introduction to United States Government and Politics (4)
PS 206. *Introduction to Political Thought (4)
PS 204. *Introduction to Comparative

## Politics (4)

or PS 205. *Introduction to International Relations (4)

## Methods/WIC (4 credits)

PS 300. ${ }^{\wedge}$ Research Methods (4)

## Upper-Division Option Courses (24 credits)

16 to 24 credits from the political science courses listed below. Up to 8 upperdivision credits can come from classes listed below in economics and sociology. Credits from all courses below must add up to at least 24 . Other courses applied to this total must be approved by the department.
PS 311. Congressional Politics (4)
PS 312. Presidential Politics (4)
PS 321. Constitutional Law: Government Powers and Constraints (4)
PS 322. *Constitutional Law: Civil Rights and Liberties (4)
PS 323. Constitutional Law: Rights of the Accused (4)
PS 326. Judicial Process and Politics (4)
PS 331. *State and Local Politics (4)
PS 361. Classical Political Thought (4)
PS 362. Modern Political Thought (4)
PS 363. *Gender and Race in American
Political Thought (4)
PS 365. American Political Thought (4)
PS 371. Public Policy Problems (4)
PS 372. Public Administration (4)
PS 375. *The Civil Rights Movement and Policies (4)
PS 425. *Gender and the Law (4)
PS 454. International Law and Organizations (4)
PS 462. Theories of Law (4)
Up to 8 credits from:
ECON 461. Law, Economics, and Regulation (4)

SOC 340. Deviant Behavior and Social Control (4)
SOC 440. Juvenile Delinquency (4)
SOC 441. Criminology and Penology (4)
SOC 442. Sociology of Drug Use and Abuse (4)

SOC 448. Law and Society (4)

## Political Science Electives (12 credits)

Any other political science courses may be taken to reach the minimum of 52 total credits in the major with at least 36 of these at the upper-division level.

## Potential for Learning Outside the

## Classroom

Political science majors are strongly encouraged to pursue experiential learning and other educational opportunities outside of the classroom, and these experiences can be used to fulfill some political science graduation requirements. Such experiences can include research, thesis writing, projects, or internship. Credits will be placed in the appropriate PS 401-PS 410 designator. A maximum of 8 credits from any combination of PS 401-PS 410 may be applied to the major, although additional credits from courses in this range may be applied to general graduation requirements. Additional experiential learning opportunities include "field schools" and study abroad. Students should discuss all of these opportunities with the political science undergraduate advisor.

## Footnotes:

* Baccalaureate Core Course (BCC). Major courses cannot double count for Baccalaureate Core requirements.
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 634
SOCIOLOGY (BA, BS, CRED, HBA, HBS)


## Also available via Ecampus.

Sociology is the study of human social behavior and sociologists examine interactions within and between groups and resulting social institutions. The undergraduate program in sociology provides a general analysis and broad understanding of human societies and culture for persons in all fields. Selecting courses around a topic or theme of interest adds meaning to one's education and strengthens the base of understanding from which one can pursue a career or further education. Two options are currently available for those interested - Crime and Justice, and Environmental and Natural Resource Sociology - although students can shape a custom theme such as international development or social policy.

## Core

SOC 204. *Introduction to Sociology (3)
[Prereq. to all upper-division sociology courses] Also offered via Ecampus.
SOC 315. ${ }^{\wedge}$ Methods I: Research Design (4) Also offered via Ecampus.
SOC 316. Methods II: Quantitative Analysis
(4) Also offered via Ecampus.

SOC 413. Sociological Theory (4) Also offered via Ecampus.

## Sociology electives (33)

Maximum of 12 at lower division

Maximum of 8 credits in courses numbered SOC 401 to 410.

## Total=48

Transfer students may apply a maximum of 12 credits of lower-division sociology credits toward a degree in sociology.

A minimum grade-point average of 2.50 must be earned in sociology course work. A grade of C - or above is required in SOC 315, SOC 316, and SOC 413.

## Footnotes:

* Baccalaureate Core Course
^ Writing Intensive Course (WIC)


## Major Code: 980

## OPTIONS

CRIME AND JUSTICE OPTION
The Crime and Justice option provides students with the ability to apply social science concepts and approaches to better understand and analyze relationships between crime, justice, and public policy from a sociological perspective. The option has particular relevance for sociology students aspiring to careers in criminal justice, law, or social services, as well as those preparing for advanced/ graduate programs in criminology, criminal justice, or public policy. Academic internships are available in local criminal justice and social service agencies, offering a unique combination of scholarly analysis and practical experience for students seeking careers in fields such as law, policing, corrections, and social work.

## Crime and Justice

23 credits are required from any of the below:
SOC 241. Introduction to Crime and Justice (3)

SOC 340. Deviant Behavior and Social Control (4)
SOC 410. Internship (1-4)**
SOC 440. Juvenile Delinquency (4)
SOC 441. Criminology and Penology (4)
SOC 442. Sociology of Drug Use and Abuse (4)

SOC 444. Inside Out: Prisons, Communities and Prevention (4)
SOC 448. Law and Society (4)
SOC 449. Law, Crime, and Policy (4)
**Internship placement must be in crime, law or related field to count for option. Major paper required for $2+$ credits.

## Total=23 credits

Option Code: 995

## ENVIRONMENTAL AND

NATURAL RESOURCE SOCIOLOGY OPTION
Also available via Ecampus.
The option is designed to provide students with the ability to apply social science concepts and approaches to better understand relationships between societies and their bio-physical environment from a sociological perspective. This
option has great relevance for sociology students aspiring to careers in natural resource and environmental policy, planning, management, and education, as well as preparation for advanced/graduate programs related to environmental law and environment/natural resource sociology or policy.

## Required Courses

SOC 480. *Environmental Sociology (4)+ SOC 481. *Society and Natural Resources (4)+

## Elective Courses

ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)+
SOC 360. *Population Trends and Policy (4)+
SOC 454. *Leisure and Culture (4) (SS)+
SOC 456. *Science and Technology in a Social Context (4)+
SOC 475. Rural Sociology (4)+
SOC 499. Special Topics (related to community and demography) (1-16)
SOC 410. Internship Experience (1-4)
No more than two of the following elective courses can count toward the option:
ANTH 481. *Natural Resources and Community Values (3)+
GEO 420/GEOG 430. Resilience-Based
Natural Resource Management (3)
GEO 423/GEOG 450. Land Use in the
American West (3)
PHL 440. *Environmental Ethics (3) (HC)+
PHL 443. *World Views and Environmental
Values (3) (NC)+
PS 475. Environmental Politics and Policy (4)+

NR 455. Natural Resource Decision Making
(3)+ (on-campus section needs instructor approval)

## Total=21

Footnotes:

* Baccalaureate Core Course (BCC)
+ Also offered online via Ecampus
SS = College of Liberal Arts (social core)
HC = CLA (Humanities core)
NC = CLA (Non-Western core)
Option Code: 642


## UNDERGRADUATE MINORS

## ASIAN STUDIES MINOR

The minor program will provide an opportunity for students majoring in fields such as business, engineering, or sciences who will be working in Asia or with Asians. They will gain a significant degree of cultural literacy that will be critical for their professional success. In addition, the program will be an outstanding supplement to a traditional liberal arts major for students with particular interests in Asia, who want to study abroad, or who plan to go on to do graduate work in areas with concentrations in aspects of Asia.

## Required 27-28 credits

Select 19-20 credits from the
following (two disciplines):
ANTH 316. *Peoples of the World-South and Southeast Asia (3)
ANTH 318. *Peoples of the World-China
(3)

ANTH 319. *Peoples of the World-Japan and Korea (3)
ART 208. *Introduction to Asian Art (3)
ART 310. *Early Chinese Art and
Archaeology (3)
ART 311. *Late Chinese Art and Culture (3)
ART 313. *Art of Japan (3)
BA 347. International Business (4)
CHN 331, 332, 333. *Chinese Culture
$(3,3,3)$ [Terminated summer 2017]
ES 231. *Introduction to Asian American Studies (4)
ES 233. *Asian Pacific American Activism and Empowerment (4)
ES 332. Asian Pacific Americans and the Media (4)
GEOG 313. *Geography of Asia (3)
GEOG 330. *^Geography of International
Development and Globalization (3)
HST 391. *Traditional China and Japan (4)
HST 392. *Modern China and Japan (4)
HST 396. *Gender, Family and Politics in Traditional China (4)
HST 397. *Gender, Family and Politics in Modern China (4)
JPN 331, 332, 333. *Japanese Culture (3,3,3)
[Terminated summer 2017]
PHL 208. Introduction to Buddhist Traditions (4)
PHL 312. *Asian Thought (4)
PHL 315. *Gandhi and Nonviolence (4)
PHL 371. *Philosophies of China (4)
PS 348. *Chinese Politics (4)
PS 350. *Japanese Politics (4)
PS 356. International Politics Asia Pacific (4)
Select 8-9 credits from the following:
ANTH 488. *Business and Asian Culture (3)
HST 494. Modern Japan: A Cultural History (4)

HST 495. China in the Twentieth Century (4)

PHL 430. History of Buddhist Philosophy (4)

PHL 432. *Yoga and Tantric Traditions (4)
PS 446. East Asian Political Economy (4)
PS 457. US-China Relations (4)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 938

## ECONOMICS MINOR

Also available via Ecampus.
Students minoring in economics must complete a minimum of 27 credits with a GPA of at least 2.0 in their program of study. A maximum of two classes (8 credits) may be taken on an $\mathrm{S} / \mathrm{U}$ basis. Course requirements for the Economics minor:
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 311. Intermediate Microeconomic
Theory I (4)
or ECON 411. Advanced Microeconomic Theory (4)
Plus upper-division courses in economics (15)
Notes:

- ST 351, Introduction to Statistical

Methods, serves as a substitute for 4 credits of economics upper-division course work when ECON 424, Introduction to Econometrics, is part of the student's program.

- Students cannot receive credit toward the minor for both ECON 311 and ECON 411.
- Students are advised to consult with the Economics advisor before completing their course work.


## Footnote:

* Baccalaureate Core Course (BCC)


## Minor Code: 885

POLITICAL SCIENCE MINOR

## Also available via Ecampus.

The Political Science Program offers students the ability to augment their primary major by adding a minor in political science. Because politics and policy are relevant to all disciplines, understanding how your discipline interacts with political systems and policymaking can enhance any program of study and strengthen students' graduate school applications and resumes for future employment.

The structure of the Political Science minor mirrors that of the major. In both, there is a "general" program of study that provides a wide array of choices among courses, as well as three "tracks" that afford students the opportunity for specialization. All students in the minor must complete at least seven courses ( 28 credits), of which at least 3 courses ( 12 credits) must be taken at Oregon State University. Students must maintain a 2.0 GPA in their OSU courses. In addition, no more than four (4) credits from PS 401-PS 410 may count toward the minor.

## General Minor

To complete the general Political Science minor, students must take two introductory level courses (chosen from PS 201, PS 204, PS 205, and PS 206); and five upper-division (300- or 400-level) courses in political science.

## Minor Tracks

Students can select one of three concentrations in the minor: Law and Politics;International Affairs; or Environmental and Energy Politics. These tracks correspond to the options within the Political Science major.

To complete any of these tracks within the minor, students must take the two introductory courses for the track, and at least four courses from the list of upper-division courses in the track. One of these may be a non-political science course on the list. The fifth upper-division course may be a political science course on the list, or may be an upperdivision PS course not on the list.

## Law and Politics Track

Introductory Courses:
PS 201. *Introduction to United States Government and Politics (4)
PS 206. *Introduction to Political Thought (4)

## Upper-Division Courses:

PS 311. Congressional Politics (4)
PS 312. Presidential Politics (4)
PS 321. Constitutional Law: Government Powers and Constraints (4)
PS 322. *Constitutional Law: Civil Rights and Liberties (4)
PS 323. Constitutional Law: Rights of the Accused (4)
PS 325. *Gender and Law (4)
PS 326. Judicial Process and Politics (4)
PS 331. *State and Local Politics (4)
PS 361. Classical Political Thought (4)
PS 362. Modern Political Thought (4)
PS 363. *Gender and Race in American Political Thought (4)
PS 365. American Political Thought (4)
PS 370. *Science, Religion, and Politics (4)
PS 371. Public Policy Problems (4)
PS 372. Public Administration (4)
PS 375. *The Civil Rights Movement and Policies (4)
PS 454. International Law and Organizations (4)
PS 462. Theories of Law (4)
ECON 461. Law, Economics, and Regulation (4)

SOC 340. Deviant Behavior and Social Control (4)
SOC 438. US Immigration Issues in the 21st Century (4)
SOC 440. Juvenile Delinquency (4)
SOC 441. Criminology and Penology (4)
SOC 442. Sociology of Drug Use and Abuse (4)

SOC 448. Law and Society (4)

## Total $=\mathbf{2 8}$ credits

## International Affairs Track

## Introductory Courses:

PS 204. *Introduction to Comparative Politics (4)
PS 205. *Introduction to International Relations (4)

## Upper-Division Courses:

PS 340. Eastern and Central European Politics (4)
PS 341. *European and EU Politics (4)
PS 343. *Russian Politics (4)
PS 344. *Latin American Politics (4)
PS 345. *Politics of Developing Nations (4)
PS 348. *Chinese Politics (4)
PS 350. *Japanese Politics (4)
PS 351. American Foreign Policy (4)
PS 356. International Politics of Asia Pacific (4)
PS 441. Democratization (4)
PS 446. East Asian Political Economy (4)
PS 454. International Law and Organizations (4)
PS 455. *The Politics of Climate Change (4)
PS 457. US-China Relations (4)
PS 458. *International Political Economy (4)
PS 470. Global Food Politics and Policy (4)
PS 477. International Environmental
Politics and Policy (4)
ECON 340. International Economics (4)
ECON 440. Economics of Globalization (4)

ECON 441. International Finance Theory and Policy (4)
ECON 455. Economic Development (4)
SOC 360. *Population Trends and Policy (4)
SOC 460. The Sociology of Globalization (4)
SOC 466. International Development: Gender Issues (4)

## Total=28 credits

## Environmental and Energy Politics

 Track
## Introductory Courses:

PS 201. *Introduction to United States Government and Politics (4)
PS 205. *Introduction to International Relations (4)

## Upper-Division Courses:

PS 314. Interest Group Politics (4)
PS 331. *State and Local Politics (4)
PS 371. Public Policy Problems (4)
PS 372. Public Administration (4)
PS 374. *Sustainable Living: Practices and
Policies (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 455. *The Politics of Climate Change (4)
PS 461. Environmental Political Theory (4)
PS 470. Global Food Politics and Policy (4)
PS 473. US Energy Policy (4)
PS 475. Environmental Politics and Policy (4)
PS 476. *Science and Politics (4)
PS 477. International Environmental
Politics and Policy (4)
PS 478. Renewable Energy Policy (4)
ECON/AEC 352. Environmental Economics and Policy (3)
ECON 466. ${ }^{\wedge}$ Economics of Traditional and Renewable Energy (4)
SOC 381. Social Dimensions of
Sustainability (4)
SOC 456. *Science and Technology in Social Context (4)
SOC 475. Rural Sociology (4)
SOC 480. Environmental Sociology (4)
SOC 481. Society and Natural Resources (4)
SOC/ANS/FES/FW 485. *Consensus and Natural Resources (3)

## Total=28 credits

Minor Code: 960

## SOCIOLOGY MINOR

## Also available via Ecampus.

Undergraduate students may elect a Sociology minor to complement course work in their major discipline. The Sociology minor also is available through Extended Campus (Ecampus).
Transfer students may apply a maximum of 12 credits of lower-division sociology credits toward the Sociology minor.
A minimum GPA of 2.00 must be earned in sociology course work.

## Core (7)

SOC 204. *Introduction to Sociology (3)
(Prerequisite to all upper-division courses)
Select one theory or methods course

## from the following:

SOC 340. Deviant Behavior and Social Control (4)
SOC 418. Qualitative Research Methods (4)
SOC 424. Social Psychology (4)

SOC 426. *Social Inequality (4)+
SOC 450. Sociology of Education (4)+
SOC 452. Sociology of Religion (4)
SOC 456. *Science and Technology in Social Context (4)+
A maximum of 12 credits of lower-division courses.
A maximum of 3 credits from SOC 401 to SOC 410.
Additional sociology courses as necessary to total 27 credits.

## Total=27

## Footnotes:

* Baccalaureate Core Course (BCC)
+ Also offered online via Ecampus


## Minor Code: 980

## PUBLIC POLICY (MPP, PhD)

Graduate Areas of Concentration
Energy policy; environmental policy; international policy; law, crime, and policy; rural policy; science and technology policy; social policy

## Also available via Ecampus at the

 master's level only.Oregon State University offers graduate programs in public policy to students interested in energy policy; environmental policy; international policy; law, crime, and policy; rural policy; science and technology policy; and/or social policy. The degrees are granted by the College of Liberal Arts and provide graduate education for students wishing to develop their interests and careers in the public and nonprofit sectors. The Master of Public Policy (MPP) specifically prepares students for careers in domestic and international organizations or preparation for PhD studies. The PhD in Public Policy prepares students for academic or nonacademic research careers in the public, private, and nongovernmental sectors. The Public Policy Graduate Program accepts students with backgrounds in related academic disciplines. The degrees are designed to provide individuals with analytic skills, an understanding of public policy processes, and substantive knowledge in a specific policy area.
To see details outlined in a brochure, go http://liberalarts.oregonstate.edu/spp/ graduate-programs-public-policy

For more information, contact:
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Major Code: 9570

## GRADUATE MINORS

## POLITICAL SCIENCE GRADUATE MINOR

## Graduate Areas of Concentration

American politics, judicial politics, public administration, political theory, state and local government, international relations, comparative politics, gender politics, environmental policy
Graduate work in Political Science may serve as a field of study for a Master of Arts in Interdisciplinary Studies (MAIS) degree or as a minor in other advanced degree programs. The political science program aims to provide a systematic understanding of political processes, institutions, theories, and behavior. Students are encouraged to acquire competence in statistics as aids to analyzing political phenomena.
Students may choose the "generic" graduate minor, which simply requires 16 credits of graduate course work in political science for Master's students and 20 credits for doctoral students. Or, students may choose one of two tracks within the minor: Environmental and Energy Politics; and International Politics. Students pursuing a track may choose any of the political science courses listed for that track. Students may also count one of the non-political science courses listed under the track toward the political science graduate minor.
For the generic graduate minor in political science, no specific courses are required. Master's students must take 16 credits of graduate course work in political science, and PhD students must take 20 credits. Any combination of graduate political science courses will satisfy this requirement, but a maximum of 4 credits from PS 501-510 may be counted toward the minor.
For one of the two tracks, Master's students must choose four (4) courses from the list of courses for the track, at least three (3) being from political science; and PhD students much choose five (5) courses, at least four (4) being from political science. Students may take one non-political science course on the list, and may also count up to 4 credits from PS 501-510 toward the option.

## Environmental and Energy Politics Track

## Political Science Courses

PS 549. Topics in Comparative Politics (4)
PS 555. The Politics of Climate Change (4)
PS 570. Global Food Politics and Policy (4)
PS 573. US Energy Policy (4)
PS 575. Environmental Politics and Policy (4)
PS 576. Science and Politics (4)
PS 577. International Environmental
Politics and Policy (4)
PS 578. Renewable Energy Policy (4)

## Non-Political Science Courses

ECON 566. Economics of Traditional and Renewable Energy (4)
PPOL 545. International Marine Policy (4)
PPOL 546. The Policy and Law of United States Coastal Governance (4)
PPOL 547. Integrated Policy: Food, Energy,
Water, Climate (4)
PPOL 548. Marine Policy in the United States (4)
SOC 580. Environmental Sociology (4)
SOC 581. Society and Natural Resources (4)
SOC 585. Consensus and Natural Resources (4)

## International Politics Track

Political Science Courses
PS 541. Democratization (4)
PS 546. East Asian Political Economy (4)
PS 549. Topics in Comparative Politics (4)
PS 555. The Politics of Climate Change (4)
PS 557. US-China Relations (4)
PS 558. International Political Economy (4)
PS 570. Global Food Politics and Policy (4)
PS 577. International Environmental
Politics and Policy (4)

## Non-Political Science Courses

ECON. 540 Economics of Globalization (4)
ECON 541. International Finance Theory and Policy (4)
ECON 555. Economic Development (4)
ECON 640. International Trade and Economic Growth (4)
PPOL 545. International Marine Policy (4)
SOC 560. The Sociology of Globalization (4)
SOC 566. International Development: Gender Issues (4)

## Minor Code: 9600

## SOCIOLOGY GRADUATE MINOR

Graduate Areas of Concentration
Environmental and natural resources, international sociology, social policy
Sociology in the School of Public Policy serves as a minor field in the Master of Arts in Interdisciplinary Studies degree program and participates as a minor field in other advanced degree programs. The MAIS program is designed to meet the particular needs and interests of the individual student and features collaborative work in any two other pertinent departments. Further information can be obtained by writing the School of Public Policy, 307 Fairbanks Hall, OSU, Corvallis, OR 97331-3703.

## Minor Code: 9800

## ■ ECONOMICS COURSES

ECON 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
ECON 201. *INTRODUCTION TO
MICROECONOMICS (4). An introduction to microeconomic principles including the study of price theory, economic scarcity, consumer behavior, production costs, the theory of the firm, market structure, and income distribution. Other selected topics may include market failure international economics, and public finance. (SS) (Bacc Core Course) PREREQS: MTH 111 or equivalent is recommended.

## ECON 202. *INTRODUCTION TO

MACROECONOMICS (4). An introduction to macroeconomic principles including study of the theories of output determination, consumption, investment, inflation, unemployment, and fiscal and monetary policy. Other selected topics may include the study of the international balance of payments, growth and development, and urban and regional problems. (SS) (Bacc Core Course) PREREQS: MTH 111 or equivalent is recommended.

ECON 311. INTERMEDIATE MICROECONOMIC
THEORY (4). An examination of demand theory, production and cost theory, game theory, behavioral economics, competitive and imperfectly competitive markets, and general equilibrium and welfare economics. ECON 311 and ECON 411 cannot both be taken for credit toward the economics major. PREREQS: ECON 201 [D-] or ECON 201H [D-]
ECON 312. INTERMEDIATE MICROECONOMIC
THEORY II (4). An examination of the theories of imperfect competition, input markets, general equilibrium, and welfare economics. PREREQS: ECON 311 [D-]

ECON 315. INTERMEDIATE MACROECONOMIC
THEORY (4). An examination of macroeconomic aggregates, income determination, aggregate demand and supply. The basic macroeconomic models will be discussed such as Keynesian, Classical, Monetarist, and Neo-Classical. ECON 315 and ECON 415 cannot both be taken for credit toward the Economics major. PREREQS: (ECON 201 [D-] or ECON 201H [D-] ) and (ECON 202 [D-] or ECON 202H [D-] )
ECON 316. INTERMEDIATE MACROECONOMIC
THEORY II (4). An examination of individual sectors of the macro economy, including theories of consumption, investment, money demand and money supply; an introduction to economic growth, open economy macroeconomics, and monetary and fiscal policy issues. PREREQS: ECON 315

## ECON 329. INTRODUCTION TO

MATHEMATICAL ECONOMICS (4). Mathematical methods of economic analysis. Theory of economic structure and optimization developed through calculus and linear algebra, dynamic systems analyzed through integral calculus and difference and differential equations. The mathematical tools are developed in conjunction with their application to economic problems. Some acquaintance with calculus recommended. PREREQS: (ECON 201 [D-] or ECON 201H [D-] ) and (ECON 202 [D-] or ECON 202H [D-] ) and (MTH 241 [D-] or MTH 251 [D-] or MTH 251H [D-] )

ECON 330. MONEY AND BANKING (4). Nature and functions of money; functions and operations of depository institutions; the money market; central banking and monetary policy. (SS) PREREQS: (ECON 201 [D-] or ECON 201H [D-] ) and (ECON 202 [D-] or ECON 202H [D-] )
ECON 340. INTERNATIONAL ECONOMICS (4). An overview of international economics with an emphasis on current events and applications, including classical and modern trade theory and the study of trade and exchange-rate policies. (SS) (See Schedule Comment regarding Bacc Core status.) PREREQS: (ECON 201 [D-] or ECON 201H [D-] ) and (ECON 202 [D-] or ECON 202H [D-] )
ECON 350. FINANCIAL ECONOMICS (4).
Discusses how various securities meet the needs of different economic agents and the efficiency of financial markets in meeting those needs. Topics include interest rates, valuation, investment risk, trading and market structure, arbitrage, market efficiency, debt markets, equity markets, and financial derivatives. PREREQS: ECON 201 [D-] and ECON 202 [D-]
ECON 352. *ENVIRONMENTAL ECONOMICS AND POLICY (3). Provides an overview of the interrelationships between economic activity, the
environment, and public policy. Through case studies, discussion groups, readings, and group activities, students learn how economists define and analyze environmental problems and the types of policies they advocate for managing environmental quality. CROSSLISTED as AEC 352. (Bacc Core Course) PREREQS: AEC 250 [D-] or AREC 250 [D-] or ECON 201 [D-] or ECON 201H [D-]

## ECON 383. *THE ECONOMICS OF

DISCRIMINATION (4). An economic analysis of discrimination, focusing on labor market inequities for women and minorities. Historical and current trends in pay, education, and employment disparities, economic explanations for such disparities, and econometric evidence for wage and employment discrimination. (SS) (Bacc Core Course) PREREQS: ECON 201 [C-] or ECON 201H [C-]

ECON 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

ECON 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Honors College approval required.
ECON 401. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECON 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ECON 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECON 405. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECON 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ECON 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

ECON 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECON 410. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECON 411. ADVANCED MICROECONOMIC THEORY (4). Rigorous treatment of optimizing behavior of economic agents and markets. Examines utility maximization and demand; cost minimization, profit maximization and supply; perfect competition and monopoly; imperfect competition and game theory; and general equilibrium, social welfare and market failure using sophisticated mathematical tools. Students cannot receive credit toward the major for both ECON 311 and ECON 411. PREREQS: (ECON 201 [D-] or ECON 201H [D-] ) and (MTH 241 [D-] or MTH 251 [D-] or MTH 251H [D-] )
ECON 414. BEHAVIORAL ECONOMICS (4).
Economic analysis of the effects of social, cognitive, and emotional factors on individual decision making and their implications for market outcomes and policy making. Topics include time inconsistency, decision making under risk, cognitive dissonance, heuristics, social preferences, and experimental economics. PREREQS: (ECON 311 [D-] or ECON 411 [D-] )

## ECON 415. ADVANCED MACROECONOMIC

 THEORY (4). Macroeconomics as an application of general equilibrium theory. Macroeconomic models are developed taking preferences and technology as primitives. The models' short and long run predictions are analyzed and compared to the data. The welfare implications of fiscal and monetary policy are discussed. ECON 315 and ECON 415 cannot both be taken for credit towardthe major. PREREQS: (ECON 201 [D-] or ECON 201H [D-] ) and (ECON 202 [D-] or ECON 202H [D-] ) and (MTH 241 [D-] or MTH 251 [D-] or MTH 251H [D-] )
ECON 420. GAME THEORY (4). Systematically studies strategic interactions among multiple decision makers with applications in economics, politics, sociology, law, computer science, sports, and biology. Topics taught include static, sequential, and repeated games of perfect and imperfect information. PREREQS: ECON 311 [D-] or ECON 411 [D-]
ECON 423. ECONOMETRICS I (4). Introduction to probability and statistics with an emphasis on estimation and hypothesis testing. Applications to economic models. PREREQS: MTH 241 [D-] or MTH 251 [D-] or MTH 251H [D-]

## ECON 424. INTRODUCTION TO

ECONOMETRICS (4). Application of statistical techniques, including sampling theory, hypothesis testing, and multiple regression analysis, to economic models. Economic modeling, analysis of economic data, and policy analysis are emphasized. ECON 424 and ECON 427 cannot both be taken for credit toward the major. Lec/lab. PREREQS: (ECON 311 [C] or ECON 411 [C]) and (ST 351 [C] or ST 351H [C] or ECON 423 [C] )
ECON 427. ECONOMETRICS II (4). Addresses both the theory and practice of econometrics, including properties of estimators, modeling economic processes, estimation, hypothesis testing, prediction and interpretation of results. Students cannot receive credit toward the major for both ECON 424 and ECON 427. Lec/lab. PREREQS: (ECON 311 [C] or ECON 411 [C] ) and ECON 423 [C]
ECON 428. ^INTRODUCTION TO ECONOMIC
RESEARCH (4). Basic methods of economic research: concepts and models; data sources, collection, and presentation; hypothesis formulation and testing; policy analysis. Written assignments apply methods. (Writing Intensive Course) PREREQS: ECON 311 [C-] or ECON 315 [C-]
ECON 435. PUBLIC ECONOMICS (4).
Composition and growth of government spending; theory of public expenditure; analysis of public expenditure programs; benefit-cost analysis; theory and practice of taxation; analysis of local, state, and federal taxes; government borrowing and fees; current issues in tax and expenditure policy. PREREQS: ECON 311 [C-] or ECON 411 [C-]
ECON 439. ^PUBLIC POLICY ANALYSIS (4).
Theory of public problems and decision making.
Evaluation of public policy strategies, selected
public programs and individual public projects considering the full range of efficiency and equity effects. Direct and indirect impacts of policy, strength of implicit incentives, administrative feasibility, and problems of policy implementation. (Writing Intensive Course) PREREQS: ECON 311 [D-] or ECON 411 [D-]
ECON 440. ECONOMICS OF GLOBALIZATION
(4). Examination of the phenomenon of globalization using economic analysis to explore controversial themes of the globalization debate-offshoring, sweatshops, child labor, environmental standards, intellectual property protection, cultural diversity, economic development, immigration, and governance. PREREQS: ECON 311 [D-]

## ECON 441. INTERNATIONAL FINANCE

THEORY AND POLICY (4). Theories and policies of exchange rate regimes; fixed, floating and managed floats; internal and external trade and capital balances; international capital flows and institutions. PREREQS: ECON 315
ECON 455. ECONOMIC DEVELOPMENT (4).
History, theories and policies for economic development in the Third World of underdeveloped countries. (SS) PREREQS: (ECON 201 or ECON 201) and (ECON 202 or ECON 202H)

ECON 460. INDUSTRIAL ORGANIZATION
THEORY AND POLICY (4). The study of the causes and effects of firm and market structures, conduct, and performance; United States antitrust and other laws regulating business behavior. PREREQS: ECON 311 [D-]
ECON 461. LAW, ECONOMICS, AND
REGULATION (4). The analysis of the effectiveness of laws and government regulations in fostering economic efficiency and fairness. Topics include the design of laws and policies to promote social welfare and the study of the effectiveness of criminal law, antitrust law, and the government regulation of business in promoting social goals. PREREQS: ECON 201 [D-] or ECON 201H [D-]
ECON 462. MANAGERIAL ECONOMICS (4).
The application of microeconomic theory and quantitative methods to management decisions. Case-oriented course emphasizing actual business decisions. PREREQS: ECON 311 [D-] or ECON 411 [D-]
ECON 463. EFFICIENCY AND PRODUCTIVITY
ANALYSIS (4). Workshop on the theory and measurement of performance, especially efficiency and productivity. Emphasis on application including introduction to user-friendly software. PREREQS: ECON 311 [C] or ECON 411 [C]
ECON 465. TRANSPORTATION ECONOMICS
(4). Demand, supply, and pricing for transport facilities, (airports, ports) right of way (highways, waterways), including optimal user fees, congestion tolls, and second-best pricing schemes. Theories of economic regulation and evaluation of experience in the transport sector PREREQS: ECON 311
ECON 466. ^ECONOMICS OF TRADITIONAL AND RENEWABLE ENERGY (4). Reviews and analyzes the economics and structure of world markets for various traditional energy (e.g., oil, coal, natural gas), as well as renewable energy (wind, geothermal and solar) with the latter focusing on the Pacific Northwest electrical industry structure and regulatory framework. (Writing Intensive Course) PREREQS: (ECON 201 [D-] or ECON 201H [D-] )
ECON 480. LABOR ECONOMICS AND SOCIAL POLICY (4). Interaction of workers and firms in labor markets, social policy and its effects on labor markets, human capital theory and education policy, discrimination and other sources of wage differentials, immigration, unemployment, inequality. PREREQS: ECON 311 [D-] or ECON 411 [D-] and /or equivalent such as ECON 517 Microeconomics for MPP students

ECON 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits PREREQS: ECON 311 or ECON 411

ECON 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECON 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Departmental approval required.
ECON 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
ECON 505. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ECON 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECON 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
ECON 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.

ECON 512. MICROECONOMIC THEORY I (4)
Economic theories of consumer behavior and demand, production, cost, the firm, supply, and competitive and monopoly market structures. PREREQS: ECON 312
ECON 513. MICROECONOMIC THEORY II (4). Economic theories of imperfect competition, input markets, general equilibrium and welfare economics. PREREQS: ECON 512

ECON 514. BEHAVIORAL ECONOMICS (4). Economic analysis of the effects of social, cognitive, and emotional factors on individual decision making and their implications for market outcomes and policy making. Topics include time inconsistency, decision making under risk, cognitive dissonance, heuristics, social preferences, and experimental economics. PREREQS: ECON 311 or ECON 411
ECON 515. MACROECONOMIC THEORY I (4). Determination of income, employment, and prices in classical, Keynesian, monetarist, and new classical macroeconomic models. Theories of consumption, investment, money demand, and money supply. Monetary and fiscal policies, the role of expectations. PREREQS: ECON 315 or equivalent
ECON 517. MICROECONOMIC THEORY FOR MPP (4). Familiarizes MPP students who do not have a strong background in microeconomics with the material they will need for their future economics course work. PREREQS: Working knowledge of algebra and geometry.
ECON 520. GAME THEORY (4). Systematically studies strategic interactions among multiple decision makers with applications in economics, politics, sociology, law, computer science, sports, and biology. Topics taught include static, sequential, and repeated games of perfect and imperfect information. PREREQS: ECON 311 or ECON 411
ECON 523. STATISTICS FOR ECONOMETRICS
4). Examines mathematical and statistical topics essential for graduate-level econometric analysis, including matrix algebra, probability and distribution theory (emphasizing joint and conditional distributions), statistical inference, and econometric optimization algorithms. PREREQS: MTH 253 and (ST 351 or ST 351H) and (ST 352 or ECON 424 or ECON 524)

## ECON 524. INTRODUCTION TO

ECONOMETRICS (4). Application of statistical techniques, including sampling theory, hypothesis testing, and multiple regression analysis, to economic models. Economic modeling, analysis of economic data, and policy analysis are emphasized. PREREQS: (ECON 311 or ECON 411 or ECON 517) and (ST 351 or ST 351 H or ECON 423)
ECON 525. ECONOMETRIC METHODS (4).
The use of multiple regression under generalized assumptions, specification problems, an introduction to simultaneous equation estimation, the classical linear model using matrices. Emphasis on the analysis of data and communication of findings. PREREQS: ECON 523 [C] and (ECON 424 or ECON 524) and ECON 512

ECON 526. APPLIED ECONOMETRICS (4).
Model building, hypothesis testing, and appropriate estimation procedures including generalized least squares, seemingly unrelated regressions, simultaneous equations, maximum likelihood, and limited dependent variables. Emphasis on applications and interpretation of results. PREREQS: ECON 525

ECON 535. PUBLIC ECONOMICS (4).
Composition and growth of government spending; theory of public expenditure; analysis of public expenditure programs; benefit-cost analysis; theory and practice of taxation; analysis of local, state, and federal taxes; government borrowing and fees; current issues in tax and expenditure policy. PREREQS: ECON 311 or ECON 411

ECON 539. PUBLIC POLICY ANALYSIS (4).
Theory of public problems and decision making Evaluation of public policy strategies, selected public programs and individual public projects considering the full range of efficiency and equity effects. Direct and indirect impacts of policy, strength of implicit incentives, administrative feasibility, and problems of policy implementation. PREREQS: ECON 311 and ECON 435 or equivalent
ECON 540. ECONOMICS OF GLOBALIZATION
4). Examination of the phenomenon of globalization using economic analysis to explore controversial themes of the globalization debate-offshoring, sweatshops, child labor, environmental standards, intellectual property protection, cultural diversity, economic development, immigration, and governance. PREREQS: ECON 311

ECON 541. INTERNATIONAL FINANCE
THEORY AND POLICY (4). Theories and policies of exchange rate regimes; fixed, floating and managed floats; internal and external trade and capital balances; international capital flows and institutions. PREREQS: ECON 315
ECON 555. ECONOMIC DEVELOPMENT
(4). History, theories and policies for economic development in the Third World of underdeveloped countries. PREREQS: (ECON 201 or ECON 201 H ) and (ECON 202 or ECON 202H) ECON 560. INDUSTRIAL ORGANIZATION THEORY AND POLICY (4). The study of the causes and effects of firm and market structures, conduct, and performance; United States antitrust and other laws regulating business behavior.
PREREQS: ECON 311
ECON 561. LAW, ECONOMICS, AND
REGULATION (4). The analysis of the effectiveness of laws and government regulations in fostering economic efficiency and fairness. Topics include the design of laws and policies to promote social welfare and the study of the effectiveness of criminal law, antitrust law, and the government regulation of business in promoting social goals. PREREQS: ECON 201 or ECON 201H

ECON 562. MANAGERIAL ECONOMICS (4).
The application of microeconomic theory and quantitative methods to management decisions. Case-oriented course emphasizing actual business decisions. PREREQS: ECON 311 or ECON 411
ECON 563. EFFICIENCY AND PRODUCTIVITY
ANALYSIS (4). Workshop on the theory and measurement of performance, especially efficiency and productivity. Emphasis on application including introduction to user-friendly software. PREREQS: ECON 311 or ECON 411

## ECON 565. TRANSPORTATION ECONOMICS

(4). Demand, supply, and pricing for transport facilities, (airports, ports) right of way (highways, waterways), including optimal user fees, congestion tolls, and second-best pricing schemes. Theories of economic regulation and evaluation of experience in the transport sector PREREQS: ECON 311
ECON 566. ECONOMICS OF TRADITIONAL AND RENEWABLE ENERGY (4). Reviews and analyzes the economics and structure of world markets for various traditional energy (e.g., oil, coal, natural gas), as well as renewable energy (wind, geothermal and solar) with the latter focusing on the Pacific Northwest electrical industry structure and regulatory framework. PREREQS: ECON 201 or ECON 201H

ECON 570. MACROECONOMIC THEORY I (4). Introduction to dynamic macroeconomic theory, including a review of Keynesian models, continuous and discrete time programming, Solow Ramsey, and endogenous growth models, and real business cycle theory. PREREQS: ECON 315 or equivalent.

ECON 580. LABOR ECONOMICS AND SOCIAL POLICY (4). Interaction of workers and firms in labor markets, social policy and its effects on labor markets, human capital theory and education policy, discrimination and other sources of wage differentials; immigration, unemployment, inequality. PREREQS: ECON 311 or ECON 411 or equivalent such as ECON 517 Microeconomics for MPP students
ECON 601. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECON 602. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ECON 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
ECON 605. READING AND CONFERENCE
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECON 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECON 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ECON 610. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.
ECON 640. INTERNATIONAL TRADE AND
ECONOMIC GROWTH (4). Issues of international trade in the contemporary world, including protection with perfect and imperfect competition, political economy of protection and multilateral trade negotiations, international factor movements, economic integration, and international debt. Analysis of the effects of endogenous innovation and growth on world trade. PREREQS: ECON 513 and ECON 526 and ECON 540

## ■ MASTER OF PUBLIC POLICY COURSES

MPP 507. SEMINAR (1-16). Selected issues concerning government, public policy, public affairs or non-profit organizations. This course is repeatable for a maximum of 16 credits. PREREQS: MPP Director approval required.
MPP 510. INTERNSHIP (1-16). Supervised work experience in government, public policy, public affairs or non-profit organizations. Reports and appraisals required. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: MPP Director approval required.
MPP 808. WORKSHOP (1-16). This course is repeatable for a maximum of 32 credits.

## ■ PUBLIC POLICY COURSES

PPOL 441. *ENERGY AND SOCIETY (4). Explores the complex interrelationships between humans and energy, emphasizing the role of energy in critical social issues, including but not limited to: domestic and international conflict, poverty, social change, inter-generational equity, energy transitions and environmental justice. (Bacc Core Course)
PPOL 446. THE POLICY AND LAW OF U.S. COASTAL GOVERNANCE (4). Examines federal and state policy, legislative and judicial protections of public beach access; ownership and use of tide and submerged lands, including the public trust doctrine; wetland conservation; and the Federal Coastal Zone Management Act. This course is intended to equip future environmental and natural resource professionals with a foundation in US coastal management, especially areas where new professionals will be very involved (coastal development, offshore/alternative energy, and sea level rise/storm hazards). The format includes
reading, discussion, and student presentations. Readings will be drawn from the textbook; additional readings will be posted on Canvas.
PPOL 447. INTEGRATED POLICY: FOOD,
ENERGY, WATER, CLIMATE (4). Environmental decisions include trade-offs. Policy choices for sustainably providing Earth's eight billion people with food, energy, and water are urgently needed. Policy sectors (such as food) risk outcomes that are not beneficial, and impose long-term costs and potential catastrophic climate burdens. This transdisciplinary course examines emerging integrated policies concerning provision of food, energy, and water and their relationship to climate

PPOL 448. MARINE POLICY IN THE UNITED STATES (4). Introduces students to the history, rationale, achievements, and gaps in American ocean policy. Students will acquire foundationa tools of policy analysis and problem solving, and will synthesize and apply their knowledge creatively in order to propose integrated policy solutions to specific contemporary marine issues.
PPOL 501. RESEARCH AND SCHOLARSHIP (1-12). Graded $P / N$. This course is repeatable for a maximum of 99 credits. PREREQS: Faculty permission.
PPOL 505. READING AND CONFERENCE (1-4).
This course is repeatable for a maximum of 16 credits. PREREQS: Faculty permission.

PPOL 507. SEMINAR (1-4). This course is repeatable for a maximum of 16 credits. PREREQS: Faculty permission.
PPOL 510. INTERNSHIP (1-12). Supervised work experience in government, public policy, public affairs or non-profit organizations. Reports and appraisals required. Graded P/N. This course is repeatable for a maximum of 12 credits. PREREQS: Public Policy Graduate Director approval required.
PPOL 511. PUBLIC ORGANIZATIONS AND LEADERSHIP (4). Provides an historical overview of developments in, and theories associated with, the organization and control of public organizations. Students will critically examine various influential models of bureaucracy, while also learning about the strengths and weaknesses of emergent forms of bureaucratic organization, including networks, public-private partnerships, collaboration, and governance. The course also explores different theories of leadership, assisting students in the development of their own authentic leadership style, and thinking through the application of such theories and styles to the real world of public organization leadership, especially in the fragmented, decentralized, complex, and uncertain contemporary environment of networks, partnerships, and governance.
PPOL 521. UNDERSTANDING SOCIAL RESEARCH (4). Study of basic concepts and principles of qualitative and quantitative social research, including selection of general strategies and specific designs, conceptual and operational measurement, sample selection, data collection, data processing and analysis techniques, interpretation and reporting. Utilizes reports of social research in scholarly journals, popular media, and agency documents. Emphasis on critical evaluation and interpretation.
PPOL 522. CONDUCTING SOCIAL RESEARCH (4). Reviews concepts and principles covered in SOC 415 with emphasis on actual experiences in using techniques of social research and gaining greater depth of knowledge and skill. Assignments involve practicing techniques used in various phases of the research process, including both qualitative field observation and computerized processing and analysis of quantitative information. Individual or group research projects will be required. PREREQS: PPOL 521 [C] and PPOL 521
PPOL 523. QUALITATIVE RESEARCH
METHODS (4). An introduction to the theory and methods of qualitative research. Students will be
exposed to various qualitative research methods through practical field exercises. These include ethnographic field observation, content analysis, interviewing, focus groups and unobtrusive measures. Other commonly used methods of collecting qualitative data are also examined. PREREQS: SOC 204 or SOC 204H

PPOL 524. APPLIED RESEARCH METHODS
(4). Application of sociological theory, concepts, and methods. Topics vary but may include program evaluation, social impact assessment, policy analysis, focus group research, survey research, among others. PREREQS: SOC 204 or SOC 204 H and at least one upper-division course in sociology.
PPOL 541. ENERGY AND SOCIETY (4).
Explores the complex interrelationships between humans and energy, emphasizing the role of energy in critical social issues, including but not limited to: domestic and international conflict, poverty, social change, inter-generational equity, energy transitions and environmental justice.
PPOL 544. COLLABORATIVE GOVERNANCE (4). Explores and develops the norms, rules, institutional design, decision-making dynamic, and politics of collaborative governance arrangements for complex natural resource problem settings. Designed to bring together traditional adversaries, government agencies, and citizens to resolve and improve management of collective public problems, collaborative governance for natural resources is now an important problem-solving tool that is employed in thousands of communities, watersheds, and landscapes around the world.
PPOL 545. INTERNATIONAL MARINE POLICY (4). Explores the institutional, political and legal factors that impact international marine policy with an emphasis on the United Nations Law of the Sea Convention. Additional topics include marine resource exploitation, climate change, and national security issues as they pertain to the world's oceans, coasts, and national policies. This course is repeatable for a maximum of 16 credits.
PPOL 546. THE POLICY AND LAW OF UNITED STATES COASTAL GOVERNANCE (4). Examines federal and state policy, legislative and judicial protections of public beach access; ownership and use of tide and submerged lands, including the public trust doctrine; wetland conservation; and the Federal Coastal Zone Management Act. This course is intended to equip future environmental and natural resource professionals with a foundation in US coastal management, especially areas where new professionals will be very involved (coastal development, offshore/alternative energy, and sea level rise/storm hazards). The format includes reading, discussion, and student presentations. Readings will be drawn from the textbook; additional readings will be posted on Canvas.

PPOL 547. INTEGRATED POLICY: FOOD, ENERGY, WATER, CLIMATE (4). Environmental decisions include trade-offs. Policy choices for sustainably providing Earth's eight billion people with food, energy, and water are urgently needed. Policy sectors (such as food) risk outcomes that are not beneficial, and impose long-term costs and potential catastrophic climate burdens. This transdisciplinary course examines emerging integrated policies concerning provision of food, energy, and water and their relationship to climate.

## PPOL 548. MARINE POLICY IN THE UNITED

 STATES (4). Introduces students to the history, rationale, achievements, and gaps in American ocean and coastal policy. Students will acquire foundational tools of policy problem solving, critique, and analysis, and will synthesize and apply their knowledge creatively to propose integrated policy solutions to specific contemporary marine issues.PPOL 551. HIGHER EDUCATION POLICY (4). An introduction to policy issues in the area of higher education and exploration of possible tensions within the policy goals of quality,
equity, access and outcomes. Students will gain knowledge of the key pieces of legislation and constitutional law governing higher education policy at both federal and state levels, as well as an overview of the relevant research in this area. Begins with a short historical introduction to the U.S. higher education system and concludes with a discussion of its competing demands and functions.
PPOL 552. INTERNATIONAL COMPARATIVE RURAL POLICY (4). Examines and compares the role of rural policy in different cultural, political and administrative contexts at the international, national, state, regional and local levels. The course also provides the opportunity to study the nature and implications of new forms of governance in rural contexts in North America and Europe.
PPOL 599. SPECIAL TOPICS (1-4). This course is repeatable for a maximum of 16 credits. PREREQS: Faculty permission.

PPOL 602. INDEPENDENT STUDY (1-4). This course is repeatable for a maximum of 16 credits. PREREQS: Faculty permission.
PPOL 603. THESIS (1-12). This course is repeatable for a maximum of 999 credits.
PREREQS: Faculty permission.
PPOL 607. SEMINAR (1-4). This course is repeatable for a maximum of 16 credits.
PPOL 609. PRACTICUM (1-12). This course is repeatable for a maximum of 24 credits. PREREQS: Faculty permission.

PPOL 613. ADVANCED POLICY THEORY I (4). First of two-class series introducing a comprehensive review of public policy theory focused on examining theoretical approaches to understanding the complex and contentious assumptions and premises that pose challenges to the way we conduct public policy. PREREQS: PhD standing.
PPOL 614. ADVANCED POLICY THEORY II (4). Second course in a two-course series providing a comprehensive review of public policy theory. The course examines theoretical approaches to understanding the complex and contentious assumptions and premises that pose challenges to the way we conduct public policy.
PPOL 621. ADVANCED QUANTITATIVE
METHODS (4). Methods used in research in the social sciences, focused on causal inference in public policy contexts. Covers methods used at the frontier of research to estimate the causal effect of policies on outcomes, including instrumental variables, regression discontinuity, and difference-in-differences estimation. PREREQS: ECON 524 or equivalent
PPOL 622. ADVANCED POLICY ANALYSIS (4). Introduction to advanced quantitative modeling used in policy analysis, with an emphasis on the application of modeling techniques to research papers. Focus is predominantly on counts and zero-truncated modeling, time series, and panel regression. PREREQS: ((SOC 516 [B+] and ECON 524 [B+] ) or PPOL 621 [C+] or (AEC 523 [C+] and AEC 525 [C+] ))
PPOL 628. ADVANCED QUALITATIVE METHODS (4). Focus on epistemological approaches, research design, data analysis techniques and critiques of qualitative research, with emphasis on participant observation and interviewing. Culminates in the written and oral presentation of a qualitative research proposal, including preliminary results from fieldwork conducted during the course. PREREQS: ANTH 591 [C] or HDFS 538 [C] or SOC 518 [C] and PhD standing or permission of instructor.

PPOL 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

- POLITICAL SCIENCE COURSES

PS 110. *GOVERNING AFTER THE ZOMBIE
APOCALYPSE (3). Constitution-writing in a postapocalyptic world. Students write a constitution that addresses issues of difference, power, and discrimination. (Bacc Core Course)

## PS 126. INTRODUCTION TO LAW AND

POLITICS (3). Introductory course to the Summer Pre-Law Series. Topics include role of courts and lawyers in society, basic judicial process, and pre-law advising. Conducted via Ecampus Canvas portal. Graded P/N.
PS 201. *INTRODUCTION TO UNITED STATES GOVERNMENT AND POLITICS (4). Description and analysis of American politics and government including such topics as interest groups, parties, elections, media, the presidency, Congress, the Constitution, and the courts. (SS) (Bacc Core Course)
PS 204. *INTRODUCTION TO COMPARATIVE POLITICS (4). Major concepts of comparative politics applied to various political settings; the United States, Western Europe, Communist regimes, and developing countries. (SS) (Bacc Core Course)
PS 205. *INTRODUCTION TO INTERNATIONAL
RELATIONS (4). Analysis of the international system and factors affecting world politics. (SS) (Bacc Core Course)

PS 206. *INTRODUCTION TO POLITICAL
THOUGHT (4). Introduction to political philosophy. Major ideas and issues of selected political thinkers. (H) (Bacc Core Course)
PS 299. SPECIAL STUDIES (1-4). This course is repeatable for a maximum of 4 credits.
PS 300. ^RESEARCH METHODS (4). Qualitative and quantitative approaches to the study of political phenomena. The role of values, theory, hypothesis, data collection, and analysis in evaluating and conducting political science research. (Writing Intensive Course)
PS 311. CONGRESSIONAL POLITICS (4). Congressional politics, both on Capitol Hill and in the district, including campaigns, constituent relations, lobbying, legislating, and the legislature in democratic theory.
PS 312. PRESIDENTIAL POLITICS (4).
Office, powers, and politics of the American presidency, with reference to other executive offices in American government; emphasis on the importance and effect of the presidency in American politics.
PS 313. CAMPAIGNS AND ELECTIONS (4).
Political parties and elections, the conduct of electoral campaigns, the electorate and voting behavior, electoral system, exercise of the suffrage, extent and consequences of voter participation.
PS 314. INTEREST GROUP POLITICS (4). Interest group formation, resources, strategies, and internal struggles, as well as group influence on elections and politics, in government and policy making, and in relation to democratic theory.

## PS 315. *THE POLITICS OF MEDIA (4)

Examination of the methods of operation, content and effects of the media in relation to politics and government. Includes analysis of newspaper radio and television, political advertising, and other forms of political communication. (Bacc Core Course)
PS 316. PUBLIC OPINION AND POLITICS (4).
Examination of methods of study, formation, and content of public opinion and of its effect on elections and politics, government operations, and public policy, primarily in the United States. (SS)

PS 317. GENDER AND POLITICS (4). Analyzes the role that gender plays in shaping politics and other aspects of society. The course will cover theories of gender difference, gender-based movements, gender and political office, and

## gender and public policy. (SS)

PS 321. CONSTITUTIONAL LAW:
GOVERNMENT POWERS AND CONSTRAINTS
(4). The role of the U.S. Supreme Court in shaping the powers and limitations of the U.S. government. The powers of the three main branches of our government, and cases where the powers of these branches clash with one another or with the powers of the states or rights of the individual.

PS 322. *CONSTITUTIONAL LAW: CIVIL RIGHTS AND LIBERTIES (4). Doctrines pertaining to the First, Second and Fourteenth Amendments, such as freedom of speech, of expression, of the press and of the exercise, the right to bear arms and the prohibition against governmental establishment of religion. Issues of discrimination and the reach of the 14th amendment's equal protection clause, and the right to privacy. (Bacc Core Course)
PS 323. CONSTITUTIONAL LAW: RIGHTS OF THE ACCUSED (4). The role of the U.S. Supreme Court in shaping the powers and limitations of the U.S. government. The powers of the three main branches of our government, and cases where the powers of these branches clash with one another or with the powers of states or rights of the individual.

PS 325. *GENDER AND THE LAW (4). Legal status of American women, with emphasis on constitutional law, the 1964 Civil Rights Act and its amendments, and various state laws as they relate to the legal rights of women. (Bacc Core Course)
PS 326. JUDICIAL PROCESS AND POLITICS (4). Study of the operation, processes, behavior and influence of the state and federal judiciaries, as well as current research in the judiciary as it relates to politics.
PS 328. SPORTS AND POLITICS (4). Topics include: Sport's interactions with formal political institutions, sports law, sports in the international community, sports at the university, sports and gender, sports and labor politics, and sports and race.
PS 331. *STATE AND LOCAL POLITICS (4). Role, organization, and functions of government at the state and local level. Satisfies teaching certification requirement for course work in state and local government. (Bacc Core Course)

PS 340. EASTERN AND CENTRAL EUROPEAN POLITICS (4). Analyzes domestic and international politics in Central and Eastern Europe, focusing on the period since WW II. Particular attention will be paid to the establishment and dissolution of the Soviet bloc; the interplay of Soviet foreign policy and domestic politics in the various states; and comparisons of domestic political structures, especially since 1989.

PS 341. *EUROPEAN AND EU POLITICS (4). Describes and analyzes the political situation in Europe and the European Union. Special focus is given to issues concerning European security and the European Union, its institutions, politics, and the challenges it faces since the opening of Europe to the East. (Bacc Core Course)
PS 342. THE POLITICS OF CORRUPTION (4). Surveys corruption and how it manifests itself in democracies and centralized states. Topics include theoretical accounts for why corruption occurs, what factors are conducive toward producing corruption, the consequences of corruption, and anti-corruption efforts that have succeeded and failed to rectify corruption.

PS 343. *RUSSIAN POLITICS (4). Brief survey of Russian politics in Tsarist and Soviet periods followed by extensive analysis of Russian politics in the late Soviet period under Gorbachev (1985-91), the collapse of the USSR in 1991, and post-Soviet Russian politics (1992-present). (Bacc Core Course)

PS 344. *LATIN AMERICAN POLITICS (4). The key political, social and economic issues in Latin America. Surveys topics of interest in the region such as economic development, democratization, revolution and political leadership from both an historical and contemporary perspective. (Bacc Core Course)

PS 345. *POLITICS OF DEVELOPING NATIONS
(4). Analyzes the concepts of development and modernization. Also focuses on the economic, political, and cultural problems faced by developing nations. (NC) (Bacc Core Course)
PS 346. *MIDDLE EAST POLITICS (4). The comparative study of the Middle East and North Africa focusing on the internal political dynamics of countries in the region and the international relations among them. Examines issues of political and economic development in their post-colonial context and analyzes impact of nationalism, political Islam, ethnicity, and globalization. (Bacc Core Course)

PS 348. *CHINESE POLITICS (4). Examines China's post-1949 political and economic development. Special attention is given to the reform era from the late 1970s to the present. The course also addresses the impact of the reforms on society and on the country's relationship with the world. (NC) (Bacc Core Course)

PS 349. *BRITISH POLITICS (4). The structure and operation of the British political system, the nature of the political parties and how the governing institutions of the British state have changed over time. The course will also consider how British politics impact upon the culture, politics and institutions of the United States. (Bacc Core Course)
PS 350. *JAPANESE POLITICS (4). Examination of the Japanese political system during the postwar period. Topics include prewar historical influences, political parties, bureaucracy, interest groups, policy processes and issues, political economy, foreign policy, and United States-Japan relations. Attention will also be given to recent dramatic changes in Japan's political system. (Bacc Core Course)

## PS 351. AMERICAN FOREIGN POLICY (4).

Overview of the role of the United States in the world since World War II and of the factors influencing the formation of American foreign policy.
PS 354. *INTERNATIONAL ORGANIZATIONS
AND GLOBAL POLITICS (4). The role of international law and organizations in global politics. How sovereign states interact, and what motivates them to commit to supranational laws and intergovernmental organizations. How international law has evolved since the early 1900s. Intergovernmental organizations and treaties, with emphasis on the United Nations, the International Monetary Fund and the World Bank, the World Trade Organization, the European Union, and the North Atlantic Treaty Organization. (Bacc Core Course)
PS 356. INTERNATIONAL POLITICS OF ASIA
PACIFIC (4). Examines the most pressing issues facing the region: security and regional economic integration. The major players, their interests, and their differing perspectives on regional issues will be analyzed.
PS 361. CLASSICAL POLITICAL THOUGHT (4). Major political theorists from the pre-Socratics through the Scholastics. (H)
PS 362. MODERN POLITICAL THOUGHT (4). Major political theorists from the Renaissance to the mid-nineteenth century. (H)
PS 363. *GENDER AND RACE IN AMERICAN POLITICAL THOUGHT (4). Traditional canon of American political thought scrutinized from vantage point of feminist and critical race theory scholarship. (Bacc Core Course)
PS 364. CONTEMPORARY POLITICAL THEORY
(4). Major issues in contemporary political theory.

The specific emphasis of the course may vary from term to term, focusing on questions related to theories of justice, theories of democracy, global political theory, or the work of a single important thinker.
PS 365. AMERICAN POLITICAL THOUGHT
(4). Political values and theoretical systems in the American tradition, from the Puritans to the present.

PS 366. *FROM ATLANTIS TO UTOPIA: THE POLITICS OF THE IDEAL STATE (4). The search for the ideal state has occupied political philosophy since antiquity. From Plato's Atlantis story through More's utopia and beyond, philosophers, writers and filmmakers have pondered how to create a perfect state with perfect citizens which will stand the test of time. Each week will combine theoretical reflections from antiquity through post-modernity with a selection of examples from more or less contemporary fiction that will ideally already be known to the audience. (Bacc Core Course)
PS 370. *SCIENCE, RELIGION, AND POLITICS
(4). Addresses historical interplay between religion and science in Western culture, then focuses on the perceived conflicts between science and religion within American socio-political context; illustrates role of politics as the "playing field" on which social differences contend; requires students to grapple with viewpoints that differ from their own. Team taught. (Bacc Core Course)
PS 371. PUBLIC POLICY PROBLEMS (4).
The content and the politics of adoption and application of such policy areas as defense, poverty and welfare, macroeconomics, and regulation.
PS 372. PUBLIC ADMINISTRATION (4). The workings of the modern administrative state, processes and procedures through which government acts, and the balance between powerful government, democratic and accountable government, and efficient government.

## PS 374. *SUSTAINABLE LIVING: PRACTICES

AND POLICIES (4). Exploration of the role individuals in sustainability practices and policies. Special focus is given to an examination of how individuals can make sustainable lifestyle choices in light of policy regulations, technologies, socioeconomic conditions, and cultural values. (Bacc Core Course)
PS 375. *THE CIVIL RIGHTS MOVEMENT AND POLICIES (4). Political and social evolution of the civil rights movement, emphasizing events 19541965, and major contemporary civil rights politics and policies in the South and the nation. (Bacc Core Course)
PS 375H. *THE CIVIL RIGHTS MOVEMENT
AND POLICIES (4). Political and social evolution of the civil rights movement, emphasizing events 1954-1965, and major contemporary civil rights politics and policies in the South and the nation. (Bacc Core Course) PREREQS: Honors College approval required.
PS 380. CELEBRITY POLITICS (4). Exploration of the role of celebrities and celebrity politicians in the political process. Special focus is given to celebrities working in humanitarian, environmental, and other high visibility causes. Also examines the domestic and international policy implications of celebrity activism.
PS 399. CURRENT PROBLEMS IN POLITICS
(1-4). Selected issues of recent American and international concern such as Vietnam, Central America, or similar topical issues. May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits.
PS 399H. CURRENT PROBLEMS IN POLITICS
(1-4). Selected issues of recent American and international concern such as Vietnam, Central America, or similar topical issues. May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits.

PREREQS: Honors College approval required.
PS 401. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PS 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PS 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PS 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

PS 405H. READING AND CONFERENCE (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required. Honors College approval required.
PS 406. PROJECTS (1-16). Section 1-5: Reading. Associated with the internship for which credit is given in PS 410. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PS 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PS 407H. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required. Honors College approval required.

PS 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PS 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
PS 410. POLITICAL SCIENCE INTERNSHIP (112). Supervised work experience in governmentor law-related programs or other public affairs organizations. Reports and appraisals required. Only 4 credits may be applied to the major. This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.
PS 425. *GENDER AND THE LAW (4). Legal status of American women, with emphasis on constitutional law, the 1964 Civil Rights Act and its amendments, and various state laws as they relate to the legal rights of women. (Bacc Core Course) PREREQS: PS 201 or PS 326
PS 441. DEMOCRATIZATION (4).
Democratization and the factors that encourage and/or erode democratic stability. Political developments in a wide array of countries, with a particular focus on the unfolding events in the Middle East. Theories of what causes authoritarian regimes to collapse and what helps initially fragile democracies endure or collapse.
PS 446. EAST ASIAN POLITICAL ECONOMY (4). Surveys and analyzes the economic and political development of China, Japan, South Korea, Taiwan, Hong Kong, and Singapore. Japan is examined as a developmental model for the East Asian Newly Industrializing Countries (NICs) and as a major player in the regional economy. China is examined as a contrasting model in terms of its changing pattern of economic development and its importance for the region.
PS 449. ${ }^{\wedge}$ TOPICS IN COMPARATIVE POLITICS
(4). Topics in comparative politics not covered in other courses. May be repeated for credit when topic varies. (Writing Intensive Course) This course is repeatable for a maximum of 16 credits.

PS 454. INTERNATIONAL LAW AND
ORGANIZATIONS (4). Theories and historical development of international law and organizations; the United Nations system. PREREQS: PS 204 or PS 205

PS 455. *THE POLITICS OF CLIMATE CHANGE
(4). Covers domestic and international political aspects of global climate change. Topics include local, state, and national activity as well as roles played by presidents, Congress, the Supreme Court, corporations and media. International focus on conventions and treaties, tensions between developed and developing nations and possible national security impacts. (Bacc Core Course)
PS 457. US-CHINA RELATIONS (4). Historical evolution of US-China relationship. Emphasis on economic ties, tensions, and conflicts surrounding trade, investment, security, human rights, political reform, Tibet, and Taiwan.

## PS 458. *INTERNATIONAL POLITICAL

ECONOMY (4). Examines topics in which politics and economics meet in the international arena, such as trade, debt, finance, development, multinational corporations, and globalization. Does not require a background in economics. (Bacc Core Course)

PS 461. ENVIRONMENTAL POLITICAL THEORY
(4). Examines the ways in which political theory enhances our understanding of environmental issues. Focuses on the political and philosophical premises of various environmental perspectives, and how different theories of justice and democracy address issues such as environmental racism, ecological justice, and global climate change.
PS 462. THEORIES OF LAW (4). Covers some of the main theories and approaches to the nature of law. What is law? What is its relation, if any, to morality? What is it that judges do? Questions such as these are explored through reading some of the classic works on the topic.
PS 470. GLOBAL FOOD POLITICS AND POLICY (4). Examines the politics and policy of global food systems as they relate to food distribution, production, and consumption. The cultivation and consumption of food is highly political, and at times, contentious. Specific focus is given to issues like social justice, GMOs, human health, environment and agribusiness.
PS 471. NUCLEAR POLITICS AND POLICY
(4). Covers the political and policy implications of nuclear technology, including both nuclear weapons and civilian applications such as nuclear energy.
PS 473. US ENERGY POLICY (4). Addresses US energy policy with respect to how the U.S. governs the production and use of different energy sources, along with the management of its energy infrastructure. Examines policies currently in place, as well as proposals for alternatives, while examining the economic, environmental, national security and energy security implications of different policy approaches.
PS 475. ENVIRONMENTAL POLITICS AND
POLICY (4). Environmental and natural resource issues and policies in national and regional context, emphasizing public attitudes, elections, Congress, public policy, and relevant national and state agencies.
PS 476. *SCIENCE AND POLITICS (4).
Relationship between science and the political system in political ideas and history, in bureaucratic politics of science policy, and in contemporary scientific disputes. (Bacc Core Course)
PS 477. INTERNATIONAL ENVIRONMENTAL POLITICS AND POLICY (4). Analysis of international environmental theory and politics the development of international environmenta regimes, agreements and treaties, and the process of globalization and the quality of the environment.
PS 478. RENEWABLE ENERGY POLICY (4).
Renewable energy policy with respect to how the U.S. governs the market development, production and use of different renewable energy sources are addressed.

PS 483. CUBAN CULTURE, POLITICS AND ARTS (4). One of two courses that comprise the Cuba Study Abroad Program. It introduces students to Cuban culture, politics (and particularly Cuba-U.S. relations during and after the Revolution) and arts via a combination of lectures/lessons led by invited specialists in their fields, readings, films and student activities. Students will learn about a variety of topics including migration, agriculture, health care, education, economics, religion/spirituality, gender, race, and the arts (literature, music and other performance). Given the interdisciplinary approach to this course, students will also be able to focus on other topics of interest to them/their program of study. CROSSLISTED as ENG 483, WLC 483. PREREQS: Sophomore standing and acceptance into the OSU Cuba Study Abroad Program.
PS 499. SPECIAL TOPICS (1-16). Selected topics in political science of special or current interest not covered in other courses. May be repeated for credit when topic varies. This course is repeatable for a maximum of 99 credits.

PS 501. RESEARCH AND SCHOLARSHIP (1-16). Independent research project under supervision of graduate faculty. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PS 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PS 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.

PS 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PS 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PS 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

PS 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PS 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PS 510. POLITICAL SCIENCE INTERNSHIP (112). Supervised work experience in governmentor law-related programs or other public affairs organizations. Reports and appraisals required. This course is repeatable for a maximum of 12 credits. PREREQS: Departmental approval required.
PS 523. AMERICAN CONSTITUTIONAL LAW
(4). Examines constitutional law with a heavy emphasis on the practices and procedures of the criminal justice system. Pays particular attention to the rights of the criminally accused; how these rights have changed over time; and the role of politics in the decisions of the Supreme Court.
PS 541. DEMOCRATIZATION (4).
Democratization and the factors that encourage and/or erode democratic stability. Political developments in a wide array of countries, with a particular focus on the unfolding events in the Middle East. Theories of what causes authoritarian regimes to collapse and what helps initially fragile democracies endure or collapse.
PS 546. EAST ASIAN POLITICAL ECONOMY
(4). Surveys and analyzes the economic and political development of China, Japan, South Korea, Taiwan, Hong Kong, and Singapore. Japan is examined as a developmental model for the East Asian Newly Industrializing Countries (NICs) and as a major player in the regional economy. China is examined as a contrasting model in terms of its changing pattern of economic development
and its importance for the region.
PS 549. TOPICS IN COMPARATIVE POLITICS
(4). Topics in comparative politics not covered in other courses. May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits. PREREQS: At least one upper-division course in comparative politics.
PS 554. INTERNATIONAL LAW AND
ORGANIZATIONS (4). Theories and
historical development of international law and organizations; the United Nations system. PREREQS: PS 204 or PS 205
PS 555. THE POLITICS OF CLIMATE CHANGE
(4). Covers domestic and international political aspects of global climate change. Topics include local, state, and national activity as well as roles played by presidents, Congress, the Supreme Court, corporations and media. International focus on conventions and treaties, tensions between developed and developing nations and possible national security impacts.
PS 557. US-CHINA RELATIONS (4). Historical evolution of US-China relationship. Emphasis on economic ties, tensions, and conflicts surrounding trade, investment, security, human rights, political reform, Tibet, and Taiwan.

## PS 558. INTERNATIONAL POLITICAL

ECONOMY (4). Examines topics in which politics and economics meet in the international arena, such as trade, debt, finance, development, multinational corporations, and globalization. Does not require a background in economics.
PS 561. ENVIRONMENTAL POLITICAL THEORY
(4). Examines the ways in which political theory enhances our understanding of environmental issues. Focuses on the political and philosophical premises of various environmental perspectives, and how different theories of justice and democracy address issues such as environmental racism, ecological justice, and global climate change.
PS 562. THEORIES OF LAW (4). Covers some of the main theories and approaches to the nature of law. What is law? What is its relation, if any, to morality? What is it that judges do? Questions such as these are explored through reading some of the classic works on the topic.
PS 570. GLOBAL FOOD POLITICS AND
POLICY (4). Examines the politics and policy of global food systems as they relate to food distribution, production, and consumption. The cultivation and consumption of food is highly political, and at times, contentious. Specific focus is given to issues like social justice, GMOs, human health, environment and agribusiness.
PS 571. PUBLIC POLICY THEORY (4).
Theoretical approaches to the study of the policy process, policy elements, policy tools, (e.g., regulation), and policy typologies. PREREQS: Departmental approval required.
PS 572. PUBLIC ADMINISTRATION (4). Principles of public administration, administrative organization and procedures, public relations.
PS 573. US ENERGY POLICY (4). Addresses
US energy policy with respect to how the U.S. governs the production and use of different energy sources, along with the management of its energy infrastructure. Examines policies currently in place, as well as proposals for alternatives, while examining the economic, environmental, national security and energy security implications of different policy approaches.
PS 575. ENVIRONMENTAL POLITICS AND POLICY (4). Environmental and natural resource issues and policies in national and regional context, emphasizing public attitudes, elections, Congress, public policy, and relevant national and state agencies.

PS 576. SCIENCE AND POLITICS (4).
Relationship between science and the political system in political ideas and history, in
bureaucratic politics of science policy, and in contemporary scientific disputes

PS 577. INTERNATIONAL ENVIRONMENTAL POLITICS AND POLICY (4). Analysis of international environmental theory and politics, the development of international environmenta regimes, agreements and treaties, and the process of globalization and the quality of the environment.

PS 578. RENEWABLE ENERGY POLICY (4). Renewable energy policy with respect to how the U.S. governs the market development, production and use of different renewable energy sources are addressed.
PS 583. CUBAN CULTURE, POLITICS AND
ARTS (4). One of two courses that comprise the Cuba Study Abroad Program. It introduces students to Cuban culture, politics (and particularly Cuba-U.S. relations during and after the Revolution) and arts via a combination of lectures/lessons led by invited specialists in their fields, readings, films and student activities. Students will learn about a variety of topics including migration, agriculture, health care, education, economics, religion/spirituality, gender, race, and the arts (literature, music and other performance). Given the interdisciplinary approach to this course, students will also be able to focus on other topics of interest to them/their program of study. CROSSLISTED as ENG 583, WLC 583. PREREQS: Sophomore standing and acceptance into the OSU Cuba Study Abroad Program.

PS 599. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits.

PS 808. WORKSHOP (4). Principles of public administration, administrative organization and procedures, public relations. It will include collaborative governance, leadership, and other issues.

## ■ SOCIOLOGY COURSES

SOC 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
SOC 204. *INTRODUCTION TO SOCIOLOGY (3). Development and application of sociological concepts and perspectives concerning human groups; includes attention to socialization, culture, organization, stratification, and societies. Consideration of fundamental concepts and research methodology. (SS) (Bacc Core Course)

## SOC 205. *INSTITUTIONS AND SOCIAL

CHANGE (3). Sociological study of the dynamic organizational nature of society through analysis of social change and major social institutions such as family, education, religion, the economy, and political systems. (SS) (Bacc Core Course)
SOC 206. *SOCIAL PROBLEMS AND ISSUES
(3). Examination of social problems with particular focus upon U.S. society. Sociological perspectives on definition, description, and analysis of contemporary and recurrent problems in industrialized societies. Investigation of causes and consequences of social problems considered in societal context. (SS) (Bacc Core Course)

## SOC 241. INTRODUCTION TO CRIME

AND JUSTICE (3). Provides a sociological understanding of criminal justice system institutions and processes. Emphasis is placed on understanding the criminal law; police and policing; courts and the prosecution process; and prisons, jails and corrections.
SOC 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
SOC 312. *SOCIOLOGY OF THE FAMILY (4). Survey of the family as a social institution. Addresses historical and cultural perspectives with emphasis on family diversity, variations in family form and life style, interdependence between family and other institutions, analysis of major family issues, forces for change in the family. (Bacc Core Course) PREREQS: (SOC 204 [D-] or

SOC 204H [D-] )
SOC 312H. *SOCIOLOGY OF THE FAMILY
(4). Survey of the family as a social institution. Addresses historical and cultural perspectives with emphasis on family diversity, variations in family form and life style, interdependence between family and other institutions, analysis of major amily issues, forces for change in the family (Bacc Core Course) PREREQS: (SOC 204 [D-] or SOC 204H [D-] ) and Honors College approval required.
SOC 313. SOCIOLOGY OF INTIMATE
RELATIONSHIPS (4). Examines the
microsociological dynamics of intimate relationships. Perceptions and expectations of intimate relationships are explored. Specific attention will be given to issues, processes, and factors that are involved in the construction and management of intimate relationships in contemporary society. PREREQS: SOC 204 [D-] or SOC 204H [D-]

SOC 315. ^METHODS I: RESEARCH DESIGN
(4). First in a two-course sequence required of all sociology majors. Students learn to formulate researchable questions, devise measures, select data collection techniques, and examine ethical and practical dilemmas in constructing sociological research. (Writing Intensive Course) PREREQS: (SOC 204 [D-] or SOC 204H [D-] ) and junior standing. Sociology majors only.

## SOC 316. METHODS II: QUANTITATIVE

ANALYSIS (4). Second in a two-course sequence required of all sociology majors. The primary objective is to provide students with the statistical skills necessary to analyze sociological data. Covers the construction and interpretation of contingency tables, basic ideas of probability and statistical inference, and an introduction to correlation and regression. PREREQS: ((SOC 204 [D-] or SOC 204H [D-] ) and SOC 315 [C-] ) and junior standing. Sociology majors only.
SOC 340. DEVIANT BEHAVIOR AND SOCIAL
CONTROL (4). Current perspectives, research and theories of deviant behavior. Review and analysis of various approaches and programs designed to prevent and deal with deviant behavior. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 345. *CRIMES AND VIOLENCE IN INTIMATE RELATIONSHIPS (4). Analyzes the historical, social, political, legal, cultural, and psychological aspects of domestic violence, sexual assault, and stalking. Addresses definitions of the problem, demographics, survivors, perpetrators, witnesses, bystanders, strategies and tactics of abusers and survivors, along with strategies for prevention, intervention, treatment, and social change. (Bacc Core Course)
SOC 350. HEALTH, ILLNESS AND SOCIETY (4). Social and cultural factors in the identification, course, and treatment of illness; analysis of selected health settings and professions. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 355. DEATH AND DYING (4). An overview of cross-cultural and historical attitudes and practices around end of life, death and dying. Assessment of contemporary legal, professional, cultural and technological issues surrounding end of life/death and dying. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 360. *POPULATION TRENDS AND POLICY
(4). Basic socio-demographic factors affecting population size, distribution, composition and change; examination of local, national, and international trends, and demographic policy. (Bacc Core Course) PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 381. SOCIAL DIMENSIONS OF
SUSTAINABILITY (4). Exploration of the social forces driving current views of sustainability. Specific attention will be given to values and belief systems, as well as social institutions in shaping sustainability issues related to ecologically sound,
socially just, and economically viable outcomes. PREREQS: SOC 204 [D-] or SOC 204H [D-]
SOC 399. SPECIAL TOPICS (1-16). Selected topics of special or current interest not covered in other courses. This course is repeatable for a maximum of 16 credits. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 399H. SPECIAL TOPICS (1-16). Selected topics of special or current interest not covered in other courses. This course is repeatable for a maximum of 16 credits. PREREQS: (SOC 204 [D-] or SOC 204 H [D-] ) and Honors College approval required.
SOC 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SOC 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Department approval required.

SOC 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SOC 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SOC 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )

SOC 410. INTERNSHIP (1-16). Graded P/N. This course is repeatable for a maximum of 30 credits. PREREQS: Departmental approval required.

SOC 412. SOCIOLOGY OF WORK AND FAMILY
(4). Survey of the intersections between families and work; variations in family structure, policies and paid and unpaid work in the United States; interdependence between paid and unpaid family labor and broader social change.

SOC 413. SOCIOLOGICAL THEORY (4). Historical and philosophical foundations of sociological theory; major schools of thought and their major contributors. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 418. QUALITATIVE RESEARCH METHODS
(4). An introduction to the theory and methods of qualitative research. Students will be exposed to various qualitative research methods through practical field exercises. These include ethnographic field observation, content analysis, interviewing, focus groups and unobtrusive measures. Other commonly used methods of collecting qualitative data are also examined. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 422. SOCIOLOGY OF ORGANIZATIONS (4). Introduces sociological thinking about organizations in contemporary society with an emphasis on exploring the range of frameworks used to think about and explain modern organizations; applies knowledge to specific contemporary organizations. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 424. SOCIAL PSYCHOLOGY (4). Examines individuals in social context; explores dynamics of interpersonal relationships; evaluates link between self and society, including concepts of role/status/ identity. Contemporary research design, problems, and findings pertinent to social psychology. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 426. *SOCIAL INEQUALITY (4). Evolution of social inequality in society. Emphasis upon the causes and consequences of inequality in power, privilege, and prestige in human societies, with special attention to the United States. (Bacc Core Course) PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 430. GENDER AND SOCIETY (4).
Examination of nature and consequences of social differentiation and stratification on the basis of sex and gender. Analysis of social position of women and men in society, focusing on their positions in
institutional areas such as the family, politics, work and education. Evaluation of theories of biological psychological, and sociological bases for the behavior and characteristics of women and men. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 432. SOCIOLOGY OF AGING (3).
Examination of the social significance of age, position and problems of the elderly in society; discusses the societal and individual consequences of an aging population; explores social theories of aging. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 437. RACE AND ETHNIC RELATIONS (4) Comparative/international perspective on the social construction of race and ethnicity. Social, economic and political experiences of selected groups in the U.S. and other countries are examined. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 438. US IMMIGRATION ISSUES IN THE 21ST CENTURY (4). Provides a critical overview of immigration to the United States from a sociohistoric perspective. Examines how successive waves of immigrants have influenced American society from the earliest groups of Europeans in the 19th century to the most recently arriving immigrants from Asia, Latin America and the Caribbean. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )

SOC 439. WELFARE AND SOCIAL SERVICES
(4). Analysis of social, political, and economic forces affecting welfare and social service systems, with overview of current programs, policy issues, public opinions, occupational aspects and societal impacts. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 440. JUVENILE DELINQUENCY (4). Contemporary research and theories of juvenile delinquency. Review and evaluation of various strategies and programs designed to prevent delinquency or for treatment of delinquents.
PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 441. CRIMINOLOGY AND PENOLOGY (4). Review of sociological perspectives on crime and criminal justice, with emphasis upon North America. Review of crime statistics, types of crime, theories of criminality, corrections programs and prisons, and programs to reduce crime. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )

## SOC 442. SOCIOLOGY OF DRUG USE

AND ABUSE (4). Emphasizes a sociological understanding of drug use, drug problems and drug policy. In order to understand drug use and abuse it is necessary to understand the chemical properties of the substances at issue, the attributes of the people who use and abuse drugs, and the norms and characteristics of the society in which the substance use occurs. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )

## SOC 444. INSIDE-OUT: PRISONS,

COMMUNITIES, AND PREVENTION (4). Course takes place in a state correctional facility, with OSU students learning alongside "inside" students from the facility for a full quarter. Course content examines prisons, communities, crime, and prevention from a sociological perspective. All students participate in service-learning projects. PREREQS: SOC 204 [C] and junior standing.
SOC 444H. INSIDE-OUT: PRISONS,
COMMUNITIES, AND PREVENTION (4). Course takes place in a state correctional facility, with OSU students learning alongside "inside" students from the facility for a full quarter. Course content examines prisons, communities, crime, and prevention from a sociological perspective. All students participate in service-learning projects. PREREQS: SOC 204 [C] and junior standing. Honors College approval required.

SOC 448. LAW AND SOCIETY (4). An introduction to social scientific approaches to law, covering major topics in the area. Topics may include disputing, legal consciousness, social movements and law, punishment, legal actors, and
egal institutions. PREREQS: (SOC 204 or SOC 204 H ) with minimum grade of D-

SOC 449. LAW, CRIME, AND POLICY (4).
Surveys criminal justice policies aimed at enforcing laws, reducing crime, punishing violators, and rehabilitating ex-offenders. Interrogates the behavioral assumptions used in creating and evaluating policies. Examines specific crimes and the policies used to address them. PREREQS: SOC 204 [D-] or SOC 204H [D-]
SOC 450. SOCIOLOGY OF EDUCATION (4). Contemporary perspectives and research on schools, students, teachers and social forces affecting the educational system. Review of comparative and evaluation research on alternative educational strategies and programs. Overview of the literature of educational critics. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 452. SOCIOLOGY OF RELIGION (4). Social patterns within U.S. religious groups, relation of religious groups to society, and the methodologica problems in studying such groups. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )

SOC 453. SOCIOLOGY OF SPORT (4). Critical analysis of sport. Examines sport socialization; deviance; violence; gender; race/ethnicity; professional sport careers; intercollegiate athletics; marriage/family; and the media. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )

SOC 454. *LEISURE AND CULTURE (4). Examination of the social, cultural, and global significance of leisure activity (in particular, tourism and recreation) from a historical perspective relative to attitudes, values, behaviors, and use of natural resources. (SS) (Bacc Core Course) PREREQS: (SOC 204 [D-] or SOC 204H [D-])
SOC 456. *SCIENCE AND TECHNOLOGY
IN SOCIAL CONTEXT (4). Study of social aspects of science and technology (values, practices, organization, impacts) by analysis of issues revealing their relationship to other social and cultural processes. (Bacc Core Course) PREREQS: (SOC 204 [D-] or SOC 204H [D-] )

## SOC 460. THE SOCIOLOGY OF

GLOBALIZATION (4). Examines the sociological effect of globalization on Western and nonWestern societies. The course focuses on changes in the global economy and how this has influenced the social structure, patterns of change, and mutual influences among societies. (NC) PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 466. INTERNATIONAL DEVELOPMENT: GENDER ISSUES (4). Examines roles and statuses of women and men throughout the world and differential impact of development on men and women. Evaluates traditional development policies and programs and discusses theories of gender stratification and of modernization. (NC) PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 470. COLLECTIVE BEHAVIOR (4).
Examines current theories; focuses on behavior in crowds and diverse social settings including fads/fashions, ecstatic crowds/miracles, natural/ technological disasters, urban legends, collective delusions/mass hysteria, protest/demonstrations, riots/mobs. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 471. SOCIAL MOVEMENTS (4). Introduces core theoretical and methodological issues related to social movements in the US and abroad. Emphasizes social forces giving rise to movements, tactics employed by movements, and impacts of them on society. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 472. GIVING AND VOLUNTARISM (4). Examines concepts of donor motivation, giving, charity, voluntarism, philanthropy, and the nonprofit sector through the analysis of gender roles, ethnicity, power, status, and social institutions. PREREQS: SOC 204 [D-] or SOC 204H [D-] and /or instructor approval.

SOC 475. RURAL SOCIOLOGY (4). Helps students understand the rich diversity in rural society, with an emphasis on the interdependencies between urban and rural contexts. Current issues and social problems experienced by rural populations and how sociology is used to understand and address issues affecting rural communities are explored. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 480. *ENVIRONMENTAL SOCIOLOGY (4). Explores the evolution of environmental thought, paradigm shifts, and institutional structures associated with environmental concerns, social movements, and social impacts. (Bacc Core Course) PREREQS: (SOC 204 [D-] or SOC 204H D-] )
SOC 481. *SOCIETY AND NATURAL
RESOURCES (4). Explores the complex interrelationships between humans and natural resources, emphasizing how management decisions and organizations are enmeshed in social and cultural contexts. (Bacc Core Course) PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 485. *CONSENSUS AND NATURAL RESOURCES (3). Students will use a working group approach. They will select a natural resource topic, study the team process and interaction as a method of learning, explore the issue using systems practice, and strive for consensus on solutions to their issue. CROSSLISTED as ANS 485, FES 485/FES 585, FW 485/FW 585. (Bacc Core Course)

SOC 499. SPECIAL TOPICS (1-16). Selected topics of special or current interest not covered in other courses. For advanced undergraduate and graduate students. This course is repeatable for a maximum of 16 credits. PREREQS: (SOC 204 [D-] or SOC 204H [D-] )
SOC 499H. SPECIAL TOPICS (1-16). Selected topics of special or current interest not covered in other courses. For advanced undergraduate and graduate students. This course is repeatable for a maximum of 16 credits. PREREQS: (SOC 204 [D-] or SOC 204H [D-] ) and Honors College approval required.

SOC 501. RESEARCH AND SCHOLARSHIP
1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SOC 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits.
SOC 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
SOC 505. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

SOC 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SOC 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

SOC 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
SOC 510. INTERNSHIP (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
SOC 512. SOCIOLOGY OF WORK AND FAMILY (4). Survey of the intersections between families and work; variations in family structure, policies and paid and unpaid work in the United States; interdependence between paid and unpaid family labor and broader social change. PREREQS: SOC 204 or SOC 204H
SOC 513. SOCIOLOGICAL THEORY (4).
Historical and philosophical foundations of sociological theory; major school of thought and their major contributors. PREREQS: SOC 204 or SOC 204 H

SOC 515. UNDERSTANDING SOCIAL RESEARCH (4). Study of basic concepts and principles of qualitative and quantitative social research, including selection of general strategies and specific designs, conceptual and operational measurement, sample selection, data collection, data processing and analysis techniques, interpretation and reporting. Utilizes reports of social research in scholarly journals, popular media, and agency documents. Emphasis on critical evaluation and interpretation. PREREQS: Reserved for MPP students only.

SOC 518. QUALITATIVE RESEARCH METHODS
(4). An introduction to the theory and methods of qualitative research. Students will be exposed to various qualitative research methods through practical field exercises. These include ethnographic field observation, content analysis, interviewing, focus groups and unobtrusive measures. Other commonly used methods of collecting qualitative data are also examined. PREREQS: SOC 204 or SOC 204H
SOC 522. SOCIOLOGY OF ORGANIZATIONS
(4). Introduces sociological thinking about organizations in contemporary society with an emphasis on exploring the range of frameworks used to think about and explain modern organizations; applies knowledge to specific contemporary organizations. PREREQS: SOC 204 or SOC 204H

SOC 524. SOCIAL PSYCHOLOGY (4). Examines individuals in social context; explores dynamics of interpersonal relationships; evaluates link between self and society, including concepts of role/status/ identity. Contemporary research design, problems, and findings pertinent to social psychology. PREREQS: SOC 204 or SOC 204H

SOC 526. SOCIAL INEQUALITY (4). Evolution of social inequality in society. Emphasis upon the causes and consequences of inequality in power, privilege, and prestige in human societies, with special attention to the United States. PREREQS: SOC 204 or SOC 204H

## SOC 530. GENDER AND SOCIETY (4).

Examination of nature and consequences of social differentiation and stratification on the basis of sex and gender. Analysis of social position of women and men in society, focusing on their positions in institutional areas such as the family, politics, work and education. Evaluation of theories of biological, psychological, and sociological bases for the behavior and characteristics of women and men. PREREQS: SOC 204 or SOC 204H
SOC 532. SOCIOLOGY OF AGING (3). Examination of the social significance of age, position and problems of the elderly in society; discusses the societal and individual consequences of an aging population; explores social theories of aging. PREREQS: SOC 204 or SOC 204H
SOC 537. RACE AND ETHNIC RELATIONS
(4). Comparative/international perspective on the social construction of race and ethnicity. Social, economic and political experiences of selected groups in the U.S. and other countries are examined. PREREQS: SOC 204 or SOC 204H

## SOC 538. US IMMIGRATION ISSUES IN THE

 21ST CENTURY (4). Provides a critical overview of immigration to the United States from a sociohistoric perspective. Examines how successive waves of immigrants have influenced American society from the earliest groups of Europeans in the 19th century to the most recently arriving immigrants from Asia, Latin America and the Caribbean.SOC 539. WELFARE AND SOCIAL SERVICES
(4). Analysis of social, political, and economic forces affecting welfare and social service systems, with overview of current programs, policy issues, public opinions, occupational aspects and societal impacts. PREREQS: SOC 204 or SOC 204H

SOC 540. JUVENILE DELINQUENCY (4). Contemporary research and theories of juvenile delinquency. Review and evaluation of various strategies and programs designed to prevent delinquency or for treatment of delinquents. PREREQS: SOC 204 or SOC 204H
SOC 541. CRIMINOLOGY AND PENOLOGY
(4). Review of sociological perspectives on crime and criminal justice, with emphasis upon North America. Review of crime statistics, types of crime, theories of criminality, corrections programs and prisons, and programs to reduce crime. PREREQS: SOC 204 or SOC 204H
SOC 542. SOCIOLOGY OF DRUG USE
AND ABUSE (4). Emphasizes a sociological understanding of drug use, drug problems and drug policy. In order to understand drug use and abuse it is necessary to understand the chemical properties of the substances at issue, the attributes of the people who use and abuse drugs, and the norms and characteristics of the society in which the substance use occurs.

## SOC 544. INSIDE-OUT: PRISONS,

COMMUNITIES, AND PREVENTION (4). Course takes place in a state correctional facility, with OSU students learning alongside "inside" students from the facility for a full quarter. Course content examines prisons, communities, crime, and prevention from a sociological perspective. All students participate in service-learning projects. PREREQS: SOC 204 and junior standing.
SOC 548. LAW AND SOCIETY (4). An
introduction to social scientific approaches to law, covering major topics in the area. Topics may include disputing, legal consciousness, social movements and law, punishment, legal actors, and legal institutions. PREREQS: (SOC 204 or SOC 204 H ) with minimum grade of D-
SOC 549. LAW, CRIME, AND POLICY (4).
Surveys criminal justice policies aimed at enforcing laws, reducing crime, punishing violators, and rehabilitating ex-offenders. Interrogates the behavioral assumptions used in creating and evaluating policies. Examines specific crimes and the policies used to address them. PREREQS: SOC 204 or SOC 204H

SOC 550. SOCIOLOGY OF EDUCATION (4). Contemporary perspectives and research on schools, students, teachers and social forces affecting the educational system. Review of comparative and evaluation research on alternative educational strategies and programs. Overview of the literature of educational critics.
PREREQS: SOC 204 or SOC 204H
SOC 552. SOCIOLOGY OF RELIGION (4). Social patterns within U.S. religious groups, relation of religious groups to society, and the methodological problems in studying such groups. PREREQS: SOC 204 or SOC 204H

SOC 553. SOCIOLOGY OF SPORT (4). Critical analysis of sport. Examines sport socialization; deviance; violence; gender; race/ethnicity; professional sport careers; intercollegiate athletics; marriage/family; and the media. PREREQS: SOC 204 or SOC 204H
SOC 554. LEISURE AND CULTURE (4).
Examination of the social, cultural, and global significance of leisure activity (in particular, tourism and recreation) from a historical perspective relative to attitudes, values, behaviors, and use of natural resources. PREREQS: SOC 204 or SOC 204H
SOC 556. SCIENCE AND TECHNOLOGY IN SOCIAL CONTEXT (4). Study of social aspects of science and technology (values, practices, organization, impacts) by analysis of issues revealing their relationship to other social and cultural processes. PREREQS: SOC 204 or SOC 204H

SOC 560. THE SOCIOLOGY OF
GLOBALIZATION (4). Examines the sociological effect of globalization on Western and non-

Western societies. The course focuses on changes in the global economy and how this has influenced the social structure, patterns of change, and mutual influences among societies. PREREQS: SOC 204 or SOC 204H
SOC 566. INTERNATIONAL DEVELOPMENT:
GENDER ISSUES (4). Examines roles and statuses of women and men throughout the world and differential impact of development on men and women. Evaluates traditional development policies and programs and discusses theories of gender stratification and of modernization. PREREQS: SOC 204 or SOC 204H

SOC 570. COLLECTIVE BEHAVIOR (4).
Examines current theories; focuses on behavior in crowds and diverse social settings including fads/fashions, ecstatic crowds/miracles, natural/ technological disasters, urban legends, collective delusions/mass hysteria, protest/demonstrations, riots/mobs. PREREQS: SOC 204 or SOC 204H

SOC 571. SOCIAL MOVEMENTS (4). Introduces core theoretical and methodological issues related to social movements in the US and abroad. Emphasizes social forces giving rise to movements, tactics employed by movements, and impacts of them on society. PREREQS: SOC 204 or SOC 204H

SOC 572. GIVING AND VOLUNTARISM
(4). Examines concepts of donor motivation, giving, charity, voluntarism, philanthropy, and the nonprofit sector through the analysis of gender roles, ethnicity, power, status, and social institutions. PREREQS: SOC 204 or SOC 204H or instructor approval.

SOC 575. RURAL SOCIOLOGY (4). Helps students understand the rich diversity in rural society, with an emphasis on the interdependencies between urban and rural contexts. Current issues and social problems experienced by rural populations and how sociology is used to understand and address issues affecting rural communities are explored. PREREQS: SOC 204 or SOC 204H
SOC 580. ENVIRONMENTAL SOCIOLOGY (4) Explores the evolution of environmental thought, paradigm shifts, and institutional structures associated with environmental concerns, social movements, and social impacts. PREREQS: SOC 204 or SOC 204H
SOC 581. SOCIETY AND NATURAL
RESOURCES (4). Explores the complex interrelationships between humans and natural resources, emphasizing how management decisions and organizations are enmeshed in social and cultural contexts. PREREQS: SOC 204 or SOC 204H
SOC 585. CONSENSUS AND NATURAL RESOURCES (3). Students will use a working group approach. They will select a natural resource topic, study the team process and interaction as a method of learning, explore the issue using systems practice, and strive for consensus on solutions to their issue. CROSSLISTED as ANS 485, FES 485/FES 585, FW 485/FW 585.
SOC 599. SPECIAL TOPICS (1-16). Selected topics of special or current interest not covered in other courses. For advanced undergraduate and graduate students. This course is repeatable for a maximum of 16 credits. PREREQS: SOC 204 or SOC 204H
SOC 808. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

## SCHOOL OF WRITING,

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## FACULTY

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Associate Professors Betjemann, Gottlieb, Holmberg, Olson, Rodgers, Williams
Assistant Professors Bube, Dybek,
Jensen, León, Malewitz, Passarello, Pflugfelder, Ribero, Sheehan, St.
Germain, Ward, Zuo
Senior Instructors Brock, Harrison, Larison, St. Jacques

Undergraduate Major
English (BA, HBA)
Minors
English
Film Studies
Writing

## Undergraduate Certificates

Medical Humanities
Scientific, Technical, and Professional Communication

## Graduate Majors

Creative Writing (MFA)
Graduate Areas of Concentration
Fiction
Poetry
Nonfiction Writing
English (MA, MAIS)
Graduate Areas of Concentration Literature and Culture Rhetoric, Writing, and Culture

## Graduate Minors

Creative Writing

## English

The School of Writing, Literature, and Film offers instruction in literary studies, writing (creative, critical, professional/ technical), and critical film studies to students in all disciplines who seek the cultural and intellectual values of the humanities and arts, as well as the broadening influence of humanistic studies, creative expression, cultural studies, and writing for the professions. In addition, the school provides courses for those interested in the major or minor in English, especially for those who plan to teach in the elementary, secondary, or college professions, or who plan to pursue graduate work in English, writing, or film. The Writing minor, which is also offered via Ecampus, serves students interested in creative writing and/or writing for the scientific and/or technical and professional fields.

## MINOR PROGRAMS

The minor in English allows students to concentrate in the area of the liberal arts and develop the reading and writing skills often demanded by employers. Students taking a minor in English choose from among three areas: general English studies, English literature, and American literature.

The minor in Writing requires a total of 27 credits to be taken as a minimum of 11 credits ( 3 courses, with at least one at the 300 level) from the following: WR 199, WR 214, WR 222, WR 224, WR 241, WR 323, WR 324, WR 327, WR 341, WR 362, and WR 383 and 12 credits (3 courses) from the following: WR 406, WR 407, WR 408, WR 411, WR 414, WR 416, WR 420, WR 424, WR 441, WR 448, WR 493, WR 495; and one upper-division literature or writing elective.

## GRADUATE PROGRAMS

The School of Writing, Literature, and Film offers graduate work leading to a Master of Arts degree in English. The major area of concentration may be in literature and culture, or rhetoric, writing, and culture. The school also offers the Master of Fine Arts degree in Creative Writing. Graduate work in the school may also be applied to the Master of Arts in Interdisciplinary Studies (MAIS) degree or to minors in other advanced degree programs.

## ENGLISH (BA, CRED, HBA)

Undergraduate English majors must attain proficiency in a foreign language, as certified by the School of Language, Culture, and Society, equivalent to that assumed at the end of a second-year language sequence ( $211 / 212 / 213$ ).

A grade of C - or better is required for all courses used to complete major requirements.

## Lower Division

From one of the following sequences, 8 credits:
ENG 204. *Survey of British Literature:
Beginnings to 1660 (4)
ENG 205. *Survey of British Literature: Restoration to Romantic Era (4)
ENG 206. *Survey of British Literature:
Victorian Era to 20th Century (4)
ENG 210. *Literatures of the World: Asia (4)
ENG 211. *Literatures of the World: Africa (4)
ENG 212. *Literatures of the World: Meso/ South America, Caribbean (4)
ENG 213. *Literatures of the World: Middle East (4)
ENG 214 *Literatures of Europe (4)
ENG 253. *Survey of American Literature: Colonial to 1900 (4)
ENG 254. *Survey of American Literature: 1900 to Present (4)
From the following, 12 additional credits
(at least 4 credits pre-1800):
ENG 200. Library Skills for Literary Study (1)
ENG 201. *Shakespeare (4)
ENG 202. *Shakespeare (4)
ENG 204. *Survey of British Literature: Beginnings to 1660 (4)
ENG 205. *Survey of British Literature: Restoration to Romantic Era (4)
ENG 206. *Survey of British Literature:
Victorian Era to 20th Century (4)
ENG 207. *Literature of Western
Civilization: Classical-Renaissance (4)
ENG 208. *Literature of Western
Civilization: 18th Century to Present (4)
ENG 210. *Literatures of the World: Asia (4)
ENG 211. *Literatures of the World: Africa (4)
ENG 212. *Literatures of the World: Meso/ South America, Caribbean (4)
ENG 213. *Literatures of the World: Middle East (4)
ENG 214 *Literatures of Europe (4)
ENG 221. *African-American Literature (4)
ENG 253. *Survey of American Literature:
Colonial to 1900 (4)
ENG 254. *Survey of American
Literature:1900 to Present (4)
ENG 260. *Literature of American Minorities (4)

## Upper Division

ENG 345. Introduction to Literary Criticism and Theory (4)
Pre-1800 Literature (Select a minimum of 2
courses, 8 credits) ${ }^{1}$
ENG 417. The English Novel: Defoe
Through Scott (4)
ENG 425. Studies in Medieval Literature (4)
ENG 426. Studies in Chaucer (4)
ENG 430. Studies in Early Modern
Literature (4)
ENG 433. Studies in the Long Eighteenth Century (4)
ENG 435. Studies in Shakespeare (4)
ENG 490. History of the English Language (4)

Post-1800 Literature (Select a minimum of 2 courses, 8 credits) ${ }^{1}$
ENG 317. *The American Novel: Beginnings to Chopin (4)
ENG 318. *The American Novel: Modernist Period (4)
ENG 319. *The American Novel: Post-World War II (4)

ENG 320. *Studies in Page, Stage, and Screen (4)
ENG 360. *Native American Literature (4)
ENG 362. *American Women Writers (4)
ENG 374. *Modern Short Story (4)
ENG 418. The English Novel: Victorian Period (4)
ENG 419. The English Novel: 20th Century (4)

ENG 434. Studies in Romanticism (4)
ENG 436. Studies in Victorian Literature (4)
ENG 438. Studies in Modernism (4)
ENG 440. Studies in Modern Irish Literature (4)

ENG 450. Studies in Short Fiction (4)
ENG 470. ${ }^{\wedge}$ Studies in Poetry (4)
ENG 482. Studies in American Literature,
Culture, and the Environment (4)
ENG 485. ${ }^{\wedge}$ Studies in American Literature (4)

FILM 452. ${ }^{\wedge}$ Studies in Film (4)
Electives ( 12 credits upper-division ENG or WR)
WIC Course (3)
Courses taken to satisfy major requirements may not be taken with an $\mathrm{S} / \mathrm{U}$ grade.
Total=53
SAMPLE FOUR-YEAR PLAN: ENGLISH

## Year 1

Fall (14)
ALS 199. Special Topics: U-Engage (2)
ENG 204. *Survey of British Literature: Beginnings to 1660 (4)
or ENG 205. *Survey of British Literature: Restoration to Romantic Era (4) or ENG 206. *Survey of British Literature: Victorian Era to 20th Century (4) or ENG 253. *Survey of American Literature: Colonial to 1900 (4) or ENG 254. *Survey of American
Literature:1900 to Present (4)
Language 111 (4)
PAC Course (1-2)
WR 121. *English Composition (3)
or COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)

## Winter (16)

ENG 200. Library Skills for Literary Study (1)
ENG 204. *Survey of British Literature:
Beginnings to 1660 (4)
or ENG 205. *Survey of British Literature: Restoration to Romantic Era (4)
or ENG 206. *Survey of British Literature:
Victorian Era to 20th Century (4)
or ENG 253. *Survey of American
Literature: Colonial to 1900 (4)
or ENG 254. *Survey of American
Literature:1900 to Present (4)
Language 112 (4)
WR 121. *English Composition (3)
or COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
Bacc Core Course-Western Culture (4)

## Spring (15)

Survey of Literature Elective (4)
Language 113 (4)

MTH Course (4)
Bacc Core Course-Difference, Power, and Discrimination (3)

## Year 2

Fall (15)
Survey of Literature Elective (4)
Language 211 (4)
Bacc Core Course-Cultural Diversity (3)
Bacc Core Course-Physical Science with Attached Lab (3)

## Winter (16)

Survey of Literature Elective (4)
Language 212 (4)
Bacc Core Course-Social Processes and Institutions (3)
Bacc Core Course-Biological Science with
Attached Lab (3)

## Spring (14)

HHS 231. *Lifetime Fitness for Health (2)
Language 213 (4)
WR II (4)
Bacc Core Course-Difference, Power, and
Discrimination (3)
Bacc Core Course-Literature and the Arts (4)

## Year 3

Fall (15)
ENG 345. Introduction to Literary Criticism and Theory (4)
Bacc Core Course-Social Sciences (3)
Pre-1800 Upper-Division Literature (4)
Third Lab Science (4)

## Winter (16)

Post-1800 Upper-Division Literature (4)
Bacc Core Course-Non-Western Culture (3)
CLA Core Course-Fine Arts (3)
CLA Core Course, Additional-(3)
General Elective (3)

## Spring (15)

Bacc Core Course-Science, Technology and Society (3)
CLA Core Course-Humanities (3)
Post-1800 Upper-Division Literature (4)
Pre-1800 Upper-Division Literature (4)
PAC (1-2)

## Year 4

Fall (16)
ENG or WR Upper-Division Elective (4)
Bacc Core Course-Contemporary Global Issues (3)
General Elective (3)
General Elective (3)
General Elective (4)

## Winter (14)

ENG or WR Upper-Division Elective (4)
General Elective (3)
General Elective (3)
General Elective (4)

## Spring (14)

ENG or WR Upper-Division Elective (4)
General Elective (3)
General Elective (3)
General Elective (4)
Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
${ }^{1}$ See advisor for additional pre- and post-1800 courses.
Major Code: $\mathbf{8 9 0}$


## UNDERGRADUATE MINORS

## ENGLISH MINOR

## Also available at OSU-Cascades

The minor in English allows students to concentrate in the area of the liberal arts and develop the reading and writing skills often demanded by employers. There are three options for completing the English minor: General English, the English Literature, and the American Literature.

## General English Studies (28)

A. Required sequence. Choose one of the following sequences (12):
ENG 204. *Survey of British Literature: Beginnings to 1660 (4)
ENG 205. *Survey of British Literature: Restoration to Romantic Era (4)
ENG 206. *Survey of British Literature: Victorian Era to 20th Century (4)

## OR

ENG 253. *Survey of American Literature: Colonial to 1900 (4)
ENG 254. *Survey of American Literature: 1900 to Present (4)
B. Upper Division ( 12 credits)
C. One additional upper- or lower-division

English OR one upper-level Writing (4)
English Literature Area (28)

## A. Lower Division

ENG 204. *Survey of English Literature: Beowulf to Milton (4)
ENG 205. *Survey of British Literature:
Restoration to Romantic Era (4)
ENG 206. *Survey of English Literature:
Byron to the Present (4)
Choose one course from below:
ENG 201. *Shakespeare (4)
ENG 202. *Shakespeare (4)
ENG 203. *Shakespeare (4)

## B. Upper Division

English Literature Courses (12 credits)

## American Literature Area (28)

## A. Lower Division

ENG 253. *Survey of American Literature: Colonial to 1900 (4)
ENG 254. *Survey of American Literature: 1900 to Present (4)

## Choose one course from below:

ENG 221 *African-American Literature (4)
ENG 260 *Literature of American Minorities (4)

ENG 275 *The Bible as Literature (4)
ENG 317 *The American Novel: Beginnings to Chopin (4)
ENG 318 *The American Novel: Modernist Period (4)
ENG 319 *The American Novel: Post World War II (4)
FILM 245 *The New American Cinema (4)
B. Upper Division

Courses in American Literature (12 credits)
Total $=\mathbf{2 8}$
Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Minor Code: $\mathbf{8 9 0}$


## FILM STUDIES MINOR

The Film Studies minor is designed to give students a coherent introduction to film criticism, theory, and history (what those of us in the field call "critical studies") as well as more specialized and/or advanced classes in film genres, authors (auteurs), and cultural studies.

## Film Minor Requirements

- Minimum total credits (including electives): 28
- Minimum total upper-division credits (including electives): 12
- Minimum total credits in FILM classes: 24
- Minimum total upper-division credits in FILM classes: 8


## To be selected from:

FILM 101. Film Criticism and Theory: The Basics (3) [Pending submission and approval of curriculum proposal.]
FILM 110. *Introduction to Film Studies, 1895-1945 (3)
FILM 125. *Introduction to Film Studies, 1945-Present (3)
FILM 220. *Topics in Difference, Power, and Discrimination (4)
FILM 245. *The New American Cinema (4)
FILM 255. *World Cinema Part I: Origins to 1968 (4)
FILM 256. *World Cinema Part II: 1968Present (4)
FILM 265. *Films for the Future (4)
FILM 301. Advanced Film Criticism and Theory (4) [Pending submission and approval of a proposal]
FILM 452. ^Studies in Film (4) (can be taken two times for up to 8 credits)
FILM 480. Studies in Film, Culture, and Society (4)
Any other FILM courses of at least 3 credits

## Electives:

Select no fewer than 3 and no more than 6 credits selected from the following:

## German

GER 261. *Masterpieces of German Cinema (3)

GER 361. Critical Issues of German Cinema (3)

GER 362. Divided Screen: German Cinema Between 1945 and 1990 (3)
GER 363. Contemporary German Cinema (3)

## French

FR 329. *Francophone Cultures in Film (3-9)

## Spanish

SPAN 439. ${ }^{\wedge}$ Topics in Mexican Culture as
Evidenced Through Mexican Film (3)

## Ethnic Studies

ES 352. *Asian Representation in Hollywood and Independent Cinemas (3)
ES 411. Chicano/as In/On Film (3)
ES 452. *Ethnicity in Film (4)

## Women Studies

WGSS 230. *Women in the Movies (3)
WGSS 235. *Women in World Cinema (3)
WGSS 325. *Disney: Gender, Race, Empire (3)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Minor Code: 268


## WRITING MINOR

## Also available via Ecampus.

The Writing minor benefits students who wish to learn about, practice and hone their writing skills, primarily to prepare them for their careers and to increase their qualifications for professional positions in a world where communication skills are ever more needed and revered by employers. Some students with aspirations for graduate, law or medical school studies pursue the Writing minor to better enable themselves to write more proficiently at higher academic levels, where work is more rigorous and written output is expected to be of a very high level. Others engage in the Writing minor for the pure joy of expressing themselves, working with ideas and words, and many publish works in student publications on campus and in external publications. Writing minors may also participate in on-campus and off-campus internships for credit.

The Writing minor requires a minimum of 27 credits, as follows: a minimum of 11 credits from 100- to 300-level writing courses, plus a minimum of 12 credits from 400-level upper-division writing courses, plus one elective upperdivision (300/400) 4-credit course in writing or literature.

## Part A. A minimum of 11 credits

 from 100- to 300-level writing courses. Choose from this list, at least one course must be at the 300 level:WR 199. Special Studies (3)
WR 201. *Writing for Media (3)
WR 214. *Writing in Business (3)
WR 222. *English Composition (3)
WR 224. *Introduction to Fiction Writing (3)
WR 239 *Introduction to Writing: Fiction
and Creative Nonfiction (3)
WR 240 *Introduction to Nonfiction Writing (3)
WR 241. *Introduction to Poetry Writing (3)
WR 303. *Writing for the Web (3)
WR 323. *English Composition (3)
WR 324. *Short Story Writing (4)
WR 327. *Technical Writing (3)
WR 329. Writing for Law and Law School (3)
WR 330. *Understanding Grammar (3)
WR 340. *Creative Nonfiction (4)
WR 341. *Poetry Writing (4)
WR 362. *Science Writing (3)
WR 383. Food Writing (4)
Part B. A minimum of 12 credits
from 400 -level upper-division
writing courses from the following

## list:

ENG 410. Internship in English (1-16)
WR 406. Projects (1-16)
WR 407. Seminar (variable)
WR 408. Workshop (1-16)
WR 411. ^The Teaching of Writing (4)
WR 414. Advertising and Public Relations Writing (4)
WR 416. Advanced Composition (4)

WR 420. Studies in Writing (4)
WR 424. Advanced Fiction Writing (4)
WR 441. Advanced Poetry Writing (4)
WR 448. Magazine Article Writing (4)
WR 449. Critical Reviewing (4)
WR 462. *Environmental Writing (4)
WR 493. ${ }^{\wedge}$ The Rhetorical Tradition and the
Teaching of Writing (4)
WR 495. ^Introduction to Literacy Studies (4)
WR 497. *Digital Literacy and Culture
Part C. One elective upper-division (300/400) 4-credit course in film, literature, or writing, from this list, which does not duplicate any

## course used in Parts A or B.

## Film Electives

FILM 452. $\wedge$ Studies in Film (4)

## Literature Electives

ENG 311. ^Studies in British Prose (4)
ENG 312. ${ }^{\wedge}$ Studies in British Drama (4)
ENG 313. ^Studies in British Poetry (4)
ENG 317. *The American Novel: Beginning to Chopin (4)
ENG 318. *The American Novel: Modernist Period. (4)
ENG 319. The American Novel: Post-World War II (4)
ENG 320. *Studies in Page, Stage, and Screen (4)
ENG 345. Introduction to Literary Criticism and Theory (4)
ENG 360. *Native American Literature (4)
ENG 362. *American Women Writers (4)
ENG 374. *Modern Short Story (4)
ENG/ART 386. A Cultural History of
American Art and Literature: Part I (4)
ENG/ART 387. A Cultural History of
American Art and Literature: Part II (4)
ENG/ART 388. A Cultural History of
American Art and Literature: Part III (4)
ENG 412. Studies in British Theater and Society (4)
ENG 416. *Power and Representation (4)
ENG 417. The English Novel: Defoe
Through Scott (4)
ENG 418. The English Novel: Victorian Period (4)
ENG 419. The English Novel: 20th Century (4)

ENG 420. *Studies in Difference, Power, and Discrimination (4)
ENG 425. Studies in Medieval Literature (4)
ENG 426. Studies in Chaucer (4)
ENG 430. Studies in Early Modern Literature (4)
ENG 433. Studies in the Long Eighteenth Century (4)
ENG 434. Studies in Romanticism (4)
ENG 435. Studies in Shakespeare (4)
ENG 436. Studies in Victorian Literature (4)
ENG 438. Studies in Modernism (4)
ENG 440. Studies in Modern Irish Literature
(4)

ENG 445. ^Studies in Nonfiction (4)
ENG 450. Studies in Short Fiction (4)
ENG 454. Major Authors (4)
ENG 460. Studies in Drama (4)
ENG 465. Studies in the Novel (4)
ENG 470. ^Studies in Poetry (4)
ENG 475. Studies in Criticism (4)
ENG 480. Studies in Literature, Culture, and

Society (4)
ENG 482. Studies in American Literature, Culture, and the Environment (4)
ENG 485. ${ }^{\wedge}$ Studies in American Literature (4)
ENG 486. Studies in British Literature (4)
ENG 488. Literature and Pedagogy (4)
ENG 489. Writing, Literature, and Medicine (4)

ENG 490. History of the English Language (4)

ENG 497. *International Women's Voices (4)
ENG 498. Women and Literature (4)
ENG 499. Selected Topics (1-16)

## Writing Electives

WR 324. *Short Story Writing (4)
WR 341. *Poetry Writing (4)
WR 383. Food Writing (4)
WR 399. Special Topics (1-16)
WR 399H. Special Topics (1-16)
WR 401. Research and Scholarship (1-16)
WR 402. Independent Study (1-16)
WR 403. Thesis (TBA) (1-16)
WR 404. Writing and Conference (1-16)
WR 405. Reading and Conference (1-16)
WR 406. Projects (1-16)
WR 407. Seminar (1-16)
WR 408. Workshop (1-16)
WR 411. ^ The Teaching of Writing (4)
WR 414. Advertising and Public Relations Writing (4)
WR 416. Advanced Composition (4)
WR 420. Studies in Writing (4)
WR 424. Advanced Fiction Writing (4)
WR 441. Advanced Poetry Writing (4)
WR 448. Magazine Article Writing (4)
WR 449. Critical Reviewing (4)
WR 462. Environmental Writing (4)
WR 493. ${ }^{\wedge}$ The Rhetorical Traditional and The Teaching of Writing (4)
WR 495. ^Introduction to Literacy Studies (4)

WR 499. Special Topics (1-16)

## Total=a minimum of 27 credits

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)


## Minor Code: 891

## GRADUATE MAJORS

## CREATIVE WRITING (MFA)

Graduate Areas of Concentration
Fiction, poetry, nonfiction writing
The School of Writing, Literature, and Film offers the Master of Fine Arts degree in Creative Writing (fiction, poetry, nonfiction writing) at the Corvallis campus and a Low-Residency MFA partner program on the OSU-Cascades campus in Bend, Oregon.

The MFA Program in Creative Writing on the OSU Corvallis campus is a two-year, high residency, studio/research program that interweaves literary artistic practice and literary scholarship. Tracks in fiction, nonfiction, and poetry are supported by writing workshops led by nationally known writers, as well as by courses in form, craft, and theory. Inten-
sive mentoring during the thesis year, training in creative writing pedagogy, professional internships, and opportunities for outreach and community engagement produce graduates who are both accomplished creative writers and advocates for the role of literary arts in American culture and society.

OSU-Cascades's Low-Residency MFA is a two-year program combining writing workshop with studies in craft, literature, and vocation. The program offers intensive 10-day residency sessions in June and October and individualized mentorships by nationally known writers throughout the year. The program's intensive low-residency format is designed to balance the modern writer's need for both solitude and community, for both freedom and responsibility-to give our students the freedom as well as the discipline to write. Our curriculum builds sustainable writing habits, develops skills needed to support a creative livelihood after graduation, and creates an environment for taking imaginative risks.

## Major Code: 8920

## ENGLISH (MA, MAIS)

Graduate Areas of Concentration
Literature and culture; rhetoric, writing, and culture
The School of Writing, Literature and Film offers graduate work leading to a Master of Arts degree in English. The major area of concentration may be literature and culture; or rhetoric, writing, and culture. Graduate work in the school may also be applied to a Master of Arts in Interdisciplinary Studies degree or to minors in other advanced degree programs.

## Major Code: $\mathbf{8 9 0 0}$

## GRADUATE MINORS

## CREATIVE WRITING GRADUATE

 MINORFor more details, see the departmental advisor.

## Minor Code: 8920

## ENGLISH GRADUATE MINOR

For more details, see the school advisor.

## Minor Code: 8900

## ■ ENGLISH COURSES

ENG 104. *INTRODUCTION TO LITERATURE:
FICTION (3). Study of fiction for greater understanding and enjoyment. (H) (Bacc Core Course)
ENG 104H. *INTRODUCTION TO LITERATURE:
FICTION (3). Study of fiction for greater understanding and enjoyment. (H) (Bacc Core Course) PREREQS: Honors College approval required.
ENG 105. *INTRODUCTION TO LITERATURE:
DRAMA (3). Study of drama for greater understanding and enjoyment. (H) (Bacc Core Course)

ENG 106. *INTRODUCTION TO LITERATURE:
POETRY (3). Study of poetry for greater
understanding and enjoyment. (H) (Bacc Core Course)
ENG 106H. *INTRODUCTION TO LITERATURE:
POETRY (3). Study of poetry for greater
understanding and enjoyment. (H) (Bacc Core
Course) PREREQS: Honors College approval required.

ENG 107. *INTRODUCTION TO CREATIVE NONFICTION (3). An introduction to the study of creative nonfiction as a diverse genre, from journalism to memoir and essay. (Bacc Core Course) PREREQS: WR 121 or its equivalent in college credit.

ENG 199. SPECIAL STUDIES (1-16). This
course is repeatable for a maximum of 16 credits.
PREREQS: Departmental approval required.
ENG 200. LIBRARY SKILLS FOR LITERARY STUDY (1). Introduction to library resources for the study of literature. Required for English majors.
ENG 201. *SHAKESPEARE (4). The earlier plays. (H) (Bacc Core Course)

ENG 202. *SHAKESPEARE (4). The later plays. (H) (Bacc Core Course)

ENG 202H. *SHAKESPEARE (4). The later plays. (H) (Bacc Core Course) PREREQS: Honors College approval required.
ENG 204. *SURVEY OF BRITISH LITERATURE:
BEGINNINGS TO 1660 (4). English literature presented in chronological sequence. (H) (Bacc Core Course)

## ENG 204H. *SURVEY OF BRITISH

LITERATURE: BEGINNINGS TO 1660 (4).
English literature presented in chronological sequence. (H) (Bacc Core Course) PREREQS: Honors College approval required.
ENG 205. *SURVEY OF BRITISH LITERATURE: RESTORATION TO ROMANTIC ERA (4). English literature presented in chronological sequence. (H) (Bacc Core Course)
ENG 205H. * SURVEY OF BRITISH
LITERATURE: RESTORATION TO ROMANTIC
ERA (4). English literature presented in
chronological sequence. (H) (Bacc Core Course)
PREREQS: Honors College approval required.
ENG 206. *SURVEY OF BRITISH LITERATURE: VICTORIAN ERA TO 20TH CENTURY (4). English literature presented in chronological sequence. (H) (Bacc Core Course)

## ENG 207. *LITERATURE OF WESTERN

CIVILIZATION: CLASSICAL-RENAISSANCE
(4). The great plays, poems and fiction of Western civilization. Covers the Classical World: (Greek, Hebrew, Roman) and Western European major authors through the Renaissance. (H) (Bacc Core Course)
ENG 208. *LITERATURE OF WESTERN
CIVILIZATION: 18TH CENTURY TO PRESENT
(4). The great plays, poems and prose of Western civilization from the 18th century Enlightenment through Romanticism and beyond. (H) (Bacc Core Course)
ENG 210. *LITERATURES OF THE WORLD:
ASIA (4). Representative works of poetry, prose, and drama from nonwestern cultural traditions. Covers literature of Asia. (H) (NC) (Bacc Core Course)

ENG 211. *LITERATURES OF THE WORLD:
AFRICA (4). Representative works of poetry, prose, and drama from nonwestern cultural traditions. Covers literature of Africa. (H) (NC) (Bacc Core Course)
ENG 212. *LITERATURES OF THE WORLD: MESO/SOUTH AMERICA, CARIBBEAN (4).
Representative works of poetry, prose, and drama from nonwestern cultural traditions. Covers literature of Meso- and South America and the Caribbean. (H) (NC) (Bacc Core Course)

ENG 213. *LITERATURES OF THE WORLD
MIDDLE EAST (4). Representative works of poetry, prose, and drama from nonwestern cultural traditions. Covers literature of the Middle East. (H) (NC) (Bacc Core Course)
ENG 213H. *LITERATURES OF THE WORLD:
MIDDLE EAST (4). Representative works of
poetry, prose, and drama from nonwestern cultural traditions. Covers literature of the Middle East. (H) (NC) (Bacc Core Course) PREREQS: Honors College approval required.
ENG 214. *LITERATURE OF THE WORLD:
EUROPE (4). Representative works of poetry, prose, and drama written by European authors (Bacc Core Course)

ENG 215. *CLASSICAL MYTHOLOGY (4). Greek
and Roman mythology, its allusions, continuing influences. Not offered every year. (H) (Bacc Core Course)
ENG 220. *TOPICS IN DIFFERENCE, POWER,
AND DISCRIMINATION (4). A comparative treatment of literary topics in the context of institutional and systematic discrimination. Not offered every year. CROSSLISTED as FILM 220 (H) (Bacc Core Course)

ENG 221. *AFRICAN-AMERICAN LITERATURE
(4). Reading and critical analysis of African-

American literature in historical, political, and/or thematic perspective. Content changes from term to term; see Schedule of Classes. Not offered every year. (H) (Bacc Core Course) This course is repeatable for a maximum of 8 credits.

## NG 221H. *AFRICAN-AMERICAN

LITERATURE (4). Reading and critical analysis of African-American literature in historical, political, and/or thematic perspective. Content changes from term to term; see Schedule of Classes. Not offered every year. (H) (Bacc Core Course) This course is repeatable for a maximum of 8 credits. PREREQS: Honors College approval required.
ENG 225. THE ART, SCIENCE, AND LITERATURE OF FLY FISHING (1). Designed to rapidly introduce students to some of the major themes and formal devices of literature written about fly fishing. In four days, we will gain a sense of how four different genres--the short story, the novel, poetry, and creative nonfiction--represent and understand this activity. COREQS: FW 112, PAC 331

ENG 253. *SURVEY OF AMERICAN
LITERATURE: COLONIAL TO 1900 (4).
Readings from American literature presented in chronological sequence, important eras and movements with emphasis on major writers. (H) (Bacc Core Course)
ENG 254. *SURVEY OF AMERICAN
LITERATURE: 1900 TO PRESENT (4).
Readings from American literature presented in chronological sequence, important eras and movements with emphasis on major writers. (H) (Bacc Core Course)
ENG 254H. *SURVEY OF AMERICAN LITERATURE: 1900 TO PRESENT (4).
Readings from American literature presented in chronological sequence, important eras and movements with emphasis on major writers. (H) (Bacc Core Course) PREREQS: Honors College approval required.
ENG 260. *LITERATURE OF AMERICAN MINORITIES (4). Study of the literature of American minorities: North American Indian, black, Chicano/Chicana, Asian, Middle Eastern, gay and lesbian. Not offered every year. (H) (Bacc Core Course) PREREQS: Sophomore standing.
ENG 260H. *LITERATURE OF AMERICAN MINORITIES (4). Study of the literature of American minorities: North American Indian, black, Chicano/Chicana, Asian, Middle Eastern, gay and lesbian. Not offered every year. (H) (Bacc Core Course) PREREQS: Sophomore standing and Honors College approval required.

ENG 275. *THE BIBLE AS LITERATURE (4). Biblical structure, literary types, ideas, influences. Not offered every year. (H) (Bacc Core Course)
ENG 275H. *THE BIBLE AS LITERATURE (4). Biblical structure, literary types, ideas, influences. Not offered every year. (H) (Bacc Core Course) PREREQS: Honors College approval required.
ENG 295. *FEMINISM AND THE BIBLE (3). Examines feminist interpretations of the Bible and pays special attention to intersections of race, social class, sexual identity, and nation in biblical interpretation. (Bacc Core Course) CROSSLISTED as PHL 295, WGSS 295.
ENG 295H. *FEMINISM AND THE BIBLE (3). Examines feminist interpretations of the Bible and pays special attention to intersections of race, social class, sexual identity, and nation in biblical interpretation. (Bacc Core Course) CROSSLISTED as PHL 295, PHL 295H, WGSS 295, WGSS 295H.
ENG 311. ^STUDIES IN BRITISH PROSE (4). An introduction to the prose genre in British literature with intensive practice in reading and writing practices for literary study. (Writing Intensive Course)
ENG 312. ^STUDIES IN BRITISH DRAMA (4). An introduction to the dramatic arts genre in British literature with a special emphasis in reading and writing for literary study. (Writing Intensive Course)
ENG 313. ^${ }^{\wedge}$ STUDIES IN BRITISH POETRY (4). An introduction to the poetry genre in British literature with intensive practice in reading and writing for literary study. (Writing Intensive Course)

## ENG 317. *THE AMERICAN NOVEL:

BEGINNINGS TO CHOPIN (4). Chronological survey of the novel in America. Covers from the beginnings to Chopin. (H) (Bacc Core Course)
ENG 318. *THE AMERICAN NOVEL:
MODERNIST PERIOD (4). Chronological survey of the novel in America. Covers Modernist Period from Dreiser to Faulkner. (H) (Bacc Core Course)

ENG 319. *THE AMERICAN NOVEL: POST-
WORLD WAR II (4). Chronological survey of the novel in America. Covers Post-World War II: Mailer to the present. (H) (Bacc Core Course)
ENG 320. *STUDIES IN PAGE, STAGE, AND SCREEN (4). Study of a particular theme, genre, movement, or author through the relations of text and performance. Topics change from term to term and may include content from film, drama, digital sources, and other visual media. (H) (Bacc Core Course) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing or above.

ENG 321. *STUDIES IN WORD, OBJECT, AND IMAGE (4). Study of a particular theme, genre, movement, or author through the relations of texts to material artifacts and/or static visual objects (e.g., paintings, engravings, printed matter, or photographs). Topics change from term to term. (Bacc Core Course) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing or above.
ENG 322. *STUDIES IN GLOBALISM, TEXT,
AND EVENT (4). Study of a particular theme, genre, movement, or author as informed by patterns of globalization, issues in international relations, and/or landmark moments of cultura exchange. Topics change from term to term. (Bacc Core Course) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing.
ENG 330. *THE HOLOCAUST IN LITERATURE
AND FILM (4). Study of fiction, memoir, and film representing Nazi Holocaust of European Jewry. Reviews history of racial Anti-Semitism and rise of Nazism as context for textual analysis of Holocaust literature. Examines literary and filmic form as productive to social awareness of the roots, events, and aftermath of the Holocaust. (Bacc Core

Course) PREREQS: Sophomore standing or above
ENG 345. INTRODUCTION TO LITERARY
CRITICISM AND THEORY (4). Study and analysis of critical frameworks and methodologies for the interpretation of literature and culture. Required for English majors. (H) PREREQS: ENG 200 [C-]
ENG 360. *NATIVE AMERICAN LITERATURE
(4). An introduction to the prose and poetry written by Native Americans of the North American continent. Not offered every year. (H) (NC) (Bacc Core Course)

ENG 362. *AMERICAN WOMEN WRITERS (4).
Study of important literary works of any genre by American women from historical, thematic, or formalist perspectives. (H) (Bacc Core Course)
ENG 374. *MODERN SHORT STORY (4). Survey of the short story from the 19th century to the present. Not offered every year. (H) (Bacc Core Course)

ENG 374H. *MODERN SHORT STORY (4).
Survey of the short story from the 19th century to present. Not offered every year. (H) (Bacc Core Course) PREREQS: Honors College approval required.
ENG 375. CHILDREN'S LITERATURE (4).
Surveys a variety of genres, including fairy tales, folktales, and fables, nonsense poetry, picture books, historical and fantasy novels, examining how these texts represent childhood and connect with historical, cultural, and psychological contexts.
ENG 375H. CHILDREN'S LITERATURE (4).
Surveys a variety of genres, including fairy tales, folktales and fables, nonsense poetry, picture books, historical and fantasy novels, examining how these texts represent childhood and connect with historical, cultural, and psychological contexts. PREREQS: Honors College approval required.

ENG 386. A CULTURAL HISTORY OF AMERICAN ART AND LITERATURE: PART I (4). The first course in an interdisciplinary sequence of courses that examines the development and interrelationships of American art and literature from contact to the present. ENG 386 covers Conquest to Civil War. CROSSLISTED as ART 386. PREREQS: Sophomore standing.

## ENG 387. A CULTURAL HISTORY OF

AMERICAN ART AND LITERATURE: PART II
(4). The second course in an interdisciplinary sequence that examines the development and interrelationships of American art and literature from contact to the present. ENG 387 covers Civil War to Harlem Renaissance. CROSSLISTED as ART 387. PREREQS: Sophomore standing.

## ENG 388. A CULTURAL HISTORY OF

 AMERICAN ART AND LITERATURE: PART III (4). The third course in an interdisciplinary sequence that examines the development and interrelationships of American art and literature from contact to the present. ENG 388 covers Great Depression to Postmodernity. CROSSLISTED as ART 388. PREREQS: Sophomore standing.ENG 399. SELECTED TOPICS (1-16). (H) This course is repeatable for a maximum of 16 credits
ENG 399H. SELECTED TOPICS (1-16). (H) This course is repeatable for a maximum of 16 credits PREREQS: Honors College approval required.
ENG 401. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENG 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Departmental approval required.

ENG 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ENG 405. READING AND CONFERENCE (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENG 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENG 406H. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

ENG 407. ^SEMINAR (1-16). May be repeated as topics vary. CROSSLISTED as AMS 407. (Writing Intensive Core) This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENG 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
ENG 410. INTERNSHIP IN ENGLISH (1-
16). Provides upper-division English majors with supervised, on-the-job work experience, accompanying academic readings. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing in English; 16 credits of literature; 6 credits of writing beyond WR 121. Departmental approval required.

ENG 412. STUDIES IN BRITISH THEATER AND SOCIETY (4). Study of major dramatists and the audiences they addressed, of socio-economic conditions and their interrelations with theatrical institutions. Readings may include dramatic and non-dramatic literature. Historical period and content may vary. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 416. *POWER AND REPRESENTATION (4). Critical analysis of works by colonized peoples, women, and ethnic minorities, with a focus on the issue of representation. Not offered every year. (H) (Bacc Core Course) PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 417. THE ENGLISH NOVEL: DEFOE THROUGH SCOTT (4). Selected English novels from Defoe through Scott. Not offered every year (H) PREREQS: Sophomore standing; 8 credits of ENG 200-level or above

ENG 418. THE ENGLISH NOVEL: VICTORIAN
PERIOD (4). Selected English novels focusing on those from the Victorian period. (H) PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 419. THE ENGLISH NOVEL: 20TH CENTURY (4). Selected English novels of the 20th century. (H) PREREQS: Sophomore standing; 8 credits in English at 200-level or above.

ENG 420. *STUDIES IN DIFFERENCE, POWER, AND DISCRIMINATION (4). Comparative studies in literature documenting or illuminating institutional and systematic discrimination. Not offered every year. (H) (Bacc Core Course) PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.

ENG 425. STUDIES IN MEDIEVAL LITERATURE (4). Particular genres, themes, and writers in medieval literature. Topics change from term to term. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.

ENG 426. STUDIES IN CHAUCER (4). The works of Geoffrey Chaucer in their historical, cultural, and poetic contexts. Topics change from term to term. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 430. STUDIES IN EARLY MODERN
LITERATURE (4). Literature and culture of the Tudor, early Stuart, and Interregnum periods, 1485-1660. Content and genres will vary and may include non-English writers who influenced the English Renaissance. (H) This course is
epeatable for a maximum of 8 credits. PREREQS Sophomore standing; 8 credits of ENG 200-level or above.

## ENG 433. STUDIES IN THE LONG EIGHTEENTH

CENTURY (4). Literature of the period 1660-
1800, with emphasis on one or more of the following poets: Dryden, Pope, Swift, Johnson, Gray, Cowper. May also include prose writers (e.g., Behn, Fielding, Richardson, Addison and Steele) and dramatists (e.g., Congrieve, Wycherly, Gay). Not offered every term. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200 -level or above.

ENG 434. STUDIES IN ROMANTICISM (4).
Romantic-period writing and culture, with emphasis on one or more of the following authors: Blake, Wordsworth, Coleridge, Keats, Byron and Shelley. May also include Romantic novelists and prose writers (e.g., Austen, Wollstonecraft, Burke). Not offered every term. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 435. STUDIES IN SHAKESPEARE (4).
Shakespeare's works from a variety of critical and scholarly perspectives. Not offered every term (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above
ENG 436. STUDIES IN VICTORIAN LITERATURE
(4). Fiction, poetry, and nonfiction prose of the Victorian era. Topics change from term to term see Schedule of Classes. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 438. STUDIES IN MODERNISM (4). Studies in the literature and contexts of the Modernist period in Anglo-American letters (1890s to 1940s). Authors may include Wilde, Crane, Conrad, Eliot, Stevens, James, Woolf, Joyce, Lawrence, Shaw, Forster. Topics change from term to term. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.

## ENG 440. STUDIES IN MODERN IRISH

LITERATURE (4). Studies in the literature and contexts of the period of Irish writing often referred to as the Irish Renaissance. Authors may include Yeats, Joyce, Shaw, O'Casey, Gregory, Synge, Bowen, Moore, Behan, O'Brien, Kavanaugh, Cronin. Sometimes offered as a study of Joyce's works alone. Topics change from term to term. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.

ENG 445. ^STUDIES IN NONFICTION (4). Particular essayists and journalists, movements, problems, conventions, and types of nonfiction writing in English. Topics change from term to term: see Schedule of Classes. Not offered every year. (H) (Writing Intensive Course) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 450. STUDIES IN SHORT FICTION (4). Particular writers, movements, and types of short fiction. Topics change from term to term: see Schedule of Classes. Not offered every year. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 454. MAJOR AUTHORS (4). Advanced study of major and influential authors from various cultures and backgrounds. Subjects change from term to term; see Schedule of Classes. Not offered every year. $(H)$ This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 460. STUDIES IN DRAMA (4). Particular dramatists, movements, conventions, and types of world drama. Topics change from term to term;
see Schedule of Classes. Not offered every term (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 465. STUDIES IN THE NOVEL (4). Particula novelists, movements, conventions, and types of the novel throughout its history. Topics change from term to term; see Schedule of Classes. Not offered every term. (H) This course is repeatable for a maximum of 8 credits. PREREQS:
Sophomore standing; 8 credits of ENG 200-level or above.
ENG 470. ^STUDIES IN POETRY (4). Particular poets, movements, problems, conventions, and types of poetry in English or English translation. Topics change from term to term; see Schedule of Classes. Not offered every term. (H) (Writing Intensive Course) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.

ENG 475. STUDIES IN CRITICISM (4). Particular critics, critical movements, issues, and histories of criticism. Topics change from term to term; see Schedule of Classes. Not offered every year. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.

ENG 480. STUDIES IN LITERATURE, CULTURE
AND SOCIETY (4). Study of literature in its relationship to society and culture; study of literary culture. Topics change from term to term; see Schedule of Classes. Not offered every term. (H)
This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.

## ENG 482. STUDIES IN AMERICAN

## ITERATURE, CULTURE, AND THE

ENVIRONMENT (4). Creative nonfiction, fiction, poetry, and film from the mid-19th century to the present, examining relationships between rural and urban, and investigating the development of important patterns in how the physical environment is perceived, represented, interpreted, and used in the United States. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 483. CUBAN CULTURE, POLITICS
AND ARTS (4). One of two courses that comprise the Cuba Study Abroad Program. It introduces students to Cuban culture, politics (and particularly Cuba-U.S. relations during and after the Revolution) and arts via a combination of lectures/lessons led by invited specialists in their fields, readings, films and student activities. Students will learn about a variety of topics including migration, agriculture, health care, education, economics, religion/spirituality, gender, race, and the arts (literature, music and other performance). Given the interdisciplinary approach to this course, students will also be able to focus on other topics of interest to them/their program of study. CROSSLISTED as PS 483, WLC 483. PREREQS: Sophomore standing and acceptance into the OSU Cuba Study Abroad Program.
ENG 485. ^STUDIES IN AMERICAN
LITERATURE (4). Special topics in American literary history. Organized around movements, regions, themes, or major authors. Topics change from term to term; see Schedule of Classes. Not offered every term. (H) (Writing Intensive Course) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.

ENG 486. STUDIES IN BRITISH LITERATURE
(4). Particular British writers, movements, conventions, genres, and problems. Topics change from term to term; see Schedule of Classes. Not offered every year. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 488. LITERATURE AND PEDAGOGY (4).

Practices, approaches, histories, and theories of teaching literature appropriate for secondary through college settings. Considers text selection, assignments, and evaluation. (H) PREREQS: Upper-division standing.
ENG 489. WRITING, LITERATURE AND MEDICINE (4). Considers medical themes in literature, social meanings of illness, and writing strategies appropriate to the healing arts. PREREQS: Sophomore and above.
ENG 490. HISTORY OF THE ENGLISH
LANGUAGE (4). A study of the origins, changes, and reasons for changes in the grammar, sounds, and vocabulary of English from its earliest stages through its modern forms. (H) PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.

## ENG 497. *INTERNATIONAL WOMEN'S

VOICES (4). A study of women and literature in an international context, focusing on the cultural differences among women and the effects of gender on language and literature. (H) (Bacc Core Course) PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 498. WOMEN AND LITERATURE (4). Study of the relations between women and literature, including such issues as images of women in literature, women writers, and the effects of gender on language. This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 499. SELECTED TOPICS (1-16). (H) This course is repeatable for a maximum of 16 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
ENG 501. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval and graduate standing required.
ENG 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval and graduate standing required.
ENG 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval and graduate standing required.
ENG 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval and graduate standing required.
ENG 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval and graduate standing required.

ENG 507. SEMINAR (1-16). May be repeated for credit as topics vary. CROSSLISTED as AMS 507 This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval and graduate standing required.

## ENG 510. GRADUATE INTERNSHIP IN

ENGLISH (1-2). Provides graduate students with supervised, on-the-job work experience and professional development. Graded P/N. This course is repeatable for a maximum of 12 credits. PREREQS: Graduate standing in English, departmental approval.
ENG 512. STUDIES IN BRITISH THEATER AND SOCIETY (4). Study of major dramatists and the audiences they addressed, of socio-economic conditions and their interrelations with theatrical institutions. Readings may include dramatic and non-dramatic literature. Historical period and content may vary. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.

## ENG 514. INTRODUCTION TO GRADUATE

STUDIES (4). Introduction to the MA program; theories and methods of English studies. Offered fall term only. Required for first-year MA students.

ENG 516. POWER AND REPRESENTATION (4).
Critical analysis of works by colonized peoples, women, and ethnic minorities, with a focus on the issue of representation. Not offered every year. PREREQS: Graduate standing.
ENG 517. THE ENGLISH NOVEL: DEFOE THROUGH SCOTT (4). Selected English novels from Defoe through Scott. Not offered every year. PREREQS: Graduate standing.

ENG 518. THE ENGLISH NOVEL: VICTORIAN
PERIOD (4). Selected English novels focusing on those from the Victorian period. PREREQS: Graduate standing.
ENG 519. THE ENGLISH NOVEL: 20TH
CENTURY (4). Selected English novels of the 20th century. PREREQS: Graduate standing.
ENG 520. STUDIES IN DIFFERENCE, POWER, AND DISCRIMINATION (4). Comparative studies in literature documenting or illuminating institutional and systematic discrimination. Not offered every year. PREREQS: Graduate standing
ENG 525. STUDIES IN MEDIEVAL LITERATURE (4). Particular genres, themes, and writers in medieval literature. Topics change from term to term. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 526. STUDIES IN CHAUCER (4). The works of Geoffrey Chaucer in their historical, cultural, and poetic contexts. Topics change from term to term. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 530. STUDIES IN EARLY MODERN
LITERATURE (4). Literature and culture of the Tudor, early Stuart, and Interregnum periods, 1485-1660. Content and genres will vary and may include non-English writers who influenced the English Renaissance. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.

ENG 533. STUDIES IN THE LONG EIGHTEENTH
CENTURY (4). Literature of the period 1660-1800, with emphasis on one or more of the following poets: Dryden, Pope, Swift, Johnson, Gray,
Cowper. May also include prose writers (e.g.,
Behn, Fielding, Richardson, Addison and Steele) and dramatists (e.g., Congreve, Wycherly, Gay). Not offered every term. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 534. STUDIES IN ROMANTICISM (4).
Romantic-period writing and culture, with emphasis on one or more of the following authors: Blake, Wordsworth, Coleridge, Keats, Byron and Shelley. May also include Romantic novelists and prose writers (e.g., Austen, Wollstonecraft, Burke). Not offered every term. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 535. STUDIES IN SHAKESPEARE (4). Shakespeare's works from a variety of critical and scholarly perspectives. Not offered every term. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing and at least one quarter of Shakespeare.

ENG 536. STUDIES IN VICTORIAN LITERATURE
(4). Fiction, poetry, and nonfiction prose of the Victorian era. Topics change from term to term; see Schedule of Classes. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 538. STUDIES IN MODERNISM (4). Studies in the literature and contexts of the Modernist period in Anglo-American letters (1890's to 1940's). Authors may include Wilde, Crane, Conrad, Eliot, Stevens, James, Woolf, Joyce, Lawrence, Shaw, Forster. Topics change from term to term. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.

## ENG 540. STUDIES IN MODERN IRISH

LITERATURE (4). Studies in the literature and context of the period of Irish writing often referred to as the Irish Renaissance. Authors may include

Yeats, Joyce, Shaw, O'Casey, Gregory, Synge Bowen, Moore, Behan, O'Brien, Kavanaugh, Cronin. Sometimes offered as a study of Joyce's works alone. Topics change from term to term. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 545. STUDIES IN NONFICTION (4).
Particular essayists and journalists, movements, problems, conventions, and types of nonfiction writing in English. Topics change from term to term: see Schedule of Classes. Not offered every year. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.

ENG 550. STUDIES IN SHORT FICTION (4).
Particular writers, movements, and types of short fiction. Topics change from term to term: see Schedule of Classes. Not offered every year. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 554. MAJOR AUTHORS (4). Advanced study of major and influential authors from various cultures and backgrounds. Subjects change from term to term; see Schedule of Classes. Not offered every year. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 560. STUDIES IN DRAMA (4). Particular dramatists, movements, conventions, and types of world drama. Topics change from term to term; see Schedule of Classes. Not offered every term. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 565. STUDIES IN THE NOVEL (4). Particular novelists, movements, conventions, and types of the novel throughout its history. Topics change from term to term; see Schedule of Classes. Not offered every term. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 570. STUDIES IN POETRY (4). Particular poets, movements, problems, conventions, and types of poetry in English or English translation. Topics change from term to term; see Schedule of Classes. Not offered every term. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 575. STUDIES IN CRITICISM (4). Particular critics, critical movements, issues, and histories of criticism. Topics change from term to term; see Schedule of Classes. Not offered every year. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 580. STUDIES IN LITERATURE, CULTURE AND SOCIETY (4). Study of literature in its relationship to society and culture; study of literary culture. Topics change from term to term; see Schedule of Classes. Not offered every term. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 582. STUDIES IN AMERICAN
LITERATURE, CULTURE, AND THE
ENVIRONMENT (4). Creative nonfiction,
fiction, poetry, and film from the mid-19th century to the present, examining relationships between rural and urban, and investigating the development of important patterns in how the physical environment is perceived, represented, interpreted, and used in the United States. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 583. CUBAN CULTURE, POLITICS
AND ARTS (4). One of two courses that comprise the Cuba Study Abroad Program. It introduces students to Cuban culture, politics (and particularly Cuba-U.S. relations during and after the Revolution) and arts via a combination of lectures/lessons led by invited specialists in their fields, readings, films and student activities. Students will learn about a variety of topics including migration, agriculture, health care, education, economics, religion/spirituality, gender, race, and the arts (literature, music and other performance). Given the interdisciplinary approach
to this course, students will also be able to focus on other topics of interest to them/their program of study. CROSSLISTED as PS 583, WLC 583. PREREQS: Sophomore standing and acceptance into the OSU Cuba Study Abroad Program.
ENG 585. STUDIES IN AMERICAN LITERATURE
(4). Special topics in American literary history. Organized around movements, regions, themes, or major authors. Topics change from term to term; see Schedule of Classes. Not offered every term. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 586. STUDIES IN BRITISH LITERATURE
(4). Particular British writers, movements, conventions, genres, and problems. Topics change from term to term; see Schedule of Classes. Not offered every year. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
ENG 588. LITERATURE AND PEDAGOGY (4).
Practices, approaches, histories, and theories of teaching literature appropriate for secondary through college settings. Considers text selection, assignments, and evaluation. PREREQS: Graduate standing.
ENG 589. WRITING, LITERATURE AND MEDICINE (4). Considers medical themes in literature, social meanings of illness, and writing strategies appropriate to the healing arts. PREREQS: Sophomore and above.

ENG 590. HISTORY OF THE ENGLISH LANGUAGE (4). A study of the origins, changes, and reasons for changes in the grammar, sounds, and vocabulary of English from its earliest stages through its modern forms. PREREQS: Graduate standing.

ENG 595. LANGUAGE, TECHNOLOGY, AND CULTURE (4). Explores relationship between literacy, technology, and thought. PREREQS: Graduate standing.
ENG 597. INTERNATIONAL WOMEN'S VOICES
(4). A study of women and literature in an international context, focusing on the cultural differences among women and the effects of gender on language and literature. PREREQS: Graduate standing.
ENG 598. WOMEN AND LITERATURE (4). Study of the relations between women and literature, including such issues as images of women in literature, women writers, and the effects of gender on language. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.

## FILM STUDIES COURSES

FILM 110. *INTRODUCTION TO FILM STUDIES:
1895-1945 (3). An introduction to the serious study of world cinema, 1895-1945. Class lectures will offer a variety of historical, critical and theoretical approaches. Weekly screenings of important films from the U.S., Europe, and Asia accompany the lectures. Film fee required. (H) (Bacc Core Course)
FILM 125. *INTRODUCTION TO FILM STUDIES: 1945-PRESENT (3). Provides an introduction to the serious study of world cinema, 1945-present. Class lectures will offer a variety of historical, critical and theoretical approaches. Weekly screenings of important films from the U.S. Europe, and Asia accompany the lectures. Film fee required. (H) (Bacc Core Course)
FILM 220. *TOPICS IN DIFFERENCE, POWER, AND DISCRIMINATION (4). A comparative treatment of literary topics in the context of institutional and systematic discrimination. Not offered every year. CROSSLISTED as ENG 220. (H) (Bacc Core Course)

FILM 245. *THE NEW AMERICAN CINEMA (4). A formalist, ideological, and commercial
investigation into contemporary American cinema. Three hours of lecture and separate screenings
each week. Film fee required. Not offered every year. (H) (Bacc Core Course)

FILM 245H. *THE NEW AMERICAN CINEMA (4).
A formalist, ideological, and commercial
investigation into contemporary American cinema. Three hours of lecture and separate screenings each week. Film fee required. Not offered every year. (H) (Bacc Core Course) PREREQS: Honors College approval required.

FILM 255. *WORLD CINEMA PART I: ORIGINS TO 1968 (4). A systematic introduction to the arts and history of international cinema, from the invention of the medium in 1895 to the rise of New Wave and Third Cinema in the 1960s. Weekly screenings of films such as Rashomon, Tokyo Story, Pather Parchali, Terra em Transe, and La Noire de. (Bacc Core Course)

## FILM 256. *WORLD CINEMA PART II:

1968-PRESENT (4). A systematic introduction to the arts and history of international cinema, from the decolonization movement in the 1960s and the 1970s to the dynamics of globalization that we are experiencing today. Weekly screenings include such films as A Better Tomorrow, Chungking Express, Spirited Away, Oldboy, Bombay, and City of God. (Bacc Core Course)
FILM 265. *FILMS FOR THE FUTURE (4). An interdisciplinary study of film, literary, and philosophical visions of the future. Three hours of lecture and separate screenings each week. Film fee required. Not offered every year. (H) (Bacc Core Course)
FILM 360. INTERNATIONAL FILM FESTIVAL (3). Critical study of a selection of films screened at the Oregon State University's International Film Festival. Topics include acting, sound, special effects, cinematography. CROSSLISTED as WLC 360. This course is repeatable for a maximum of 9 credits. PREREQS: Sophomore standing or higher.

FILM 445. DOCUMENTARY FILM STUDIES (4).
Examines the worldwide development of documentary filmmaking. We interrogate the nature, form, and function of non-fiction cinematic forms by analyzing diverse films, filmmakers, and theoretical models, while paying attention to social, technological, and aesthetic influences. We study significant modes of documentary including the city symphony, political documentary direct cinema/cinema verite, and postmodern documentary. Finally, we will pay special attention to the cross-fertilization of non-fiction with other filmmaking modes. Throughout the course, we seek to answer the following questions: How do documentary conventions mark the "Real"? How is documentary film a tool for social change?

FILM 452. ^STUDIES IN FILM (4). Particular cinematographers, movements, types, conventions, or problems in film. Topics change from term to term; see Schedule of Classes. Lecture and separate screenings each week. Film fee required. Not offered every year. (H) (Writing Intensive Course) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.
FILM 452H. ${ }^{\wedge}$ STUDIES IN FILM (4). Particular cinematographers, movements, types, conventions, or problems in film. Topics change from term to term; see Schedule of Classes. Lecture and separate screenings each week. Film fee required. Not offered every year. (H) (Writing Intensive Course) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above. Honors College approval required.

FILM 480. STUDIES IN FILM, CULTURE AND SOCIETY (4). Study of film in its relationship to society and culture; study of film culture. Topics change from term to term; see Schedule of Classes. (H) This course is repeatable for a maximum of 8 credits. PREREQS: Sophomore standing; 8 credits of ENG 200-level or above.

FILM 545. DOCUMENTARY FILM STUDIES (4).
Examines the worldwide development of documentary filmmaking. We interrogate the nature, form, and function of non-fiction cinematic forms by analyzing diverse films, filmmakers, and theoretical models, while paying attention to social, technological, and aesthetic influences We study significant modes of documentary including the city symphony, political documentary, direct cinema/cinema verite, and postmodern documentary. Finally, we will pay special attention to the cross-fertilization of non-fiction with other filmmaking modes. Throughout the course, we seek to answer the following questions: How do documentary conventions mark the "Real"? How is documentary film a tool for social change?

FILM 552. STUDIES IN FILM (4). Particular cinematographers, movements, types, conventions, or problems in film. Topics change from term to term; see Schedule of Classes. Lecture and separate screenings each week. Film fee required. Not offered every year. This course is repeatable for a maximum of 16 credits. PREREQS: Graduate standing.

FILM 580. STUDIES IN FILM, CULTURE AND SOCIETY (4). Study of film in its relationship to society and culture; study of film culture. Topics change from term to term; see Schedule of Classes. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.

## ■ WRITTEN ENGLISH COURSES

WR 115. INTRODUCTION TO EXPOSITORY WRITING (3). Introduction to rhetorical concepts and writing strategies necessary for university evel written composition. Includes substantial discussion of grammar, punctuation, and usage conventions of standard written English. Does not satisfy WR 121 requirement. Graded P/N. This course is repeatable for a maximum of 6 credits.
WR 121. *ENGLISH COMPOSITION (3).
Introduction to critical thinking, the writing process, and the forms of expository writing. Intensive writing practice, with an emphasis on revision. The term in which the student takes the course is determined alphabetically; see Schedule of Classes. (Bacc Core Course)

WR 121H. *ENGLISH COMPOSITION (3). introduction to critical thinking, the writing process, and the forms of expository writing. Intensive writing practice, with an emphasis on revision. The term in which the student takes the course is determined alphabetically; see Schedule of Classes. (Bacc Core Course) PREREQS: required of all students. Honors College approval required.

## WR 130. FUNDAMENTALS OF GRAMMAR,

SYNTAX, AND SENTENCE BUILDING (1).
Provides opportunities to improve writing at the sentence level. Focuses on the fundamental elements of the sentence (grammar), the principles and rules of sentence structure (syntax), and techniques for writing meaningful, compelling sentences (sentence building). WR 130 is a hybrid course; students will use online modules, activities, and quizzes to advance understanding of grammar fundamentals and to practice writing, editing, and revising sentences. In-person meetings will emphasize student questions and applying lessons to other academic writing projects. Graded P/N.

WR 199. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
WR 201. *WRITING FOR MEDIA (3). Introduction to newspaper style. Introduction to reporting (Bacc Core Course) PREREQS: Grade B or higher in WR 121 or WR 121H and 30 wpm typing speed.
WR 214. *WRITING IN BUSINESS (3). Continued practice in writing with an emphasis on the rhetorical and critical thinking demands of writers in business and industry. (Bacc Core Course) PREREQS: WR 121 [C-] or WR 121H [C-] or

## Placement Test WWRI(1)

WR 222. *ENGLISH COMPOSITION (3).
Continued practice in expository writing with an emphasis on argumentation and research. (Bacc Core Course) PREREQS: WR 121 [C-] or WR 121 H [C-] or Placement Test WWRI(1)

## WR 224. *INTRODUCTION TO FICTION

WRITING (3). Discussion workshop. Student work examined in context of contemporary published work. (FA) (Bacc Core Course) PREREQS: WR 121 [C-] or WR 121H [C-] or Placement Test WWRI(1)
WR 239. INTRODUCTION TO WRITING FICTION AND CREATIVE NONFICTION (3). Explores how
to write good stories, whether real or imagined. Students will read and write in both genres, identifying the elements that make stories more vivid, more human, and more true. Students will write informal pieces and one longer work in each genre, and will workshop one story or essay. Taught via Ecampus only.
WR 240. *INTRODUCTION TO NONFICTION
WRITING (3). Discussion workshop. Student work examined in context of contemporary published work. (Bacc Core Course) This course is repeatable for a maximum of 9 credits. PREREQS: WR 121 [C-] or WR 121H [C-]

## WR 241. *INTRODUCTION TO POETRY

WRITING (3). Discussion workshop. Rudiments of mechanics and some background in development of modern poetry. (FA) (Bacc Core Course) PREREQS: WR 121 [C-] or WR 121H [C-] or Placement Test WWRI(1)
WR 303. *WRITING FOR THE WEB (3). The production of instructive, informative, and rhetorically savvy writing for Web-based locations and applications. Helps people find information, get things done, convey their opinions, build communities, and collaborate on complex projects (Bacc Core Course) PREREQS: WR 121 [D-] or WR 121H [D-]
WR 323. *ENGLISH COMPOSITION (3).
Continued practice in writing with an emphasis on the elements of style: diction, tone, precision and economy, emphasis, figurative language. (Bacc Core Course) PREREQS: WR 121 [C-] or WR 121 H [C-] or Placement Test WWRI(1)
WR 324. *SHORT STORY WRITING (4). Study and writing of the short story. (FA) (Bacc Core Course) This course is repeatable for a maximum of 8 credits. PREREQS: WR 224 [D-] and /or instructor approval required.
WR 327. *TECHNICAL WRITING (3). Continued practice in writing with an emphasis on the rhetorical and critical thinking demands of writers in scientific and technological fields. (Bacc Core Course) PREREQS: WR 121 [C-] or WR 121H [C-] or Placement Test WWRI(1)
WR 327H. *TECHNICAL WRITING (3). Continued practice in writing with an emphasis on the rhetorical and critical thinking demands of writers in scientific and technological fields. (Bacc Core Course) PREREQS: WR 121 [C-] or WR 121H [C-] or Placement Test WWRI(1) and Honors College approval required.

## WR 329. WRITING FOR LAW AND LAW

 SCHOOL (3). Improves the rhetorical and structural sophistication of persuasive writing, and gives practice in writing the law application essay. Provides a thorough review of logical, grammatical, usage, and sentence-level errors. PREREQS: WR 121 [C-] or WR 121 H [C-]WR 330. *UNDERSTANDING GRAMMAR (3). Advanced study of traditional grammatical forms and conventional grammatical terms with emphasis on the assumptions underlying the structure of traditional grammar. (Bacc Core Course) PREREQS: WR 121 [C-] or WR 121H [C-] or Placement Test WWRI(1)
WR 340. CREATIVE NONFICTION (4). Study and writing of creative nonfiction. This course is
repeatable for a maximum of 8 credits. PREREQS: WR 240 [D-] and /or instructor approval required.
WR 341. *POETRY WRITING (4). Study and writing of verse. (FA) (Bacc Core Course) This course is repeatable for a maximum of 8 credits. PREREQS: WR 241 [D-] and /or instructor approval required.
WR 353. WRITING ABOUT PLACES (3). Utilizing personal experience, reading, and research, students, study, discuss, and practice the conventions of writing about place far and near, global and local, for various audiences and in a range of formats. PREREQS: WR 121 [D-]
WR 362. *SCIENCE WRITING (3). Students learn and practice the conventions for writing scientific material for a variety of audiences. Involves writing and research assignments, multimedia presentations, lecture, and in-class and online activities. (Baccalaureate Core Course) PREREQS: WR 121 [C-] or WR 121H [C-]
WR 383. FOOD WRITING (4). Students will write about food and food issues for a variety of audiences, including print and digital, adapting their texts to become increasingly sophisticated critical thinkers and writers who can shape material effectively. Will also address food science and food studies from a historical and cultural background. PREREQS: (WR 121 [D-] or WR 121 H [D-] ) and (HC 199 [D-] or PHL 121 [D-] or WR 201 [D-] or WR 214 [D-] or WR 222 [D-] or WR 224 [D-] or WR 241 [D-] or WR 323 [D-] or WR 324 [D-] or WR 327 [D-] or WR 330 [D-] or WR 341 [D-] or WR 362 [D-] ) and students need to have cleared their Baccalaureate WR II requirement in order to have the necessary writing skills to build upon for this course.
WR 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
WR 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
WR 401. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
WR 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
WR 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
WR 404. WRITING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
WR 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
WR 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
WR 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
WR 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
WR 411. ^THE TEACHING OF WRITING (4).
Pedagogy and theory in composition; prepares teachers (secondary through college) in writing process, assignment design, evaluation, and grammar. Also focuses on students' own writing. (Writing Intensive Course) PREREQS: Upperdivision standing.
WR 414. ADVERTISING AND PUBLIC
RELATIONS WRITING (4). Writing news releases, annual reports, brochures, newsletters, and other PR materials. Writing advertising copy. PREREQS:

WR 121 [B] or WR 121H [B] and upper-division standing.

## WR 416. ADVANCED COMPOSITION (4).

The development of style and voice in both the personal and the academic essay. This course is repeatable for a maximum of 8 credits. PREREQS: Upper-division standing.
WR 420. STUDIES IN WRITING (4). Selected
topics in rhetoric and composition. This course is repeatable for a maximum of 8 credits. PREREQS: Upper-division standing.
WR 424. ADVANCED FICTION WRITING (4).
Workshop. (FA) This course is repeatable for a maximum of 8 credits. PREREQS: WR 324 [D-] and /or instructor approval required.
WR 435. SCIENTIFIC, TECHNICAL, \& PROFESSIONAL COMMUNICATION CAPSTONE (1). Students complete a portfolio comprised of material generated throughout previous courses in the Certificate in Scientific, Technical, and Professional Communication. CROSSLISTED as COMM 435. PREREQS: Completion of 18 credits towards the Certificate in Scientific, Technical, and Professional Communication.
WR 441. ADVANCED POETRY WRITING (4). Advanced poetry workshop. (FA) This course is repeatable for a maximum of 8 credits. PREREQS: WR 341 [D-] and /or instructor approval required.
WR 448. MAGAZINE ARTICLE WRITING (4). Writing the magazine article. Analyzing markets and writing query and cover letters, marketing manuscripts to magazines. Interviewing and researching. PREREQS: Upper-division standing.
WR 449. CRITICAL REVIEWING (4). Writing critical reviews of books, television programs, movies, plays, and restaurants for newspapers and magazines. The role of criticism in popular culture. PREREQS: Upper-division standing.
WR 462. ^ENVIRONMENTAL WRITING (4). Writing about environmental topics from multiple perspectives. Includes science journalism, research and writing on current scientific issues and controversies, and theories of rhetoric and environmentalism. (Writing Intensive Course) This course is repeatable for a maximum of 12 credits. PREREQS: WR 121 [C-] or WR 121H [C-]
WR 466. PROFESSIONAL WRITING (4). Introduces the texts, contexts, and concepts important to the practice of professional communication in organizational contexts, addressing practical writing skills, rhetoric, ethics, and information design. Course readings concern what professional writers do and what theories govern their actions, bridging the gap between real-world problems and academic research. PREREQS: WR 121 [D-] or WR 121H [D-] and upper-division standing for undergraduates.
WR 475. RHETORICS OF RACE (4). By exploring the interrelated concepts of race, racialization, and racism, Rhetorics of Race problematizes race as a taken-for-granted phenomenon. Through reading, writing, and discussion, class participants study racial formations as historically specific and analyze contemporary forms of racism in the US. Readings and discussion pay close attention to how rhetoric and discourse have the power to reproduce and challenge white supremacy and race-based oppressions. Emphasizing the intersectionality of oppression-that racism necessarily takes place at intersections with other forms of subordination including sexism, homophobia, ablelism, etc.-Rhetorics of Race draws from Queer Black Feminism, Chican@ Feminism, and Critical Race Theory.

## WR 485. CONTEMPORARY RHETORIC

THEORY (4). Familiarizes students with a range of theories that have significantly contributed to or influenced the field of modern and contemporary rhetorical research. The course examines scholars, concepts, and methodologies that are central to contemporary rhetorical theory, while
ouching on key critical theorists who, although may be considered outside the field of rhetoric studies, impact the ways in which language, persuasion, and communication are currently understood. From this work, students develop their own perspectives and generate evidencebased arguments concerning those same issues. PREREQS: WR 121 [C-] or WR 121H [C-]
WR 493. ${ }^{\wedge}$ THE RHETORICAL TRADITION AND THE TEACHING OF WRITING (4). Major past and contemporary theories of written communication, their historical context, and their impact on writing and the teaching of writing. (Writing Intensive Course) PREREQS: Upper-division standing.

## WR 495. ^INTRODUCTION TO LITERACY

STUDIES (4). Literacy studies in multidisciplinary contexts. Examines historical, theoretical, and practical relationships among reading, writing, language, culture, and schooling. (Writing Intensive Course) PREREQS: Upper-division standing.

WR 497. DIGITAL LITERACY AND CULTURE
(4). From pencils to pixels, telegraphs to texts, and semaphores to social networking, Digital Literacy and Culture focuses on the relationships between human expression and the technologies that provide context, meaning, and shape to those expressions. PREREQS: WR 121 [C-] or WR 121H [C-] and upper-division standing for undergraduates.
WR 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
WR 500. MFA RESIDENCY (12). Low-Residency Masters of Fine Arts Residency. Required course for graduate students in the Low-Residency Masters of Fine Arts in Creative Writing. This course is repeatable for a maximum of 48 credits.
WR 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval and graduate standing required.
WR 502. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval and graduate standing required

WR 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS:
Departmental approval and graduate standing required.
WR 504. WRITING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

WR 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval and graduate standing required.
WR 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval and graduate standing required.
WR 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval and graduate standing required
WR 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval and graduate standing required.
WR 509. PRACTICUM (1-16). Required practicum for graduate students teaching introduction to poetry writing. This course is repeatable for a maximum of 16 credits.

WR 511. THE TEACHING OF WRITING (4). Pedagogy and theory in composition; prepares teachers (secondary through college) in writing process, assignment design, evaluation, and grammar. Also focuses on student's own writing. PREREQS: Graduate standing.

WR 512. CURRENT COMPOSITION THEORY
(4). Current rhetoric and composition theory and its applications for teachers and writers. PREREQS: Graduate standing.
WR 513. LOW-RESIDENCY MFA MENTORSHIP
(5-12). Low-Residency Masters of Fine Arts
Mentorship. Required course for graduate students in the Low-Residency Masters of Fine Arts in Creative Writing. This course is repeatable for a maximum of 36 credits.
WR 514. ADVERTISING AND PUBLIC
RELATIONS WRITING (4). Writing news releases, annual reports, brochures, newsletters, and other PR materials. Writing advertising copy. PREREQS: Graduate standing.

## WR 516. ADVANCED COMPOSITION (4).

The development of style and voice in both the personal and the academic essay. This course is repeatable for a maximum of 16 credits. PREREQS: Graduate standing.
WR 517. TEACHING PRACTICUM: ENGLISH COMPOSITION (2). Required practicum for graduate students teaching English Composition.
WR 518. TEACHING PRACTICUM: WRITING IN BUSINESS (1). Pedagogy practicum for graduate students in the teaching of professional writing and communication. This course is required for GTA's who will teach WR 214, Writing in Business. This course is repeatable for a maximum of 3 credits.

WR 519. TEACHING PRACTICUM: TECHNICAL
WRITING (1). Required practicum for graduate students teaching technical writing.
WR 520. STUDIES IN WRITING (4). Selected topics in rhetoric and composition. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.
WR 521. TEACHING PRACTICUM: FICTION WRITING (1). Required practicum for graduate students teaching introduction to fiction writing. This course is repeatable for a maximum of 3 credits.
WR 522. TEACHING PRACTICUM: POETRY
WRITING (1). Required practicum for graduate students teaching introduction to poetry writing. This course is repeatable for a maximum of 3 credits.
WR 524. ADVANCED FICTION WRITING (4).
Advanced fiction workshop with an emphasis on developing longer pieces. This course is repeatable for a maximum of 24 credits. PREREQS: Instructor approval and graduate standing required.

## WR 525. ADVANCED SCIENTIFIC AND

TECHNICAL WRITING (4). Combines scientific and technical writing with science journalism. Students will draw on a data set (preferably their own) to draft a scientific journal article, short grant proposal, magazine article, and letter of inquiry. They will also critically evaluate and edit documents by reviewing classmates' drafts

WR 540. ADVANCED NONFICTION WRITING
(4). Advanced creative nonfiction workshop with an emphasis on developing longer pieces. This course is repeatable for a maximum of 24 credits. PREREQS: Instructor approval.
WR 541. ADVANCED POETRY WRITING (4). Advanced poetry workshop. This course is repeatable for a maximum of 24 credits. PREREQS: Instructor approval and graduate standing required.
WR 548. MAGAZINE ARTICLE WRITING (4). Writing the magazine article. Analyzing markets and writing query and cover letters, marketing manuscripts to magazines. Interviewing and researching. This course is repeatable for a maximum of 8 credits. PREREQS: Graduate standing.

WR 549. CRITICAL REVIEWING (4). Writing critical reviews of books, television programs, movies, plays, and restaurants for newspapers and magazines. The role of criticism in popular culture. PREREQS: Graduate standing.
WR 562. ENVIRONMENTAL WRITING (4). Writing about environmental topics from multiple perspectives. Includes science journalism, research and writing on current scientific issues and controversies, and theories of rhetoric and environmentalism. This course is repeatable for a maximum of 8 credits. PREREQS: WR 121 and/or graduate standing.
WR 566. PROFESSIONAL WRITING (4).
Introduces the texts, contexts, and concepts important to the practice of professional communication in organizational contexts, addressing practical writing skills, rhetoric, ethics, and information design. Course readings concern what professional writers do and what theories govern their actions, bridging the gap between real-world problems and academic research.
WR 575. RHETORICS OF RACE (4). By exploring the interrelated concepts of race, racialization, and racism, Rhetorics of Race problematizes race as a taken-for-granted phenomenon. Through reading, writing, and discussion, class participants study racial formations as historically specific and analyze contemporary forms of racism in the US. Readings and discussion pay close attention to how rhetoric and discourse have the power to reproduce and challenge white supremacy and race-based oppressions. Emphasizing the intersectionality of oppression-that racism necessarily takes place at intersections with other forms of subordination including sexism, homophobia, ablelism, etc.-Rhetorics of Race draws from Queer Black Feminism, Chican@ Feminism, and Critical Race Theory

## WR 585. CONTEMPORARY RHETORIC

THEORY (4). Familiarizes students with a range of theories that have significantly contributed to or influenced the field of modern and contemporary rhetorical research. The course examines scholars, concepts, and methodologies that are central to contemporary rhetorical theory, while touching on key critical theorists who, although may be considered outside the field of rhetoric studies, impact the ways in which language, persuasion, and communication are currently understood. From this work, students develop their own perspectives and generate evidencebased arguments concerning those same issues. PREREQS: WR 121

WR 593. THE RHETORICAL TRADITION AND THE TEACHING OF WRITING (4). Major past and contemporary theories of written communication, their historical context, and their impact on writing and the teaching of writing. PREREQS: Graduate standing.

## WR 595. INTRODUCTION TO LITERACY

STUDIES (4). Literacy studies in multidisciplinary contexts. Examines historical, theoretical, and practical relationships among reading, writing, language, culture, and schooling. PREREQS: Graduate standing.
WR 597. DIGITAL LITERACY AND CULTURE (4). From pencils to pixels, telegraphs to texts, and semaphores to social networking, Digital Literacy and Culture focuses on the relationships between human expression and the technologies that provide context, meaning, and shape to those expressions. PREREQS: WR 121 and upperdivision standing for undergraduates.

WR 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## OTHER DECREES $\mathcal{E}_{2}$ <br> PROCRAMS WITHIN THE COLLECE OF LIBERAL ARTS

## UNDERGRADUATE MAJORS WITH OPTIONS

## INTERNATIONAL STUDIES (BA)

See International Programs for information on the International Studies degree.

The International Studies degree also is available on the OSU-Cascades campus.

## Major Code: 910

## SOCIAL SCIENCE (BA, BS, CRED)

Available only on OSU-Cascades Campus.
The Social Science major is only offered at the OSU-Cascades Campus through the Division of Arts and Sciences, College of Liberal Arts at OSU. Students will also be able to take advantage of distance courses offered by OSU Ecampus and streamed via TV from Corvallis.

Completion of the Community Development and Leadership option is required to earn a degree in Social Science.

## Baccalaureate Core (48)

College of Liberal Arts

## Requirements

Courses taken to fulfill College of Liberal Arts Requirements cannot be used to fulfill Bacc Core, major cores or option requirements.

## Core (5 courses)

[These requirements can be fulfilled at Oregon Community Colleges.]

- Humanities
- Fine Arts
- Non-Western Culture
- Social Science
- Additional course requirement


## Lower-Division Requirements

Choose either BS or BA: [These requirements can be fulfilled at Oregon community colleges.]

## For a Bachelor of Science (20

## credits):

1. Select 8 credits from the following MTH courses: MTH 111, 112, 113, 211, 241, 243, 244, 251. Note that MTH 113, 243, and 244 are non-OSU courses that meet this requirement. These courses can be taken at Oregon community colleges.
2. One additional 3-credit course from the science departments except Math and ST (no lab required, 3 credits)
3. One computer science course (4 credits)

For a Bachelor of Arts (18 credits):
Two years of a foreign language with a grade of C- or better
Social Science Major (29-35 credits) Note: Courses taken to fulfill major requirements cannot be used to fulfill
the baccalaureate core, College of Liberal Arts, or option requirements. Not all courses are offered every year. Students should consult the annual schedule of classes for a listing of available courses for the academic year.

## Social Science Core

Required Courses (11 credits)
ANTH 352. *Anthropology, Health, and Environment (3)
or SUS 420. Social Dimension of Sustainability (3)
COMM 321. Introduction to
Communication Theory (3)
SSCI 201. Career Development in the Social Sciences (1)
SSCI 301. ^Qualitative Research Methods for the Social Sciences (4)
Social Science Core Class Selection (18-24 credits)
Select six 300-400 level courses in ANTH, COMM, PSY, PS, or SOC. Must include one course from at least four disciplines.

## Total=180

Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course (WIC)
E Ecampus Course


## SAMPLE FOUR-YEAR PLAN: SOCIAL SCIENCE

Fall Year 1
ALS 199. Special Topics: First-Year Experience (2)
HHS 231. *Lifetime Fitness for Health (2)
MTH 105. *Introduction to Contemporary Math (4)
PAC. Physical Education Course (1)
SPAN 111. *First-Year Spanish (4) or CS 101. Computers: Applications and Information (4)
WR 121. *English Composition (3)

## Winter Year 1

ANTH 210. *Comparative Cultures (3)
COMM 111. *Public Speaking (3)
or COMM 218. Interpersonal
Communication (3)
SPAN 112. First-Year Spanish (4)
or MTH 111. *College Algebra (4)
WR 222. *English Composition (3)

## Spring Year 1

ANTH 251. *Language in the US (3)
ECON 201. *Introduction to
Microeconomics (4)
GEO 201. *Physical Geology (4)
SPAN 113. First-Year Spanish (4)
or MTH 245. *Mathematics for Management, Life and Social Sciences (4)

## Fall Year 2

HST 106. World History III--Modern and Contemporary World (4)
PS 201. *Introduction to United States Government and Politics (4)
SPAN 211. Second-Year Spanish (4) or SOIL 205. Soil Science (3)

## Winter Year 2

BI 102. General Biology (4)
ENG 253. *Survey of American Literature: Colonial to 1900 (4)
PAC. Physical Education Course (1)
SPAN 212. Second Year Spanish (4)
or Elective (4)
SSCI 201. Career Development in the Social Sciences (1)

## Spring Year 2

ENG 254. *Survey of American Literature: 1900 to Present. (4)
ENG 360. Native American Literature (4)
SPAN 213. Second-Year Spanish (4)
or Elective (4)
College of Liberal Arts Core course. (4)
Fall Year 3
ART 101. *Introduction to the Visual Arts (4)
BI 101. *General Biology (4)
or SOIL 205. *Soil Science (3) and SOIL
206. *Soil Science Laboratory for Soil 205 (1)

COMM 321. Introduction to
Communication Theory (3)
PAC. Physical Education Course (1)
PSY 381. Abnormal Psychology (4)

## Winter Year 3

COMM 325. Communicating Leadership (4)
PS 331. State and Local Government and Politics (4)
PSY 360. Social Psychology (4)
SSCI 301. ^Qualitative Research Methods for the Social Sciences (4)

## Spring Year 3

ANTH 311. Peoples of the World--North America (3)
BA 352. Managing Individual and Team Performance (4)
COMM 326. Intercultural Communication (3)

PAC. Physical Education Course (1)
SOC 439. Welfare and Social Service (4)
Fall Year 4
HDFS 447. Families and Poverty (4)
SOC 430. Gender and Society (4)
Elective (4)
Elective (4)
Winter Year 4
COMM 323. Community Dialogue (4)
COMM 440. Theories of Conflict and
Conflict Management (3)
GEO 306. Minerals, Energy, Water and the Environment (3)
SUS 420. Social Aspects of Sustainability (3)

## Spring Year 4

PS 475. Environmental Politics and Policy (4)

Elective (4)
Elective (4)
Elective (4)
Major Code: 286

## OPTIONS

## COMMUNITY DEVELOPMENT AND LEADERSHIP OPTION Available only on OSU-Cascades Campus.

Not all courses are offered every year. Students should consult the annual schedule of classes for a listing of available courses for the academic year. All courses are offered at OSU-Cascades with the exception of COMM 114 and PS 201, which are offered at Oregon community colleges.

## Required

COMM 323. Community Dialogue (4)
or COMM 325. Communicating
Leadership (4)
Choose five courses different from the one taken above:
BA 352. Managing Individual and Team Performance (4)
COMM 114. Argument and Critical Discourse (3)
COMM 323. Community Dialogue (4)
or COMM 325. Communicating Leadership (4)
COMM 425. Communication and Youth Outreach (4)
COMM 440. Theories of Conflict and Conflict Management (3)
LS 499. Special Topics: Funding and Resource Development (4)
PS 201. *Introduction to US Government and Politics (4)
PS 331. *State and Local Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)

Total=22-24
Option Code: 279

## SUSTAINABILITY (BS, HBS)

Also available via Ecampus.
OSU Main Campus Contact: Ann
Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.

OSU-Cascades Campus Contact:
Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@ osucascades.edu.

## Sustainability Core (17-20)

All Sustainability Majors and Minors must take the five courses that make up the Sustainability Core: SUS 304, SUS
350, an ecological sustainability course
(SUS 102 recommended), a social sustainability course (choose one below), and an economic sustainability course (choose one below):
SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)

## Ecological Dimensions of

 Sustainability (3-4)
## Select 3 to 4 credits from the

## following:

BI 301. *Human Impacts on Ecosystems (3)
SUS 102. *Introduction to Environmental
Science and Sustainability (4)

## Social Dimensions of Sustainability

## (3-4)

Select 3 to 4 credits from the following:
SOC 381. Social Dimensions of Sustainability (4)(Ecampus only)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/FES/ANS/FW 485. *Consensus and
Natural Resources (3)

SUS 420. Social Dimensions of Sustainability (3)(Ecampus, Cascades Campus )

## Economic Dimensions of

Sustainability (3-4)

## Select 3 to 4 credits from the

 following:AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 351. *Natural Resources Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)

## Practicum (3-12)

Sustainability majors are required to complete a minimum of 3 Practicum credits. Before registering for a practicum, students must get practicum approved by Sustainability Double Degree advisor. Email: Sus.advising@oregonstate.edu.
SUS 401. Research (3-12)
SUS 410. Internship (3-12)
SUS 499. Special Topics (3-12)
Note: SUS 410 credits may be achieved by participation in an IE3 Global Internship with advisor approval.

## Remaining Elective Credits (4-16)

In addition to the required credits specified above, students must work with the sustainability program advisor to select courses relevant to their discipline and career path interests.

## Credits total=36

Classes that can be used to fulfill remaining requirements are listed below. Students are NOT limited to taking courses within their primary major of study. The Sustainability advisor(s) will approve courses not listed here if they have an obvious link to sustainability and fulfill the intent of the double degree. See the OSU Sustainability Office list of sustain-ability-related courses.

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 465. *Systems Thinking and Practice (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 311. Intermediate Microeconomic Theory (4)

ECON 315. Intermediate Macroeconomic
Theory (4)
MGMT 452. Leadership (4)

## Engineering

BEE 221. Fundamentals of Ecological Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering
Fundamentals (4)
ENVE 322. Fundamentals of Environmental
Engineering (4)
HEST 310. *Introduction to Community
Engagement and Community-Based Design (3)

## Natural Sciences

ANS/FES/FW/SOC 485. *Consensus and
Natural Resources (3)
ATS 320. *The Changing Climate (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 348. *Human Ecology (3)
BI 370. Ecology (3)
BRR 325. *Energy Technology and Social Change (3)
BRR 350. Introduction to Regional Bioenergy (2)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
DHE/WSE 415. *Renewable Materials in the Modern Age (3)
FES 341. Forest Ecology (3)
FES 354. Communities, Natural Areas, and Sustainable Tourism (3)
FES 355. Management for Multiple Resource Values (3)
FES 360. Collaboration and Conflict
Management (3)
FES 365. *Issues in Natural Resources Conservation (3) Ecampus or Cascades campus only
FES/TOX 435. *Genes and Chemicals in
Agriculture: Value and Risk (3)
FES/FW 445. Ecological Restoration (4)
FES/HORT 455. Urban Forest Planning,
Policy and Management (4) Ecampus only
FES/NR/RNG 477. *Agroforestry (3)
FES/SOC/ANS/FW 485. *Consensus and Natural Resources (3)
FOR 462. Natural Resource Policy and Law (3)

FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information
Systems in Natural Resource (3)
FW 321. Applied Community and
Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society, and Sustainability (3)

FW 435. ^Wildlife in Agricultural Ecosystems (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 309. *Environmental Justice (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
SOIL 475. Soil Resource Potentials (4)
SOIL 499. Special Topics (1-16)
SUS 103. *Introduction to Climate Change (4)

WSE 111. Renewable Materials for a Green Planet (2)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 392. *Bamboolooza: The Fascinating World of Bamboo (3)
WSE 453. ^Global Trade in Renewable Materials (3)
WSE 455. Marketing and Innovation in Renewable Materials (4)
WSE 473. Bioenergy and Environmental Impact (3)
WSE 475. Environmental Assessment of Building Materials (4)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy, and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ANTH 481. *Natural Resources and Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature, Culture and the Environment (4)
FES/SOC/ANS/FW 485. *Consensus and Natural Resources (3)

HEST 310. *Introduction to Community Engagement and Community-Based Design (3)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL/REL 443. *World Views and
Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion, and Politics (4)
PS 374. *Sustainable Living: Practices and Policies (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)

PS 477. International Environmental
Politics and Policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
WGSS 440. *Women and Natural Resources (3)

WGSS 450. Ecofeminism (3)

## Footnotes:

* Bacc Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: $\mathbf{8 7 0}$

## SUSTAINABILITY MINOR

## Available on the Corvallis and

 OSU-Cascades campuses, and via Ecampus.OSU Main Campus Contact: Ann
Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.

OSU-Cascades Campus Contact: Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@ osucascades.edu.

The Sustainability minor includes core sustainability courses (5) and tailored elective courses to expand students' knowledge and experience of their primary major in the context of sustainability principles and frameworks. Courses from a student's major course of study will not count towards minor requirements. Completion of the Sustainability minor requires 27 credits beyond the 180-credit minimum for graduation.

## Sustainability Core (17-20)

All Sustainability students must take (8):
SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)

## Social Dimensions of

Sustainability:

## Select 3 to 4 credits from the

 following:SOC 381. Social Dimensions of Sustainability (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)

SOC 485/ANS 485/FES 485/FW 485.
*Consensus and Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)
Ecological Dimensions of Sustainability:
Select 3 to 4 credits from the following:
BI 306. *^Environmental Ecology (3)
SUS 102. *Introduction to Environmental
Science and Sustainability (4)

## Economic Dimensions of

## Sustainability:

Select 3 to 4 credits from the following:
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)

## Sustainability Individualized Study/

Elective Credits (7-10)
Students will work with their primary academic advisor and the Sustainability academic advisor to select electives in the theme relevant to their interests for a total of 7-10 credits. Students should discuss with Sustainability advisor to apply elective courses that may not be listed below.

## Total Credits=27

## Elective Courses:

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. Introduction to
Macroeconomics (4)
ECON 315. Intermediate Macroeconomic Theory (4)

## Engineering

BEE 221. Fundamentals of Ecological
Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative
Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Electric Vehicles (4)
ENGR 350. *Sustainable Engineering (3)

ENVE 321. Environmental Engineering
Fundamentals (4)
ME 312. Thermodynamics (4)

## Natural Sciences

ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 370. Ecology (3)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FOR 462. Natural Resource Policy and Law (3)

FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information Systems in Natural Resource (3)
FW 321. Applied Community and
Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in
Natural Resources (3)
FW 350. *Endangered Species, Society and Sustainability (3)
FW 435. ${ }^{\wedge}$ Wildlife in Agricultural Ecosystems (3)
FW/ANS/FES/SOC 485. *Consensus and Natural Resources (3)
FW 488. Problem Solving in Fisheries and Wildlife Science (3)
FW 489. Effective Communications in
Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water and the Environment (3)
GEO 309. *Environmental Justice (3)
GEO 453. Resource Evaluation Methods/ EIS (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 322. Physical and Mechanical Properties of Renewable Materials (4)
SOIL 499. Special Topics [Organic Farming]
(1-16)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ANTH 481. *Natural Resources and
Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature, Culture and the Environment (4)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL 443. *World Views and Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion and Politics (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)

PS 477. International Environmental Politics and policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 381. Social Dimensions of Sustainability (4)
SOC 480. *Environment Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/ANS/FES/FW 485. *Consensus and Natural Resources (3)

## Footnotes:

* Baccalaureate Core Course
^ Writing Intensive Course (WIC)


## Minor Code: 871

ENVIRONMENTAL ARTS AND
HUMANITIES (MA)
HUMANITIES (MA)
Graduate Areas of Concentration
Environmental imagination, environmental action, environmental thinking

## Environmental Arts and

Humanities Foundation (12 credits)
EAH XXX. Environmental Arts and Humanities Field Course. (3) [Pending submission \& approval]
EAH 411/EAH 511. Perspectives in
Environmental Arts and Humanities (4)
EAH XXX. Environmental Science Methods and Practice (3)
EAH XXX. Professional Development. (1)
[Pending submission \& approval]
EAH XXX. Thesis or Project Proposal
Writing for Environmental Arts and
Humanities. (2) [Pending submission \& approval]
EAH 412/EAH 512. Environmental Science in Context (4)

Note: Students must enroll in at least 29 stand-alone courses (52\% of their course work).
Environmental Arts and
Humanities Core ( 9 credits)
Choose three from below; no more than one from any department:
ART XXX. Art and Nature [Pending approval]
COMM 412/COMM 512. Topics in Speech Communication: Environmental Communication (3)
COMM XXX. The Rhetoric of Land Use (3)
[Pending submission \& approval]
EAH XXX. Classics of American Environmental Thought [Pending
submission \& approval]
ENG 482/ENG 582. Studies in American Literature, Culture, and the Environment (4)

ES XXX. Environmental Racism [Pending submission \& approval]
FES 523. Quantitative Analysis in Social Science (4)
FS 599. Conservation Ethics (2-3)
[Terminated fall 2013]
HST 481/HST 581. Environmental History of the United States (4)
HST XXX. Global Environmental History
[Pending submission \& approval]
PHL 440/PHL 540. Environmental Ethics (3)
PHL 443/PHL 543. Worldviews and
Environmental Values (3)

## Graduate Areas of Concentration

(12 credits)
Select one graduate area of con-
centration and complete a mini-
mum of 12 credits in that area.

## Environmental Imagination

ART XXX. Art and Nature [Pending submission \& approval]
ART 546. Documentary Photography (3)
ART 562. Directions and Issues in Contemporary Art (3)
ART 569. Methods and Theory of Art History (3)
COMM 550. Communication and the Practice of Science (3)
COMM XXX. Environmental Rhetoric
[Pending submission \& approval]
ENG 545. Studies in Nonfiction (4)
ENG 575. Studies in Criticism (4)
ENG 582. Studies in American Literature, Culture, and the Environment (4)
FES 493/FES 593. Environmental
Interpretation (4)
PHL 539. Philosophy of Nature (3)
PHL 562X. Aesthetics of the Natural World
(3)[Terminated summer 2015]

WR 448/WR 548. Magazine Article Writing (4)

WR 462/WR 562. Environmental Writing (4)

WR 525. Advanced Scientific and Technical Writing (4)

## Environmental Action

AEC 532. Environmental Law (4)
ANTH 577. Ecological Anthropology (4)
COMM 426/COMM 526. Intercultural Communication: Theories and Issues (3) COMM 442/COMM 542. Bargaining and Negotiation Processes (3)

COMM 599. Special Topics: Environmental Conflict Resolution (3)
ES 560. Ethnicity and Social Justice (3)
FW 549. History of Fisheries Science (3)
HST 481/HST 581. Environmental History of the United States (4)
HST XXX. Global Environmental History [Pending approval]
HSTS 421/HSTS 521. Technology and Change (4)
HSTS 422/HSTS 522. Historical Studies of Science and Politics (4)
HSTS 570/FW 570. Ecology and History: Landscapes of the Columbia Basin (3)
PHL XXX. Environmental Justice
[Pending submission \& approval]
PSY 492/PSY 592. Conservation Psychology (4)

SOC 485/SOC 585. Consensus and Natural Resources (3)
WGSS 523. Community Organizing and Collective Action (2)
WGSS 540. Women and Natural Resources (3)

WGSS 550. Ecofeminism (3)

## Environmental Thinking

ANTH 481/ANTH 581. Natural Resources and Community Values (4)
ECON 439/ECON 539. Public Policy Analysis (4)
ENSC 520. Environmental Analysis (3)
ES 448/ES 548. Native American Philosophies (4)
FES XXX. Conservation Ethics (3-4)
[Pending submission \& approval]
FES XXX. Critical Thinking About Environmental Issues (3-4) [Pending submission \& approval]
FW 537. Structured Decision Making in
Natural Resource Management (2)
HSTS 515. Theory of Evolution and
Foundation of Modern Biology (4)
PHL 539. Philosophy of Nature (3)
PHL 540. Environmental Ethics (3)
PHL 541. Classical Moral Theories (3)
PHL 542. Contemporary Moral Theories (3)
PHL 543. Worldviews and Environmental Values (3)
PHL XXX. Philosophy of Adaptive Ecosystem Management (3) [Pending submission \& approval]
PHL 434/PHL 534. Spirituality and the Environment: Green Yoga
PS 461/PS 561. Environmental Political Theory (4)

## Electives (9 credits)

Select electives that inform graduate areas of concentration and meet learning, research, and career goals. Students are encouraged to use elective credits to pursue an OSU graduate certificate such as the Graduate Certificate in Fisheries Management, the Graduate Certificate in Management for Science Professionals, the Graduate Certificate in Marine Resource Management, the Graduate Certificate in Sustainable Natural Resources, and the Graduate Certificate in Water Conflict Management and Transformation. Students may also fulfill their elective credits by participating in the Natural Resources Leadership Academy.

## Engagement (14 credits)

Students are required to develop a plan for their Engagement credits with their committee by the end of year one. Engagement credits include fieldwork and thesis/project credits.
EAH XXX. Fieldwork (up to 8 credits) EAH XXX. Thesis/Project (up to 8 credits) All students will be required to make a final thesis or project presentation and defend the work to the student's committee. Students must submit a draft of their thesis or project to their committee for review six weeks prior to their presentation and oral examination.

Thesis Options: Students can develop a written thesis of appropriate length and format as agreed upon by their committee. Theses can include, but are not limited to 1 ) a sustained argument broken into closely related chapters or sections, or 2 ) a number of articles (e.g., magazine articles, scholarly articles) that develop arguments on distinct but related topics with a framing introduction that addresses their relationship.

Project Option: Student's projects can take any form with the approval of the student's committee. Examples include developing a community program, making a documentary film, and creating multi-media or art exhibits.

## Major Code: $\mathbf{8 2 0 0}$

## ENVIRONMENTAL ARTS AND

 HUMANITIES GRADUATE MINORFor details, see proposal: https://secure. oregonstate.edu/ap/cps/proposals/ view/85127

Select a minimum of 12 credits from the following categories:

## Environmental Arts and

Humanities Foundation (4 credits)
EAH XXX. Environmental Arts and
Humanities Methods and Practice (3)
[Pending submission \& approval]
or EAH 511. Perspectives in Environmental Arts and Humanities (4)
EAH 508. Professional Development Workshop (1)

## Environmental Arts and

Humanities Core (8 credits)
Minor Code: 8201

## CERTIFICATES

## 20TH CENTURY STUDIES <br> CERTIFICATE

This program has been suspended, January 2005.

Students are not being admitted to the 20th Century Studies Undergraduate Certificate program.

To complete the certificate program, students are required to take a minimum of 27 credits, consisting of 9 credits of core courses, 9 credits of thematic interdisciplinary courses, and 9 credits of approved elective courses.

## Core Courses (9)

TCS 200. *Twentieth Century Realities: The U.S. (3) [Terminated fall 2008]

TCS 201. *Twentieth Century Dreams: The U.S. (3) [Terminated fall 2009]

TCS 300. *World Community in the
Twentieth Century: Development (3)
[Terminated fall 2008]
TCS 301. *World Community in the Twentieth Century: Underdevelopment (3) [Terminated summer 2016]

## Thematic Interdisciplinary Courses

 (9)
## Elective Courses (9)

Elective courses may be chosen from among the many regular departmental offerings in the College of Liberal Arts. Elective credits must be outside the student's major.

## Major Code: C825

## RUSSIAN STUDIES CERTIFICATE

This program has been suspended, 2010. Pending termination via \#100119, https://secure.oregonstate.edu/ap/cps/ proposals/view/100119

## Option I

The course of study consists of a minimum of 30 credits: 21 credits of required core courses and 9 credits of appropriate electives. In the distribution of electives, students must complete at least one course in two of the following areas: economics, history, political science.
Requirements (21)
RUS 211, RUS 212, RUS 213. Second-Year Russian (4,4,4)
RUS 231, RUS 232, RUS 233. *Russian Culture ( $3,3,3$ ) [Terminated summer 2017]

## Elective Courses (9)

HST 340, HST 341. History of Russia (4,4)
HST 344. Special Topics in Russian History $(4,4)$
HSTS 418/HSTS 518. *Science and Society (4)

HST 345. Society in Modern Russia (4)
PS 343. *Russian Politics (4)
PS 399. Current Problems in Politics (3)
PS 402. Independent Study (1-16)
RUS 341. *20th Century Russian Literature in Translation (3) [Terminated fall 2009]

## Option II

The course of study consists of a minimum of 30 credits: 12 credits of required core courses and 18 credits of appropriate electives. In the distribution of electives, students must complete at least one course in three of the following areas: foreign languages; economics; history; political science.

## Requirements (12)

RUS 111, RUS 112, RUS 113. First-Year Russian (4,4,4)

## Elective Courses (18)

HST 341. History of Russia (4)
HST 344. Special Topics in Russian History $(4,4)$

HST 345. Society in Modern Russia (4)
HSTS 418/HSTS 518. *Science and Society (4)
PS 343. *Russian Politics (4)
PS 399. Current Problems in Politics (3)
PS 402. Independent Study (1-16)
RUS 233. *Russian Culture [20th century] (3)
RUS 341. *20th Century Russian Literature in Translation (3)
Courses offered on a one-time basis that are directly related to Russian Studies may be used if the student receives prior approval from the Russian Studies coordinator. For example, HST 415/HST
515. Selected Topics: Stalin and Stalinism (3).

Footnote:

* Baccalaureate Core Course


## Major Code: C820

■ LIBERAL ARTS COURSES
LA 199. SPECIAL TOPICS (2). Various topics introducing students to the liberal arts. This course is repeatable for a maximum of 6 credits.
LA 399. SPECIAL TOPICS (1-12). This course is repeatable for a maximum of 12 credits.
SSCI 211. CAREER DEVELOPMENT IN THE SOCIAL SCIENCES (1). An introduction to career options available to students pursuing a social science degree. Students will explore career options and engage in exercises to help them reflect on their own interests, career goals, and aspirations. Hybrid class.
SSCI 301. ^QUALITATIVE RESEARCH
METHODS FOR THE SOCIAL SCIENCES
(4). Introduces a variety of qualitative research methods including ethnography, interviewing, recording oral histories, and conducting focus groups. Students will develop their own research questions, collect data to answer that research question, code and analyze data, and write and disseminate results. The course will culminate in a final paper and in-class presentation of original research results. (Writing Intensive Course)
PREREQS: Six credits of upper division courses in the social sciences, including sociology, political science, anthropology, or communication.

The Oregon State University College of Pharmacy's Doctor of Pharmacy (PharmD) Program is accredited by the Accreditation
Council for
Pharmacy
Education (http:// www.acpeaccredit.org/), 135 S. LaSalle Street, Suite
4100, Chicago, IL 60603-4810, 312-664-3575,
800-533-3606;
Fax, 312-6644652. The PharmD degree is jointly conferred by Oregon State University and Oregon Health \& Science University. The Oregon State University College of Pharmacy is a member of the American Association of Colleges of Pharmacy. The College of Pharmacy is dedicated to advancing societal health through leadership in pharmacy education, research, community engagement, and improved patient care.

Apetition from the pharmacists of Oregon led to the establishment of the Department of Pharmacy at Oregon State College in 1898. The department grew steadily and in 1917 became the School of Pharmacy. In 1983, it became the College of Pharmacy.

There are many career options available to individuals having a pharmacy degree. Some graduates are employed in privately owned or chain pharmacies and practice in a community setting while others practice in hospitals or nursing homes. The pharmaceutical industry offers careers in many areas including sales, marketing, public and government relations, manufacturing, and basic research. Pharmacy graduates are also employed in various local, state and federal health agencies, including the U.S. Public Health Service and the Department of Veterans Affairs. Individuals who decide to acquire advanced professional or graduate training may follow a career in research and academics.

College of Pharmacy graduates are eligible for licensure as pharmacists throughout the United States.

Professional Program
Doctor of Pharmacy (PharmD)
Graduate Major
Pharmaceutical Sciences (MS, PhD)
Graduate Areas of Concentration
Biopharmaceutics
Medicinal Chemistry
Natural Products Chemistry
Pharmaceutics
Pharmacoeconomics
Pharmacokinetics
Pharmacology
Toxicology

## Graduate Minor

Pharmacy

## FACULTY

Professors Bearden, Block (Emeritus), Christensen, Kioussi, Kradjan (Emeritus), Leid, Mahmud, Olyaei, Stevens, Williams, Zabriskie
Associate Professors Alani, DeLander, Filtz, Furuno, Hartung, Haxby, Indra, Ishmael-Leid, McGregor, McPhail, Munar, P. Proteau, Singh

Assistant Professors Anderson, Coon, Herink, Irwin, Lee, Morgun, Philmus, S. Ramirez, Sahay, Sikora, Suchy, Sun, Taratula, Zumach
Senior Instructor I Linares
Senior Instructor II Zweber
Instructors Bowers, Russell, Schnabel, Starwalt
Professional Faculty Austin Haney, Beaumont, Clark, Corwin, Mettie, Ostrogorsky, Peters, J. Ramirez

RESEARCH FACULTY
Professor, Sr. Research Simonson Assistant Professors, Sr. Research
G. Indra, Taratula, Yin, Zielke

## COURTESY FACULTY

## AND PRECEPTORS

The College of Pharmacy utilizes practicing pharmacists, physicians, and pharmaceutical scientists as lecturers in the professional pharmacy program and in the college's graduate education program. This group includes over 400 pharmacy preceptors. These individuals make a very important and significant contribution to the educational programs of the college.

## PHARMACY INFORMATION

Professional pharmacy education has advanced both in Oregon and throughout the United States in order to meet the expectations of an evolving health care system. To be eligible for admission to the PharmD program, students must complete the PharmD prerequisites, which will require three to four years of college study. Completion of the pharmacy professional program requires an additional four years.

After completion of the four-year professional pharmacy program, the graduate is eligible to take a licensing exam administered by state boards of pharmacy. After passing the licensing exam and completing required internship training, the graduate is licensed to practice as a registered pharmacist. While time requirements may vary from state to state, most graduates become licensed as pharmacists approximately three months after graduation from Oregon State University.

## PHARMD PREREQUISITES

Required PharmD prerequisites may be taken at Oregon State University or any other accredited college or university. The PharmD prerequisites must be completed prior to beginning the professional program.

Required courses must be taken for a letter grade; however, an exception may be made if a course is only offered pass/ no pass. The student should make a specific request for waiver of grade requirement directly to the College of Pharmacy Admissions Committee prior to taking the course.

Students from community colleges, other colleges and universities, may transfer to OSU at any time to complete the PharmD prerequisites.

For more information on the prerequisites, please visit our website, http://pharmacy.oregonstate.edu/ pharm-d-prerequisites.

## EARLY ASSURANCE PROGRAM

The Early Admission Program is intended to guarantee highly qualified students

## 203 Pharmacy

 Building Oregon State University Corvallis, OR 97331-3507 541-737-3424 541-737-3999 fax Website: http:// pharmacy. oregonstate.edu/
## Administration

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Dean, mark.
zabriskie@ oregonstate.edu

## Gary DeLander,

Executive Associate Dean, gary.delander@ oregonstate.edu

## Mark Leid,

Associate Dean for Research, mark.leid@ oregonstate.edu

## David Bearden,

Chair, Department of Pharmacy Practice, david.bearden@ oregonstate.edu

## Theresa Filtz,

Chair, Department of Pharmaceutical Sciences, theresa. filtz@oregonstate. edu

## Tanya

Ostrogorsky,
Director of
Assessment and Faculty Development, ostrogot@ oregonstate.edu.

## Angela Austin

 Haney,Director of Student Services/Head Advisor, angela.austinhaney@ oregonstate.edu

## Paige Clark,

Director of Alumni Relations and Professional Development, paige. clark@oregonstate. edu

Patty Beaumont,
Executive Assistant to the Dean, patty.beaumont@ oregonstate.edu
admitted to Oregon State University the opportunity to enter the College of Pharmacy Doctor of Pharmacy (PharmD) program after the successful completion of the program prerequisites and the maintenance of certain academic criteria.

Further information on eligibility and the admissions process is available at http://pharmacy.oregonstate.edu.

## THE PROFESSIONAL PHARMACY PROGRAM

Enrollment in the four-year professional program is limited. Students must apply for admission to the professional pharmacy program. Application information and forms are available at http://www. pharmcas.org/. Contact the OSU College of Pharmacy for other information or visit the college website at http:// pharmacy.oregonstate.edu/. Students are admitted to the professional program beginning fall term only.

Once admitted to the professional program, each student is assigned a faculty advisor. Students may register only for those courses for which they have completed the stated prerequisite courses. Exceptions are allowed only after approval by the College of Pharmacy's Academic and Professional Standards Committee. Students will complete the first two years of their course work on the Oregon State University campus. The third professional year will be at the College of Pharmacy Satellite Campus at Oregon Health and Science University in Portland, Oregon. Most students choose to live in the Portland area during the third year. The fourth year will be off-campus at various pharmacy practice sites throughout the state of Oregon and the Northwest, including Hawaii. Contact the college directly for additional information about the PharmD curriculum.

Immunization and vaccination requirements for PharmD students are stricter than for other university students. PharmD students must satisfy all college immunization and vaccination requirements before starting classes and each year in the program. Failure to meet these requirements may delay enrollment.

The four-year professional pharmacy program provides a broad, scientifically based, clinically focused education. Through appropriate selection of professional elective courses in the fourth year, a student may concentrate in such areas as community, institutional, geriatric, or managed care pharmacy; or prepare for graduate study.

The pharmacy profession is experiencing profound changes. These changes include an increased focus toward patient care, in addition to the study of pharmaceutical products. All students will be required to give immunizations (shots), take medical histories from patients, and
perform physical examinations. These experiences will involve asking sensitive questions and physically touching other people. Throughout the curriculum, students are assigned to off-campus practice sites where they are supervised by licensed pharmacists who are affiliate faculty members of the college. Practice sites are located primarily throughout Oregon. Completion of practicum courses at these off-campus practice sites in the fourth professional year generally requires up to 40 hours per week at the practice site. Practicum experience may include nights, evenings, and weekends. Practice sites are varied but include community pharmacies, hospitals, long-term care facilities, and outpatient clinics. PharmD students are required to provide their own transportation to sites.

The College of Pharmacy requires all pharmacy students to complete criminal background checks and recommends that all pharmacy students submit to drug screening. Criminal background checks and drug screenings have become standard requirements for employment in a pharmacy and placement in experiential rotations. Criminal background checks and drug screening may also be required for licensure. Students who cannot participate in experiential rotations due to criminal or other activities of concern that are revealed in criminal background checks or drug screenings may be unable to fulfill the requirements of the professional PharmD program. Therefore, it is in everyone's interest to resolve any issues prior to commitment of resources by the college and by students.

PharmD students must immediately disclose any criminal activity that occurs prior to or while enrolled in the PharmD program. PharmD students must immediately reveal any action taken by a Board of Pharmacy, including but not limited to warning, probation and revocation of licensure. Failure to do so could result in dismissal from the PharmD program.

To become licensed by the state of Oregon to practice pharmacy, an individual must meet at least three criteria:

1. Possess a baccalaureate or PharmD degree in pharmacy from an accredited U.S. college of pharmacy,
2. Pass the North American Pharmacist Licensing Exam (NAPLEX), the Multistate Pharmacy Jurisprudence Examination (MPJE), and
3. Complete the Oregon Board of Pharmacy internship requirements.

## ADMISSION STANDARDS

Equal Opportunity and Disability Accommodation The College of Pharmacy, as a part of Oregon State University, is committed to the principle of equal opportunity.

The college does not discriminate on the basis of race, color, creed, religion, national origin, gender, sexual orientation, age, marital status, disability, and disabled veteran or Vietnam-era veteran status. When requested, the college will provide reasonable accommodation to otherwise qualified students with disabilities. Disabled students must work with and be approved by the Disability Access Services office.

## Essential Characteristics

## of Student Pharmacists

The essential characteristics of student pharmacists identified below are drawn from a number of different resources that govern the professional expectations of pharmacists and student pharmacists, including but not limited to the national Pharmacy Code of Ethics, the Oath of a Pharmacist, and the Pledge of Professionalism. Please see Appendices to view these resources. The essential characteristics are intended to ensure that student pharmacists and pharmacists educated at the College of Pharmacy (the "college") have the capacity to meet federal and state regulations and policies that pertain to pharmacy, and to meet or exceed expectations that the public has for professional competence and behavior among pharmacy professionals.

Academic and professional environments present different challenges, but the essential characteristics required to succeed in pharmacy are common to both settings. Students in the college must observe and fulfill the essential characteristics, which have been divided into the following relevant categories: intellectual ability, empathetic and collegial communication skills, psychomotor skills, respect for diversity, high ethical standards, and behavioral and social expectations. Under each category are examples that describe and clarify these essential characteristics.

## Intellectual Ability

- Comprehend, interpret and analyze new information
- Reason and carry out evidence-based decision making
- Use critical thinking skills and problem solving to evaluate information from multiple sources and synthesize a plan of action
- Thrive in a rigorous foundational and clinical science-based curriculum
- Participate in self- and programmaticassessment intended to sustain a continual improvement process
- Be curious and pursue lifelong learning
Empathetic and Collegial


## Communication Skills

- Formulate concise, accurate synopses of essential information
- Contribute in a meaningful and collaborative manner in group
discussions
- Interact constructively with other members of a health care team
- Communicate difficult concepts orally and in writing at an appropriate level for specific patients or audiences
- Listen empathetically and develop rapport
- Appropriately display and interpret nonverbal communication signals
- Communicate fluently in English
- Effectively utilize resources to communicate in non-English languages


## Psychomotor Skills ${ }^{1}$

- Participate effectively in preparation and distribution of sterile and nonsterile drug products
- Utilize and analyze information from varied sensory inputs
- Participate in drug administration, including injections
- Carry out tasks required for objective and subjective assessment of patient health
- Discern critical elements of a problem through observation


## Respect for Diversity

- Communicate in a manner that respects all individuals
- Proactively seek ways to provide an inclusive environment that addresses unique patient needs
- Provide care without judgment of a patients' personal choices or situation
- Individualize care with consideration of cultural norms for the patient
- Individualize care with consideration of unique therapeutic needs or challenges


## High Ethical Standards

- Maintain confidentiality
- Act with compassion, empathy and altruism
- Accept responsibility and provide leadership
- Abstain from illicit drug use
- Act with integrity and expect the same of professional colleagues


## Behavioral and Social Expectations

- Demonstrate a history of appropriate behavior in personal actions
- Perform effectively and display sound judgment while under stress
- Perform appropriately in academic or professional settings
- Address disagreements with tact and avoid public altercations
- Exhibit the capacity to adapt to change readily and adjust responses in dynamic, unpredictable situations
- Accept constructive criticism and adapt behavior


## Footnote:

${ }^{1}$ Students may be able to be admitted and progress to graduation while not possessing selected psychomotor skills. In the instance of
a documented disability, the college will work to provide reasonable accommodation. The absence of some skills, however, may limit the variety of settings in which a pharmacist can work.

## REQUIREMENTS FOR

## PROGRESSION

Doctor of Pharmacy (PharmD) students must meet university requirements and standards and adhere to the university Student Conduct Regulations (http:// studentlife.oregonstate.edu/studentconduct//). The College of Pharmacy faculty has adopted additional requirements to assure that all pharmacy graduates have the best possible educational background and preparation for their pharmacy practice careers. College of Pharmacy standards may vary from the university standards in order to ensure compliance with policies, regulations and expectations specific to the pharmacy profession.

Students are expected to meet specific academic and professional requirements to matriculate in the College of Pharmacy and to progress to each successive year of the professional program. Each student's standing in the College of Pharmacy is reviewed at the end of every term, or at any time in the interim 'for cause'. The review includes core pharmacy term GPA, cumulative GPA, and other characteristics identified as being essential to student pharmacists and pharmacists.

The professional PharmD degree program at Oregon State University is designed to be completed within four years. The program combines didactic courses, structured clinical practice opportunities, and, optimally, significant work experience to educate pharmacists that have both in-depth and up-to-date knowledge to be change agents in their chosen profession. In order to assure this current and in-depth knowledge base for each graduate, the professional program must be completed within a five-year period.

## To begin the first professional year, students:

1. Must receive, and respond in a timely manner, to an offer of admission.
2. Must complete all pre-pharmacy courses with a grade of C - or better.
3. Must hold a current CPR and first aid certification from an approved provider.
4. Must successfully complete a background check following guidelines established by the college.
5. Must submit to the recommended drug screening or provide written acknowledgment of the potential consequences of declining the drug screening.
6. Must attend the first-year professional orientation program, and verify an understanding and acceptance of College of Pharmacy policies and procedures.
7. Must obtain an Oregon Pharmacy Intern License.
8. Must fulfill the essential characteristics of student pharmacists identified by the college.

## To advance into the second

## professional year, students:

1. Must successfully complete all courses that are included in the curriculum of the first professional year, including electives with a cumulative pharmacy GPA of 2.00 and a P (Pass) in all P/N (Pass/No Pass) courses.
2. Must have no more than one D grade in pharmacy courses.
3. Must maintain a current Oregon Pharmacy Intern License.
4. Must have a current CPR certification from an approved provider.
5. Must fulfill the essential characteristics of student pharmacists identified by the college.
To advance into the third
professional year, students:
6. Must successfully complete all courses that are included in the curriculum of the first two professional years, including electives with a cumulative pharmacy GPA of 2.00 and a P (Pass) in all P/N (Pass/ No Pass) courses.
7. Must have no more than one D grade in pharmacy courses.
8. Must have completed two approved elective courses with a grade of C - or better in graded courses, or with a P in Pass/No Pass (P/N) courses.
9. Must successfully complete a background check during the summer preceding the third professional year
10. Must maintain a current Oregon Pharmacy Intern License.
11. Must have a current CPR certification from an approved provider.
12. Must have earned a bachelor's degree.
13. Must fulfill the essential characteristics of student pharmacists identified by the college.

## To advance into the fourth

professional year, students:

1. Must successfully complete all courses that are included in the curriculum of the first three professional years, including electives with a cumulative GPA of 2.00 and a P (Pass) in all P/N (Pass/No Pass) courses.
2. Must have no more than one D grade in pharmacy courses.
3. Must have completed three approved elective courses, one of which must be completed after the second professional year, with a grade of Cor better in graded courses, or with a P in Pass/No Pass ( $\mathrm{P} / \mathrm{N}$ ) courses.
4. Must maintain a current Oregon Pharmacy Intern License. (Licensure
in additional states may be required for students completing clerkships outside of Oregon.)
5. Must have a current CPR certification from an approved provider.
6. Must be willing to meet site specific requirements for all assigned clerkship rotations.
7. Must verify an understanding and acceptance of College of Pharmacy policies and procedures as they pertain to advanced experiential learning.
8. Must fulfill the essential characteristics of student pharmacists identified by the college.
To graduate with the PharmD degree, students:
9. Must have met all requirements defined for progression through each professional year.
10. Must successfully complete all required and elective advanced clerkships with a passing grade.
11. Must fulfill the essential
characteristics of student pharmacists identified by the college.

## STUDENT STANDING IN THE <br> COLLEGE OF PHARMACY

The Academic and Professional Standards Committee ("APSC") may, at any time, review a student's standing in the college. APSC is charged with ensuring that students are aware of academic performance or behavior which is not consistent with essential characteristics of student pharmacists and that, therefore, places their completion of the PharmD program at risk. Academic performance and behavioral concerns are often evaluated independently but have equal significance in determining whether a student is meeting the essential characteristics of student pharmacists. Severe, continuing or repeated academic or behavioral problems can result in dismissal from the PharmD program.

APSC, when necessary, provides student standing information to communicate performance deficits, insufficient student progress, and lack of progress in a student addressing academic or behavioral problems. APSC and the college's director of student services/head advisor provide students guidance regarding what the college expects from a student to increase their opportunities for success in the college. Student performance and progress are evaluated on a case-by-case basis, utilizing the experience of APSC members. APSC uses good faith, informed judgment to determine appropriate recommendations for each student's situation.

The following student standing notifications may be received by students who are demonstrating performance deficits or insufficient progress in the PharmD program:

## Warning

Warning status is cautionary and identifies student performance which may place a student's completion of the PharmD program at risk.

Students are placed on warning status if they have a term core pharmacy GPA of less than 2.5 or receive 2 or more C grades in core or elective professional courses in a term. Students may also be placed on Warning status if they engage in behavior that does not meet the Essential Characteristics of Student Pharmacists.

- The first time students are placed on Warning status, they must meet with the Director of Student Services/Head Advisor to discuss their situation.
- The second time students are placed on Warning status, they must meet with the Director of Student Services/ Head Advisor and develop a holistic action plan for overcoming academic and non-academic barriers to success. They must subsequently execute this action plan.
- The third time students are placed on Warning status, they are automatically placed on Probation.


## Probation

Probation status identifies an academic or behavioral concern that places the student's completion of the PharmD program at serious risk. Probation may be accompanied by a delay in progression at the determination of the APSC.

Students are placed on Probation status if they have a term core pharmacy GPA of less than a 2.0 or if they receive a C- or lower grade in any core or elective professional course. A third warning automatically results in Probation.
Student behavior that is a significant departure from the Essential Characteristics of Student Pharmacists will also result in Probation status. Such behavior includes, but is not limited to, violations of Academic Integrity policies, criminal violations, repeated or intentional violation of college policies, or significant breaches of the University Student Conduct Code (see http://studentlife.oregonstate.edu/studentconduct/).

Students on Probation status must follow recommendations of the APSC and the Director of Student Services/Head Advisor. Students on Probation status must meet with the Director of Student Services/Head Advisor following each term to review their progress and standing in the college. Students that successfully fulfill the recommendations prescribed will be removed from Probation status.
Students that fail to follow or are unsuccessful in fulfilling the recommendations will be suspended and evaluated for dismissal from the college. Students who are placed on Probation status for the second time will also be evaluated for

## dismissal from the college.

## Suspension

Students that have failed to make adequate progress, or who have displayed severe or repeated departures from the Essential Characteristics of Student Pharmacists, may be placed on Suspension status. The college will place an indefinite hold on the progression of a student placed on Suspension status until APSC can adequately evaluate whether the student will be allowed to continue in the PharmD program. Students engaged in an appeal of their dismissal from the college will also be placed on Suspension status.
Students placed on Suspension status will not be allowed to progress in the PharmD program. APSC will review the status of a student on Suspension no later than the beginning of the next academic term. After review, ASPC may recommend immediate Dismissal from the college, recommend that the student be continued on Suspension status pending receipt of additional information, or prescribe a plan to address specific concerns that resulted in the student's Suspension status. If a plan for progression is developed by APSC, the student will be changed to Probation status. If at any time it becomes evident that the student will not be able to address concerns and graduate within the required five-year window, the student will be dismissed immediately.

## Dismissal

Students will be dismissed from the professional program if they are not making adequate academic progress, or if they fail to constructively address professional or behavioral concerns.

## PROFESSIONAL ASSOCIATIONS

Students are encouraged to join various professional organizations. At OSU, they may choose the following:

## NCPA-National Community

Pharmacists Association-Open to all students in pharmacy; affiliated with the national parent organization.
Academy of Students of
Pharmacy-Open to all students in pharmacy; includes affiliation with the American Pharmaceutical Association and the Oregon State Pharmacists Association.
American Society of Health-System Pharmacists-Open to all students in pharmacy; includes membership in the Oregon Society of Health-System Pharmacists.
Rho Chi-Membership in Beta chapter of Rho Chi, national pharmaceutical honor society, is selective and based on high scholastic achievement.
Phi Delta Chi-Membership in the Beta Iota chapter of this 100 -year-old national pharmacy fraternity is limited.

Individuals must meet the pledge requirements.
Phi Lamda Sigma-Membership in the Beta Zeta chapter of the national fraternity is limited to qualified individuals who meet requirements for professional development and leadership.
$\boldsymbol{A A C P}$-American Association of Colleges of Pharmacy.
OSSP—Oregon State Student
Pharmacists is an umbrella professional development organization for pharmacy students that includes membership in several national and state professional organizations.

## SCHOLARSHIPS AND LOANS

Information about scholarships and loans is available from the College of Pharmacy website and the Office of Financial Aid and Scholarships, 541-737-2241.

## WICHE PROGRAM

The College of Pharmacy accepts students supported through the Western Interstate Commission for Higher Education (WICHE) Professional Student Exchange Program. This interstate program provides the opportunity for students from the 12 cooperating states to obtain professional training not available in their home states. Residents from the states of Alaska and Nevada are eligible to apply for support in pharmacy.

To apply, the applicant must become "certified" by his or her home state. Applicants must apply to their home offices before October 15 prior to the academic year in which they plan to enroll. State certifying office contact information is available at http://wiche.edu/psep/ cert-off.

## GRADUATE MAJORS

## PHARMACEUTICAL SCIENCES

 (MS, PhD)
## Graduate Areas of Concentration

Biopharmaceutics, medicinal chemistry, natural products chemistry, pharmaceutics, pharmacoeconomics, pharmacokinetics, pharmacology, toxicology
The emphasis of most graduate programs is on foundational research investigating drug discovery, chemistry, mechanisms of drug action, molecular biology, genomics, drug metabolism, and dosage form design.

Faculty in the department are involved in identification of new drugs from the ocean and other biological sources, biochemical toxicology, and drug metabolism studies; the design and development of new drug delivery and dosage forms; and studies on the clinical efficacy and distribution of drugs through the body as a function of dosing regimen or
dosage form. They are using biochemical and molecular biological techniques to investigate signal transduction pathways mediated by phospholipids and retinoids; electrophysiological approaches to studying ion channel function; and the molecular biology of nuclear receptors and factors regulating gene expression.

## Major Code: 4790

## PHARMACY, DOCTOR OF PHARMACY (4-YEAR) (DPhar)

## First Professional Year - Corvallis

 campusBB 490. Biochemistry 1: Structure and Function (3)
BB 491. Biochemistry 2: Metabolism (3)
BB 492. Biochemistry 3 : Genetic
Biochemistry (3)
PHAR 707. Career Perspectives and
Professional Development (2)
PHAR 708. Introductory Pharmacy Practice
Experiences: Community Care I (2)
PHAR 709. Introductory Pharmacy Practice
Experiences: Community Care II (2)
PHAR 720. Pharmacy Practice I: Principles
of Integrated Patient Care (4)
PHAR 721. Pharmacy Practice II (3)
PHAR 722. Pharmacy Practice III: Principles
of Integrated Patient Care (4)
PHAR 729. Principles of Evidence-Based
Medicine I: Information Science (3)
PHAR 733. Pharmaceutics I (3)
PHAR 734. Pharmaceutics II (3)
PHAR 735. Foundations of Drug Action I (3)
PHAR 736. Foundations II: Autonomic Drug
Actions (3)
PHAR 737. Foundations of Drug Action II (3)
PHAR 738. Health Care Systems I (2)
PHAR 739. Health Care Systems II (2)
Z 441, Z 442. Vertebrate Physiology
Laboratory $(2,2)$
Electives (2-4)

## Second Professional Year -

## Corvallis campus

PHAR 726. Principles of Evidence-Based Medicine II: Drug Lit Eval (3)
PHAR 740, PHAR 741, PHAR 742. Pharmacy Practice IV, V, VI $(3,3,3)$
PHAR 743. Introductory Practice
Experiences: Community Care II (2)
PHAR 744. Introductory Practice
Experiences: Ambulatory Care I (2)
PHAR 745. Introductory Practice
Experiences: Ambulatory Care II (2)
PHAR 746. Pharmacy Management (3)
PHAR 750. Pharmacokinetics/
Biopharmaceutics (4)
PHAR 751. Biopharmaceutics (3)
PHAR 753. Integrated Drug Structure,
Action and Therapeutics II (7)
PHAR 754. Integrated Drug Structure, Action, and Therapeutics III (6)

## Third Professional Year - Portland campus at OHSU

PHAR 760. Transitional Clerkship (2)
Repeatable for 6 credits.
PHAR 761. Advanced Integrated Drug Therapy I (8)
PHAR 762. Advanced Integrated Drug
Therapy II (8)
PHAR 764, PHAR 765, PHAR 766. Pharmacy

Practice VII, VIII, IX (3,3,3)
PHAR 770. Advanced Pharmacokinetics (4)
PHAR 773. EBM III: Evidence Synthesis and
Decision Analysis (3)
PHAR 774. Principles of Evidence-Based
Medicine IV: Drug Policy (3)
Electives (2-4)
Fourth Professional Year -

## Off-campus Practicum

PHAR 780. Community Pharmacy Clerkship (8)
PHAR 785. Ambulatory Primary Care
Clerkship (8 credits, 6 weeks)
PHAR 790. General Internal Medicine (8 credits, 6 weeks)
PHAR 792. Hospital/Health Systems Patient Care Clerkship (8)
PHAR 795. Patient Care Elective Clerkship ( 8 credits, 6 weeks)
PHAR 797. Elective Clerkship (8 credits, 6 weeks)
A total of seven clerkships are required.
Required clerkships include PHAR 780,
PHAR 785, PHAR 790, PHAR 792, and at
least two selected from the list of PHAR
795 clerkships.
Pre-Professional Pharmacy major Code: 468
Major Code: 4780

## PHARMACEUTICAL SCIENCES

## GRADUATE MINOR

For more details, see the departmental advisor.

## Minor Code: 4795

## ■ PHARMACY COURSES

PHAR 201. PHARMACY ORIENTATION (1).
Career opportunities in pharmacy including community and institutional practice, government, and industry. Discussion of available educational pathways. Open to non-pharmacy students.
Graded P/N.
PHAR 210. TERMINOLOGY OF THE HEALTH
SCIENCES (2). Provides the student in any of
the health science disciplines or pre-professional studies with a working knowledge of the terminology used in the health sciences. Open to non-pharmacy students.
PHAR 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
PREREQS: Departmental approval required.
PHAR 403. THESIS ( $1-16$ ). This course is repeatable for a maximum of 16 credits.
PREREQS: Departmental approval required.
PHAR 405. READING \& CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PHAR 407. SEMINAR (1-16). One-credit section. Graded P/N. This course is repeatable for a maximum of 16 credits.
PHAR 501. RESEARCH (1-16). This course
is repeatable for a maximum of 16 credits.
PREREQS: Departmental approval required.
PHAR 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
PREREQS: Departmental approval required.
PHAR 505. READING \& CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

PHAR 507. SEMINAR (1-16). One-credit section. Graded P/N. This course is repeatable for a maximum of 16 credits.

PHAR 525. FOUNDATIONS OF DRUG ACTION I (3). Introductory course presenting actions of chemicals on physiological systems. Concepts encompass drug absorption and distribution, drug design and characterization of drug interactions with specialized cellular components, and drug biotransformation or excretion.

## PHAR 526. FOUNDATIONS OF DRUG

ACTION III (3). Drug actions in the autonomic nervous system (ANS) provide a template for understanding drug actions throughout the body. This course provides a complete consideration of pharmacologic and medicinal chemistry principles as they relate to drug interactions with the ANS.
Treatment options for selected diseases that respond to drugs acting on the ANS are also addressed.

## PHAR 527. FOUNDATIONS OF DRUG

ACTION II (3). Introductory course presenting actions of chemicals on physiological systems. Concepts encompass drug activation of biological response via biochemical or molecular transduction mechanisms, pharmacogenetics and pharmacogenomics, and drug-induced toxicities.
PHAR 537. BIOORGANIC CHEMISTRY (3).
A contemporary treatment of the chemistry, enzymology and molecular genetics techniques used in studying major natural products biosynthesis pathways in nature. Offered alternate years. PREREQS: CH 530 and CH 531 and CH 535. BB 590, BB 591, BB 592 are recommended.

## PHAR 563. CANCER AND

CHEMOPREVENTION (2). A summary of mechanisms of cancer progression, how cancer is detected, and introduction to chemoprevention using targeted therapy and alternative medicine. PREREQS: (BB 451 or BB 551) and BI 314 and (BI 460 or BI 560 ) or equivalent courses or second year standing in the PharmD program.
PHAR 571. EXPERIMENTAL APPROACH TO BIOPHARMACEUTICS (3). Experimental protocol, rationale, and procedures in clinical pharmacokinetic, pharmacokinetic, and biopharmaceutical experiments. PREREQS: PHAR 750

PHAR 572. APPLIED BIOPHARMACEUTICS AND PHARMACOKINETICS (3).
Pharmacokinetics and bioavailability of drugs in clinical care, including changing disease states. PREREQS: Graduate standing.
PHAR 573. CURRENT TOPICS IN PHARMACEUTICAL SCIENCES (1-3). Critical evaluation of contemporary pharmaceutics and pharmacokinetics research articles. This course is repeatable for a maximum of 9 credits.
PHAR 574. NANOMEDICINE (3). Introduction to the interdisciplinary field of nanomedicine, the use of nanoscale (1-100 nm) phenomena and materials in biomedical applications. Reviews the basic principles of nanotechnology relevant to areas such as diagnostic/molecular imaging, drug delivery, and other novel therapeutics. Topics will be described through both survey of historical developments and the latest scientific developments in the field of nanomedicine. PREREQS: Graduate student standing in Pharmaceutical Sciences program.
PHAR 580. PHARMACODYNAMIC AND PHARMACOKINETIC MODELING (3). Evaluation of strengths and weaknesses of mathematical models relative to pharmacodynamic and pharmacokinetic data. PREREQS: PHAR 750

PHAR 591. PHARMACOLOGY I (5). Principles of pharmacology; molecular, cellular, and physiologic mechanisms of drug action; pharmacological rationale for therapeutic and toxicologic treatment outcomes. PREREQS: Graduate standing and instructor permission.

PHAR 592. PHARMACOLOGY II (5). Principles of pharmacology; molecular, cellular, and physiologic mechanisms of drug action; pharmacologic rationale for therapeutic and toxicologic treatment outcomes. PREREQS: Graduate standing and instructor permission.
PHAR 593. PHARMACOLOGY III (5).
Principles of pharmacology; molecular, cellular, and physiologic mechanisms of drug action; pharmacologic rationale for therapeutic and toxicologic treatment outcomes. PREREQS: Graduate standing and instructor permission.
PHAR 601. RESEARCH (1-16). This course is repeatable for a maximum of 99 credits. PREREQS: Departmental approval required.
PHAR 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
PHAR 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PHAR 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PHAR 669. INTRODUCTION TO GRANT PROPOSAL WRITING (1). To introduce students to the fundamentals of writing grant proposals to the National Institute of Health (NIH), different funding mechanisms, as well as the grant reviewing process. CROSSLISTED as VMB 669. PREREQS: Status as a student in a graduate or professional program.

## PHAR 699. SPECIAL TOPICS IN

PHARMACEUTICAL SCIENCES (3). This course is repeatable for a maximum of 99 credits.
PHAR 701. RESEARCH AND SCHOLARSHIP (1-8). Research conducted by professional pharmacy students under faculty supervision. This course is repeatable for a maximum of 12 credits.
PHAR 703. THESIS (1-8). Independent study and analysis that culminates in a thesis. This course is repeatable for a maximum of 999 credits.

PHAR 705. READING AND CONFERENCE (1-8). This course is repeatable for a maximum of 12 credits.

## PHAR 706. INTRODUCTION TO HEALTH

DISPARITIES (2). An examination of the multifaceted issue of health disparities in the U.S. healthcare system. Marginalized groups with disparities based upon racial/ethnic, gender, sexual preference and identity, disability, physical and mental health, geography and socioeconomics will be examined at the individual, systematic, and institutional levels. PREREQS: PHAR 707
PHAR 707. CAREER PERSPECTIVES AND PROFESSIONAL DEVELOPMENT (2). Students will explore the necessary knowledge, skills, and abilities in order to support professional role formation and ongoing professional development. Students will practice skills related to identifying personal strengths and weaknesses, building self-awareness, creating and maintaining a robust professional development plan, communicating professionally in written and oral formats, participating as a team leader and team member, as well as fine-tuning relationship building skills. PREREQS: First-year standing in the PharmD program.
PHAR 708. INTRODUCTORY PHARMACY PRACTICE EXPERIENCES: COMMUNITY CARE I (2). Students engage in on-site experience in community pharmacy. Learning is focused on understanding the scope of practice and roles of pharmacy personnel, while demonstrating skills related to safe and legal drug procurement and distribution in the community setting. Students observe patient counseling, develop foundational expertise in OTC and prescription drug products, and conduct medication reviews to identify drug-related problems. In-class patient case discussions are coordinated with patient care
topics in other first-year courses and explore legal, ethical and culturally sensitive decision-making Graded P/N. PREREQS: Oregon pharmacy intern license, PHAR 707. COREQS: PHAR 721 and PHAR 728

## PHAR 709. INTRODUCTORY PHARM

## PRACTICE EXPERIENCES: COMMUNITY CARE

II (2). Students engage in on-site experience in community pharmacy. Learning is focused on understanding the scope of practice and roles of pharmacy personnel, while demonstrating skills related to safe and legal drug procurement and distribution in the community setting. Students observe patient counseling, develop foundational expertise in OTC and prescription drug products, and conduct medication reviews to identify drug-related problems. In-class patient case discussions are coordinated with patient care topics in other first-year courses and explore legal, ethical and culturally sensitive decision-making. Graded P/N. PREREQS: Oregon Pharmacy Intern Licence and PHAR 708. COREQS: PHAR 712 and 714 and 722 .
PHAR 712. FOUNDATIONS OF PATIENT SAFETY AND INTERPROFESSIONAL PRACTICE (1). Techniques, best practices and opportunities for improving patient safety through interprofessional teamwork. Graded P/N. PREREQS: Admission to PharmD program.
PHAR 713. SPANISH FOR PHARMACY PROFESSIONALS (2). For the pharmacy professional with little or no Spanish language background (those with some Spanish language skills would find it beneficial). The course is presented in a video format with in-class facilitator for discussion. Provides basic Spanish grammar instruction but the focus will be on vocabulary and communication in a community pharmacy environment.
PHAR 714. COMPLEMENTARY MEDICINE (3).
Covers vitamins and microminerals and their role in biochemical processes, maintaining health and preventing disease. The course also covers the etiology of obesity and treatment modalities. The course builds upon the general background of students in biochemistry and physiology to provide a common baseline of knowledge and allow for integration of concepts required to understand preventive medicine. PREREQS: PHAR 729 and PHAR 735

PHAR 715. PRESCRIPTION DRUG ABUSE (2). Examines the issue of prescription drug abuse among the general population. Graded P/N. PREREQS: Current standing in PharmD program
PHAR 716. HEALTHCARE CHALLENGES FOR PERSONS WITH DISABILITIES (1). Students develop an understanding of healthcare challenges faced by persons with physical and mental disabilities. Graded P/N. This course is repeatable for a maximum of 2 credits.
PHAR 717. SENIOR CARE PHARMACY (2). Provides an overview of senior care pharmacy practice including an introduction to the senior patient, the senior care healthcare environment, medication-related problems in the elderly, the role of the pharmacist as a member of the interdisciplinary senior healthcare team, and employment opportunities in senior care pharmacy. Graded P/N. PREREQS: First-year professional standing in the College of Pharmacy and PHAR 723 and PHAR 735 and PHAR 739

## PHAR 718. NATURAL PRODUCT DRUG

 DEVELOPMENT (2). Overview of the process of drug development, with an emphasis on natural product sources of lead components. Top-selling and mainstay drugs will be researched in literature assignments and discussed to illustrate historical and current drug development paradigms. In addition, future approaches to drug discovery and paradigm shifts to incorporate concepts such as network pharmacology will be explored. PREREQS: Second-year standing in the PharmD program.PHAR 719. POISONS AND TOXINS (2). Covers many different types of substances, including common household poisons, poisonous plants and mushrooms, toxic gases/metals, shellfish toxins, and other natural toxins. Aspects of the chemistry and pharmacology of the poisons, antidotes/treatments, and occasional case studies will be covered. Historical examples and current events will also be incorporated into the course materials. PREREQS: PHAR 735

## PHAR 720. PHARMACY PRACTICE

I-PRINCIPLES OF INTEGRATED PATIENT
CARE (4). Pathophysiology of common conditions, self-care therapeutics, clinical data collection and documentation, prescription drug information and education, patient counseling skills, basic pharmacy calculations. PREREQS: First-year standing in the PharmD program.

PHAR 721. PHARMACY PRACTICE II (3) Interviewing skills; patient drug, education; nonprescription drugs. PREREQS: PHAR 720 COREQS: PHAR 724 and PHAR 730.
PHAR 722. PHARMACY PRACTICE III: PRINCIPLES OF INTEGRATED PATIENT CARE (4). Pharmacy Practice III continues the progression of topics introduced in Pharmacy Practice I and II. Patient interview and assessment techniques, communication skills, nonprescription products, and compounding techniques are emphasized in the lab. Lec/lab. PREREQS: PharmD student status
PHAR 726. PRINCIPLES OF EVIDENCE-BASED MEDICINE II: DRUG LIT EVAL (3). Students will learn to critique and evaluate health-related scientific journal articles using valid established techniques. PREREQS: Second-year standing in the PharmD program.
PHAR 728. PHARMACY LAW (2). Introduces the student to the federal and state agencies and regulations that govern pharmacy practice and provides students with foundational knowledge and skills to comply with state and federal regulations. Emphasis will be on regulations from the Food and Drug Administration, Drug Enforcement Administration, and Oregon Board of Pharmacy.
PHAR 729. PRINCIPLES OF EVIDENCE-

## BASED MEDICINE I: INFORMATION SCIENCE

(3). Students will learn to identify appropriate
information resources and will systematically collect, arrange, and analyze pertinent information related to a particular patient or drug product problem. PREREQS: First-year standing in the PharmD program.
PHAR 733. PHARMACEUTICS I (3). Students develop an in-depth understanding of drug dosage formulation concepts to optimize drug therapy. Approved for use on a graduate program of study. PREREQS: BB 490 and PHAR 735 and first-year standing in PharmD program.
PHAR 734. PHARMACEUTICS II (3).
Preformulation and formulation factors affecting the development, production and use of pharmaceutical dosage forms, including ingredients in, and physical, chemical, and biological properties affecting storage, stability, and handling of dosage forms. Lec/lab. Approved for use on a graduate program of study.
PREREQS: (PHAR 733 and PHAR 735)
PHAR 735. FOUNDATIONS OF DRUG ACTION I
(3). Introductory course into actions of chemicals on physiological systems. Concepts encompass drug absorption and distribution, drug design and characterization of drug interactions with specialized cellular components, drug activation of biological response via biochemical or molecular transduction mechanisms, drug-induced toxicities and drug biotransformation or excretion. Approved for use on a graduate program of study. PREREQS: First-year standing in the PharmD program.

PHAR 736. FOUNDATIONS II: AUTONOMIC DRUG ACTIONS (3). Drug actions in the autonomic nervous system (ANS) provide a template for understanding drug actions throughout biological systems. Provides a complete consideration of pharmacologic and medicinal chemistry principles as they relate to drug interactions with the ANS. Treatment options for selected diseases that respond to drugs acting on the ANS are also addressed. PREREQS: PHAR 729 and PHAR 735. COREQS: BB 491.

## PHAR 737. FOUNDATIONS OF DRUG

ACTION II (3). Introductory course presenting actions of chemicals on physiological systems. Concepts encompass drug activation of biological response via biochemical or molecular transduction mechanisms, pharmacogenetics and pharmacogenomics, and drug-induced toxicities. Approved for graduate credit. PREREQS: PHAR 735 and PharmD program admission
PHAR 738. HEALTHCARE SYSTEMS I (3). Examination of the U.S. healthcare industry and how it relates to pharmacy. Emphasis is given to changing relationships between healthcare systems, patients, providers of care, hospitals, insurers, employers and the government. PREREQS: PHAR 707 and PHAR 729.

PHAR 739. HEALTHCARE SYSTEMS II (2). Examination of the U.S. healthcare industry and the public healthcare system, as they relate to pharmacy. Emphasis is given to changing relationships between healthcare systems, patients, providers of care, hospitals, insurers, employers and the government. PREREQS: PHAR 728 and PHAR 738
PHAR 740. PHARMACY PRACTICE IV (3). Basic physical assessment skills and identification of therapeutic endpoints and monitoring parameters for drugs presented in the medicinal chemistry/ pharmacology sequence. Students will gain experience in basic physical assessment skills, interviewing skills, history taking, organizing pharmacy notes, and documenting information Lec/lab. PREREQS: PHAR 722 and PHAR 725 and PHAR 729 and PHAR 734 and PHAR 735. COREQS: PHAR 743 and PHAR 752
PHAR 741. PHARMACY PRACTICE V (3). Basic physical assessment skills and identification of therapeutic endpoints and monitoring parameters for drugs presented in the medicinal chemistry/ pharmacology sequence. Students will gain experience in basic physical assessment skills, interviewing skills, history taking, organizing pharmacy notes, and documenting information Lec/lab. PREREQS: PHAR 740. COREQS: PHAR 744 and PHAR 753

PHAR 742. PHARMACY PRACTICE VI (3). Basic physical assessment skills and identification of therapeutic endpoints and monitoring parameters for drugs presented in the medicinal chemistry/ pharmacology sequence. Students will gain experience in basic physical assessment skills, interviewing skills, history taking, organizing pharmacy notes, and documenting information. Lec/lab. PREREQS: PHAR 741. COREQS: PHAR 745 and PHAR 754

## PHAR 743. INTRODUCTORY PRACTICE

 EXPERIENCES: COMMUNITY CARE II (2). Students are assigned to community, institutional and ambulatory care pharmacy settings, and experiences emphasize topics and communication methods covered in the corresponding pharmacy practice course. Graded P/N. PREREQS: Oregon pharmacy intern license required. COREQS: PHAR 740, PHAR 752
## PHAR 744. INTRODUCTORY PRACTICE

EXPERIENCES: AMBULATORY CARE I (2).
Students are assigned to institutional or ambulatory care pharmacy settings, and experiences emphasize topics and communication methods covered in the corresponding pharmacy practice course. Graded P/N. PREREQS: Oregon pharmacy intern license required. COREQS: PHAR 741 and PHAR 753

PHAR 745. INTRODUCTORY PRACTICE EXPERIENCES: AMBULATORY CARE II (2).
Students are assigned to institutional or ambulatory care pharmacy settings, and experiences emphasize topics and communication methods covered in the corresponding pharmacy practice course. Graded P/N. PREREQS: Oregon pharmacy intern license required. COREQS: PHAR 742 and PHAR 754.
PHAR 746. PHARMACY MANAGEMENT (3). Concepts, principles and fundamentals of pharmacy financial and personnel management. Approved for use on a graduate program of study.

PHAR 747. INFECTIOUS DISEASES AND
THEIR TREATMENTS (3). Introduction to infectious disease processes and antimicrobial agents, including general clinical microbiology, and structure and mechanism of action of anti-bacterials, anti-virals, anti-fungals, and anti-parasitic agents. PREREQS: Upper-level biochemistry and PharmD program admission

## PHAR 748. DRUG ACTIONS IN IMMUNOLOGY

 AND INFLAMMATION (3). Review of foundational concepts in immunology, inflammation and tissue repair; and modification of these processes therapeutically through an understanding and application of anti-inflammatory agents and immune system modulators. PREREQS: PharmD program admission
## PHAR 750. PHARMACOKINETICS

BIOPHARMACEUTICS (4). Pharmacokinetics and bioavailability of drugs in clinical care, including changing disease states. Approved for use on a graduate program of study. PREREQS: PHAR 734 and PHAR 735 and/or graduate standing in Pharmaceutical Sciences. COREQS: PHAR 752
PHAR 751. BIOPHARMACEUTICS (3).
Preformulation and formulation factors affecting physiological outcomes in terms of bioavailability and drug product selection. Approved for use on a graduate program of study. PREREQS: PHAR 734. COREQS: PHAR 753

PHAR 752. INTEGRATED DRUG STRUCTURE, ACTION, AND THERAPEUTICS I (7). Drug therapy of central nervous system disorders; molecular, cellular and physiologic basis of drug action; chemical and physical properties affecting drug metabolism, action and toxicities; treatment options; patient and disease-specific therapeutic considerations. Approved for use on a graduate program of study. PREREQS: Second-year standing in the PharmD program.

PHAR 753. INTEGRATED DRUG STRUCTURE, ACTION AND THERAPEUTICS II (7). Pulmonary, renal, gastrointestinal, and cardiovascular disorders. Drug therapy of pulmonary and cardiovascular disorders; molecular, cellular and physiologic basis of drug action; chemical and physical properties affecting drug metabolism, action and toxicities; treatment options; patient and disease-specific therapeutic considerations. Approved for use on a graduate program of study. PREREQS: Second-year standing in the PharmD program. PHAR 752

PHAR 754. INTEGRATED DRUG STRUCTURE, ACTION AND THERAPEUTICS III (6). Drug therapy of endocrine disorders, and men's and women's health issues; molecular, cellular and physiologic basis of drug action; chemical and physical properties affecting drug metabolism, action and toxicities; treatment options; patient and disease-specific therapeutic considerations. Approved for use on a graduate program of study. PREREQS: PHAR 753 and second-year standing in the PharmD program.
PHAR 759. INTRODUCTION TO
PATHOPHYSIOLOGY AND THERAPEUTICS (3). Introduction to the pathophysiologic basis of disease and drug therapy management. PREREQS: Second year standing in the PharmD program. COREQS: PHAR 754.

PHAR 760. TRANSITIONAL CLERKSHIP (2). Supervised introductory professional education in a variety of health care settings. Emphasis will be on gaining familiarity with the provision of clinical pharmacy services and the patients, health care providers, and administrative procedures of the clinical site. Graded P/N. This course is repeatable for a maximum of 6 credits. PREREQS: Oregon pharmacy intern license required. COREQS: PHAR 764 and PHAR 765 and PHAR 766
PHAR 761. ADVANCED INTEGRATED DRUG THERAPY I (8). Pathophysiologic basis of disease and drug therapy management. PREREQS: Thirdyear standing in the PharmD program. COREQS: PHAR 764 and PHAR 770

## PHAR 762. ADVANCED INTEGRATED DRUG

THERAPY II (8). Pathophysiologic basis
of disease and drug therapy management
PREREQS: Third-year standing in the PharmD program. COREQS: PHAR 764 and PHAR 770

PHAR 763. PATHOPHYSIOLOGY AND
THERAPEUTICS III (7). Pathophysiologic basis of disease and drug therapy management. PREREQS: PHAR 762. COREQS: PHAR 766 and PHAR 774
PHAR 764. PHARMACY PRACTICE VII (3).
Development of skills for advanced drug therapy problem identification, assessment, and plan resolution for patients with diseases discussed in PHAR 761, PHAR 762, PHAR 763. Students will integrate interviewing, physical assessment, and problem-solving to identify, assess, and resolve drug therapy problems, and communicate findings in SOAP notes, care plans, and case presentations. PREREQS: PHAR 740 and PHAR 741 and PHAR 742 and third-year standing in the PharmD program. COREQS: PHAR 760 and PHAR 761 and PHAR 770
PHAR 765. PHARMACY PRACTICE VIII (3). Development of skills for advanced drug therapy problem identification, assessment, and plan resolution for patients with diseases discussed in PHAR 761, PHAR 762, PHAR 763. Students will integrate interviewing, physical assessment, and problem-solving to identify, assess, and resolve drug therapy problems, and communicate findings in SOAP notes, care plans, and case presentations. PREREQS: PHAR 761 and PHAR 764. COREQS: PHAR 760 and PHAR 762 and PHAR 771
PHAR 766. PHARMACY PRACTICE IX (3).
Development of skills for advanced drug therapy problem identification, assessment, and plan resolution for patients with diseases discussed in PHAR 761, PHAR 762, PHAR 763. Students will integrate interviewing, physical assessment, and problem-solving to identify, assess, and resolve drug therapy problems, and communicate findings in SOAP notes, care plans, and case presentations. Lec/lab/rec. PREREQS: PHAR 762 and PHAR 765. COREQS: PHAR 760 and PHAR 763 and PHAR 772
PHAR 767. PRE-APPE READINESS AND COMPLEX CASE ANALYSIS (3). Confidence and competence needed for advanced practice settings are enhanced utilizing a mixture of benchmark assessment tools and small case discussions of complex patient cases. The focus is to assure readiness to integrate into inter-professional collaborative health care settings and serve diverse patient populations Knowledge, skills, attitudes, and professional values are assessed and developed. Formative and summative feedback delivered through faculty, peer and self-evaluation help guide student preparation for advanced experiences and life-long learning. Graded P/N. PREREQS: PHAR 760 and PHAR 762 and PHAR 765 and PHAR 773
PHAR 768. APPLIED LAW AND ETHICS (1).
Student understanding of pharmacy law is assessed, and discussed in the context of pharmacists' ability to properly respond when legal concepts may not align with ethical decision making in a health profession. Students will apply a framework for ethical decision-making and
dentify personal strategies to maintain currency in pharmacy law and applied ethical decision making. PREREQS: PHAR 760 and PHAR 762 and PHAR 765 and PHAR 773

## PHAR 770. ADVANCED PHARMACOKINETICS

(4). A physiologic approach to understanding advanced pharmacokinetic principles. Approved for use on a graduate program of study. PREREQS: PHAR 750 and PHAR 751 and thirdyear standing in the PharmD program

## PHAR 773. EBM III: EVIDENCE SYNTHESIS

 AND DECISION ANALYSIS (3). Covers the principles required for evidence-based medicine, including interpreting and applying results from clinical, humanistic, and economic research to medical decision-making. Approved for use on a graduate program of study. PREREQS: PHAR 726 and PHAR 729 and third-year standing in the PharmD curriculum.
## PHAR 774. PRINCIPLES OF EVIDENCE-

 BASED MEDICINE IV: DRUG POLICY (3). This three-credit course will cover a variety of topics related to drug policy and drug use management. Population-based strategies to improve drug use will be emphasized along with developing an evidence-based process for evaluating new drugs. A major course project, evaluating a new drug, will focus on application of principles taught in this and previous courses. PREREQS: PHAR 773PHAR 775. PROFESSIONAL TRANSITIONS (1). Professional pharmacy students are directed in preparations for transition to postgraduate educational opportunities or entry-level pharmacist positions. Graded P/N. PREREQS: Fourth-year standing in the PharmD program.
PHAR 776. PHARMA-CSI (2). Application of PK, PD, and P'genomic concepts, principles, and equations in computer workshops to solve drug therapy misadventures. Approved for use on a graduate program of study. PREREQS: PHAR 770 ; third-year standing in the PharmD program or permission of instructor.
PHAR 777. ACUTE MEDICAL EMERGENCIES (2). Drug therapy management in the critically ill patient. Graded P/N. PREREQS: PHAR 762
PHAR 778. ADVANCED ADULT MEDICINE (2).
Adult medicine elective utilizes actual patient cases to enhance knowledge of pharmacy and the pharmacologic basis of therapeutics in the setting of adult medicine, emphasizing application or current guidelines and major clinical trials for commonly encountered disease states. Graded P/N. PREREQS: Third-year standing in PharmD program and PHAR 761 and PHAR 762 and PHAR 764 and PHAR 765

## PHAR 780. COMMUNITY PHARMACY

CLERKSHIP (8). Supervised advanced professional education in ambulatory care pharmacy practice environment. Emphasis is placed on the application of direct and indirect pharmaceutical patient care and direct interactions with other health care professionals. Students will evaluate, assess and monitor pharmacotherapy of acute and chronic diseases in addition to providing drug information. Graded $P / N$. This course is repeatable for a maximum of 32 credits. PREREQS: PHAR 760 and PHAR 763 and PHAR 766 and PHAR 772 and PHAR 774 and Oregon pharmacy intern license and current CPR certification and College of Pharmacy immunization documentation.

## PHAR 785. AMBULATORY PRIMARY CARE

 CLERKSHIP (8). Supervised advanced professional education in ambulatory care pharmacy practice environment. Emphasis is placed on the application of direct and indirect pharmaceutical patient care and direct interactions with other health care professionals. Students will evaluate, assess and monitor pharmacotherapy of acute and chronic diseases in addition to providing drug information to patients and health care professionals. Graded P/N. This course is repeatable for a maximum of 32 credits.PREREQS: PHAR 760 and PHAR 763 and PHAR 766 and PHAR 772 and PHAR 774 and Oregon pharmacy intern license and current CPR certification and College of Pharmacy immunization documentation.
PHAR 790. GENERAL INTERNAL MEDICINE CLERKSHIP (8). Supervised advanced professional education located in internal medicine inpatient pharmacy practice environment. Emphasis is placed on the application of biomedical and pharmaceutical sciences to direct and indirect pharmaceutical patient care and direct interactions with other health care professionals. Students will evaluate, assess, and monitor pharmacotherapy involved in a wide variety of acute and chronic diseases. In addition, students will provide drug information to other health care professionals and patients. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 32 credits. PREREQS: PHAR 760 and PHAR 763 and PHAR 766 and PHAR 772 and PHAR 774 and Oregon pharmacy intern license and current CPR certification and College of Pharmacy immunization documentation.

## PHAR 792. HOSPITAL/HEALTH SYSTEMS

 PATIENT CARE CLERKSHIP (8). Supervised advanced professional education located in various hospital or health care systems patient care-oriented settings. Emphasis is placed on application of pharmaceutical sciences and pharmacotherapy to patient care. Graded P/N This course is repeatable for a maximum of 24 credits. PREREQS: Oregon Pharmacy Intern License and current CPR certification and fourth year standing in the pharmacy professional program and College of Pharmacy immunization documentation.
## PHAR 795. PATIENT CARE ELECTIVE

CLERKSHIP (8). Supervised advanced professional education located in various patient care-oriented settings. Emphasis is placed on the application of pharmaceutical sciences and pharmacotherapy to direct and indirect pharmaceutical care. Specialties include but are not limited to geriatrics, pediatrics, infectious disease, oncology, general patient care, nutrition support, nuclear pharmacy, home infusion, critical care, anticoagulation, pain management, etc. Graded $P / N$. This course is repeatable for a maximum of 24 credits. PREREQS: PHAR 760 and PHAR 763 and PHAR 766 and PHAR 772 and PHAR 774 and Oregon pharmacy intern license and current CPR certification and College of Pharmacy immunization documentation.
PHAR 797. ELECTIVE CLERKSHIP (8).
Supervised advanced professional education located in various pharmacy-oriented settings. Emphasis is placed on the application of pharmaceutical sciences and pharmacotherapy to a variety of environments involving pharmacy. Specialties include but are not limited to managed care, drug information, administration, pharmaceutical research, pharmaceutical industry professional pharmacy organizations, etc. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 24 credits. PREREQS: PHAR 760 and PHAR 763 and PHAR 766 and PHAR 772 and PHAR 774 and Oregon pharmacy intern license and current CPR certification and College of Pharmacy immunization documentation.

## PHAR 798. PHARMACY HEALTH

ADMINISTRATION (8). Provides students the opportunity to integrate and apply leadership and business principles necessary to operate and manage a pharmacy business or department in a diverse organizational environment. This course is repeatable for a maximum of 16 credits. PREREQS: PHAR 760 and PHAR 763 and PHAR 766 and PHAR 772 and PHAR 774 and Oregon Pharmacy Intern License, current CPR certification, College of Pharmacy immunization documentation, reading and understanding the Advanced Experiential Manual.
PHAR 799. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

Lifelong health and well-being for every person, every family, every community.
nspired by our mission as a leading land grant university, we create synergy in teaching, research, and outreach to develop the next generation of globally minded public health and human sciences professionals. Through interdisciplinary research and innovative curricula, we advance knowledge, policies, and practices that improve population health in communities across Oregon and beyond.

The College of Public Health and Human Sciences offers a comprehensive array of undergraduate and graduate education programs under the public health umbrella.

Our graduates are employed in a wide variety of research, education, service, management, and leadership positions in business, government, industry, education, and agencies related to health, nutrition, education, community development, and family relationships.

The college's scholarly and creative work improves the lives of individuals, families, and communities. Reflecting the strength and diversity of our faculty and disciplines, this work includes laboratory-based investigations of nutrition and physiology.

Our outreach and engagement initiatives and programs serve individuals, families, professionals, and communities across the campus, Oregon, the nation, and the world. This outreach includes OSU Extension's Family and Community Health program, active continuing education initiatives ranging from credit and noncredit courses to full degrees, and service programs that serve OSU students, faculty, staff, as well as individuals and families.

## DEGREE PROGRAMS

Advanced degrees include the master of arts (MA), master of public health (MPH), the master of science (MS), and doctor of philosophy (PhD). The MS and PhD degrees are offered in units of the college. Most units also participate in the master of arts interdisciplinary studies (MAIS) graduate degree program.

## ADVISING

The Office of Academic Advising is a primary source of information for all College of Public Health and Human Sciences undergraduate students. Students receive accurate, thorough, and timely information regarding their degree requirements, academic progress, job opportunities, and campus activities. Professional advisors oversee the undergraduate students within the college. Faculty members also serve a vital role to undergraduates by providing professional and career advice. Faculty members often involve students in research and professional activities that create opportunities for leadership, personal growth, and discovery.

## INTERNSHIPS AND PRACTICUMS

To help prepare students in the College of Public Health and Human Sciences for careers, many of the degree programs include internships and/or practicum experiences as part of their academic programs. These opportunities provide students with invaluable work experience in their field of study and may lead to postgraduate employment. Faculty members help place students and assist in the structure of these experiences. Additional information is available at http://health. oregonstate.edu/internships.

## DOUBLE DEGREES

Undergraduates with majors in the College of Public Health and Human Sciences can earn a second degree in education, innovation management, international studies, or sustainability. See the College of Education, College of Business, International Programs or Department of Forest Ecosystems and Society sections of this catalog for more information.

## SCHOLARSHIPS

The College of Public Health and Human Sciences offers a variety of scholarships to deserving students. Many are reserved for students in designated majors or for first-year students. A list of scholarships and application forms are available from the college's website at http:// health.oregonstate.edu/students/current/ undergraduate/scholarships.

Additional scholarship information is also available at the OSU Office of Financial Aid and Scholarships.

PROGRAMS ADMINISTERED BY THE COLLEGE

## Graduate Major

Public Health (MPH, PhD)

## Graduate Options

Biostatistics
Environmental and Occupational Health
Epidemiology
Global Health
Health Management and Policy
Health Promotion and Health Behavior
Graduate Areas of Concentration
Biostatistics (MPH only)
Environmental and Occupational Health (MPH, PhD)
Epidemiology (MPH, PhD)
Health Management and Policy (MPH only)
Health Policy (PhD only)
Health Promotion and Health Behavior (MPH, PhD)
International Health (MPH only)

## Graduate Minor

Public Health
Certificate
Graduate Certificate in Public Health

Dean's Office 123 Women's Bldg. Oregon State University Corvallis, OR 97331-6802
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97331-5109
541-737-8900
Email: phhs. advising@ oregonstate.edu Website: http://health. oregonstate.edu/ students/ Or: http://health. oregonstate.edu/ students/current/ undergraduate/ advising

## Administration

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## Erin Heim,

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## COLLEGE REQUIREMENTS

A grade of C - or higher is required for all courses in a student's undergraduate program of study.

- This includes all courses and associated prerequisite courses in a student's undergraduate program of study for a major, minor or certificate as listed in the online course catalog.
- Some programs have additional grade and/or GPA criteria, which must be met in addition to this grade policy.
- Baccalaureate core courses are not subject to this policy unless they serve as courses required in or prerequisites for a student's major, minor, or certificate.
Effective calendar year 2017-2018


## (June 2017-May 2018)

The College of Public Health and Human Sciences does not accept third-course attempts either at the university or transferred in from other institutions to meet individual course requirements within any major effective Fall term 2014.

- Third or subsequent attempts taken prior to Fall term 2014 may be considered to meet major program of study requirements. ${ }^{2}$
Footnote:
${ }^{2}$ The Exercise and Sport Science and Athletic Training majors stopped allowing third or subsequent course attempts effective Fall term 2013.


## SCHOOL OF BIOLOCICAL AND POPULATION HEALTH SCIENCES

Sunil Khanna, School Head
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For Student Advising Inquiries: Student Services, 541-737-8900

## FACULTY

Professors Brandt, Bray, Cardinal, Chi, Ho, Jump, Khanna, Traber, Turner, Yun Associate Professors Branscum, V. Bovbjerg, Carozza, Case, Cluskey, Crowell, Ebbeck, Gunter, M. Hoffman, Hannigan-Downs, Hord, Houseman, Iwaniec, John, Kile, Molitor, Pavol, Pollard (OSU-Cascades), Smiley, Smit, Veltri, S. Wong
Assistant Professors Bae, Bethel, M. Bovbjerg, Dallas, Garcia, Grutzmacher, Horner, Hystad, Johnson, Kim, Kincl, Logan, MacDonald, Newsom, Norcross, Odden, Robinson, Schuna, Takata, Tomayko, Wegis, Woekel, Wegis

Senior Instructors Dark, Hoisington,
Penry, Polizzi, Rudolph, Skoog, Su Instructors Ahern, Beamer, Carr, Chavez, Dodge-Vera, Fitch, Halverson, Hatfield, Hyde, Johnson, Kirk, Lyford, Maille, Marchant, Ostby, Roberson, Russell, Schrumpf, Silberstein, Steele, Streit, Todd, Witzke (OSU-Cascades)
Associate Professor (Senior
Research) Harper
Research Associates Kaiser, C. Wong
Faculty Research Assistant Olson
Professional Faculty Armington,
Bump, Gayler, Ibarra, Mills, Quinn, Renfro, Swanger, Tobey

Undergraduate Majors
Kinesiology (BS, CRED, HBS)

## Option

Pre-therapy and Allied Health
Nutrition (BS, CRED, HBS)

## Options

Pre-Dietetics
Dietetics
Nutrition and Health Sciences
Nutrition and Foodservice Systems

## Undergraduate Minors

Environmental and Occupational Health

## Exercise Physiology

Nutrition
(Please check with the Office of Academic Advising and Student Support in 106 Women's Building for minor requirements.)

Graduate Majors
Kinesiology (MAIS, MS, PhD)
Graduate Option
Adapted Physical Activity
Graduate Areas of Concentration
Biophysical Kinesiology
Psychosocial Kinesiology
Nutrition (MAIS, MS, PhD)
Graduate Area of Concentration Nutrition
Public Health (MPH, PhD)

## Graduate Options

Biostatistics
Environmental and Occupational Health
Epidemiology
Global Health
Health Management and Policy
Health Promotion and Health Behavior
Graduate Areas of Concentration Biostatistics (MPH only)
Environmental and Occupational Health (MPH, PhD)
Epidemiology (MPH, PhD)
Health Management and Policy (MPH only)
Health Policy (PhD only)
Health Promotion and Health Behavior (MPH, PhD)
International Health (MPH only)

## Graduate Minors

Kinesiology
Nutrition
Public Health

## Graduate Certificate

Public Health

The School of Biological and Population Health Sciences comprises the fields of kinesiology, nutrition, and the public health disciplines of biostatistics, epidemiology, global health, and environmental and occupational health. These disciplinary approaches link individual biology and behavior to population and environmental health to better understand how environmental and behavioral factors, including food and nutrition, physical activity, water, pollution, carcinogens, biohazards, etc., influence the development and progression of a biological disease. Applying the quantitative methods of epidemiology and biostatistics allows a better understanding of the causes of population-level disease as well as methods of intervention and prevention.

The School of Biological and Population Health Sciences houses the undergraduate degrees of Athletic Training, Kinesiology, and Nutrition. Nationally recognized programs prepare students for careers as athletic trainers, dietitians, medical and allied health science professionals, teachers in physical education, nutritionists, researchers, personal trainers, and fitness and nutrition professionals. The majors and their options are described below.

The Bachelor of Science degree in Public Health is offered through the School of Social and Behavioral Health Sciences, which can be found at http://health. oregonstate.edu/sbhs.

The School of Biological and Population Health Sciences houses the Masters in Public Health (MPH) options of biostatistics, epidemiology, global health, and environmental and occupational health. For more information about the MPH program and its options, see http:// health.oregonstate.edu/degrees/graduate/ public-health/mph. Environment, Safety and Health is also an area of concentration within the Public Health doctoral program (see http://health.oregonstate. edu/degrees/graduate/public-health/ phd-program).

Master's and doctoral degrees are available in Nutrition (see http://health. oregonstate.edu/degrees/graduate/ nutrition) and Kinesiology (see http:// health.oregonstate.edu/degrees/graduate/ kinesiology).

## UNDERGRADUATE MAJORS

Kinesiology Major and Option
The Kinesiology major prepares students
for careers in physical activity and fitness/wellness such as organizing, directing or managing physical fitness programs; personal trainer; fitness instructor; exercise physiologist; strength and fitness coach; and fitness entrepreneur. The degree can also serve as preparation for applications to a master's level physical education teacher education program, medical school, a professional program in the allied health professions (e.g. physical or occupational therapy, nursing, physician assistant) or other graduate education. Students interested in entry into professional schools of physical or occupational therapy, nursing, medical school, or physicians' assistant should take the Pre-Therapy and Allied Health option of the Kinesiology major, which has entry standards that must be met after completion of 90 credits.

## Pre-Therapy and Allied Health Option

Students who choose this option prepare for admission into medical school or a professional training program in the allied health professions. Graduates become physical therapists, occupational therapists, physicians, physician assistants, or nurses.

## Nutrition Major and Options

 Dietetics OptionDietitians provide guidance to the public regarding nutrition, diet and their relationship to disease. The Dietetics option at OSU is accredited by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) of the Academy of Nutrition and Dietetics and prepares students to become Registered Dietitians (RD). This option provides the course work and preparation to enter a supervised dietetic internship, pass the Registered Dietitian Exam and become a leader in the profession. Graduates from OSU's program consistently exceed the national average for placement into accredited dietetic internships and for passing the RD Exam the first time.
Nutrition and Foodservice Systems Option This option prepares graduates for professional careers directing foodservice operations that focus on serving healthy menu options and using local ingredients. Foodservice opportunities exist in both non-commercial operations including schools, universities, and healthcare, as well as others in the retail environment; all are striving to meet the consumer demand for healthier food options. This program integrates course work taken at OSU and the Culinary Arts program at Linn-Benton Community College.
Nutrition and Health Sciences Option This option is designed for students who want to focus on the scientific basis of nutrition for careers in medicine and the health sciences or in nutrition science
research. Tracks within the option allow students to specifically focus and prepare for careers in medicine and the allied health sciences or for academia and/ or health-related research. Professionals trained in nutrition science have many career options due to the growth and aging of our population, the focus on prevention of obesity and other chronic diseases, and a growing emphasis on health, nutrition, and wellness.

## UNDERGRADUATE STUDIES

## Preparation

Entering first-year and undergraduate transfer students should prepare to enter the College of Public Health and Human Sciences with a strong foundation in the sciences, balanced with good writing and critical thinking skills. Students transferring from other institutions are best prepared for the college curriculum if they have taken chemistry or biology or both.

## Admission

Any student who has met the admission requirements of Oregon State University may be admitted to a nutrition or exercise and sport science program of study. To transfer from another OSU college or school, the student must have the approval of the head advisor of the College of Public Health and Human Sciences.

## PHYSICAL ACTIVITY COURSES

The Physical Activity Course (PAC) Program is an elective, academic-credit program designed to provide OSU students with the opportunity to learn and engage in a wide variety of physical activities with the goal of promoting health and lifelong participation in physical activity. Students may take any number of PAC credits, but only 11 credits may be counted toward graduation. Successful completion of any PAC section will satisfy the one-credit laboratory requirement of the fitness category of the baccalaureate core. Courses may be repeated for credit and a grade. There is a PAC fee for each class, and some courses have additional fees. All fees are listed in the online Schedule of Classes. Student accounts are billed upon registration. Refunds of the PAC fee are automatic upon dropping or withdrawing from the course and follow university policies as listed in the OSU General Catalog. Some additional fees are refunded through the PAC Office (Langton 123). Social dance classes are listed with a men's and a women's section in order help balance the number of students in the traditional lead-and-follow roles within the same class.

## Retention

Students are expected to make satisfactory progress toward a degree. Satisfactory progress includes, but is not limited to: 1. Maintaining a minimum Nutrition
and Exercise Sciences option program GPA of 2.25 .
2. Maintaining a minimum GPA of 2.50 in all NUTR-prefixed courses.

## UNDERGRADUATE MAJORS WITH OPTIONS

## KINESIOLOGY (BS, CRED, HBS)

Available on Corvallis and OSUCascades campuses.
The Kinesiology major prepares students for careers in physical activity and fitness/wellness such as organizing, directing or managing physical fitness programs; personal trainer; fitness instructor; exercise physiologist; strength and fitness coach; and fitness entrepreneur. The degree can also serve as preparation for applications to a master's level physical education teacher education program, medical school, a professional program in the allied health professions (e.g., physical or occupational therapy, nursing, physician assistant) or other graduate education. Students interested in entry into professional schools of physical or occupational therapy, nursing, medical school, or physicians assistant should take the Pre-Therapy and Allied Health option of the Kinesiology major, which has entry standards that must be met after completion of 90 credits.

## Baccalaureate Core Requirements

 (48)Major Requirements (90)
Kinesiology Core (25)
KIN 131. Introduction to Kinesiology (1)
KIN 311. Motor Behavior (4)
KIN 312. *Sociocultural Dimensions of
Physical Activity (3)
KIN 314. Introduction to Adapted Physical Activity (3)
KIN 321. Biomechanics of Human Movement (4)
KIN 324. Exercise Physiology (4)
KIN 370. Psychology of Sport and Physical Activity (3)
KIN 481. ^Analysis of Critical Issues in Kinesiology (3)
Required Supporting Courses (41)
BI 231, BI 232, BI 233. Introduction to
Human Anatomy and Physiology $(3,3,3)$ and BI 241, BI 242, BI 243. Introduction to Human Anatomy and Physiology Laboratory ( $2,2,2$ )
OR BI 331, BI 332, BI 333. Advanced Human Anatomy and Physiology $(3,3,3)$ and BI 341, BI 342, BI 343. Advanced Human Anatomy and Physiology Laboratory ( $2,2,2$ )
CH 121. General Chemistry (5) or CH 231. *General Chemistry (4) and CH 261. *Laboratory for Chemistry 231 (1)
CH 122. *General Chemistry (5) or CH 232. *General Chemistry (4) and CH 262. *Laboratory for Chemistry 232 (1) CH 123. *General Chemistry (5) or CH 233. *General Chemistry (4) and
CH 263. *Laboratory for Chemistry 233 (1)

H 100. Introduction to Public Health (4)
MTH 112. *Elementary Functions (4)
NUTR 240. Human Nutrition (3)

## KIN Courses Beyond the Core (minimum 24 credits)

These KIN courses are chosen to meet individual students' educational goals in preparation for their chosen careers. Must take at least 24 total credits of 300and 400-level KIN courses not included in the Kinesiology Core, and among these credits:

1. Must take at least 3 KIN Lab courses (KIN course with a lab component; credits per course may vary), and
2. Must take at least 3 credits of Experiential Learning from the following courses: KIN 301, KIN 306, KIN 401, KIN 406, KIN 410, and KIN practicum courses; or credits earned in research, study abroad, or servicelearning experiences. No more than 9 Experiential Learning credits will count toward the 24 total credits required.

## Total Credits Required=180

## Minimum Grade Policy:

A grade of C - or better is required in all courses fulfilling Kinesiology major requirements (Kinesiology Core, Required Supporting Courses, and KIN Courses Beyond the Core).

## Repeated Courses Policy:

The university's repeated courses policy will be followed (AR 20). Kinesiology students are allowed at most two attempts to meet individual course degree requirements. Students who do not receive the minimum grade required for a course after two attempts (including courses transferred from other institutions) will not be allowed to have grades earned in subsequent attempts count toward meeting Kinesiology degree requirements. As a result, such students may not be able to complete a degree and/or an option in Kinesiology.

Pre-Therapy and Allied Health is an option with admission standards that may be added to the major:

Students may apply for admission to the PTAH option after completion of 90 credits. Requirements for admission can be found under the catalog listing for the PTAH option.

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)


## Major Code: $\mathbf{8 4 0}$

## OPTIONS

## PRE-THERAPY AND ALLIED HEALTH OPTION

This program is designed for students interested in pursuing admission to medical school or a professional program in the allied health professions, such as
athletic training, nursing, occupational therapy, physical therapy, or physician assistant.

The Pre-Therapy and Allied Health option requires the completion of one of six professional tracks:

1. Pre-Athletic Training
2. Pre-Medicine
3. Pre-Nursing
4. Pre-Occupational Therapy
5. Pre-Physical Therapy
6. Pre-Physician Assistant

Pre-Therapy and Allied Health is an undergraduate option that may be added to the Kinesiology major once the following admission standards have been met: Students may apply for admission to the PTAH option after completion of 90 credits. Requirements for admission include:

1. Cumulative GPA of 3.0 and,
2. A grade of "C" or better and average GPA of 2.7 or higher in the anatomy and physiology series (BI 231-BI 233 and BI 241-BI 243; or BI 331-BI 333 and BI 341-BI 343; Z 331-Z 333 and Z 341-Z 343) The "Z" courses have terminated but will still be accepted if they were taken.
Pre-Therapy and Allied Health
Option Required Courses (28-33)
KIN 132. Introduction to the Allied Health Professions (1)
or BI 109. Health Professions: Medical (1) [for Pre-Med]
KIN 325. Fitness Assessment and Exercise Prescription (2)
KIN 343. Pre-Therapy/Allied Health Seminar (1)

PHAR 210. Terminology of the Health Sciences (2)
PSY 201, PSY 202. *General Psychology $(3,3)$
SOC 204. *Introduction to Sociology (3)
ST 351. Introduction to Statistical Methods (4)
or ST 201. Principles of Statistics (4)
Choose four of the following KIN supporting courses:
KIN 394. Professional Activities: Resistance
Training Program Design (2)
KIN 395. Professional Activities: Group Fitness (2)
KIN 396. Professional Activities: Aquatics (2)
KIN 423. Qualitative Movement Analysis (3)
KIN 425. Anatomical Kinesiology (4)
(Required for Pre-Athletic Training)
KIN 434. Applied Muscle Physiology (3)
KIN 437. Physical Activity, Aging, and Chronic Disease (4)
KIN 444. Advance Adapted Physical Activity (3)

KIN 483. Tissue Injury and Repair (3)
(Required for Pre-Athletic Training)
Note: 300- and 400-level KIN courses can count toward fulfilling the KIN
Courses Beyond the Core requirements in the Kinesiology major.

Additional required science and social science courses for the following pre-professional tracks are listed below: 1. Pre-Athletic Training
2. Pre-Medicine
3. Pre-Nursing
4. Pre-Occupational Therapy
5. Pre-Physical Therapy
6. Pre-Physician Assistant.

## 1. Pre-Athletic Training Track

## Courses (37 credits)

BI 103. *General Biology (4)
COMM 326. Intercultural Communication (3)

H225. Social and Individual Determinants (3)

KIN 160. Introduction to Injury
Management for the Physically Active (3)
KIN/NUTR 341. Nutrition for Exercise (3)
KIN 344. Pre-Therapy/Allied Health
Practicum (2)
KIN 380. Therapeutic Modalities (4)
KIN 385. Therapeutic Exercise (4)
KIN 425. Anatomical Kinesiology (4)
KIN 483. Tissue Injury and Repair (3)
PHL/REL 444. *Biomedical Ethics (4)
2. Pre-Medicine Track Courses (55)

BB 450. General Biochemistry (4)
BB 451. General Biochemistry (3)
BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
BI/BB 314. Cell and Molecular Biology (4)
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
Recommended, not required: MTH 251.
*Differential Calculus (4)

## 3. Pre-Nursing Track Courses (26)

H 225. *Social and Individual Health Determinants (4)
H 312. *HIV/AIDS and STIs in Modern Society (3)
H 320. Introduction to Human Disease (3)
MB 230. *Introductory Microbiology (4)
PHL 205. *Ethics (4)
PHL/REL 444. *Biomedical Ethics (4)
Choose one of the following psychology courses:
PSY 330. Brain and Behavior (4)
PSY 350. Human Lifespan Development (4)
PSY 381. Abnormal Psychology (4)

## 4. Pre-Occupational Therapy Track

## Courses (49-50)

BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
or BI 101, BI 102, BI 103. *General Biology $(4,4,4)$
KIN 344. Pre-Therapy/Allied Health Practicum (2)
KIN 380. Therapeutic Modalities (4)
KIN 385. Therapeutic Exercise (4)
PH 201, PH 202. *General Physics $(5,5)$
Applied Art Courses (take 6 credits) (6)
Choose one of the following medical/ health related courses:
H 225. *Social and Individual Health Determinants (4)
H 312. *HIV/AIDS and STIs in Modern Society (3)
H 320. Introduction to Human Disease (3)
PHL/REL 444. *Biomedical Ethics (4)

## Choose two of the following psychology courses:

PSY 330. Brain and Behavior (4)
PSY 350. Human Lifespan Development (4)
PSY 381. Abnormal Psychology (4)

## 5. Pre-Physical Therapy Track

Courses (48-49)
BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
KIN 344. Pre-Therapy/Allied Health Practicum (2)
KIN 380. Therapeutic Modalities (4)
KIN 385. Therapeutic Exercise (4)
PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
Choose one of the following medical/ health related courses:
H 225. *Social and Individual Health Determinants (4)
H 312. *HIV/AIDS and STIs in Modern Society (3)
H 320. Introduction to Human Disease (3)
PHL/REL 444. *Biomedical Ethics (4)

## Choose two of the following

 psychology courses:PSY 330. Brain and Behavior (4)
PSY 350. Human Lifespan Development (4)
PSY 381. Abnormal Psychology (4)

## 6. Pre-Physician Assistant Science

## Track Courses (50-51)

BB 450. General Biochemistry (4)
BB 451. General Biochemistry (3)
BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
BI 311. Genetics (4)
CH 331, CH 332. Organic Chemistry $(4,4)$
MB 230. *Introductory Microbiology (4)
PSY 350. Developmental Psychology (4)
PSY 381. Abnormal Psychology (4)
Choose one of the following medical/ health related courses:
H 225. *Social and Individual Health Determinants (4)
H 312. *HIV/AIDS and STIs in Modern Society (3)
H 320. Introduction to Human Disease (3)
PHL/REL 444. *Biomedical Ethics (4)
All required courses in the Pre-
Therapy and Allied Health op-
tion must be taken in the normal
grading basis, A-F.
Minimum Grade Policy: A grade of C - or better is required in all courses fulfilling the Kinesiology major and PTAH option requirements.
PTAH Option Suggested Electives

## for All Tracks:

ANTH 483. Advanced Medical Anthropology (4)
BB 350. Elementary Biochemistry (4)
BI 311. Genetics (4)
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
H 210. *Introduction to the Health Care System (3)
H 225. *Social and Individual Health Determinants (4)
H 250. Introduction to Health Care Management (3)
H 312. *HIV/AIDS and STIs in Modern Society (3)

H 320. Introduction to Human Disease (3)
MB 230. *Introductory Microbiology (4)
NUTR 312. *Issues in Nutrition and Health (3)

PHL 205. *Ethics (4)
PHL/REL 444. *Biomedical Ethics (4)
PSY 330. Brain and Behavior (4)
PSY 350. Human Lifespan Development (4)
PSY 381. Abnormal Psychology (4)
PSY 432. Physiological Psychology (4)
PSY 442. Perception (4)
SOC 205. *Institutions and Social Change (3)
SOC 340. Deviant Behavior and Social
Control (4)

- Students must complete a total of 180 credits required for a degree.
- It is strongly suggested that students examine prerequisite requirements for professional schools and utilize elective credits to meet additional requirements.
- Students may complete foreign language credits as elective credits.


## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Option Code: 732

## NUTRITION (BS, CRED, HBS)

## Baccalaureate Core (48)

Plus choose one option from below:

1. Pre-Dietetics
2. Dietetics (must first complete PreDietetics)
3. Nutrition and Foodservice Systems
4. Nutrition and Health Sciences

Pre-Professional Nutrition Major

## Code: 463

Major Code: 466

## OPTIONS

## DIETETICS OPTION

Meets the Academy of Nutrition and Dietetics' academic and accreditation requirements.
Before taking the Dietetics option, students must first complete the Pre-Dietetics option.

## Dietetics Admission Requirements

Students must apply to and be accepted into the Dietetics option in Nutrition.
See pre-dietetics courses and Dietetics

## Admission Requirements.

## Required

BA 351. Managing Organizations (4)
BB 350. Elementary Biochemistry (4)
BI 231, BI 232, BI 233, Introduction to
Human Anatomy and Physiology ( $3,3,3$ )
BI 241, BI 242, BI 233, Introduction
to Human Anatomy and Physiology
Laboratory $(2,2,2)$
CH 332. Organic Chemistry (4)
or CH 335, CH 336. Organic Chemistry $(3,3)$
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
H 100. Introduction to Public Health (4)
H 320. Introduction to Human Disease (3)

KIN 324. Exercise Physiology (4)
NUTR 235. Science of Foods (5)
NUTR 307. Seminar (1)
NUTR 311. Foodservice Production and
Purchasing (4)
NUTR 319. Promoting Food and Nutrition (3)
NUTR 325. Nutrition Through the Life
Cycle (3)
NUTR 407. Seminar (1)
NUTR 417, NUTR 418. Human Nutrition Science $(4,4)$
NUTR 423. Community Nutrition (4)
NUTR 430. Medical Nutrition Therapy 1 (4)
NUTR 431. Medical Nutrition Therapy 2 (4)
NUTR 432. Medical Nutrition Therapy 3 (3)
NUTR 439. ${ }^{\wedge}$ Communications in Dietetics (3)

NUTR 446. Managing Food and Nutrition Services (4)
NUTR 447. Management of Food Systems Laboratory (3)
PSY 202. *General Psychology (3)
ST 351. Introduction to Statistical Methods (4)

## Electives

Sufficient (together with baccalaureate and nutrition and food management cores) to ensure 180 total credits ( 60 must be upper division).

## Total= 180

## Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course (WIC)
Option Code: 419


## NUTRITION AND FOODSERVICE SYSTEMS OPTION

The Nutrition and Foodservice Systems option prepares graduates for professional careers directing foodservice operations that focus on serving healthy menu options and using local ingredients. Foodservice opportunities exist in both non-commercial operations including schools, universities, and healthcare as well as others in the retail environment; all are striving to meet the consumer demand for healthier food options. This program integrates course work taken at OSU and the Culinary Arts program at Linn-Benton Community College.

Please contact Dr. Mary M. Cluskey, 541-737-0960, cluskeym@oregonstate. edu for more information about the Nutrition and Foodservice Systems option.

## Introductory Core

H 100. Introduction to Public Health (4)
NUTR 104. Orientation: Nutrition and Food Management (1)
or CA 201. Culinary Arts Career Planning (1) (LBCC)

NUTR 240. Human Nutrition (3)
NUTR 241. Applications in Human
Nutrition (1)
NUTR 325. Nutrition Through the Life
Cycle (3)
CA 101. Culinary Arts Practicum I (7) (LBCC)
CA 102. Culinary Arts Practicum II (8) (LBCC)
CA 103. Culinary Arts Practicum III (8) (LBCC)

## General Education Core

CH 121. General Chemistry (5)
COMM 218. *Interpersonal
Communication (3)
or COMM 111. *Public Speaking (3)
ECON 201. *Introduction to
Microeconomics (4)
ECON 202. *Introduction to Macroeconomics (4)
H 320. Introduction to Human Disease (3)
H 385. Safety and Health Standards and Laws (3)
or H 344. Foundations of Environmental Health (3)
MB 230. *Introductory Microbiology (4) or MB 302, MB 303. General
Microbiology, General Microbiology Lab $(3,2)$
PSY 202. *General Psychology (3)
ST 201. Principles of Statistics (4) or ST 351. Introduction to Statistical Methods (4)

## Healthy Foodservice Systems

## Courses

BA 215. Fundamentals of Accounting (4)
BA 230. Business Law I (4)
BA 351. Managing Organizations (4)
BA 360. Introduction to Financial
Management (4)
BA 390. Marketing (4)
BA/MGMT 453. Human Resources
Management (4)
CA 111. Food Service Safety and Sanitation (1) (LBCC)

CA 112. Stations, Tools, and Culinary Techniques (3) (LBCC)
CA 113. Service Techniques (1) (LBCC)
FST 251. Introduction to Wines, Beers and Spirits (3)
FST 360. Food Safety and Sanitation (3)
FST 421. *Food Law (3)
NUTR 311. Foodservice Production and Purchasing (4)
NUTR 319. Promoting Food and Nutrition (3)
NUTR 407. Seminar (1) ${ }^{1}$
NUTR 410. Field Experience (8) ${ }^{2}$ Pre-arrange NUTR 410 with department
NUTR 416. ^Cultural Aspects of Foods (3)
NUTR 446. Managing Food and Nutrition Services (4)
NUTR 447. Management of Food Systems Laboratory (3)
Credits needed to graduate=180
Upper-division credits needed=60

## Maximum S/U credits=36

Note: Departmental courses within major may not be taken $\mathrm{S} / \mathrm{U}$.
Transfer Students: See Schedule of Classes, Academic Regulations 18a.1.

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
${ }^{\mathbf{1}}$ Recommend fall term of senior year.
${ }^{2}$ Recommend spring term of senior year.
Option Code: 261


## NUTRITION AND HEALTH

## SCIENCES OPTION

The Nutrition and Health Sciences option is designed for students who want to focus on the scientific basis of nutrition
for careers in medicine and the health sciences or in nutrition science research. Tracks within the option allow students to specifically focus and prepare for careers in medicine and the allied health sciences or for academia and/or healthrelated research. Professionals trained in nutrition science have many career options due to the growth and aging of our population, the focus on prevention of obesity and other chronic diseases, and a growing emphasis on health, nutrition, and wellness.

## Science/Social Science Core (All

## Tracks) (105 credits):

BB 314. Cell and Molecular Biology (4)
BB 450, BB 451. General Biochemistry (4,3)
BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
BI 231, BI 232, BI 233. Introduction to Human Anatomy and Physiology (3,3,3)
BI 241, BI 242, BI 233 . Introduction to Human Anatomy and Physiology Laboratory ( $2,2,2$ )
CH 121. General Chemistry (5)
CH 122, CH 123. *General Chemistry $(5,5)$ or CH 231, CH 232, CH 233. *General Chemistry ( $4,4,4$ )
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233 (1,1,1)
CH 331, CH 332. Organic Chemistry $(4,4)$ or CH 334, CH 335, CH 336. Organic Chemistry ( $3,3,3$ )
CH 337. Organic Chemistry Laboratory (4)
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. Interpersonal
Communication (3)
H 100. Introduction to Public Health (4)
KIN 324. Exercise Physiology (4)
MB 302, MB 303. General Microbiology and
Laboratory (3,2)
MTH 112. *Elementary Functions (4)
PH 201, PH 202. *General Physics $(5,5)$
PSY 201, PSY 202. *General Psychology $(3,3)$
ST 351. Introduction to Statistical Methods (4)

WR 121. *English Composition (3)

## Nutrition Core (All Tracks) (27-30

## credits):

NUTR 240. Human Nutrition (3)
NUTR 241. Applications in Human Nutrition (1)
NUTR 325. Nutrition Through the Life Cycle (3)
NUTR 417, NUTR 418. Human Nutrition Science (4,4)
NUTR 430. Medical Nutrition Therapy 1 (4)
NUTR 439. ^Communications in Dietetics (3)

Choose two courses from below:
NUTR 312. *Issues in Nutrition and Health (3)

NUTR 423. Community Nutrition (4)
NUTR 431. Medical Nutrition Therapy 2 (4)
NUTR 432. Medical Nutrition Therapy 3 (3)
Nutrition Science Track (7 credits):
CH 324. Quantitative Analysis (4)
NUTR 104. Orientation: Nutrition and Food

Management (1)
NUTR 401. Research (2 credits minimum)
Physician Assistant and Pre-Med
Track: (11 credits)
KIN 132. Introduction to the Allied Health Professions (1)
or BI 109. Health Professions: Medical (1)
KIN 325. Fitness Assessment and Exercise
Prescription (2)
KIN 343. Pre-Therapy/Allied Health Seminar (1)
or \#GS 410. Science Internship (1) (For Pre-Med Students)
PH 203. *General Physics (5)
PHAR 210. Terminology of the Health Sciences (2)

## Total Credits=180

Total credits must be sufficient (together with baccalaureate and NUTR cores) to ensure 180 total credits ( 60 credits must be upper division).

## Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course (WIC)
\# Requirement for Pre-Med or MCAT preparation


## Option Code: 467

## PRE-DIETETICS OPTION

## Dietetics Admission Requirements

To be considered for admission to the Dietetics option within the Nutrition major, students must complete the Pre-Dietetics courses listed below with a grade of B- or higher in each of the NUTR courses listed, a grade of C - or higher in each of the other courses listed, and a grade-point average of 3.0 or higher for the listed courses as a whole. Applicants to the Dietetics option must achieve an overall GPA of 3.0 or higher based on completing at least 60 quarter credits [OSU (institutional) and transfer], including the prerequisite courses listed below. At least 12 credits must be taken at OSU. Information on how to apply for admission to the Dietetics option can be found at the PHHS Advising Office and on the BPHS Nutrition Dietetics Web page at http://health.oregonstate.edu/ bphs/dietetics.
BI 212. *Principles of Biology (4)
CH 121. General Chemistry (5)
CH 122, CH 123. *General Chemistry $(5,5)$ or CH 231, CH 232, CH 233. *General
Chemistry ( $4,4,4$ ) and CH 261, CH 262,
CH 263. *Laboratory for Chemistry 231,
232, 233 ( $1,1,1$ )
CH 331. Organic Chemistry (4)
or CH 334. Organic Chemistry (3)
MB 230. *Introductory Microbiology (4) or MB 302, MB 303. General Microbiology and $\operatorname{Lab}(3,2)$
NUTR 104. Orientation: Nutrition and Food Management (1)
NUTR 240. Human Nutrition (3)
NUTR 241. Applications in Human
Nutrition (1)
NUTR 325. Nutrition Through the Life
Cycle (3)

PSY 201. *General Psychology (3)
WR 121. *English Composition (3)
Total=40-42
Footnote:

* Baccalaureate Core Course (BCC)

Option Code: 652

## UNDERGRADUATE MINORS

## ENVIRONMENTAL AND

OCCUPATIONAL HEALTH MINOR
Provides undergraduate students with academic and professional experience that will enable them to understand the impact of environmental and occupational hazards on human health and society, as well as developing effective interventions that will control and prevent exposure to hazards. This knowledge will enable them to apply scientific principles and management strategies in the fields of environmental protection, occupational health and safety, and public health.

## Required Courses (27)

H 344. Foundations of Environmental Health (3)
H 407. Seminar (2)
H 410. Internship (9)
H 445. *Occupational Health (3)
H 448. Public Health Toxicology (3)
H 480. Undergraduate EOH Seminar (1)
Select two electives listed below for a total of 6 credits:
AEC 432. Environmental Law (4)
AG 412. AG Safety and Health (3)
FST 421. *Food Law (3)
GEO 309. *Environmental Justice (3)
GEOG 300. *Sustainability for the Common Good (3)
H 385. Safety and Health Standards and Laws (3)
H 489. Emergency and Disaster
Management (3)
H 494. Applied Ergonomics (3)

## Footnote:

* Baccalaureate Core Course


## Minor Code: 747

EXERCISE PHYSIOLOGY MINOR
Students pursuing this minor develop a deeper understanding of the motivational, psychosocial, and lifespan factors affecting human behavior within the context of sport and physical activity settings. A theory-to-research-to-practice approach is followed in the core course work, with supplemental course work focusing on the individual needs and interests of the students.
KIN 321. Biomechanics of Human
Movement (4)
KIN 324. Exercise Physiology (4)
KIN 325. Fitness Assessment and Exercise Prescription (2)
KIN 406. Projects (3)
KIN 434. Applied Muscle Physiology (3)
KIN 437. Physical Activity, Aging, and
Chronic Disease (4)
KIN 474. Exercise Physiology Lab Methods (2)

BI 231, BI 232, BI 233. Introduction to Human Anatomy and Physiology $(3,3,3)$ and BI 241, BI 242, BI 243. Introduction to Human Anatomy and Physiology Laboratory (2,2,2)
or BI 331, BI 332, BI 333. Advanced
Human Anatomy and Physiology (3,3,3)
and BI 341, BI 342, BI 343. Advanced
Human Anatomy and Physiology
Laboratory (2,2,2)
Note: Prerequisites for KIN 324 are (BI
233 [D-] or Z 333 [D-]) and CH 121 [C-] and CH 122 [C-] and (CH 123 [C-] or CH 130 [C-]) and (BI 231 [C-] or Z 331 [C-] or equivalent.

## Total=37

Minor Code: 752

## NUTRITION MINOR

This minor requires 35 credits, including 22 credits at the upper-division level.

Students are strongly encouraged to consult an advisor in the School of Biological and Population Health Sciences to be sure that prerequisites are taken.
BB 350. Elementary Biochemistry (4)
BI 231, BI 232, BI 233. Introduction to
Human Anatomy and Physiology ( $3,3,3$ )
NUTR 240. Human Nutrition (3)
NUTR 241. Applications in Human
Nutrition (1)
NUTR 312. *Issues in Nutrition and Health (3)

NUTR 325. Nutrition Through the Life Cycle (3)
NUTR 417. Human Nutrition Science (4)
NUTR 418. Human Nutrition Science (4)
NUTR 423. Community Nutrition (4)

## Total=35

## Footnote:

${ }^{\wedge}$ Bacc Core Course
Minor Code: 426

## GRADUATE MAJORS

## ATHLETIC TRAINING (MATRN)

The Athletic Training graduate major is a two-year program leading to the Master of Athletic Training degree, MATRN.

Upon graduation, students are eligible to sit for the Board of Certification examination. Successful completion of this examination is the prerequisite to obtaining registration as an Athletic Trainer in the state of Oregon.

The clinical education of students in the athletic training program primarily takes place during rotations with various OSU intercollegiate athletic teams, some of the most culturally diverse groups on the OSU campus. This experience helps students develop sensitivity to varying cultures, strategies for overcoming potential cultural barriers to communication, and interpersonal skills that serve them well outside the campus community.

## Athletic Training Program

## Admission Criteria

- Baccalaureate degree program from
an accredited university prior to beginning the program.
- Cumulative GPA of 3.0 from the undergraduate degree.
- Three letters of recommendation, with at least one from a certified athletic trainer (ATC).
- Personal statement.
- Meet program technical standards with or without accommodations as required by Commission on Accreditation of Athletic Training Education (CAATE) accreditation standards 64 and 65.
- Minimum of 50 hours of work, volunteering and/or observation under an ATC within two years prior to program application. Documentation of clinical hours must be verifiable on the official program application. Note: Hours obtained under the supervision of a physical therapist do not count unless the individual is dual credentialed as an ATC/PT.
- Graduate Record Exam (GRE) taken within the last five years.
- Satisfactory completion (C- or better with a cumulative GPA of 3.0) in the following prerequisite course work (course syllabi must be submitted to the program director with the application):


## Prerequisite Course Work

## Biology, 12 credits

- Human Anatomy-Human anatomy with the study of skeletons and models.
- Human Physiology-Human physiology with emphasis on homeostatic mechanisms.


## Exercise Science, 12 credits

- Exercise Physiology-Understanding of factors affecting the physiological function of the body related to exercise and physical performance.
- Biomechanics/Anatomical Kinesiology—Anatomical and mechanical bases of physical activity with emphasis on the analysis of sport and exercise skills.
- Nutrition-Basic principles of human nutrition with emphasis on the nutrients and factors that affect their utilization in the human body.


## Chemistry, 12 credits

- General Chemistry-Completion of introductory general chemistry series.


## Athletic Training Graduate Courses

## (98 credits)

KIN 509. Practicum (19)
KIN 510. Professional Internship: Physical
Education (26)
KIN 511. Introduction to Athletic Training (4)

KIN 520. Orthopedic Assessment of Upper Extremity Injuries (4)
KIN 521. Orthopedic Assessment of Lower Extremity Injuries (4)
KIN 522. Orthopedic Assessment of the

Spine (4)
KIN 561. Psychosocial Factors in Physical Activity (3)
KIN 565. Emergency Management of Sports Trauma (3)
KIN 566. General Medical Assessment (3)
KIN 567. Pharmacology in Athletic Training (3)

KIN 568. Athletic Training Program Management (3)
KIN 569. Evidence-based Practice (3)
KIN 584. Therapeutic Modalities (4)
KIN 585. Upper Extremity Therapeutic Exercise (4)
KIN 586. Lower Extremity Therapeutic Exercise (4)
H 523. Foundations of Public Health (4)
NUTR 535. Nutrition and Exercise:
Macronutrients and Energy Metabolism (3)

## Major Code: $\mathbf{2 4 4 0}$

## KINESIOLOGY (MS, PhD, MAIS)

Graduate Areas of Concentration
Biophysical kinesiology, psychosocial kinesiology
The graduate program in kinesiology offers courses and learning experiences in the theoretical and practical study of physical activity (including exercise and sport) for the promotion of optimal health and disease prevention.

Graduate fields in kinesiology include biophysical kinesiology and psychosocial kinesiology.

The MS degree can be completed via a thesis or project. The PhD degree requires the completion of a dissertation. For further information about the graduate program in Kinesiology, visit the school's website at http://health.oregonstate.edu/ bphs.
Major Code: $\mathbf{7 7 0 0}$

## OPTIONS

## ADAPTED PHYSICAL ACTIVITY OPTION

This graduate option is focused on the development of leadership personnel in the area of disability and will build competencies to serve individuals with disabilities as effective teachers, scholars, and advocates.

## Prerequisite Course

KIN 544. Advanced Adapted Physical
Activity (3) or equivalent courses
A minimum of 9 credits from the following classes:
KIN 547. Inclusion in Physical Activity (3)
KIN 548. Assessment and Programming for
Special Populations (3)
KIN 549. Physical Activity for Persons with Severe Disabilities (3)
KIN 550. Health Promotion for People with Disabilities (3)
KIN 647. Current Topics and Research in Adapted Physical Activity (3)
KIN 610. Professional Internship: Adapted
Physical Activity (1,1,1)
Note: This requires graduate students to
be in residence for 1 year.
The major faculty advisor(s) and a faculty member from the Adapted Physical Activity program must approve the option in Adapted Physical Activity.

## Option Code: 7720

## NUTRITION (MS, PhD, MAIS)

## Graduate Areas of Concentration Nutrition

The School of Biological and Population Health Sciences offers graduate programs leading to the Master of Science (MS) and Doctor of Philosophy (PhD) degrees in nutrition. The program of study integrates multiple disciplines relevant to nutrition, including molecular, biochemical, physiological and clinical nutrition. The overall goal of the program is for the student to gain a "cutting-edge" understanding of contemporary issues in nutrition and apply these concepts to human health.

Research in nutrition is focused on human nutrition and nutrient effects on physiological systems impacting human health. Our research programs seek the discovery of new knowledge, information, techniques and/or interventions that can promote the optimal health of individuals and families in Oregon, nationally, and worldwide. A thesis based on original research is required for the MS and PhD degree programs.

Since nutrition builds upon the natural sciences, entering graduate students should have a strong background in chemistry, physiology, nutrition, statistics, and biochemistry.
Depending upon their concentration, graduates are prepared for positions in academic research and teaching or research and development in industry or government.

Information on the nutrition graduate program graduate fellowships and assistantships is available at the website: http://health.oregonstate.edu/degrees/ graduate/nutrition, click on the "Application and Admission Requirements" link.

For additional information about the college and school, visit the website at http://health.oregonstate.edu/.

## Major Code: 4660

## GRADUATE MINORS

KINESIOLOGY GRADUATE MINOR
For more details, see the program advisor.

## Minor Code: 7710

## NUTRITION GRADUATE MINOR

For more details, see the school advisor.

## Minor Code: 4660

■ PUBLIC HEALTH COURSES
H 100. INTRODUCTION TO PUBLIC HEALTH (4).
A basic overview of public health. Uses a mix of lectures, guest speakers, classroom activities and
homework to help students understand the role of public health in eliminating health disparities, understanding epidemics, and setting policy.
H 100H. INTRODUCTION TO PUBLIC HEALTH (4). A basic overview of public health. Uses a mix of lectures, guest speakers, classroom activities and homework to help students understand the role of public health in eliminating health disparities, understanding epidemics, and setting policy. PREREQS: Honors College approval required.
H 199. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.
H 210. *INTRODUCTION TO THE HEALTH CARE
SYSTEM (3). Provides tools to understand and critically assess the health care delivery system, its components, and the challenges created by its structure. The health care system will be considered from the perspective of several main players [e.g., patients, hospitals, doctors, health plans]. (Bacc Core Course)
H 220. INTRODUCTION TO HEALTH DATA
ANALYSIS (3). Introduction to the application of biostatistics and probability to the health sciences. Topics include quantitative analysis and inference, statistical methods in the biosciences, and quantitative study to evaluate and control health problems. PREREQS: MTH 105 or MTH 111 or higher mathematics.
H 225. *SOCIAL AND INDIVIDUAL HEALTH DETERMINANTS (4). Overview of the macro (social/system/environmental) and micro (individual) contributors to premature disease, disability and population health. Selected behavioral theories supporting health risks and strategies for the prevention of premature disease/ disability and the promotion of health. (Bacc Core Course)
H 250. INTRODUCTION TO HEALTH CARE MANAGEMENT (3). Participants will learn key principles, practices and personalities of health care management. The content is broadly applicable to health care enterprises of every kind: public health organizations, physician practices and clinics, hospitals and health systems, agencies and service organizations, for-profit firms, not-for-profit enterprises, etc. PREREQS: H 210* [C-]
H 309. PRACTICUM IN HEALTH CARE
SERVICES (3-6). Supervised work experience in a health care service setting or health-related agency or program. Weekly progress reports and post-experience summary report and evaluation will be expected. Preplanned with instructor approval. Open to health care administration majors. Graded P/N. This course is repeatable for a maximum of 12 credits. PREREQS: Junior standing. Instructor consent required.
H 310. HEALTH FIELD EXPERIENCES (3-6). Introductory field experience in a health or health-related worksite. Graded P/N. This course is repeatable for a maximum of 12 credits. PREREQS: H 210 [C-] and junior standing.

## H 312. *HIV/AIDS AND STIS IN MODERN

SOCIETY (3). Fundamental principles relating to etiology, nature, prevention, and control of AIDS and other sexually transmitted diseases in contemporary society; emphasis on social, psychological, legal, economic, and ethical issues surrounding these diseases. (Bacc Core Course)
H 319. INTRODUCTION TO HEALTH POLICY (3). Describe the policy development process, including problem conceptualization, agenda setting, role of interest groups and public opinion, analysis of alternatives and selection of policy alternative. PREREQS: H 210 [C-]
H 320. INTRODUCTION TO HUMAN DISEASE
(3). Fundamental principles relating to etiology, nature, prevention, and control of communicable and noncommunicable diseases in human populations. Special emphasis on disease prevention and health promotion in the high risk

## diseases of modern, industrialized society.

H 333. *GLOBAL PUBLIC HEALTH (3).
Introduction to the field of global health, its history, methods, and key principle; understanding global health inequities through case studies; overview of major global health prevention programs. (Bacc Core Course)
H 344. FOUNDATIONS OF ENVIRONMENTAL
HEALTH (3). Introductory course examining environmentally-linked disease, and health effects associated with toxic substances, food quality, pesticides, air, water, and noise pollution, and solid/hazardous wastes.
H 349. PEER HELPER SKILLS DEVELOPMENT
(3). Prepares the student for an active role as a peer helper in alcohol and drug abuse prevention and health education. Course work will include: drug, alcohol, addiction and other related health issues, basic listening and communication skills, conflict resolution, crisis recognition and referral. A major component will be affective learning situations designed to promote self-awareness and personal growth.

## H 364. DRUGS, SOCIETY AND HUMAN

BEHAVIOR (3). Drug use and abuse; theories of addiction; basic principles of drug action regarding the use of sedative and stimulative compounds; alcohol; opiates; hallucinogens; designer drugs; cocaine; and over-the-counter products. Particular emphasis on the role of the individual,s value orientation, decision-making, and selfresponsibility in treatment and educational approaches to prevention. PREREQS: (PSY 201 [C-] or PSY 202 [C-])
H 364H. DRUGS, SOCIETY AND HUMAN
BEHAVIOR (3). Drug use and abuse; theories of addiction; basic principles of drug action regarding the use of sedative and stimulative compounds; alcohol; opiates; hallucinogens; designer drugs; cocaine; and over-the-counter products. Particular emphasis on the role of the individual's value orientation. PREREQS: (PSY 201 [C-] or PSY 202 [C-] ) and Honors College approval required.
H 385. SAFETY AND HEALTH STANDARDS
AND LAWS (3). Emphasis on the Occupational Safety and Health Act; study includes the scope and duties under the act, enforcement, and adjudication procedures and OSHA litigation; components of Oregon-OSHA.
H 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
H 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
H 401. RESEARCH AND SCHOLARSHIP (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Instructor's consent required.

## H 402. INDEPENDENT STUDY (1-16). This

 course is repeatable for a maximum of 16 credits.H 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Instructor's consent required.
H 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Instructor's consent required.
H 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
PREREQS: Instructor's consent required.
H 407. SEMINAR (2). Seminar to prepare students for their internship in public health. This course is repeatable for a maximum of 6 credits. PREREQS: HMP (Health Management Promotion) option students are required to take $H$ 436 in preparation and hold junior standing. HPHB (Health Promotion and Health Behavior) option students are required to take H 225 and H 320 and hold junior standing.
H 407H. SEMINAR (2). Seminar to prepare students for their internship in public health. This course is repeatable for a maximum of 6
credits. PREREQS: HMP (Health Management Promotion) option students are required to take H 436 in preparation and hold junior standing. HPHB (Health Promotion and Health Behavior) option students are required to take H 225 and H 320 and hold junior standing. Honors College approval required.
H 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Instructor consent required.
H 409. PRACTICUM (1-6). Supervised work experience in a public health or health care administration setting. Open to majors in public health. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Senior standing and departmental approval.
H 410. INTERNSHIP (1-12). Directed field experience with participation in a community, worksite, or health agency program. Experience is individually arranged to meet student needs. Graded P/N. This course is repeatable for a maximum of 24 credits. PREREQS: H 436 and H 407 (HMP only); H 225 and H 320 and H 476 and H 407 (HPHB only)
H 418. PUBLIC HEALTH ETHICS AND ISSUES
(3). Current ethical issues in public health, including gender and ethnicity in employment, pharmaceutical controls, product liability, advertising, and export of high technology. PREREQS: Senior standing.
H 421. MENTAL HEALTH (3). Examination of social, governmental, legal and individual mental health issues. Brief overview of some major mental disorders. PREREQS: (H 225 [C-] and H 320 [C-] ) and junior standing.
H 422. HEALTH, AGING AND CONTROL OF CHRONIC DISEASES (4). Epidemiology of the major chronic diseases, risk factors, potential methods of prevention/intervention, ethical issues, and efficacy of current methods of prevention and control. Emphasis on adult populations and public health services, policies, and programs at the local, state, and federal levels designed to promote healthy aging. PREREQS: 9 credits of health course work.
H 425. FOUNDATIONS OF EPIDEMIOLOGY
(3). Measures of disease frequency; measures of effect; association and causation; sources of inaccuracy; experimental and observational study designs. Lec/rec. PREREQS: (H 220 [D-] or ST 201 [D-] ) and junior standing.
H 431. HEALTH CARE MARKETING (3).
Principles, elements and methods of marketing health care services. Role of the consumer, governing body, administration and medical staff as well as impact of professional ethics.
H 432. ECONOMIC ISSUES IN HEALTH AND MEDICAL CARE (3). Application of economic principles to the health care field: the demand for medical care and insurance, health care suppliers, health care markets. PREREQS: ( (ECON 201 [C-] or ECON 201H [C-] ) and H 210 [C-]) and junior standing.

## H 434. ^HEALTH CARE LAW AND

REGULATION (3). Legal aspects of health care delivery; tort law and its applications; professional liability and liability insurance; laws relative to health care institutions, cost controls, antitrust and access. (Writing Intensive Course) PREREQS: H 210 [C] and H 250 [C-] and admission to HMP program and junior standing.

## H 436. ADVANCED TOPICS IN HEALTH

CARE MANAGEMENT (3). Covers how health services are governed and organized; how health care organizations assess and adapt to change; constraints/opportunities in shaping organizational performance; leadership; strategic decision-making and the use of evidence-based management in health care. PREREQS: (H 210 [C-] and H 250 [C-] ) and junior standing.
H 445. *OCCUPATIONAL HEALTH (3). Current and historical topics in the area of occupational
health, with particular emphasis on the types of materials that produce human health effects; clinical and epidemiologic data used to assess the public health importance of occupational pollutants and to evaluate control strategies. (Bacc Core Course)
H 448. PUBLIC HEALTH TOXICOLOGY (3). Introduction to the concepts and principles of toxicology as they apply to environmental and occupational health PREREQS: H 344 [C-] and One year basic college chemistry and biology and two terms organic chemistry.
H 449. MASS MEDIA AND HEALTH (3). Designed to examine the effects of mass media on population health, from the negative impact of advertising of cigarettes, alcohol and junk food, to the (hopefully) positive impact of public-health campaigns. PREREQS: (H225 [C-] and H 320 [C-] ) and junior standing.
H 457. FINANCIAL MANAGEMENT OF HEALTH CARE ORGANIZATIONS (3). Utilization of standard financial tools needed to manage the capital resources of health care organizations. Includes funding capital projects, product costing, budgeting methods, capital formation and investment strategies. PREREQS: H 210 [C-] and H 250 [C-] and BA 215 [C-]

## H 458. REIMBURSEMENT MECHANISMS (3).

Introduces and analyzes the different types of healthcare reimbursement methodologies used in the U.S. health care system. PREREQS: H 210 [C-] and junior standing.
H 461. SEXUALITY: A HEALTH SCIENCE PERSPECTIVE (3). Exploration of the meaning of sexuality from a variety of contemporary health science perspectives; aspects of sex and sexuality fundamental to total health; issues central to the health educator role examined. PREREQS: Senior standing.
H 465. *PUBLIC HEALTH AND WOMEN: SOCIAL AND POLICY ISSUES (3). Public health approach to the identification of women's health needs in the United States and in other countries as it relates to the intersection of race, ethnicity, social class, sexual orientation, age, and ability. (Bacc Core Course) PREREQS: 6 credits in public health.

H 467. LONG-TERM CARE ALTERNATIVES (3). Overview of the long-term care alternatives. Comparisons of nursing homes with community based facilities; adult day care centers, respite to hospice facilities, social HMOs and other services; cost, quality of life and practicality are addressed.
H 468. FINANCING AND ADMINISTRATION OF LONG-TERM CARE (3). Examines the financing and administration of long term care. Emphasis is on a system-wide overview and specific application to nursing facility management. PREREQS: Admission to HMP program.
H 474. PUBLIC HEALTH AND VIOLENCE IN SOCIETY (3). Examination of violence as a major public health issue. Historical, social, environmental, economic, behavioral and psychological aspects of assaultive violence, spousal abuse, rape and sexual assault, child abuse, child sexual abuse, suicide, the effects of the media on violence, drug abuse and violence, and related public health problems in contemporary American society. Emphasis on health and the efficacy of current efforts aimed at ameliorating these problems and potential for alternative public health models for prevention and intervention.

H 476. ^PLANNING AND EVALUATING HEALTH PROMOTION PROGRAMS (4). A systematic approach to planning, implementing and evaluating health promotion programs in a variety of health related settings. Students will be writing a series of drafts to effectively develop a health promotion program plan. (Writing Intensive Course) PREREQS: (H 225 [C-] and H 320 [C-] ) and at least junior standing.

H 477. DIETARY INTERVENTIONS FOR PUBLIC HEALTH (3). A public health perspective on the practice of population-based dietary intervention. Examination of relevant theories, research, and practice that pertain to health promoters/ educators. PREREQS: NUTR 225 [C-]
H 480. UNDERGRADUATE EOH SEMINAR (1).
Explores current topics in environmental health and safety. EOH faculty will discuss their current research interests; EOH graduate student speakers will share their environmental health and safety internship experiences. Documentaries will be viewed to introduce topics of discussion. Features will be discussions relating directly to ongoing, current environmental/occupational health crises, both in the United States and around the world. Graded P/N. This course is repeatable for a maximum of 2 credits. PREREQS: Junior or senior standing.

H 489. EMERGENCY AND DISASTER MANAGEMENT (3). Study of preparedness, response, recovery and business resumption strategies, activities and applications needed to effectively deal with emergency and disaster incidents.

H 491. SELECTED TOPICS (1-3). Recent changes and advances in public health and health care administration and their application to special fields of study. Topics vary from term to term and year to year. This course is repeatable for a maximum of 6 credits. PREREQS: Senior standing.

H 491H. SPECIAL TOPICS (1-3). Recent changes and advances in public health and health care administration and their application to special fields of study. Topics vary from term to term and year to year. This course is repeatable for a maximum of 6 credits. PREREQS: Senior standing and Honors College approval required.

H 494. APPLIED ERGONOMICS (3). Principles of occupational ergonomics for managing optimal worker performance and well-being.
H 495. DESIGN FOR ENVIRONMENT, SAFETY, AND HEALTH (3). Systematic consideration of environmental, safety, and health concerns at the earliest possible stage in the lifecycle design engineering of products, technologies, and manufacturing processes. PREREQS: Junior or senior standing.
H 501. RESEARCH AND SCHOLARSHIP (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
H 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Instructor approval required.

H 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
H 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
H 507. SEMINAR (1-16). Section 1. Internship (1). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
H 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
H 509. PRACTICUM (1-16). Supervised work experience in a public health or health care administration setting. Open to majors in public health. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Senior standing and departmental approval.
H 510. INTERNSHIP (1-16). Directed field experience with participation in a community, worksite, or health agency program. Experience is individually arranged to meet student needs.

Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Graduate standing in Public Health Department, instructor approval required, departmental approval required.
H 511. COMMUNITY, CULTURE, AND GLOBAL HEALTH (3). Overview of health issues across cultures, ethnic groups, and regional/national boundaries from a critical and interdisciplinary perspective. Special emphasis on understanding social and behavioral factors that influence health in underserved communities/groups, especially ethnic/racial minorities, women, children, and migrants.
H 512. INTRODUCTION TO ENVIRONMENTAL AND OCCUPATIONAL HEALTH SCIENCES (3). Introduction to environmental and occupational health. Hazards affecting human health are examined in the context of current social, political and regulatory pressures.
H 513. INTEGRATED APPROACH TO PUBLIC
HEALTH (12). An integrated approach to introduce students to the core knowledge and methods used in public health, including evidence-based approaches to public health, public health and health care systems, planning and management to promote health, and policy in public health.
H 514. ENVIRONMENT, SAFETY AND HEALTH SEMINAR (1). One-credit graduate seminar on current topics of interest and importance to the environmental health and occupational safety field. Critical reading of research publications, discussion of controversial issues facing ESH professionals, and/or presentation of current ESH research. This course is repeatable for a maximum of 3 credits.

H 515. RESEARCH METHODS IN SOCIAL AND BEHAVIORAL HEALTH SCIENCES (3). Provides an introduction to quantitative research methods and design. Topics include definition of research problems and questions, hypothesis generation, research design, sampling, variable definition and measurement, data collection, and ethical considerations. Also provides a brief introduction to qualitative and mixed methods.
H 516. RESEARCH METHODS IN GLOBAL
HEALTH (3). Overview of research methods used to understand health, illness, health care, and health-seeking behavior in international settings. Special emphasis on the use of qualitative and mixed methods in international health research.
H 518. PUBLIC HEALTH ETHICS AND ISSUES
(3). Current ethical issues in public health, including gender and ethnicity in employment, pharmaceutical controls, product liability, advertising, and export of high technology. PREREQS: Graduate standing.

## H 519. DISPLACEMENT, MIGRATION, AND

 GLOBAL HEALTH (3). Critical examination of health of displaced/migrant populations with an emphasis on health disparities and social determinants. Understanding intersections of humanitarianism, migration, vulnerability, and displacement from a global health perspective.H 520. HEALTH DISPARITIES (3). Health disparities based on race/ethnicity, culture, social class, and rural/urban residence, among others; strategies to reduce disparities, promote health, and prevent disease in diverse populations.

H 521. MENTAL HEALTH (3). Focus upon mental health policy development, in relation to federal and state government services and regulations, implementation of services.
H 522. HEALTH, AGING AND CONTROL OF CHRONIC DISEASES (4). Epidemiology of the major chronic diseases, risk factors, potential methods of prevention/intervention, ethical issues, and efficacy of current methods of prevention and control. Emphasis on adult populations and public health services, policies, and programs at the local, state, and federal levels designed to promote healthy aging. PREREQS: 9 credits of public health course work.

H 523. FOUNDATIONS OF PUBLIC HEALTH (4). Fundamental principles, concepts and tools used in public health to promote the health of populations. Using a combination of case study method, lecture and discussion, students will develop a broad understanding of public health and recognition of how discipline-specializations address the social, behavioral and environmental determinants of public health. PREREQS: Graduate standing.
H 524. INTRODUCTION TO BIOSTATISTICS (4). Quantitative analysis and interpretation of health data including probability distributions, estimation of effects, and hypothesis-tests such as Chi-square, one-way ANOVA, and simple linear regression.
H 525. PRINCIPLES OF EPIDEMIOLOGY (4). Introduction to the concepts and methods of epidemiology. Topics include measures of population health, screening, study design, measures of association, and interpretation of epidemiological data.
H 526. EPIDEMIOLOGIC METHODS (3). Principles and methods of epidemiologic analysis; standardization; stratified analysis; confounding and its control; planning and conducting epidemiologic research; role of multivariate analysis in epidemiologic research. PREREQS: H 525 [C]

## H 527. CRITICAL ASSESSMENT OF

INTERNATIONAL HEALTH PROGRAMS (3).
Introduces the critical evaluation framework of assessing international health development programs, based on self-determination and community ownership principles. The framework of assessment method includes three levels: upstream evaluation, midstream evaluation, and downstream evaluation. PREREQS: H528 and H 529 and graduate standing.

H 528. GLOBAL HEALTH ISSUES (3). Examines major issues in health developments of global significance, their causes and impacts on international health, and methods and strategies to address them.
H 529. INTERNATIONAL HEALTH (3). Overview of the epidemiological, economic, political, sociological, and cultural factors that impact on international health. Special emphasis on the methods of prevention/intervention utilized in coping with health problems on an international level.
H 530. HEALTH POLICY ANALYSIS (3). Analysis of public policies affecting health care programs, services and organizations and the impact of those programs on citizens; processes by which health policy proposals are generated, promoted, defeated, modified and implemented.
H 531. HEALTH CARE MARKETING (3).
Principles, elements and methods of marketing health care services. Role of the consumer, governing body, administration and medical staff as well as impact of professional ethics.
H 532. ECONOMIC ISSUES IN HEALTH AND
MEDICAL CARE (3). Application of economics principles to the health care field: the demand for medical care and insurance, health care suppliers, health care markets. PREREQS: ECON 201

H 533. HEALTH SYSTEMS ORGANIZATION (3). Examines the nature of health and health care services and reviews the role of government and the free market on health services. Alternative ways of organizing, financing, and delivery of health care services are explored.
H 534. HEALTH CARE LAW AND REGULATION
(3). Legal aspects of health care delivery; tort law and its applications; professional liability and liability insurance; laws relative to health care institutions, cost controls, antitrust and access.
H 535. INTERPRETING EPIDEMIOLOGIC
EVIDENCE (3). Intended for students in the
human sciences and allied health fields.
Introduces basic epidemiology concepts. Topics
will include measures of disease frequency, assessing population health, causal logic, quantifying associations between exposures and health outcomes, epidemiologic study design, and threats to study validity (random error, bias, confounding). Examples focus on application of epidemiological methods to a variety of healthrelated fields.

H 536. HEALTHCARE ORGANIZATION THEORY
AND BEHAVIOR (3). Administrative practice in health care settings with emphasis on longterm care and acute care services. Provides a framework for health care systems and managerial process and roles. Focus on operations, planning, marketing, human resources, finance, productivity and control as well as emerging trends in health services.

## H 538. PUBLIC AND PRIVATE HEALTH

INSURANCE (3). Introduction to the principles and practices of public or social and commercial health insurance, and their financial reimbursement mechanisms.

## H 540. WATER AND HUMAN HEALTH (3).

Critically examine the complex relationship between water quality, human activities, and population health.
H 541. AIR QUALITY AND HUMAN HEALTH (3). Examination of the major sources of air pollution, its impact on ecosystems and climate change, and population health. Will also discuss technologies and introduce regulations that are used to control air pollutants.
H 542. ENVIRONMENTAL AND OCCUPATIONAL HEALTH RISK ASSESSMENT (3). Understand concepts, principles and practices in modern environmental and occupational risk analysis and how they are utilized to make evidence-based decisions by regulatory agencies.
H 543. EXPOSURE SCIENCE I (3). Overview of the concepts, principles and practices in modern environmental and occupational exposure assessment. Exposure Science I provides a broad introduction to environmental and occupational exposure assessment methods, while Exposure Science II focuses on sampling and measurement methods.
H 544. ENVIRONMENTAL AND OCCUPATIONAL EPIDEMIOLOGY (3). Examines exposure assessment methodology and epidemiological study designs that are commonly used in environmental and occupational health science in order to characterize the impact of environmental and occupational exposures on population health. PREREQS: H 525 [C] and a graduate level statistics course.

H 545. OCCUPATIONAL HEALTH (3). A broad overview of occupational health including recognizing and preventing risks from toxic chemical, radiation and physical hazards in the workplace.
H 546. EXPOSURE SCIENCE II: SAMPLING AND MEASUREMENT (3). Concepts, principles and practices in modern environmental and occupational exposure assessment are reviewed. Exposure Science I provides a broad introduction to environmental and occupational exposure assessment methods, while Exposure Science II focuses on sampling and measurement methods. Lec/lab. PREREQS: H 543 [C]

H 547. GIS AND PUBLIC HEALTH (3).
Applications of geographic information systems (GIS) to public health are reviewed, including mapping, spatial analysis methods, estimating access, and exposure assessment. This course is geared toward individuals involved in public health who have no (or introductory level) knowledge of GIS.
H 548. PUBLIC HEALTH TOXICOLOGY (3). Introduction to the concepts and principles of toxicology as they apply to environmental and occupational health. PREREQS: H 344 and one year basic college chemistry and biology and two
terms organic chemistry.
H 549. MASS MEDIA AND HEALTH (3).
Examines the effects of mass media on population health, from the negative impact of advertising of cigarettes, alcohol and junk food, to the (hopefully) positive impact of public health campaigns.
PREREQS: H 571 [C]
H 550. SOCIAL EPIDEMIOLOGY (3). Explores the social determinants of health at the population level. Primary focus is on introduction to methods specific to social epidemiology, but will also provide an overview of current understanding of the empirical associations between social factors and health. PREREQS: H 525 [B] and /or equivalent introductory course in epidemiology, or permission of the instructor.

H 551. APPLIED EPIDEMIOLOGICAL ANALYSIS OF SECONDARY DATA (3). Practical experience performing a hypothesis-driven epidemiological analysis utilizing secondary surveillance or other appropriate data set, writing an analytical plan, appropriate programming for the analysis (using STATA or SAS), understanding the analysis output, preparing tables, and interpreting results. PREREQS: H 526 [B-] and H 560 [B-] and H 580 [B-] and /or instructor consent.

H 552. DISASTER EPIDEMIOLOGY (3). Describe the impact of natural and manmade disasters on human health, understand epidemiologic methods specific to disasters, and apply fundamental epidemiologic methods to identify and characterize disaster-related adverse health outcomes. PREREQS: H 525 [C]

H 553. APPLIED EPIDEMIOLOGIC METHODS
(3). Builds upon the previous two terms in the three-term epidemiology core methods sequence, through the practical application of epidemiologic methods to the conduct of a student-directed investigation. Core goals are practical skills in hypothesis generation, study design, data management, data analysis, interpretation of results, and communication of findings. PREREQS: H 525 [B] and H 526 [B] and /or instructor permission
H 554. EPIDEMIOLOGY OF AGING (3). An overview of the core principles of the epidemiology of aging is provided. There will be an emphasis on health and disease processes in older adults. Students will learn essential study design and analytic issues that may arise in studies of aging. PREREQS: H 525 [C]
H 555. CANCER EPIDEMIOLOGY (3). Introduction to basic concepts and methodology in cancer epidemiology. PREREQS: H 525 [C]

H 556. STRATEGIC MANAGEMENT OF HEALTH SERVICE ORGANIZATIONS (3). Theories and methodologies of long-range planning and strategic management in health care organizations.
H 557. FINANCIAL MANAGEMENT OF HEALTH
CARE ORGANIZATIONS (3). Utilization of
standard financial tools needed to manage the capital resources of health care organizations. Includes funding capital projects, product costing, budgeting methods, capital formation and investment strategies. PREREQS: H 210 and H 250

H 558. REIMBURSEMENT MECHANISMS (3).
Techniques used in cost-effectiveness analysis Examples are drawn from the public health and health economics literature. PREREQS: Graduate standing.
H 559. CONTRACTS AND NEGOTIATION (3). Different negotiation styles and strategies used in healthcare contracting are explored--distributive, integrative, and mixed motive negotiation styles. Students examine various contracts and the role the healthcare administrator plays in a variety of health care settings.
H 560. PUBLIC HEALTH SURVEILLANCE (3). An introduction to public health surveillance systems (national and international) for chronic and
infectious diseases. Utility of existing surveillance systems for secondary epidemiological data analysis. PREREQS: H 524 [B-] and H 525 [B-] and /or instructor's consent.

## H 561. SEXUALITY: A HEALTH SCIENCE

PERSPECTIVE (3). Exploration of the meaning of sexuality from a variety of contemporary health science perspectives; aspects of sex and sexuality fundamental to total health; issues central to the health educator role examined. PREREQS: Graduate standing.
H 562. INFECTIOUS DISEASE EPIDEMIOLOGY (3). Understand epidemiologic methods specific to infectious diseases, apply fundamental epidemiologic methods to infectious disease questions, and describe the broad trends in global infectious disease burden. The application methods and principles will be explored through ectures, discussions, assignments and writing projects. PREREQS: H 525 [C]

H 563. PHYSICAL ACTIVITY EPIDEMIOLOGY
(3). Physical activity epidemiology will focus on current research, controversial issues, and methodological problems in the epidemiology of physical activity, exercise, and health. PREREQS: H 525 [B-] and H 524 or equivalent

H 564. COMPUTING TOOLS AND HEALTH DATA ANALYSIS (3). Modern computational biostatistics or analyzing health data, emphasizing important technologies and methods for data processing and understanding of how they work. Topics will evolve over time as new procedures are developed. PREREQS: (H 524 [C] or HDFS 530 [C] )

H 565. PUBLIC HEALTH AND WOMEN: SOCIAL AND POLICY ISSUES (3). Public health approach to the identification of women's health needs in the United States and in other countries as it relates to the intersection of race, ethnicity, social class, sexual orientation, age, and ability. PREREQS: 6 credits in public health.

H 566. DATA MINING IN PUBLIC HEALTH (3). An introduction to high-dimensional data analysis and data mining techniques used as an information technology tool to extract previously unknown and potentially useful information from large databases in biology, medicine, and public health. PREREQS: H 581 or permission of instructor; H 564 recommended.

## H 567. LONG-TERM CARE ALTERNATIVES

(3). Overview of the long-term care alternatives. Comparisons of nursing homes with community based facilities; adult day care centers, respite to hospice facilities, social HMOs and other services; cost, quality of life and practicality are addressed.

H 568. FINANCING AND ADMINISTRATION OF LONG-TERM CARE (3). Examines the financing and administration of long term care. Emphasis is on a system-wide overview and specific application to nursing facility management.
H 569. MATERNAL AND CHILD HEALTH
(3). Women's reproductive health and health of children stressing causation, management, and prevention of public health problems. Epidemiological analysis of morbidity and mortality in children and women of childbearing age; impact of social, political and economic influences on the health of women and children; comparison of issues and problems of industrialized versus developing nations. Consideration of health issues of interest to the many diverse racial and ethnic groups of women and children in the U.S. as well as the global village.

H 570. WORKFLOW OF DATA ANALYSIS (3). Covers the management of workflow for studies involving data management and coordination including planning the work, documenting activities, creating, validating, and verifying variables, statistical analyses, replicating findings, and archiving work. Emphasizes tight control of data management: making changes to data in a documented and replicable manner. Lec/rec PREREQS: HDFS 532 [C] and /or equivalent or permission of instructor.

H 571. PRINCIPLES OF HEALTH BEHAVIOR
(3). Theoretical approaches to behavior change in health promotion/education research and practice; factors influencing health behaviors, ethical behavior change issues, behavioral interventions for special populations.

## H 572. COMMUNITY ORGANIZATION FOR

 HEALTH PROMOTION AND EDUCATION (3). History, theory, and practice of community organizing for health advocacy; focus on group processes, use of media, leadership, coalitions, grass roots methods and social change.H 573. INTRODUCTION TO MULTILEVEL/ HIERARCHICAL MODELS (3). Introduction to the theory and application of hierarchical models to problems in epidemiology and public health. Hierarchical models will be dealt with using both frequentist and Bayesian frameworks. PREREQS: H 581 or permission of instructor.

## H 574. PUBLIC HEALTH AND VIOLENCE

IN SOCIETY (3). Examination of violence as a major public health issue. Historical, social environmental, economic, behavioral and psychological aspects of assaultive violence, spousal abuse, rape and sexual assault, child abuse, child sexual abuse, suicide, the effects of the media on violence, drug abuse and violence, and related public health problems in contemporary American society. Emphasis on health and the efficacy of current efforts aimed at ameliorating these problems and potential for alternative public health models for prevention and intervention.

## H 575. EVALUATION OF HEALTH PROMOTION

AND EDUCATION PROGRAMS (3). Provides theoretical and practical bases for program evaluation. Develops basic skills in a variety of approaches to evaluation, including techniques that are particularly suitable for evaluating health promotion, community health improvement, and related health and social services programs. Course learning is synthesized through designing an evaluation framework and methodology for a relevant program. PREREQS: H 515 [C] and /or instructor consent.

## H 576. PROGRAM PLANNING/PROPOSAL

WRITING IN HEALTH/HUMAN SERVICES (4).
Planning and preparing of proposals for program initiation, financing, delivery and evaluation in health-related settings; emphasis on funding sources, community, individual, and organizational support. PREREQS: 9 credits of graduate course work in public health.
H 577. DIETARY INTERVENTIONS FOR PUBLIC HEALTH (3). A public health perspective on the practice of population-based dietary intervention. Examination of relevant theories, research, and practice that pertain to health promoters/ educators. PREREQS: NUTR 225

## H 578. INTRODUCTION TO MOLECULAR

EPIDEMIOLOGY I (3). A survey of and introduction to the methods and issues arising in genetics and molecular epidemiology, including key biostatistical methods, study designs, and technologies used in the conduct of these studies. Students will gain experience conducting critical reviews of research papers with respect to study design and biostatistical analysis. PREREQS: (H 524 [C] and H 526 [C] ) and knowledge of and familiarity with basic concepts of molecular biology (DNA replication, transcription, and translation).
H 579. MOLECULAR EPIDEMIOLOGY II (3). An introduction to the data analysis methods arising in genetics and molecular epidemiology. Students will obtain hands-on experience with the analysis of high-throughput data obtained from populationbased molecular studies. Lec/lab. PREREQS: (H 578 [C] and H 581 [C] ) and H 564
H 580. LINEAR REGRESSION AND ANALYSIS OF TIME TO EVENT DATA (4). Multiple linear regression analysis for measurement data and survival analysis methods for time to event health data, including modes of inference, diagnostics,
model selection, and reporting conclusions. Lec/ lab. PREREQS: (H 524 [C] or HDFS 530 [C] )
H 581. GENERALIZED LINEAR MODELS AND CATEGORICAL DATA ANALYSIS (4).
Biostatistical methods focusing on binary
and count data will provide a foundation for understanding and implementing generalized linear regression and categorical data models that are commonly used to analyze epidemiological and public health data from cohort, casecontrol, and clinical trial study designs. Lec/lab. PREREQS: H 580
H 582. ANALYSIS OF CORRELATED HEALTH DATA (3). Biostatistical methods for clustered, repeated measures, and longitudinal correlated health data, with an introduction to applications of linear and generalized linear mixed models and generalized estimating equations. PREREQS: H 581 [C]
H 583. ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT (3).
The management principles and practices in the environment, safety and health profession are examined.

## H 584. ANALYSIS OF INTERVENTION STUDIES

 AND CLINICAL TRIALS (3). Principles of data analysis from intervention studies and clinical trials, including professional graphical and tabular presentation, reproducibility and reliability of measurements, and controlling the Type I error rate when analyzing multiple endpoints. Basic principles of designing experiments are also covered including blocking, stratification, interaction, and control of variability. PREREQS: (H 524 [C] or HDFS 530 [C] )H 585. ENVIRONMENT, SAFETY AND HEALTH POLICY AND LAW (3). Survey of the environment, safety and health policy and law in the United States. Furnishes the basic knowledge and general understanding about policy and law-related issues important to all environmental health and safety professionals. PREREQS: H 385 or graduate standing.
H 586. BAYESIAN BIOSTATISTICS IN PUBLIC HEALTH (3). An examination of methods for designing and implementing Bayesian analysis to address scientific questions through handson experience with health data. This survey course also covers proper interpretation and communication of results from practical Bayesian methods for biostatistics data analysis, with illustrations of the utility of Bayesian ideas in public health. PREREQS: H 581 [C]

H 587. TIME TO EVENT ANALYSIS OF HEALTH DATA (3). Biostatistical models and methods for survival analysis of time to event data that are routinely encountered in biomedical and health research. PREREQS: (H 524 [C] or HDFS 530 [C])
H 588. APPLIED OCCUPATIONAL SAFETY AND HEALTH (3). The management and technical aspects of a workplace safety and health program are identified and assessed. Students completing the course receive a 30-hour OSHA General Industry card.
H 589. EMERGENCY AND DISASTER
MANAGEMENT (3). Study of preparedness, response, recovery and business resumption strategies, activities and applications needed to effectively deal with emergency and disaster incidents.
H 591. SELECTED TOPICS (1-3). Recent changes and advances in public health and health care administration and their application to special fields of study. Topics vary from term to term and year to year. This course is repeatable for a maximum of 9 credits. PREREQS: Graduate standing.
H 592. SPATIAL EPIDEMIOLOGY (3). An introduction to methods in spatial epidemiology is provided, including spatial exploration of health data, quantifying spatial patterns and clusters, spatial exposure assessment, and explaining
patterns and associations. PREREQS: H 547 [C] and H 581 [C] and or equivalent.

H 593. REPRODUCTIVE EPIDEMIOLOGY (3). Focuses on current research, controversial issues, and methodological problems in the epidemiology of reproductive health. PREREQS: H 525 [B-] and H 524 (recommended)
H 594. APPLIED ERGONOMICS (3). Principles of occupational ergonomics for managing optimal worker performance and well-being.
H 595. DESIGN FOR ENVIRONMENT, SAFETY, AND HEALTH (3). Systematic consideration of environmental, safety, and health concerns at the earliest possible stage in the lifecycle design engineering of products, technologies, and manufacturing processes. PREREQS: Graduate standing.

H 596. HEALTHCARE EPIDEMIOLOGY (3). Focus on current research, controversial issues, and methodological problems in the epidemiology of healthcare. Topics include institutional infection control, medical errors, screening and diagnostic testing, cost-effectiveness, and others related to the delivery and assessment of healthcare, with a focus on the US healthcare system specifically. PREREQS: H 525 [B-] and H 524 is recommended
H 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 24 credits.
H 601. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.

H 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
H 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
H 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

H 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

H 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
H 610. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

## H 612. DOCTORAL SEMINAR IN PUBLIC

 HEALTH: RESEARCH AND PRACTICE (1). Contemporary research and professional issues specific to the discipline of public health. Includes responsible conduct of research, writing for publication, professional development and leadership, and faculty research in public health. This course is repeatable for a maximum of 9 credits. PREREQS: Restricted to public health doctoral students.
## H 613. INDEPENDENT RESEARCH PROJECT

(1-9). Independent research project for PhD students, including research design, execution or research, and the formal presentation of findings in written form. Student will develop an original research topic based on knowledge and review of the literature in a public health-relevant area of inquiry. Graded $P / N$. This course is repeatable for a maximum of 9 credits.
H 614. RESEARCH MANUSCRIPT (4). PhD
students write a manuscript to submit to a peer-reviewed journal as part of the course requirements. Graded P/N.

## H 615. ADVANCED EVALUATION AND

RESEARCH DESIGN (3). Provides an in-depth examination of advanced research designs and methods for establishing causal statements about the efficacy, effectiveness and generalizability
of public health and social service interventions designed to alter public health and social risk or protective factors. PREREQS: H 515 and H 575 or instructor permission.
H 620. ADVANCED TOPICS IN GLOBAL
HEALTH INTERVENTION AND PRACTICE (3).
Examines the processes and tools involved in planning and evaluating culturally competent health and human service prevention and intervention programs in the global context. Special considerations in program decisionmaking in the global context (community engagement, cultural competence, sustainability, feasibility, political/ethical issues) will be explored Provides a key forum for doctoral students to share ongoing developments in their research and practice drawing from fieldwork as well as attended conferences and meetings.
H 622. GLOBAL HEALTH SYSTEMS, POLICY AND POLITICS (3). Focuses on learning to identify key stakeholders in the politics of global health, and to be able to describe political and policy processes involved in negotiating global health decisions. Employment of theories and evidence from both the global North and South to explain political processes affecting public health practice and programs.

## H 626. GLOBAL HEALTH SYSTEM FINANCE

AND STRENGTHENING (3). Introduces an analytical framework of health system finance strengthening for global health, from local community to national level and international level. Develops the analytical skill and knowledge for examining the source and mechanism of financing health systems and identify, mobilize, organize, and manage domestic and global health resources. Provides training to examine equity and efficiency of financial burden in a health system, and the strategies to strengthen it.
H 630. QUANTITATIVE HEALTH POLICY RESEARCH METHODS I (4). Contemporary doctoral-level quantitative health policy/services research methods emphasizing linear regression models, data sources for health policy research, and health policy research literature. PREREQS: H 524 [B-] and /or equivalent.
H 632. APPLIED HEALTH ECONOMICS (4). Advanced doctoral-level quantitative health policy/ services research methods emphasizing causal inference when potential endogeneity is present. PREREQS: H 630 [B-] and /or permission of instructor.
H 635. COST EFFECTIVENESS ANALYSIS IN HEALTH AND MEDICAL CARE (3). The primary objective of this course is to introduce students to cost-effectiveness studies in health and medical care. Covers the core concepts of CEA, quality adjusted life years, cost calculations, and decision rules.

## H 638. PUBLIC AND PRIVATE HEALTH

INSURANCE (3). Introduction to the principles and practices of public or social and commercial health insurance, their finance mechanisms, and theoretical foundation behind the selection of certain system of health insurance and finance method. PREREQS: H 533 [C]
H 639. COMMUNITY-BASED PARTICIPATORY RESEARCH (4). Focuses on initiating and conducting research in partnership with communities. Includes in-depth examination of community-based participatory research (CBPR) elements, principles, theories, and approaches; how researchers can successfully partner with communities; and research with minority and/or underprivileged communities; with examples from environmental health, gerontology, and health promotion. PREREQS: 9 credits of public health (H) or human development and family sciences (HDFS) graduate course work.
H 642. ENVIRONMENTAL AND REGULATORY RISK ASSESSMENT (3). Understand concepts, principles and practices in modern risk analysis and how they are utilized to make evidence-
based decisions in public health. Focus will be on real world examples of risk assessment by environmental and occupational regulatory agencies.

## H 650. REPORTING RESULTS: WRITING FOR

EPIDEMIOLOGY (3). Applied experience writing a scientific paper to disseminate results, including deciding on authorship, preparing a lay summary, revising and responding to peer review, and serving as a reviewer. PREREQS: H 526 [B-] and H 551 [B-] and H 580 [B-] and /or instructor consent.
H 651. ADVANCED EPIDEMIOLOGICAL
METHODS (4). Covers advanced topics in epidemiology. Course expands on many of the same topics as H 526 , and explores them in greater breadth and depth. Topics include causal theory, measures of disease and association, confounding, selection bias, predictive models, directed acyclic graphs, effect modification, mediation, indirect and direct effects, study design, and other contemporary topics. PREREQS: H 526 [B-] and H 581 [B-]
H 652. CAUSAL INFERENCE IN
EPIDEMIOLOGY (3). Discussion of the
theoretical framework of causal statistics and the development of modern methods including propensity scores and marginal structural models. Focus is on the inverse probability of treatment weighting; discussion of other estimation methods will be included. Additional topics may include longitudinal causal models, causal mediation, instrumental variables, and other contemporary topics. Applied examples will be used for illustration. PREREQS: H 651 [B-] and /or permission of instructor.

## H 659. QUANTITATIVE HEALTH POLICY

RESEARCH METHODS II (4). Advanced doctorallevel quantitative health policy/services research methods emphasizing health care utilization expenditures, and outcomes data. PREREQS: H 630 [B-] and /or permission of instructor
H 662. ADVANCED METHODS IN INFECTIOUS DISEASE EPIDEMIOLOGY (3). Covers advanced methods and principles for infectious disease research, including framing infectious disease issues into testable hypotheses, designing epidemiologic studies using appropriate sampling strategies, and identifying strengths and weaknesses of various epidemiologic research methods. PREREQS: H 526 [B-] and H 562 [B-] and /or instructor's consent.
H 671. ADVANCED THEORIES OF HEALTH
BEHAVIOR (3). Provides an in-depth examination of major theories of health behavior (both health compromising and health enhancing). PREREQS: H 571 or permission of instructor.

H 672. ADVANCED QUALITATIVE METHODS IN HEALTH BEHAVIOR (3). Provides an in-depth examination of the use of qualitative methods in health behavior research and practice. PREREQS: H 515 and SOC 518 and HDFS 538; or permission of instructor.
H 673. MEASUREMENT OF HEALTH BEHAVIOR
CONCEPTS (4). Provides in-depth study and field work for graduate students in public health and related fields of the methods used in the conceptualization, development, and evaluation of quantitative measures of health behavior and related concepts. PREREQS: H 524, H 515, and 3 credits in other quantitative research methods or social behavioral methods (e.g., in sociology or psychology or health promotion or education programs) or equivalents, or permission of instructor.

H 675. DEVELOPMENT OF HEALTH BEHAVIOR
INTERVENTIONS (3). Examines the application of social/behavioral theories in health promotion interventions and in conducting intervention research in diverse populations. The course will focus on program development, on implementation strategies, and on translation into practice. PREREQS: (H571 and H 575 and H 576 ) or
equivalents or consent of instructor.
H 676. ADVANCED TOPICS IN HEALTH PROMOTION AND HEALTH BEHAVIOR (3). Examines topics of relevance to health promotion and health behavior. Specific topics include current issues and emerging research findings with a focus on social and behavior science perspectives, analysis of public health problems, and application of principles and practices of health promotion and health behavior. This course is repeatable for a maximum of 6 credits. PREREQS: H 515 and H 571 or permission of instructor.

## H 681. ADVANCED TOPICS IN

ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY (3). Advanced topics in the environment, safety and health discipline. Content varies with each offering.
H 682. ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY: MOVING FROM RESEARCH TO PRACTICE (3). An examination of research transfer models that can be adapted and implemented to environmental and occupational settings. Case studies and content will vary with each course offering
H 683. ADVANCED RESEARCH METHODS IN ENVIRONMENTAL AND OCCUPATIONAL HEALTH (3). Covers advanced methods for environmental and occupational health research, including framing environmental and occupational health issues into testable hypotheses, designing appropriate studies, and identifying strengths and weaknesses of different research methods.
H 685. RACE, CLASS, CULTURE AND AGING (4). Examines the diversity among the older population in health status, health beliefs/ behaviors, and health care, and explores the interaction of culture and structure as determinants of their life chances. The empirical literature used in the course is drawn from the experiences of aging of African-American, Latino, and Asian-Pacific Islander elderly. Taught spring term even years. CROSSLISTED as HDFS 685. PREREQS: 9 credits of public health or HDFS graduate course work, or permission of instructor.

H 699. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.

## - HEALTH AND HUMAN SCIENCES COURSES

HHS 220. COMMUNITY EDUCATION PROGRAMS AND PRACTICES: EXTENSION SYSTEM (2). Theory and practice of community education programs; evolution of land-grant university outreach programs; emphasis on addressing current issues and engaging diverse audiences through responsive instructional practices; some site visits.
HHS 231. *LIFETIME FITNESS FOR HEALTH (2). Provides up-to-date and relevant health and wellness information; practical strategies to implement positive behavior change in physical activity, nutrition, and stress management throughout college and the lifespan. (Bacc Core Course)
HHS 231H. *LIFETIME FITNESS FOR HEALTH
(2). Provides up-to-date and relevant health and wellness information; practical strategies to implement positive behavior change in physical activity, nutrition, and stress management throughout college and the lifespan. (Bacc Core Course) PREREQS: Honors College approval required.
HHS 241. *LIFETIME FITNESS (1). Assessment, evaluation and practice of physical fitness and health behaviors leading to the development of a personal fitness program. (Bacc Core Course)

## - KINESIOLOGY COURSES

KIN 131. INTRODUCTION TO KINESIOLOGY (1). Overview of the field; career opportunities in
exercise and sport science and other professions dealing with the discipline of human movement; orientation to support services. Graded P/N.

## KIN 132. INTRODUCTION TO THE ALLIED

 HEALTH PROFESSIONS (1). Overview of allied health professions including physical and occupational therapy, physician assistant, nursing, athletic training and others. Discuss job responsibilities, employment opportunities and educational requirements.
## KIN 160. INTRODUCTION TO INJURY

MANAGEMENT FOR THE PHYSICALLY ACTIVE
(3). Introduction to management of physical activity-related injury for the non-healthcare provider (e.g., coaches, physical educators and fitness professionals).

KIN 194. PROFESSIONAL ACTIVITIES (1-2).
Basic movement skills, basic rhythms, track and field.

KIN 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## KIN 230. INTRODUCTION TO ADVENTURE

PROGRAMS (3). Foundation course for leadership opportunities in the Adventure Leadership Institute (ALI). Provides overview of history, theoretical foundations, and utilization of adventure programs in education, recreation, and therapy.
KIN 231. HUMAN GROUP DYNAMICS (3). Provides students with the fundamental concepts and theories essential for understanding dynamics that occur in groups in recreation, leisure, and everyday settings

KIN 232. BACKCOUNTRY LEADERSHIP (3).
Prepares students to be leaders in outdoor settings by building the practical and logistical skills needed in the effective delivery of courses and/or trips. Covers the teaching skills and essentials for trip leaders in the wilderness, including trip planning, logistics, risk management, and group interaction in the backcountry. PREREQS: (EXSS 230 [C] or KIN 230 [C] ) and PAC 301 [C] and PAC 325 [C] and PAC 326 [C]

## KIN 233. TEACHING TECHNIQUES FOR

 OUTDOOR ACTIVITIES (3). Gateway course for students pursuing the Level Three Adventure Leadership Certificate. Emphasizes teaching outdoor activities at a professional level. Students work individually with the course instructor to develop, plan and implement an activity course (land or water based) for the Adventure Leadership Institute. PREREQS: EXSS 232 [C] or KIN 232 [C]KIN 299. SPECIAL TOPICS (1-3). This course is repeatable for a maximum of 24 credits.
KIN 301. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approva required.
KIN 305. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

KIN 306. PROJECTS (1-16). This course is repeatable for a maximum of 36 credits. PREREQS: Departmental approval required.
KIN 307. SEMINAR (1-3). Section 2: Seminar PreInternship (1 credit). This course is repeatable for a maximum of 36 credits.
KIN 311. MOTOR BEHAVIOR (4). Underlying mechanisms and factors affecting movement function, skill acquisition, and changes in movement behavior across the lifespan. PREREQS: BI 232 [C-]
KIN 312. *SOCIOCULTURAL DIMENSIONS OF PHYSICAL ACTIVITY (3). Physical activity in contemporary society. Relationships with the social processes; interrelationships between physical activity and cultural institutions. (Bacc Core Course) PREREQS: Social processes course.

KIN 314. INTRODUCTION TO ADAPTED
PHYSICAL ACTIVITY (3). Overview of cognitive neuromuscular, sensory and orthopedic disabilities; understanding accessible physical activity programs for individuals with disabilities. PREREQS: Sophomore standing.

## KIN 321. BIOMECHANICS OF HUMAN

MOVEMENT (4). Integration of the physical laws and anatomical structures governing human movement; qualitative analytical processes emphasized. PREREQS: ( (BI 231 [C-] and BI 241 [C-] ) or (BI 331 [C-] and BI 341 [C-] ) ) and (MTH 112 [C-] or MTH 251 [C-] )

KIN 324. EXERCISE PHYSIOLOGY (4).
Physiological effects of acute and chronic exercise; factors affecting human performance; exercise training principles. PREREQS: (BI 233 [C-] or BI 333 [C-]) and (BI 231 [C-] or BI 331 [C-] ) and CH 121 [C-] and CH 122 [C-] and (CH 123 [C-] or CH 130 [C-]) and /or equivalent
KIN 325. FITNESS ASSESSMENT AND
EXERCISE PRESCRIPTION (2). Introduction to lab- and field-based physical fitness assessments and the skills needed to design safe and effective exercise programs for apparently healthy adults. Lec/lab. PREREQS: KIN 324 [C-] or EXSS 324 [C-]
KIN 333. KINESIOLOGY PRACTICUM (2). Field experience in kinesiology under professional supervision. PREREQS: Departmental approval required.
KIN 334. KINESIOLOGY PRACTICUM (2). Field experience in kinesiology under professional supervision. PREREQS: KIN 333 [C-] and Instructor approval.
KIN 335. KINESIOLOGY PRACTICUM (2). Field experience in kinesiology under professional supervision. PREREQS: Instructor approval.

KIN 341. NUTRITION FOR EXERCISE (3).
Review of the interrelationship between
nutrition and exercise, including macronutrient, micronutrient and fluid needs for active individuals. CROSSLISTED as NUTR 341. PREREQS: (KIN 324 [C-] or EXSS 324 [C-] ) and NUTR 240 [C-]
KIN 343. PRE-THERAPY/ALLIED HEALTH
SEMINAR (1). Provides knowledge in professiona school preparation and current issues related to the allied health professions. PREREQS: (KIN 132 [C] or BI 109 [C] ) and BI 231 [C] and BI 232 [C] and BI 233 [C] and BI 241 [C] and BI 242 [C] and BI 243 [C] and overall GPA of 3.0; grade of C or better in KIN 132 or BI 109 [for Pre-Med]; Grade of C or better and average of 2.7 in $\mathrm{BI} 231, \mathrm{BI}$ 232, BI 233, BI 241, BI 242, BI 243 or equivalent. Instructor/school approval.

## KIN 344. PRE-THERAPY/ALLIED HEALTH

PRACTICUM (2). Clinical field experiences under the supervision of a licensed professional in the allied health or related setting enhanced with classroom discussion. PREREQS: (EXSS 132 [C] or KIN 132 [C] ) and Z 331 [C] and Z 332 [C] and Z 333 [C] and Z 341 [C] and Z 342 [C] and Z 343 [C] and overall GPA of 3.0; grade of "C" or better in KIN 132; grade of " C " or better and average GPA of 2.7 in BI 231, $\mathrm{BI} 232, \mathrm{BI} 233, \mathrm{BI} 241, \mathrm{BI}$ 242, BI 243. Instructor/school approval. COREQS: KIN 343
KIN 345. ALLIED HEALTH PRACTICUM (1-2).
Field experience under professional supervision in an allied health or related setting. Includes arranged consultations with the instructor to discuss current issues related to the allied health professions. This course is repeatable for a maximum of 2 credits. PREREQS: Overall GPA 2.75. Departmental approval required.

KIN 353. PHYSICAL EDUCATION TEACHER EDUCATION PRACTICUM (2). Supervised K-12 physical education field experience with seminars. May include one instructor-approved coaching experience in school setting. PREREQS: OSU GPA 2.00, KIN GPA 2.50, and KIN 422 or KIN 423 (can be concurrent) and departmental approval required.

KIN 354. PHYSICAL EDUCATION TEACHER EDUCATION PRACTICUM (2). Supervised K-12 physical education field experience with seminars. May include one instructor-approved coaching experience in school setting. PREREQS: OSU GPA 2.00, KIN GPA 2.50, and departmental approval required. Should also concurrently enroll in either KIN 422 or KIN 423.

## KIN 355. PHYSICAL EDUCATION TEACHER

EDUCATION PRACTICUM (2). Supervised K-12 physical education field experience with seminars. May include one instructor-approved coaching experience in school setting. PREREQS: OSU GPA 2.00, KIN GPA 2.50, and departmental approval required. Should also concurrently enroll in either KIN 422 or KIN 423.
KIN 370. PSYCHOLOGY OF SPORT AND
PHYSICAL ACTIVITY (3). Interaction between psychological variables and human motor performance.
KIN 380. THERAPEUTIC MODALITIES (4).
Indications, contraindication, techniques, and effects of various physical agents used in the care and treatment of musculoskeletal injuries and diseases. PREREQS: Admission to the Athletic Training major or enrollment in the Pre-Therapy and Allied Health option in the Kinesiology major or College of Science.
KIN 385. THERAPEUTIC EXERCISE (4).
Principles and techniques of therapeutic
exercise; rehabilitative activities and programs for musculoskeletal injuries, conditions, and diseases. Lec/lab. PREREQS: KIN 321 [D-] or EXSS 321 [D-]

## KIN 394. PROFESSIONAL ACTIVITIES

## RESISTANCE TRAINING PROGRAM DESIGN

(2). Presents the conceptual basis for optimizing resistance training program designs, exercise routines for all ages and fitness levels, correct exercise technique. Lec/lab. PREREQS: KIN 324 [D-] or EXSS 324 [D-]
KIN 395. PROFESSIONAL ACTIVITIES: GROUP FITNESS (2). Application of biomechanical, physiological, psychological and safety principles for the development of group exercise classes in a variety of modes and settings. Lec/lab. PREREQS: (KIN 324 [C-] or EXSS 324 [C-]) and (KIN 325*
[C-] or EXSS 325* [C-] )
KIN 396. PROFESSIONAL ACTIVITIES:
AQUATICS (2). Aquatic overview; emphasis on underlying hydrodynamic principles; includes safety, survival, stroke mechanics, aquatic exercise, training, games; certification opportunity in ARC Basic Water Rescue. Lec/lab/activity. PREREQS: PAC 250 or comparable skills.

KIN 399. SPECIAL TOPICS (1-3). This course is repeatable for a maximum of 18 credits.

KIN 399H. SPECIAL TOPICS (1-3). This course is repeatable for a maximum of 18 credits. PREREQS: Honors College approval required.
KIN 401. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approva required.
KIN 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits.
KIN 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approva required.
KIN 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
KIN 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
KIN 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
KIN 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.
KIN 410. INTERNSHIP (1-15). Planned
experiences at selected cooperating agencies companies or institutions; supervised by university and - program personnel; supplementary conference, reports and appraisal required. This course is repeatable for a maximum of 20 credits. PREREQS: Completion of required courses cumulative Kinesiology program GPA of 2.25 and KIN overall GPA of 2.50 , completion of 165 credits or departmental approval.

KIN 422. FACILITATING PHYSICAL ACTIVITY
FOR CHILDREN AND YOUTH (3). Students learn skills for facilitating physical activity programs for children and youth in a variety of settings, including information on the benefits of physical activity, program design, implementation and management techniques. PREREQS: KIN 311 [C-] or EXSS 311 [C-]
KIN 423. QUALITATIVE MOVEMENT ANALYSIS
(3). Develop observational skills to perform systematic qualitative analyses of selected physical activity performances and other human movements. PREREQS: (KIN 311 [C-] or EXSS 311 [C-] ) and (KIN 321 [C-] or EXSS 321 [C-] )
KIN 425. ANATOMICAL KINESIOLOGY (4). Anatomical aspects of human movement; actions of bones and muscles in motor activities. Application of physical principles to factors governing anatomical function in health and injury. PREREQS: EXSS 321 [C-] or KIN 321 [C-]
KIN 432. PHYSICAL ACTIVITY ASSESSMENT (3). Assessment of physical activity using subjective and objective measurement methods with focus on applications for individuals, communities, and special populations. PREREQS: Senior standing

## KIN 434. APPLIED MUSCLE PHYSIOLOGY (3)

Skeletal muscle structure, function, and metabolism; applications to muscle fatigue exercise training, inactivity, and aging. PREREQS: KIN 324 [C-] or EXSS 324 [C-]

KIN 435. PHYSICAL ACTIVITY PROMOTION (3). Application of behavioral science and public health research to the promotion of physical activity in individuals, groups and communities. PREREQS: KIN 370 [C-]
KIN 437. PHYSICAL ACTIVITY, AGING,
AND CHRONIC DISEASE (4). Addresses the consequences of primary and secondary aging from an individual and public health perspective. Physiological changes associated with aging and chronic disease, functional assessment of older adults, and exercise prescription for older adults with and without chronic exercise will be emphasized. PREREQS: (KIN 324 [C-] or EXSS 324 [C-] ) and (KIN 325 [C-] or EXSS 325 [C-] )

## KIN 444. ADVANCED ADAPTED PHYSICAL

ACTIVITY (3). Discuss various disability models and perspectives; reinforce determinants of physical activity; design and implement different physical activity programs and curricula for ndividuals with disabilities. Lec/lab. PREREQS: (KIN 314 [C-] or EXSS 314 [C-] ) and /or equivalent course.
KIN 455. ^PHARMACOLOGY IN ATHLETIC TRAINING (3). Pharmacology in sports medicine, topics including, but not limited to, the mechanisms and actions of drugs commonly administered and prescribed in sports medicine environments. (Writing Intensive Course) PREREQS: (KIN 359 [C-] or EXSS 359 [C-] ) and admission to the Athletic Training Practicum.

## KIN 474. EXERCISE PHYSIOLOGY LAB

METHODS (2). Practical experience and projects in exercise physiology lab methods, including measurement of submaximal and maximal oxygen consumption body composition, anaerobic power, and electrocardiography. PREREQS: (KIN 324 [C-] or EXSS 324 [C-] ) and (KIN 325 [C-] or EXSS 325 [C-] )

KIN 475. *POWER AND PRIVILEGE IN
SPORT (3). Issues of power and privilege in sport including race, gender, sexual orientation,
disability and aggression and the consequences of long held society norms and stereotypes. (Bacc Core Course) PREREQS: (KIN 312 [C-] or EXSS 312 [C-] ) and /or 6 credits of social science.
KIN 481. ^ANALYSIS OF CRITICAL ISSUES IN KINESIOLOGY (3). Reading and interpreting current research, and using writing as a tool for learning on a critical issue in kinesiology. (Writing Intensive Course) PREREQS: Senior standing

KIN 483. TISSUE INJURY AND REPAIR (3). Mechanics of tissue injury and the bodyss response and repair following injury of bone, muscle, tendon, ligament, cartilage and nervous system tissue. PREREQS: (BI 231 [C-] or BI 331 [C-] ) and (BI 241 [C-] or Bl 341 [C-] ) and (BI 232 [C-] or BI 332 [C-] ) and (BI 242 [C-] or BI 342 [C-] ) and (BI 233 [C-] or BI 333 [C-] ) and (BI 243 [C-] or BI 343 [C-] ) or ( (Z 331 [C-] and Z 332 [C-] and Z 333 [C-] and Z 341 [C-] and Z 342 [C-] and Z 343 [C-] ) )

## KIN 490. SCIENTIFIC INQUIRY IN

KINESIOLOGY (4). Principles and techniques of organization, administration, interpretation and evaluation of exercise science-related data. Includes human subjects training and certification, research design, and statistical analysis using SPSS and Excel including central tendency, correlation and regression, probability, and inferential statistics (t-tests and ANOVA). Lec/lab. PREREQS: KIN 325 [C-] and MTH 112 [C-]

KIN 499. SELECTED TOPICS (1-5). Impact of human movement development on people, their movement behavior, and environment. Topics vary from term to term and year to year. May be repeated for credit when topics differ. This course is repeatable for a maximum of 24 credits PREREQS: Senior standing.
KIN 501. RESEARCH AND SCHOLARSHIP
(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

KIN 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: nstructor's approval required.
KIN 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
KIN 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

KIN 507. SEMINAR (1-16). Section 1: Seminar (1). Graduate research seminar that emphasizes student oral presentations of current research topics in exercise and sport science. One credit required for all graduate students. Section 2: Current Developments (1). Discussion of contemporary issues in the exercise and sport science literature. Topics vary by term. Two credits required of all doctoral students. Section 9: International Aspects (1). Discussion of international aspects of study in exercise and sport science. Required of all doctoral students. Graded $P / N$. This course is repeatable for a maximum of 16 credits.
KIN 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
KIN 509. PRACTICUM (1-16). This course is repeatable for a maximum of 35 credits.
KIN 510. INTERNSHIP (1-16). Planned experiences at selected cooperating agencies, companies or institutions; supervised by university and program personnel; supplementary conference, reports and appraisal required. This course is repeatable for a maximum of 26 credits

## KIN 511. INTRODUCTION TO ATHLETIC

TRAINING (4). Practice domains include injury and illness prevention and wellness protection, clinical evaluation and diagnosis, immediate and emergency care, treatment and rehabilitation, and organizational and professional health and
well-being. Lec/lab. PREREQS: Admission to the Athletic Training major (MATRN)

KIN 512. APPLIED MOTOR LEARNING (3). Application of research and theory to the teaching of motor skills with emphasis on development of instructional strategies related to modeling, knowledge of results, practice, and motivational aspects of learning. PREREQS: KIN 311

KIN 515. MOTOR CONTROL AND MOVEMENT DYSFUNCTION (3). Contemporary motor contro theories and their application to the development of instructional and training programs for individuals with movement disorders caused by neurological disease and/or trauma. PREREQS: KIN 311 and (KIN 314 or KIN 444)

KIN 520. ORTHOPEDIC ASSESSMENT OF UPPER EXTREMITY INJURIES (4). Prevention, assessment and management of upper extremity injuries and conditions commonly encountered by the athletic trainer. Lec/lab. PREREQS: KIN 511 [C] and Admission to the Athletic Training major (MATRN)

KIN 521. ORTHOPEDIC ASSESSMENT OF LOWER EXTREMITY INJURIES (4). Prevention, assessment and management of lower extremity injuries and conditions commonly encountered by the athletic trainer. Lec/lab. PREREQS: KIN 511 C] and admission to the Athletic Training major (MATRN)

KIN 522. ORTHOPEDIC ASSESSMENT
OF SPINE (4). Prevention, assessment and management of spinal injuries and conditions commonly encountered by the athletic trainer. Lec/ lab. PREREQS: KIN 520 [C] and KIN 521 [C] and admission to the Athletic Training major (MATRN)

KIN 523. BIOMECHANICS OF MOTOR
ACTIVITIES (3). Kinematic and kinetic analysis of volitional human movement with emphasis on analytical techniques and quantitative problem solving. PREREQS: KIN 323 or PH 201

## KIN 525. BIOMECHANICS OF

MUSCULOSKELETAL INJURY (3). Mechanical causes and effects of forces applied to the musculoskeletal system, material properties of human tissues, pathomechanics of injury, and degenerative changes across the lifespan. Not offered every year.
KIN 531. PHYSIOLOGY OF PHYSICAL
ACTIVITY AND INACTIVITY (3). Physiologic responses to acute and chronic physical activity and inactivity with emphasis on underlying mechanisms and health outcomes.

KIN 532. PHYSICAL ACTIVITY ASSESSMENT
(3). Assessment of physical activity using subjective and objective measurement methods with focus on applications for individuals, communities, and special populations. PREREQS: Senior or graduate standing

## KIN 533. ENERGETICS AND BIOCHEMISTRY

OF EXERCISE (3). Metabolic and energetic responses to acute and chronic physical activity; emphasis on recent research. PREREQS: Undergraduate course in biochemistry or exercise physiology.

KIN 535. PHYSICAL ACTIVITY PROMOTION (3). Application of behavioral science and public health research to the promotion of physical activity in ndividuals, groups and communities. PREREQS: KIN 370
KIN 544. ADVANCED ADAPTED PHYSICAL
ACTIVITY (3). Discuss various disability models and perspectives; reinforce determinants of physical activity; design and implement different physical activity programs and curricula for individuals with disabilities. Lec/lab. PREREQS: KIN 314 or equivalent course.
KIN 547. INCLUSION IN PHYSICAL ACTIVITY (3). Effectiveness of physical activity programs provided in inclusive settings. This will include a lifespan/non-categorical approach to program development. PREREQS: KIN 314 or KIN 444 or
equivalent.
KIN 548. ASSESSMENT AND PROGRAMMING FOR SPECIAL POPULATIONS (3). Use of appropriate assessment procedures for developing effective psychomotor programs for the disabled. PREREQS: KIN 314 or KIN 444 or equivalent.
KIN 549. PHYSICAL ACTIVITY FOR PERSONS WITH SEVERE DISABILITIES (3). Plan, develop and implement appropriate physical activity programs, functional program design, assistive technology, instructional strategies, behavior management practices, and data analysis systems that address the needs for psychomotor performance of persons with low incidence disabilities. PREREQS: KIN 314 or KIN 444 or equivalent.
KIN 550. HEALTH PROMOTION FOR PEOPLE WITH DISABILITIES (3). Discussion will focus on disability and health, theory driving health promotion program development, guidelines for developing a program for individuals with disabilities, and program evaluation.

## KIN 551. CURRENT TRENDS AND ISSUES IN

 PHYSICAL EDUCATION (4). Current trends and issues in physical education, including curriculum development, professional ethics, instructional practices, and physical activity for the school community. PREREQS: Admission to the MSPETE Program.
## KIN 553. INSTRUCTIONAL ANALYSIS

TECHNIQUES I (3). Introduction to techniques of instructional analysis. Provides in-depth information and training in systematic observation techniques, raw data conversion and inter/ intraobserver reliability. PREREQS: Admission to the MS-PETE Program.
KIN 554. INSTRUCTIONAL ANALYSIS
TECHNIQUES II (3). Laboratory/seminar experience to accompany student teaching winter and spring terms. Provides continued application of systematic observation techniques throughout the elementary student teaching experience.
PREREQS: Admission to the MS-PETE Program.
KIN 555. SKILL ANALYSIS AND ASSESSMENT IN K-12 (3). Develop proficiency in assessing movement skills, execution of sport techniques, and game play performance. Assessment trends and practices utilized in physical education programs are included. PREREQS: Admission to the MS-PETE Program.
KIN 556. INSTRUCTIONAL SKILLS I (3). Skills of planning, implementing, and evaluating programs of instruction in physical education, grades K-12. PREREQS: Admission to the MS-PETE Program.
KIN 557. INSTRUCTIONAL SKILLS II (2).
Applying and refining skills of planning, implementing, and evaluating programs of instruction in physical education, grades K-12. PREREQS: Admission to the MS-PETE Program.
KIN 558. PHYSICAL EDUCATION CURRICULUM DESIGN AND ORGANIZATION (3). Curricular programs and variations from kindergarten through grade 12, administrative policies and practices. PREREQS: Admission to the MS-PETE Program.
KIN 559. THE PHYSICAL EDUCATOR AS A PROFESSIONAL (1). Transitioning to teaching, developing a portfolio, certification, obtaining a position, teacher burnout, professionalism, problems of first-year teachers, developing patterns of behavior that lead to a successful career. PREREQS: Admission to the MS-PETE Program.
KIN 560. MOTIVATION IN PHYSICAL ACTIVITY
(3). A social psychological approach to understanding the role of self-perceptions and cognitions in explaining motivated behavior in sport and exercise settings. PREREQS: KIN 370
KIN 561. PSYCHOSOCIAL FACTORS IN
PHYSICAL ACTIVITY (3). A social psychological
approach to understanding the role of social interactions and contextual factors in explaining human behavior in sport and exercise settings. PREREQS: KIN 560
KIN 562. LIFESPAN SPORT AND EXERCISE
PSYCHOLOGY (3). Social-psychological issues across the lifespan in the context of sport and exercise. PREREQS: KIN 561
KIN 564. PROGRAM CAPSTONE AND
SYNTHESIS (3). Capstone course in which teacher candidates will review and update their teaching philosophy; showcase their Physical Education master's portfolio; and develop a plan for professional development. PREREQS: KIN 510 [C-]
KIN 565. EMERGENCY MANAGEMENT OF
SPORTS TRAUMA (3). Knowledge and skills related to the specialized care required for serious and/or life-threatening acute athletic related injuries and illnesses. Lec/lab. PREREQS: KIN 511 [C] and admission to the Athletic Training major (MATRN)

KIN 566. GENERAL MEDICAL ASSESSMENT
(3). Prevention, assessment and management of general medical conditions commonly encountered by the athletic trainer. Lec/lab. PREREQS: KIN 565 [C] and admission to the Athletic Training major (MATRN)

## KIN 567. PHARMACOLOGY IN ATHLETIC

TRAINING (3). Pharmacology in sports medicine, topics including, but not limited to, the mechanisms and actions of drugs commonly administered and prescribed in sports medicine environments. PREREQS: KIN 566 [C] and admission to the Athletic Training major (MATRN)

KIN 568. ATHLETIC TRAINING PROGRAM MANAGEMENT (3). Administrative aspects of athletic training program management. Including principles of risk management, strategic and operational planning, medical-legal aspects of athletic healthcare, confidentiality and documentation of patient health information, insurance and third-party reimbursement, personnel issues, and current professional issues. PREREQS: KIN 522 [C] and admission to the Athletic Training major (MATRN)
KIN 569. EVIDENCE-BASED PRACTICE (3).
Principles and skills underlying the utilization of evidence to enhance clinical practice decisionmaking. Includes the development of clinical questions, review and appraisal of relevant literature, and utilization of patient-centered outcome measures. PREREQS: KIN 521 [C] and admission to the Athletic Training major (MATRN)

## KIN 573. MEASUREMENT IN HUMAN

MOVEMENT (3). Measurement theory applied to the study of human movement. Principles and methods for assessing validity and reliability of norm-referenced and criterion-referenced tests in the motor domain. PREREQS: ST 511 or equivalent.

KIN 575. RESEARCH IN HUMAN MOVEMENT
(3). Investigation and evaluation of research methods applicable to human movement study and professional physical education PREREQS: ST 511 or equivalent.
KIN 584. THERAPEUTIC MODALITIES (4). Indications, contraindications, techniques, and effects of various physical agents used in the care and treatment of musculoskeletal injuries and conditions commonly encountered by the athletic trainer. Lec/lab. PREREQS: KIN 521 [C] and admission to the Athletic Training major (MATRN)
KIN 585. UPPER EXTREMITY THERAPEUTIC
EXERCISE (4). Principles and techniques of therapeutic exercise and manual therapy for the upper extremity, cervical spine, and thoracic spine Lec/lab. PREREQS: KIN 586 [C] and admission to the Athletic Training major (MATRN)
KIN 586. LOWER EXTREMITY THERAPEUTIC
EXERCISE (4). Principles and techniques of therapeutic exercise and manual therapy with a
focus on the lower extremity, lumbar spine and ribs. PREREQS: KIN 584 [C] and admission to the athletic training major (MATRN)
KIN 599. SPECIAL TOPICS (1-3). Impact of human movement development on people, their movement behavior, and environment. Topics vary from term to term and year to year. May be repeated when topics differ. This course s repeatable for a maximum of 99 credits. PREREQS: Graduate standing.
KIN 601. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approva required.
KIN 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Instructor's approval required.

KIN 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
KIN 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
KIN 607. SEMINAR (1-16). Section 1: Graduate Research (1). Seminar emphasizes student oral presentations of current research topics in exercise and sport science. One credit required of all graduate students. Section 3: Current Developments (1). Discussion of contemporary issues in the exercise and sport science literature. Topics vary by term. Two credits required of all doctoral students. Section 9: International Aspects (1). Discussion of international aspects of study in exercise and sport science. Required of all doctoral students. Graded P/N. This course is repeatable for a maximum of 16 credits.

KIN 610. PROFESSIONAL INTERNSHIP: PHYSICAL EDUCATION (1-15). Field experience in which the term will integrate academic study with classroom teaching experience to learn specific competencies relating to functioning well in the context of the classroom and the school, and demonstrate this competency through the assessment of work by supervisors and by evidence collected and presented in work samples. This course is repeatable for a maximum of 25 credits.
KIN 647. CURRENT TOPICS AND RESEARCH IN ADAPTED PHYSICAL ACTIVITY (3). Current trends and critical research issues in adapted physical activity; focus on international and national trends. Topic will be variable.
KIN 699. SPECIAL TOPICS (1-16). Current issues, trends, and topics in KIN research. May be repeated for credit with different topics. This course is repeatable for a maximum of 25 credits.

## ■ NUTRITION COURSES

NUTR 104. ORIENTATION TO THE NUTRITION
MAJOR (1). Discuss and explore the academic and professional requirements for successful entry into professional careers in dietetics, foodservice systems management, and human nutrition sciences majors. Identify professional resources, career opportunities, markets and trends in these OSU Nutrition major options. Graded P/N.
NUTR 199. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## NUTR 216. *FOOD IN NON-WESTERN

CULTURE (3). Cultural determinants influencing food habits of humans. Interrelation of eating patterns and socio-cultural, ecological, psychological and economic factors in crosscultural settings. Roles of men and women in food provision. Lec/rec. (Bacc Core Course)
NUTR 225. GENERAL HUMAN NUTRITION (3). The relationship of food, its nutrients and other components to the promotion of health and fitness with emphasis on the young adult. Current health concerns on a national and international level. This
course is for non-majors; NES majors and those in the health sciences should take NUTR 240.

## NUTR 235. SCIENCE OF FOODS (5).

Composition, functional properties, and structure of foods, including modified ingredients. Principles underlying preparation of food products of
standard quality. Lec/lab. PREREQS: (CH 123 [C-] or CH 223 [C-] or ( (CH 263 [C-] or CH 263 H [C-] or CH 273 [C-] ) and (CH 233 [C-] or CH 233H [C-]) ))
NUTR 240. HUMAN NUTRITION (3). An
introductory nutrition course for exercise science, nutrition, dietetics, food science, and health science majors who have taken general chemistry. Concepts of nutrient metabolism and utilization, nutrient deficiencies and toxicities and their relationship to disease prevention and treatment. PREREQS: (CH 121 [D-] or CH 224H [D-] or (CH 221 [D-] or CH 231 [D-] or CH 231H [D-] ) ) and may be taken concurrently with NUTR 241.

## NUTR 241. APPLICATIONS IN HUMAN

NUTRITION (1). Application of nutrition theory from NUTR 240 using a dietary project and hands-on recitation activities. A key focus of the course will be on applying nutrition theory. Rec. PREREQS: NUTR 240* [C-]
NUTR 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
NUTR 306. PROJECTS (1-16). This course
is repeatable for a maximum of 36 credits. PREREQS: Departmental approval required.
NUTR 307. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

## NUTR 311. FOODSERVICE PRODUCTION AND

 PURCHASING (4). Food production, purchasing, facility and materials management in foodservice operations. Quantity production styles, safety and sanitation, service methods and equipment. Lec/ lab/rec. PREREQS: NUTR 235 [C-]NUTR 312. *ISSUES IN NUTRITION AND
HEALTH (3). Impact of nutrition as one component of complex environmental, behavioral, social, and genetic factors significant to health promotion. Apply scientific knowledge to current health issues of changing dietary patterns, technological development in food products and nutrition controversies. Recognize economic and public policy implications. Lec/rec. (Bacc Core Course) PREREQS: (NUTR 225 [D-] or NUTR 240 [D-] ) and completion of science requirement in baccalaureate core.

## NUTR 319. PROMOTING FOOD AND

NUTRITION (3). Strategies in promoting products, services or ideas; negotiating, advertising, public policy, consumer service, social marketing, market research, trends and strategies. Lec/lab. PREREQS: (NUTR 240 [C-] and NUTR 241 [C-] )
NUTR 325. NUTRITION THROUGH THE LIFE
CYCLE (3). Nutritional needs and concerns in pregnancy and lactation, infancy, childhood, adolescence, adult and later years. PREREQS: ( (NUTR 240 [C-] or NUTR 225 [C-] ) and NUTR 241 [C-] ) and /or equivalent, junior standing recommended.

## NUTR 341. NUTRITION FOR EXERCISE

(3). Review the interrelationship between nutrition and exercise, including macronutrient, micronutrient and fluid needs for active individuals. CROSSLISTED as EXSS 341, KIN 341. PREREQS: (KIN 324 [C-] or EXSS 324 [C-] ) and NUTR 240 [C-]
NUTR 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

NUTR 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

NUTR 403. THESIS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
NUTR 405. READING AND CONFERENCE (116). Graded $P / N$. This course is repeatable for a
maximum of 16 credits.
NUTR 406. SPECIAL PROBLEMS; PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
NUTR 407. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

NUTR 408. WORKSHOP (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

NUTR 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

NUTR 410. FIELD EXPERIENCE (3-15).
Supervised work experience with professionallevel responsibilities in community agency or business firm. Supplementary conferences, readings, reports. Supervised by agency/firm and instructor. For advanced students. Applications made and approved term preceding enrollment. Graded P/N. This course is repeatable for a maximum of 50 credits.
NUTR 416. ${ }^{\wedge}$ CULTURAL ASPECTS OF FOODS (3). Regional, ethnic, and religious influences on food patterns; worldwide trends in food practices. Laboratory experience with foods from several cultures. Lec/lab. (Writing Intensive Course) PREREQS: NUTR 235 [C-]
NUTR 417. HUMAN NUTRITION SCIENCE (4). Application of biochemistry and physiology to nutrition of the individual. PREREQS: BB 350 [C-] and /or equivalent courses and one physiology course.

NUTR 418. HUMAN NUTRITION SCIENCE (4). Application of biochemistry and physiology to nutrition of the individual. PREREQS: NUTR 417 [C-] and biochemistry, physiology.
NUTR 423. COMMUNITY NUTRITION (4).
Meeting nutritional needs in community settings; nutritional status of individuals and groups; programs of public and private agencies and industry; intervention techniques. Roles of community nutritionist. PREREQS: NUTR 325 [C-]

## NUTR 430. MEDICAL NUTRITION THERAPY

 I (4). Principles and practices related to implementation and documentation of the nutrition care process in dietetics. Diet-related conditions are addressed during the three-course sequence using lecture, case studies and assessment recitation sessions. Lec/lab/rec. PREREQS: (BB 350 [C-] or (BB 450 [C-] and BB 451 [C-] ) ) and ( (BI 233 [C-] and BI 243 [C-] ) or (Z 333 [C-] and Z 343 [C-] ) ) and NUTR 417* [C-] and NUTR 439 [C-]NUTR 431. MEDICAL NUTRITION THERAPY 2 (4). Principles and practices related to implementation and documentation of the nutrition care process in dietetics. Diet-related conditions are addressed during the three-course sequence using lecture, case studies and assessment recitation sessions. PREREQS: NUTR 430 [C-]
NUTR 432. MEDICAL NUTRITION THERAPY 3 (3). Principles and practices related to implementation and documentation of the nutrition care process in dietetics. Diet-related conditions are addressed during the three-course sequence using lecture, case studies and assessment recitation sessions. PREREQS: NUTR 431 [C-]
NUTR 439. ^COMMUNICATIONS IN DIETETICS (3). Theory and practice in food and nutrition communications in dietetics. Experience in nutritional counseling and interviewing, employee training and nutritional education materials development, public speaking, and media presentation strategies. (Writing Intensive Course) PREREQS: NUTR 325 [C-]
NUTR 446. MANAGING FOOD AND NUTRITION SERVICES (4). Overview of organizational structure, functions of managers in food and nutrition service organizations: human and financial resources, regulatory influences, health care organizations, current issues in operations. Lec/rec. PREREQS: NUTR 311 [C-]

NUTR 447. MANAGEMENT OF FOOD SYSTEMS
LABORATORY (3). Application of theory in managing a university food service as part of a student team: planning, production, projecting resource needs, evaluation of outcomes and financial goals. PREREQS: NUTR 446 or NUTR 546

NUTR 499. SPECIAL TOPICS IN DIETETICS
(2-6). Current issues, trends, and topics in nutrition and dietetics. May be repeated for credit when topic varies. This course is repeatable for a maximum of 12 credits.
NUTR 501. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
NUTR 502. INDEPENDENT STUDY (1-16).
Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits.

NUTR 503. THESIS (1-16). Graded P/N. This course is repeatable for a maximum of 999 credits.

NUTR 505. READING AND CONFERENCE (116). Graded $P / N$. This course is repeatable for a maximum of 16 credits.
NUTR 506. SPECIAL PROBLEMS; PROJECTS (1-16). Graded $P / N$. This course is repeatable for a maximum of 16 credits.
NUTR 507. SEMINAR (1-16). 1 credit graded P/N. This course is repeatable for a maximum of 16 credits.
NUTR 508. WORKSHOP (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
NUTR 509. PRACTICUM (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

NUTR 510. FIELD EXPERIENCE: INTERNSHIP
(1-16). Supervised work experience with professional-level responsibilities in community agency or business firm. Supplementary conferences, readings, reports. Supervised by agency/firm and instructor. Limited to students admitted to degree program. Application made and approved in the term preceding enrollment. No more than 6 credits may be applied to a master's degree program. This course is repeatable for a maximum of 6 credits.
NUTR 514. HEALTH BENEFITS OF FUNCT FOODS, NUTRACEUT, DIETARY SUPPLEMEN (3). Functional foods, nutraceuticals and dietary supplements represent a rapidly expanding segment of domestic and international markets. This course will overview the principles and procedures necessary to evaluate and market these products. The chemistry and mechanisms of major nutraceutical ingredient categories and current scientific information supporting their biochemical and physiological efficacy will be addressed. Special dietary products, such as medical, weight control, sport, and herbal supplements, will be addressed. Regulatory aspects of labeling and structure-function claims will be covered. CROSSLISTED as FST 514. PREREQS: BB 350 and CH 332
NUTR 516. CULTURAL ASPECTS OF FOODS
(3). Regional, ethnic, and religious influences on food patterns; worldwide trends in food practices. Laboratory experience with foods from several cultures. Lec/lab. PREREQS: NUTR 235
NUTR 517. HUMAN NUTRITION SCIENCE (4). Application of biochemistry and physiology to nutrition of the individual. PREREQS: BB 350 or equivalent courses and one physiology course.
NUTR 518. HUMAN NUTRITION SCIENCE (4).
Application of biochemistry and physiology to nutrition of the individual. PREREQS: NUTR 517 [C] and biochemistry, physiology.
NUTR 523. COMMUNITY NUTRITION (4). Meeting nutritional needs in community settings; nutritional status of individuals and groups; programs of public and private agencies and industry; intervention techniques. Roles of community nutritionist. PREREQS: NUTR 325

NUTR 530. MEDICAL NUTRITION THERAPY
I (4). Principles and practices related to implementation and documentation of the nutrition care process in dietetics. Diet-related conditions are addressed during the three-course sequence using lecture, case studies and assessment recitation sessions. Lec/lab/rec. PREREQS: BB 350 and BI 233 and BI 243 and NUTR 417* and NUTR 439
NUTR 531. MEDICAL NUTRITION THERAPY 2 (4). Principles and practices related to implementation and documentation of the nutrition care process in dietetics. Diet-related conditions are addressed during the three-course sequence using lecture, case studies and assessment recitation sessions. PREREQS: NUTR 430
NUTR 532. MEDICAL NUTRITION THERAPY 3 (3). Principles and practices related to implementation and documentation of the nutrition care process in dietetics. Diet-related conditions addressed during the three-course sequence using lecture, case studies and assessment recitation sessions. PREREQS: NUTR 431
NUTR 535. NUTRITION AND EXERCISE: MACRONUTRIENTS AND ENERGY
METABOLISM (3). Current research examining the interrelationship of macronutrients and exercise and energy balance will be reviewed, including their roles in health, disease prevention and exercise performance. PREREQS: NUTR 517 or KIN 533 or equivalent.

NUTR 539. COMMUNICATIONS IN DIETETICS
(3). Theory and practice of food and nutrition communications in dietetics. Experience in nutritional counseling and interviewing, employee training and nutritional education materials development, public speaking, and media presentation strategies. PREREQS: NUTR 325

## NUTR 546. FOODSERVICE ORGANIZATIONS

(3). Overview of organizational structure, functions of managers in foodservice organizations: human resources, regulatory influences, health care organizations, current issues in operations. Led/ rec. PREREQS: NUTR 311 and NUTR 445
NUTR 550. NUTRITIONAL STATUS (4). Research studies with emphasis on estimation of nutrient intake and assessment of nutritional status, including biochemical, clinical, epidemiologica and anthropometric measures. Interpretation of status indicators. PREREQS: NUTR 418 or NUTR 518
NUTR 599. SPECIAL TOPICS IN NUTRITION
(3-6). Current issues, trends, and topics in nutrition and health. May be repeated for credit when topic varies. This course is repeatable for a maximum of 18 credits.
NUTR 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
NUTR 602. INDEPENDENT STUDY (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
NUTR 603. THESIS (1-16). Graded P/N. This course is repeatable for a maximum of 999 credits.
NUTR 605. READING AND CONFERENCE (116). Graded $P / N$. This course is repeatable for a maximum of 16 credits.

NUTR 607. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

NUTR 609. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.

NUTR 610. INTERNSHIP (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

## NUTR 617. ADVANCED MACRONUTRIENT

METABOLISM (3). Focuses on human macronutrient metabolism. Macronutrient topics include water, carbohydrate, lipid, amino acid/ protein, lipid and carbohydrate and energy metabolism. Emphasis is placed on the integration of metabolism at the molecular, biochemical and physiological level. Moreover, the class examines
contemporary issues relevant to macronutrient metabolism and human disease. Offered even years in spring term. PREREQS: NUTR 418 or NUTR 518

## NUTR 618. ADVANCED MICRONUTRIENT

METABOLISM (3). Focus is on human micronutrient metabolism. Topics include micronutrients (vitamins and minerals), phytochemicals and mammalian metabolism. Emphasis will be placed on the integration of micronutrient/phytochemical metabolism at the molecular, biochemical and physiological level. Moreover, the class examines contemporary issues relevant to micronutrient/phytochemical metabolism and human disease. PREREQS: NUTR 418 or NUTR 518. Each student is expected to have a basic knowledge of the biochemistry and physiology. As such, graduate level courses in biochemistry and physiology are highly recommended.
NUTR 699. SPECIAL TOPICS IN NUTRITION RESEARCH (3-16). Current issues, trends, and topics in nutrition research. May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits.

## ■ PHYSICAL ACTIVITY COURSES

PAC 100. ADAPTED PHYSICAL ACTIVITY (1). Individual workout for students with permanent or temporary physical disabilities and for students enrolled in another PAC who sustain an injury. This course is repeatable for a maximum of 11 credits.

PAC 102. AQUA AEROBICS (1). Fitness class using a variety of movements in shallow and deep water, mostly in a vertical position. Do not need swimming skills. This course is repeatable for a maximum of 11 credits.

PAC 103. DEEP WATER AEROBICS (1). Fitness class using a variety of movements in a deep water pool, mostly in a vertical position. Should be comfortable in deep water. This course is repeatable for a maximum of 11 credits.
PAC 104. INTRODUCTION TO ACTIVITY (1). Students will be introduced to a variety of different activities, providing exposure to skills, knowledge, and gameplay of individual sports and activities. Activities may include court sports, aquatics, mind/ body practices, outdoor team sports, individual sports, and fitness activities. This course is repeatable for a maximum of 11 credits.
PAC 105. CPR/FIRST AID (1). Introduces cardiac and first aid emergency response procedures. Emphasis placed on safe response, chain of survival, quality CPR (adults, children, infants and team responses), use of an AED, medical emergencies, injury emergencies and environmental emergencies. Students successfully completing the American Heart Association certification requirements will be issued a Heartsaver First Aid and BLS (Basic Life Support) for the Healthcare Provider certification at the end of the course. This course is repeatable for a maximum of 11 credits.

PAC 107. DANCE AEROBICS (1). Fitness class set to music using a variety of movement; high/low intensity cardiovascular workout supplemented with strength and flexibility exercises. This course is repeatable for a maximum of 11 credits.
PAC 108. STEP AEROBICS (1). Low-impact, high intensity workout adjustable to all fitness levels utilizing adjustable height benches. Strengthening and flexibility exercises included. This course is repeatable for a maximum of 11 credits.
PAC 109. POWER STEP AEROBICS (1).
Advanced high intensity step workout that includes plyometric jumps and movements through a wide range of motion. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 108, Step Aerobics or equivalent.

PAC 110. INTRODUCTION TO WHITE WATER KAYAKING (2). Students will learn fundamentals of white water kayaking in sheltered water based
on the internationally recognized British Canoe (BC) teaching and skills certification system. Emphasis is on activity and basic skills. See class schedule for the location, website, and class schedule specific to the course. This course runs for six class sessions of 3 hours (Fridays), and one mandatory Saturday (5-hour) session. The entire class lasts for six weeks. This course is repeatable for a maximum of 11 credits.
PAC 111. INTRODUCTION TO CANOEING (2). Students will learn fundamentals of canoeing in sheltered water based on the internationally recognized British Canoe (BC) teaching and skills certification system. Emphasis is on activity and basic skills. See class schedule for the location, website, and class schedule specific to the course This course runs for six class sessions of 3 hours (Fridays), and one mandatory Saturday (5-hour) session. The entire class lasts for six weeks. This course is repeatable for a maximum of 11 credits.

PAC 113. BADMINTON I (1). Singles and doubles skills, practice, rules, strategies and play. This course is repeatable for a maximum of 11 credits.
PAC 114. BADMINTON II (1). Intermediate skill development in badminton. This course is repeatable for a maximum of 11 credits. PREREQS: Fundamental skills, rules and strategy of singles and doubles play.
PAC 116. BASKETBALL I (MEN/WOMEN) (1). Fundamental basketball skills, drills, rules, strategies, and practice. Game play appropriate for the skill level. This course is repeatable for a maximum of 11 credits.

PAC 117. BASKETBALL COMPETITIVE (1).
Team play, individual and team skills developed and refined, competitive round robin tournaments. This course is repeatable for a maximum of 11 credits. PREREQS: Prior competitive experience
PAC 120. MOUNTAIN BIKING (1). Touring trails in Corvallis area; riding techniques, safety, maintenance, environmental concerns. Required equipment: mountain bike, tire repair kit, helmet. This course is repeatable for a maximum of 11 credits.
PAC 121. BILLIARDS (1). Skills, technique, strategy, game knowledge as introduction to billiards (pool), a «cue, sport; rules and gaming for variations of pocket billiards; practice and class tournament play. This course is repeatable for a maximum of 11 credits.

PAC 122. BODY SCULPTING (1). Fitness workout set to music using lighter resistance training aids such as dumbbells, resistance tubing, bands, and aerobic steps. This course is repeatable for a maximum of 11 credits.

PAC 123. BOWLING I (1). Fundamentals of the game including etiquette, spot bowling, natural hook and straight ball delivery, scoring, handicap computation, spare pickup, and error correction. Additional fee; equipment supplied. This course is repeatable for a maximum of 11 credits.
PAC 124. BOWLING II (1). Review and refinement of basic fundamentals of bowling. Emphasis on spot bowling, adjusting for lane conditions, choices in equipment, league play, and mental training This course is repeatable for a maximum of 11 credits. PREREQS: Bowling I or equivalent.
PAC 126. CARDIO KICKBOXING I (1). High intensity group workout set to motivational music and combining skills and techniques from boxing, kickboxing, and other martial arts. This course is repeatable for a maximum of 11 credits.

PAC 127. CARDIO KICKBOXING II (1).
Applies what students have learned in basic cardio kickboxing and increases the difficulty of combinations in a way that intensifies the workout in complexity and cardio training; sometimes referred to as turbo kickboxing. This course is repeatable for a maximum of 11 credits.
PAC 129. CARDIO COMBO (1). Combination of aerobic training classes that use music such
as Cardio Kickboxing, Body Sculpture, Sports Conditioning, and/or Step Aerobics. Actual curriculum may vary with instructors. This course is repeatable for a maximum of 11 credits.
PAC 130. CONDITIONING (1). Total body approach to fitness, cardiorespiratory conditioning muscular strength and endurance; flexibility emphasized. May follow a specific training format, e.g., ROTC section follows Army conditioning format. This course is repeatable for a maximum of 11 credits.
PAC 131. SNOWBOARD-SKI CONDITIONING (1). Strength, muscular endurance, flexibility, balance, and cardiovascular exercises specific to downhill skiing and snowboarding; designed to help prepare students for participation in these sports. This course is repeatable for a maximum of 11 credits.
PAC 133. DANCE: TAP I (1). Individual and group dance with specialized shoes; basic step technique and vocabulary; warm up exercises progressing into rhythmic combinations performed to music; culminates in full routine to music. This course is repeatable for a maximum of 11 credits.
PAC 135. BALLETSPORT: BALLET SKILLS FOR ATHLETES (1). Fundamental ballet technique to enhance balance, agility, alignment, strength and rhythmic movement in sports. Stretching techniques and Pilates mat-work included. No prior dance experience needed. All students welcome. Additional fee for accompanist. This course is repeatable for a maximum of 11 credits.

PAC 136. DANCE: BALLET I (1). Introduction to basic ballet technique and aesthetics, terminology, alignment, stretch and strength exercises. No previous dance experience needed. Additional fee for accompanist. This course is repeatable for a maximum of 11 credits.
PAC 137. DANCE: BALLET II (1). Review and practice of beginning ballet technique, introduction of more advanced stretches, steps, and combinations. Additional fee for accompanist. This course is repeatable for a maximum of 11 credits. PREREQS: Ballet I or previous ballet experience.
PAC 138. DANCE: BALLET III (1). Intermediate and advanced ballet technique, comprehensive exploration of the discipline. Additional fee for accompanist. This course is repeatable for a maximum of 11 credits. PREREQS: Ballet II, previous comparable experience or instructor approval required.
PAC 140. DANCE: JAZZ I (1). Introduction to jazz dance, technique, isolations, and combinations. Different jazz styles are explored. No previous dance experience is necessary. This course is repeatable for a maximum of 11 credits.

PAC 141. DANCE: JAZZ II (1). Intermediate jazz technique, isolations and combinations. This course is repeatable for a maximum of 11 credits. PREREQS: Jazz I or comparable experience.
PAC 142. DANCE: JAZZ III (1). Advanced approach to jazz technique; challenging warm ups, combinations, and dances. Performance opportunity. This course is repeatable for a maximum of 11 credits. PREREQS: Jazz II, comparable experience, departmental approval required.
PAC 145. DANCE: MODERN I (1). Introduction to modern dance movement fundamentals. Technique, stretch, strength, and alignment are included, as well as an appreciation for movement expression. No previous dance experience needed. Additional fee for accompanist. This course is repeatable for a maximum of 11 credits.
PAC 146. DANCE: MODERN II (1). An intermediate level of modern dance technique and movement expression. Additional fee for accompanist. This course is repeatable for a maximum of 11 credits. PREREQS: Modern Dance I or comparable experience.

PAC 147. DANCE: MODERN III, OREGON DANCE PERFORMANCE (1). Modern dance advanced technical skills, compositions, and combinations. Additional fee for accompanist. This course is repeatable for a maximum of 11 credits. PREREQS: Previous intermediate modern dance experience or instructor approval.

PAC 148. DANCE: CUBAN SALSA I (MEN/
WOMEN) (1). Foundations of Cuban Salsa (Casino) as well as Rueda de Casino with focus on musical development and fundamentals of leading and following in partner dance. This course is repeatable for a maximum of 11 credits.

PAC 150. CULTURAL WORLD DANCE (MEN/
WOMEN) (1). Introduction to traditional dance forms from Europe, Israel, North America and Asia, focusing on movement, cultural heritage, history, and diversity. This course is repeatable for a maximum of 11 credits.
PAC 151. COUNTRY LINE DANCE (1). Nonpartner dance routines in country western style; musical interpretation, footwork, and sequencing of 20 different routines. This course is repeatable for a maximum of 11 credits.
PAC 152. DANCE: SALSA I (1). Steps and rhythmic accent of Salsa and Merengue style; fundamentals of leading and following; basic moves and combinations. No prior experience needed. This course is repeatable for a maximum of 11 credits.

PAC 153. DANCE: SALSA II (1). Intermediate moves, rhythmic accents and step combinations of Salsa; development of leading and following. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 152 [C-] and /or instructor approval.

PAC 154. DANCE: COUNTRY WESTERN (MEN/WOMEN) (1). Focus on traditional Country Western Swing patterns. Emphasizes fundamentals of leading and following. Also including introduction to waltz, two-step, cowboy cha-cha and 10-step polka. This course is repeatable for a maximum of 11 credits.

PAC 155. DANCE: COUNTRY WESTERN II
(MEN/WOMEN) (1). Build on CW I with advanced waltz, two-step, and cha-cha patterns; introduces schottishe and East Coast swing. This course is repeatable for a maximum of 11 credits. PREREQS: Country Western I or instructor approval.

PAC 156. DANCE: COUNTRY WESTERN III
(MEN/WOMEN) (1). Advanced two-step patterns and styling with a focus on musical interpretation; development of leading and following. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 155 [C-]

PAC 158. DANCE: BEGINNING SWING (MEN/
WOMEN) (1). Introduction to single time, double time, and triple time (jitterbug) swing; variations for each style, covering most swing music rhythms. Emphasizes fundamentals of leading and following. Men/women. This course is repeatable for a maximum of 11 credits.

PAC 159. DANCE: BALLROOM I (MEN/WOMEN)
(1). Posture and alignment, fundamentals of leading and following, basic steps and variations for waltz, foxtrot, swing, tango, and cha-cha. This course is repeatable for a maximum of 11 credits.
PAC 160. DANCE: BALLROOM II (MEN/
WOMEN) (1). Additional steps and patterns of popular ballroom dances. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 159 [C-]
PAC 161. DANCE: BALLROOM III (MEN/
WOMEN) (1). Styling; additional dances: rhumba, silver fox trot, and Viennese waltz; advanced dance figures for tango and cha-cha. This course is repeatable for a maximum of 11 credits.
PREREQS: PAC 160 [C-]
PAC 162. DANCE: SWING II (MEN/WOMEN) (1). Social dance focusing on Twenties-style

Charleston, pure Balboa and Balboa-Swing, and Blues Dance. This course is repeatable for a maximum of 11 credits.

PAC 163. DANCE: LATIN I (1). Latin dances including cha-cha, mambo, salsa, rhumba, merengue, bolero, salsa, and paso doble. Emphasis on proper styling and technical execution of each dance; effective leading and following techniques. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 159 [C-]
PAC 164. DANCE: LATIN II (1). Continuation of Latin Dance I; more advanced dance patterns in cha-cha, salsa, merengue, rhumba and samba. Introduction to mambo and bolero; emphasis on technical and stylistic details of each dance. This course is repeatable for a maximum of 11 credits. PREREQS: Latin I.
PAC 165. DANCE: WEST COAST SWING (MEN/ WOMEN) (1). Focus on style, technique and many different step patterns of the west coast swing dance. This course is repeatable for a maximum of 11 credits. PREREQS: (PAC 154 [C-] or PAC 159 [C-])
PAC 166. BALLROOM 2 STEP, HUSTLE (MEN/ WOMEN) (1). Smooth, romantic social dance that is neither ballroom, Latin, nor swing but a rhythm dance identified as club-style, danced to contemporary ballad-like music. Hustle is fast-paced, swing-related dance to disco beat. Class encompasses intermediate step patterns, technique and styling, stationary, traveling patterns. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 160 [C-]

PAC 167. DANCE: LINDY HOP (1). Ballroom dance style based on original eight-count swing dance evolved in Harlem ballrooms during the late 1920s; styling emphasized. This course is repeatable for a maximum of 11 credits. PREREQS: (PAC 158 [C-] or PAC 159 [C-] )
PAC 168. DANCE: LINDY HOP II (MEN/WOMEN) (1). Intermediate patterns, syncopations, play techniques, and styling with a focus on musical interpretation in the Lindy Hop style; development of leading and following. This course is repeatable or a maximum of 11 credits. PREREQS: PAC 167 [C-]
PAC 169. COOL SHOES, BALLROOM PERFORMANCE (MEN/WOMEN) (1). Focus on advanced steps and styling. A dance suite is choreographed each term. Two to three performances each term. This course is repeatable for a maximum of 11 credits. PREREQS: Departmental approval by audition required.

PAC 170. DANCE: WEST COAST SWING II (MEN/WOMEN) (1). Intermediate patterns, syncopations, play techniques, and styling with a focus on musical interpretation; development of leading and following. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 165 [C-]
PAC 174. FLAG FOOTBALL (1). Skill instruction and practice; drills; strategies, game play of America football; emphasis on teamwork and sportsmanship in a competitive but nonthreatening or stressful environment. This course is repeatable for a maximum of 11 credits.

PAC 178. FLY FISHING I (1). Casting and fishing techniques, lure making, equipment selection, terminology, and regulation for fishing in Oregon's marine environment. This course is repeatable for a maximum of 11 credits.
PAC 179. FLY FISHING II (1). Advanced fly casting and fly fishing techniques for trout, flytying, equipment selection, basic aquatic organism identification, terminology, and regulations for fishing in Oregon's freshwater environment. This course is repeatable for a maximum of 11 credits.
PAC 180. STEELHEAD FISHING (1). Casting and fishing techniques, lure making, equipment selection, terminology, and regulations for fishing
in Oregon's marine environment for steelhead. This course is repeatable for a maximum of 11 credits.

PAC 181. ADVANCED FLY TYING (1). Tying of artificial flies useful for trout, steelhead, and bass fishing; dubbing techniques, spinning hair parachute hackling, and precise winging methods included. This course is repeatable for a maximum of 11 credits. PREREQS: Fly Fishing I or previous fly tying experience.

PAC 182. DISC GOLF I (1). Techniques for throwing discs; equipment, knowledge, etiquette, and rules associated with playing a disc golf course; experience playing practice and official disc golf courses. This course is repeatable for a maximum of 11 credits.

PAC 184. GOLF I (1). Basic fundamental principles in all phases of golf; rules, terminology, etiquette, safety and scoring. Equipment provided This course is repeatable for a maximum of 11 credits.

PAC 185. GOLF II (1). Individual practice and course play; skill refinement as continuation of Golf I. Equipment available. Course play expected, additional fee. This course is repeatable for a maximum of 11 credits. PREREQS: Golf I or equivalent.

PAC 186. GOLF III (1). Advanced skills, knowledge involved in competitive play. Course play expected, additional fee. This course is repeatable for a maximum of 11 credits. PREREQS: Handicap below 15 or Golf II; competitive play.
PAC 187. GOLF ON TOUR (1). Area golf courses are played in a variety of competitive formats to improve on-course competitive performance; includes rules understanding and handicap procedures. This course is repeatable for a maximum of 11 credits. PREREQS: GOLF II/ III (PAC 184/PAC 185) or instruction from an experienced coach or instructor; the ability to consistently score under 95, and the ability to keep a 4-hour pace for 18 holes. Previous competitive golf experience is preferred.

PAC 188. GYMNASTICS (1). Fundamental techniques on vault, bars, beam, and floor. This course is repeatable for a maximum of 11 credits.

PAC 189. GYMNASTICS II (1). Build upon previous gymnastics experiences or classes; floor exercise, uneven parallel bars, vault, minitrampoline and beam apparatus are available. This course is repeatable for a maximum of 11 credits. PREREQS: Gymnastics I or competitive experience.
PAC 190. KARATE (1). Instruction in traditiona Japanese karate basic striking and blocking techniques, kata (forms), philosophy, conditioning, and etiquette. Self-defense applications are also emphasized. This course is repeatable for a maximum of 11 credits.
PAC 192. JUDO I (1). Skill instruction in landing, throwing and grappling for this style of martial arts; etiquette for practice and competition; basic knowledge of vocabulary, rules and scoring. This course is repeatable for a maximum of 11 credits.

PAC 193. JUDO II (1). Intermediate skill instruction in landing, throwing, pins, chokes in Kodokan Judo style; principles of Seiryoku-Zenyou and Jita-Kyouei designed to help individuals become better members of society through training body and mind; instruction for competition knowledge and skills. Judo etiquette for practice and competition expected. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 192 or instructor approval.

PAC 194. PILATES (1). Non-impact, invigorating approach to physical conditioning and mind/body awareness; helps develop core body strength, improve posture and balance, and increase muscle endurance, tone, flexibility. This course is repeatable for a maximum of 11 credits.

PAC 195. PILATES II (1). Progression of Joseph Pilates mat exercises; emphasis on intermediate and advanced levels; application of Pilates' principles to new exercises; use of props; application of principles to daily living. This course is repeatable for a maximum of 11 credits PREREQS: PAC 194, Pilates.

PAC 197. PICKLEBALL (1). Fast-paced, selfofficiated net game with similarities to tennis, badminton, table tennis, and racquetball. Course covers rules, strategies, technique, preparation for play, and includes extensive active practice and play; played with two, three, or four people. This course is repeatable for a maximum of 11 credits.

PAC 199. SPECIAL TOPICS (1-3). Experimental or new classes. This course is repeatable for a maximum of 11 credits.

PAC 201. RELAXATION (1). Introduction to relaxation techniques; posture awareness, gentle stretching, source of your energy, and creative imagery to relieve stress. This course is repeatable for a maximum of 11 credits.

PAC 205. ROWING, CREW I (MEN/WOMEN) (1). Introduction to the sport of rowing; designed for the novice (beginner). Includes basic technique and terminology, related water safety, and development of strength, endurance, and flexibility. This course is repeatable for a maximum of 11 credits. PREREQS: Swim Test (1)

PAC 209. ROCK CLIMBING, CONDITIONING
(1). Physical conditioning for, and instruction in, the skills and techniques of rock climbing; environmental impact issues; held at on-campus indoor climbing center. This course is repeatable for a maximum of 11 credits.

PAC 210. ROCK CLIMBING, CONDITIONING II (1). Advanced technical skills, training techniques, rescue rigging, anchor and belay systems, basic aid climbing, hauling, and other big wall techniques; three-stage training; practice. Held at on-campus climbing center. Additional fee may be required for off-campus practice. This course is repeatable for a maximum of 11 credits. PREREQS: Rock Climbing and Conditioning I or instructor approval.
PAC 212. RUNNING, JOGGING (1).
Cardiorespiratory fitness with scenic running routes; training, nutrition, and physiology. Beginning and intermediate level. This course is repeatable for a maximum of 11 credits.

PAC 213. RUNNING: 10K TRAINING (1). Intermediate to advanced conditioning and training program for road racing. This course is repeatable for a maximum of 11 credits. PREREQS: Prior training in running.

PAC 214. HALF MARATHON TRAINING (2).
Progressive training combining walking, running core strengthening, interval techniques in preparation for a 13.1 mile (1/2 marathon) event Open to all levels; may choose to walk, walk/run, or run. This course is repeatable for a maximum of 11 credits.

PAC 215. RUGBY, TOUCH (1). Basic skills of open field rugby; emphasis on ball handling and attacking strategy; rules and history; game play. This course is repeatable for a maximum of 11 credits.
PAC 217. SELF DEFENSE (1). Nonviolent self-defense. Develop self-confidence and skills for assault situations. Conditioning and practical skills. Men and women, all levels. This course is repeatable for a maximum of 11 credits.

PAC 224. TELEMARK SKIING (1). Winter sport that is a cross between cross country and downhill skiing. Requires telemark equipment where the heel is unattached. Class accommodates all levels and practices on the downhill slopes. Additiona fee covers bus transportation, lessons, and lift ticket. Rental of equipment is not included. This course is repeatable for a maximum of 11 credits.

PAC 225. DOWNHILL SKIING (1). Travel to area facilities, 1-1/2 hour lesson followed by open practice, students grouped according to skill level: beginner, intermediate, advanced, racer. Special fee covers bus transportation, lessons, and lifts. Additional fee for rentals. This course is repeatable for a maximum of 11 credits.

PAC 227. SNOWBOARDING (1). Travel to area facilities, 1 1/2 hour lesson followed by open practice, students grouped according to skill level: beginner, intermediate, advanced. Special fee covers bus transportation, lessons, and lifts. Additional fee for rentals. This course is repeatable for a maximum of 11 credits.

PAC 229. SOCCER I (1). Basic skills of controlling the ball; conditioning; lead-up games; team play. This course is repeatable for a maximum of 11 credits.
PAC 230. SOCCER II (1). Review of basic skills of offense and defense in controlled game play; concepts of team position and play, pressure and attack. This course is repeatable for a maximum of 11 credits. PREREQS: Previous soccer experience.

PAC 231. SOCCER III (1). High level soccer skills; team play and transition concepts; set plays and alignments for both offense and defense. This course is repeatable for a maximum of 11 credits. PREREQS: Soccer II or competitive playing experience.

PAC 233. SOCCER: INDOOR (1). Skill instruction and development; strategies and rules for indoor play; game play in indoor gymnasium. This course is repeatable for a maximum of 11 credits. PREREQS: Previous soccer experience.

PAC 236. SOFTBALL, WHIFFLEBALL (1). Skills, rules, strategies, practice, and game play of the popular outdoor slow pitch game. Modified softbal with whiffleball when play is indoors. This course is repeatable for a maximum of 11 credits.
PAC 242. SCUBA: OPEN WATER (2). Lecture includes physiology, water environment, equipment, and techniques for fundamental SCUBA diving. Laboratory includes practice in techniques, skills, and equipment usage; sessions held in pool and open water. Successful completion leads to PADI certification. Additional fee covers most equipment, texts, certification, and open water dive trip. This course is repeatable for a maximum of 11 credits. PREREQS: Mandatory 200-yard swim, 10-minute survival skills and good health.
PAC 243. SCUBA: ADVANCED OPEN WATER
(1). Classroom lecture and laboratory in hypothermics, natural navigation, dive physiology, compass navigation, night and limited visibility procedures, boat diving, search and salvage techniques, deep diving procedures, health for diving, and an introduction to dive rescue. Successful completion of this course can lead to PADI certification. Additional fee. This course s repeatable for a maximum of 11 credits. PREREQS: PAC 242
PAC 244. SCUBA: RESCUE DIVER (1).
Techniques, skills, knowledge, and practice in self-rescue and rescue of others in underwater emergencies; may lead to PADI certification lecture and pool laboratory; open water dive required. Additional fee. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 243 or equivalent.
PAC 245. SCUBA SPECIAL TOPICS (1).
Specialized courses requiring previous certification in SCUBA. Check the current schedule of classes for more information and prerequisites. Possible classes: altitude diver, night diver, search and recovery, deep diver, underwater navigation, equipment specialist. Additional fee. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 242

PAC 246. DIVEMASTER TRAINING (2). Entry level PADI certification course for preparation
to instruct SCUBA; lecture, lab, open water experience; must take two consecutive terms. Additional fee: $\$ 160$ per term. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 244. PADI Advanced, Advanced Plus, and Rescue Diver certifications or equivalent; 20 logged dives.

PAC 247. SURFING (1). Knowledge and fundamental skills of this aquatic sport including history, terminology, safety precautions, the ocean environment, and equipment. Additional fee. This course is repeatable for a maximum of 11 credits. PREREQS: Equivalent to Swim I (PAC 250). Students must pass a swim test in the pool before going into the ocean.
PAC 248. SWIM: NON-SWIMMER (1). Skills for self-rescue; fundamental skills in swimming and safety. Designed for people with a fear of water. Recommended S/U grading. This course is repeatable for a maximum of 11 credits.

PAC 249. LIFEGUARD TRAINING (1). Trains participants in the skills required to become a lifeguard. Emphasis on professional behavior, water rescues, safe response, quality CPR (adults, children, infants, and team responses), use of an AED and first aid. Students successfully completing the American Red Cross certification requirements will be issued a lifeguarding certification at the end of the course. This course is repeatable for a maximum of 11 credits. PREREQS: Basic swimming skills
PAC 250. SWIM I (1). Swimming concepts, survival and breathing techniques, front crawl and elementary backstroke as minimum instruction. This course is repeatable for a maximum of 11 credits. PREREQS: Minimal swimming skill.
PAC 251. LAP SWIM, STROKE ASSISTANCE (1). Noncompetitive swim, exercise program with individual stroke skill assistance. This course is repeatable for a maximum of 11 credits.

PAC 252. SWIM II (1). Fitness swimming, swimming strokes and skills. This course is repeatable for a maximum of 11 credits. PREREQS: 75 yd. front crawl. Swim I skills.
PAC 253. SWIM TRAINING WORKOUT (1). Competitive skills and strokes; emphasis on training. This course is repeatable for a maximum of 11 credits. PREREQS: Ability to do interval training.
PAC 254. COMPETITIVE SWIMMING (1).
Prepares students for competitive swimming and emphasizes lifetime aquatic fitness; interval swim workouts designed for speed and endurance; instruction on legal techniques of strokes and turns; culminates in intra-class swim meet; 2,0003,000 yards/day. This course is repeatable for a maximum of 11 credits. PREREQS: 300 yd . front crawl; 50 yd. backstroke and breast stroke; ability to do interval training.
PAC 256. TAIJI, TAI CHI I (1). Introduction to ancient Chinese 'internal martial art' based upon concepts of Yin and Yang; detailed slow and relaxed form movements provide benefits to body, mind, and spirit. This course is repeatable for a maximum of 11 credits.
PAC 257. TAIJI, TAI CHI II (1). Continuation of study of the Yang-style Taiji form; more in-depth exploration of underlying principles and pushhands exercises. This course is repeatable for a maximum of 11 credits.

PAC 258. TAP DANCE I (1). Basic vocabulary and steps; will emphasize proper technique and include a progression to more rhythmic combinations using a variety of music and creative styles. This course is repeatable for a maximum of 11 credits.

PAC 259. TAP DANCE II (1). An expansion of the skills and vocabulary of Tap Dance I; progression to more advanced and longer combinations; may be opportunities to perform in a concert. This course is repeatable for a maximum of 11 credits. PREREQS: Tap Dance I or instructor approval.

PAC 260. TENNIS I (1). Introduction to fundamental strokes, singles and doubles play, scoring, and basic concepts in tennis. This course is repeatable for a maximum of 11 credits.
PAC 261. TENNIS II (1). Review and refinement of fundamental strokes; volley, lob, return of serve; introduction to singles and doubles strategy. This course is repeatable for a maximum of 11 credits. PREREQS: Tennis I or instructor approval.

PAC 262. TENNIS III (1). Focus on ground stroke, serve consistency; approach shots and overheads; tactics for net and baseline play. This course is repeatable for a maximum of 11 credits. PREREQS: Tennis II or instructor approval.
PAC 264. TEAM HANDBALL/(MEN/WOMEN) (1).
Fast-paced indoor court game that combines skills and strategies similar to water polo, basketball, soccer and hockey; rules, regulations, strategies, and skills introduced and practiced; requires teamwork, cooperation, and court strategy. This course is repeatable for a maximum of 11 credits.
PAC 265. TUMBLING I (1). Technical instruction, progressions, and practice in basic, intermediate, and advanced tumbling skills; emphasis on safety and fitness concepts; floor and mini-trampoline skills; no apparatus instruction. This course is repeatable for a maximum of 11 credits.
PAC 266. TUMBLING II (1). Technical instruction, progressions, safety, and practice building upon skills taught in PAC 265, Tumbling I. This course is repeatable for a maximum of 11 credits. PREREQS: Tumbling I or prior experience.
PAC 268. TRIATHLON TRAINING (2). Training in swimming, running, and bicycling to prepare for triathlon participation. Strategies, transitioning technique, and weight training information; training plan formation; event planning; culminates in class or community event. This course is repeatable for a maximum of 11 credits. PREREQS: Experience in at least one of the three activities.
PAC 271. ULTIMATE FRISBEE (1). Fundamentals for the beginning and intermediate player; individual skill development, rules, game play, and strategy. This course is repeatable for a maximum of 11 credits.

PAC 273. VOLLEYBALL I (1). Fundamental volleyball skills, drills, rules, strategies, and practice. Game play appropriate for skill level. This course is repeatable for a maximum of 11 credits.
PAC 274. VOLLEYBALL II (1). Fundamental skills and knowledge refined; intermediate skills developed, competitive play. This course is repeatable for a maximum of 11 credits. PREREQS: Volleyball I and good fundamental skills.
PAC 275. VOLLEYBALL III (1). Skill refinement and development; intense, highly competitive drills and game situations, doubles through sixes play This course is repeatable for a maximum of 11 credits. PREREQS: Volleyball II and instructor's approval or varsity-level experience.
PAC 278. FITNESS WALKING (1). Establishment of personal fitness programs through walking with emphasis on technique and aerobic components. This course is repeatable for a maximum of 11 credits.

PAC 282. WATER POLO (1). Team game, played in deep water; instruction in skills, drills, strategies techniques; game play; knowledge of rules and terminology. This course is repeatable for a maximum of 11 credits. PREREQS: Swim I skills.
PAC 286. WEIGHT TRAINING: CIRCUITS (1).
Fast-paced fitness class using stations of resistance training exercises. Designed to improve cardiovascular fitness and muscular endurance more than strength. This course is repeatable for a maximum of 11 credits.
PAC 287. WEIGHT TRAINING I (1). Exercise techniques in both free and fixed resistance training equipment; safety procedures,
terminology, and principles of exercise. This course is repeatable for a maximum of 11 credits.
PAC 288. WEIGHT TRAINING II (1). Intermediate level of weight training in free and fixed weights. This course is repeatable for a maximum of 11 credits. PREREQS: Weight Training I.
PAC 292. WRESTLING (1). Collegiate wrestling fall and winter terms; freestyle and Greco wrestling spring term. All levels. This course is repeatable for a maximum of 11 credits.
PAC 293. INTERDISCIPLINARY YOGA (1). Basic yoga poses (asanas) using specific techniques and sequences to promote flexibility, strength, relaxation, and a sense of well-being will be used. Integrative concepts between yoga and our daily life will be examined as well as yoga in relationship to other forms of physical movement. This course is repeatable for a maximum of 11 credits.

PAC 293H. INTERDISCIPLINARY YOGA (1). Basic yoga poses (asanas) using specific techniques and sequences to promote flexibility, strength, relaxation, and a sense of well-being will be used. Integrative concepts between yoga and our daily life will be examined as well as yoga in relationship to other forms of physical movement. This course is repeatable for a maximum of 11 credits. PREREQS: Honors College approval required.
PAC 294. YOGA I (1). Principles and practice of basic yoga postures, techniques of posture alignment, yogi breathing styles and their impact on the body and mind. This course is repeatable for a maximum of 11 credits.
PAC 295. YOGA II (1). Intermediate level course to improve yoga practice and to develop overall deeper understanding of yoga methodology in more advanced posture. This course is repeatable for a maximum of 11 credits. PREREQS: Yoga I or previous yoga experience.
PAC 296. FITNESS YOGA (1). Dynamic sequence of movements and sustained yoga positions; regulated breathing; encourages systematic discipline and approach to life. Open to beginners. This course is repeatable for a maximum of 11 credits.

PAC 297. YOGATHON (1). Expands on knowledge and skills learned in Yoga I or Fitness Yoga through three to five class sessions, each 3-6 hours; longer sessions provide students with an intensive mental and physical experience centering on the concepts of yoga; includes introductory relaxation and meditation skills. This course is repeatable for a maximum of 11 credits. PREREQS: Yoga I or Fitness Yoga highly recommended. PAC 294 and PAC 295 and PAC 296

PAC 299. SPECIAL TOPICS (1-3). Advanced information, skills, practice, and application; experimental and new classes. May have additional fee. This course is repeatable for a maximum of 11 credits. PREREQS: Intermediate to advanced skills in an activity area or instructor approval required
PAC 300. ALI: HIKING LOCAL TRAILS (1). Covers the fundamentals of hiking as a recreational activity and an outdoor travel skill. Content will cover local trails, place history, hiking techniques, clothing and equipment selection, elemental first aid and safety concerns, leave-no-trace principles, and map basics. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.
PAC 301. ALI: CHALLENGE COURSE
EXPERIENCE (1). Emphasis on gaining practical experience and understanding of various components that occur in challenge course activities/programs; group dynamic mental and physical challenges; cooperative games and initiatives that promote communication, problem solving skills and leadership; Low and High challenge course activities that promote self-
confidence and agility. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.

## PAC 302. ALI: CHALLENGE COURSE

PRACTICES AND FACILITATION (1). Covers the set up and facilitation of various challenge course low and high course elements as they pertain to ALl's Challenge Course programming. Students will learn facilitation skills, risk management concepts, operational procedures, and technical rescue skills. A passing grade in this course will result in a certificate of completion from the OSU ALI Challenge Course. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 301 [C-] and climbing wall instructor, efficient climbers toolbox, self-rescue, or instructor approval.

PAC 303. ALI: CAMP CRAFT (1). Provides basic front-country camping skills such as packing, trip planning, how to dress for different climates/ weather, storm-proofing, knife and axe techniques and safety, stove and kitchen operations, and fire building. This course is repeatable for a maximum of 11 credits.

PAC 304. ALI: BACKPACKING (1). Hiking and camping while carrying all gear; tent set-up, camp site selection, operation of single-burner stoves, loading a backpack, water infiltration, navigation, proper hiking technique, energy conservation; leave-no-trace principles in every aspect of the trip and class; includes classroom instruction and required overnight trip. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.
PAC 307. ALI: RAFTING (1). An introduction to white water rafting. Students will learn the fundamentals of safe rafting, trip planning and become familiar with the gear associated with rafting. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.

PAC 308. ALI: CANOEING (1). Designed as an introduction to canoeing. Students learn the fundamentals of safe canoeing, trip planning and become familiar with the gear associated with rafting. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.

## PAC 311. ALI: STAND UP PADDLEBOARD (1).

 Covers the curriculum for level 1 and 2 American Canoe Association standup paddle board skill courses. Skills include equipment, environmental factors, techniques, preparation and planning, emergency management, and environmental ethics. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.PAC 313. ALI: CANYONEERING (1). Students will learn the fundamentals of canyoneering, including efficient hiking techniques, safe anchoring belaying and rappelling techniques, and environmental mitigation skills. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.
PAC 314. ALI: BOULDERING (1). Introduction to the sport of bouldering, a subset of rock climbing using an indoor climbing facility; emphasis on safety, spotting, climbing movement, training techniques and improvement; provides activities that promote muscular strength and endurance, flexibility, and cardiovascular endurance. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.

PAC 315. ALI: ROCK CLIMBING I (1). Physical conditioning for, and instruction in, the skills and techniques of rock climbing; environmental impact issues; held at on-campus indoor climbing center. PAC courses may not be used to fulfill upperdivision requirements. This course is repeatable for a maximum of 11 credits.

PAC 316. ALI: ROCK CLIMBING II (1). Advanced technical skills, training techniques, rescue rigging, anchor and belay systems, basic aid climbing, hauling, and other big wall techniques; three-stage training; practice. Held at on-campus climbing center. Additional fee may be required for off-campus practice. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 315 [C-]
PAC 317. ALI: ROCK CLIMBING III (1). Provides focus on artificial anchor set-up and gym sport lead climbing. We will look at the application of basic and intermediate gear-oriented skills and determine adequate gear practices. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits. PREREQS: (PAC 315 and PAC 316) or intermediate to advanced skills in an activity area or instructor approval required.
PAC 319. ALI: TECHNICAL RAPPELLING (1). Students will learn, practice and hone their skills in the art of technical rappelling. Introduces many different styles, techniques and equipment used for rappelling in a variety of situations. Throughout the course, students will be provided with simple to advanced challenges to overcome. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.

PAC 320. ALI: MOUNTAINEERING I (1). Snow climbing techniques, anchoring, belaying and rappelling techniques, snow camping/living skills, and wilderness ethics; classroom instruction and required overnight alpine trip. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.

PAC 321. ALI: MOUNTAINEERING II (1). Building on skills learned in Mountaineering I; rope team/glacier travel experience, fundamentals of crevasse rescue, advanced snow climbing techniques, safe anchoring, belaying and rappelling techniques, snow camping/living skills, and wilderness ethics. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits. PREREQS: PAC 320 [C-]
PAC 322. ALI: ICE CLIMBING (1). Students will learn the fundamentals of ice climbing, including efficient ice climbing techniques, safe anchoring, belaying and rappelling techniques and wilderness ethics. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.

PAC 324. ALI: WHITE WATER RESCUE (1). Provides an introduction to white water rescue; students learn the fundamentals of white water rescue, scene management, and the necessary gear to perform rescues. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.

PAC 325. ALI: WILDERNESS FIRST AID (1). Fundamentals of emergency care in a non-urban environment including anatomy, physiology, injury assessment, short-term care, small-group rescues; backcountry emphasis with longterm care and evacuation complications. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.

## PAC 326. ALI: WILDERNESS LIVING

TECHNIQUES (1). Basic wilderness living techniques, knowledge and skills needed for a student to be ethical and efficient, and have the ability to survive in the outdoors. Special emphasis is placed on building shelters, water purification, navigation, awareness, fire, self-sufficiency and caring for groups in the wilderness. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.

PAC 327. ALI: ROCK GUIDE SCHOOL (1). Serves as an opportunity to learn the skills for being a rock guide for the ALI. With five days of training and practice in the field at two climbing sites in Oregon, it serves to help students understand the unique challenges of instructing climbing in the outdoor environment. This course may end with Sport Climbing Instructor certification through the Professional Climbing Instructors of America. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits. PREREQS: Efficient climbers toolbox, self-rescue, climbing wall instructor--lead certification, or instructor approval.
PAC 328. ALI: RAFT GUIDE SCHOOL (1). Provides students the skills and guided practice time needed to become competent paddle raft guides. It is a nine-day course that focuses on the development of water reading, raft maneuvering, risk management, and whitewater rescue skills needed by raft guides. Successful completion of the course will result in a certificate of completion from the American Canoe Association (ACA). PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.

## PAC 329. ALI: WILDERNESS FIRST

RESPONDER (2). Fundamentals of emergency care in a non-urban environment, including physiology, injury assessment, short-term care, anatomy, and small-group rescues. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits. PREREQS: CPR certification.

PAC 330. ALI: SNOW TRAVEL AND CAMPING (1). An introduction to traveling in the backcountry in adverse weather conditions that often accompany winter. Topics covered include cross country touring, snow shoeing, winter camping techniques, and winter safety considerations including introducing avalanche safety. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits.

PAC 331. THE ART OF FLY FISHING (1).
Students will be introduced to fly fishing skills such as casting, knot tying, safety considerations, fly selection, and ways to approach water. There will be a general overview of common places and species to fish in Oregon and other locations. This course combines approximately 30 hours of instruction, online activities, and assignments for 1 credit. PAC courses may not be used to fulfill upper-division requirements. This course is repeatable for a maximum of 11 credits. COREQS: ENG 225, FW 112

## SCHOOL OF SOCIAL AND BEMAVIORAL HEALTH SCIENCES

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## FACULTY

Professors Aldwin, Arnold, Bourdeau, Bowman, Braverman, Catania, Dawson, Dolcini, Flay, Galloway, Harvey, Hooker, Hosty, Kershaw, Krahn, McClelland, Riportella, Settersten, Thorburn
Associate Professors Ashton, Bernell, Black, Busler, Cowan, Hart, Jones, Knutz, Lesmeister, Lipscomb (Cascades Campus), Luck, MacTavish, Magaña, Nagele, Rose, Schreiber, Smith, Stawski, Wells, White, Willis, Withee
Assistant Professors Baggott, K. Davis, W. Davis, Geldhof, Gorman, Hatfield, Irvin, Kothari (Cascades Campus), Li, Mendez-Luck, Mojica, Richards, Rothwell, Sakuma, Yoon Assistant Professors of Practice Brody, J. Davis, Etuk, Fonseca, Kraemer, Larson, Walker

## Associate Professor of Practice

 HeinClinical Associate Professor Volmar Postdoctoral Scholars and
Fellows Choun, Phibbs, Small
Senior Instructors Brey (Cascades Campus), Elliott, Greaves, Livesay, Mannering, McGraw, Osterland, Roll Instructors Chuinard, Crawford, Gilley, Graves, Hedgcoth, Johnson, Keller, Lynn (Cascades Campus), Martinez-Alvarez, McDonnell, McKenna, Olvera, O'Rourke, Peters, Snyder, Werling, Williams
Research Associates Grobe, Weber
Research Assistants Karing, Lewis, Tracy

## ADJUNCT FACULTY

Edwards, Gallagher, Gunter, Lee, Rodrigues, Sherman, Warner

## Undergraduate Majors

Human Development and Family Sciences (BS, CRED, HBS)

Options
Child Development
Human Development and Family
Sciences, General
Human Services
Public Health (BS, CRED, HBS)

## Options

Health Management and Policy
Health Promotion and Health Behavior

## Undergraduate Minors

Early Childhood Development and Education (OSU-Cascades only)
Health Management and Policy
Public Health
Undergraduate Certificate Program Gerontology Certificate

## Graduate Majors

Human Development and Family Studies (MAIS, MS, PhD)
Graduate Areas of Concentration
Human Development and Family Studies
Public Health (MPH, PhD)

## Graduate Options

Biostatistics
Environmental and Occupational Health
Epidemiology
Global Health
Health Management and Policy
Health Promotion and Health Behavior
Graduate Areas of Concentration
Biostatistics (MPH only)
Environmental and Occupational Health (MPH, PhD)
Epidemiology (MPH, PhD)
Health Management and Policy (MPH only)
Health Policy (PhD only)
Health Promotion and Health Behavior (MPH, PhD)
International Health (MPH only)

## Graduate Minors

Aging Sciences
Community Health

## Graduate Area of Concentration <br> Community Health <br> Gerontology

Graduate Areas of Concentration Gerontology
Human Development and Family Studies Public Health

## Affiliated Interdisciplinary

## Graduate Majors

Applied Economics (MA, MS, PhD) (See Graduate School)
Rural Studies (Graduate Minor) (See Graduate School)

## Graduate Certificate

Health Management and Policy
Public Health

The School of Social and Behavioral Health Sciences comprises the fields of health management and policy, health promotion and health behavior, and human development and family sciences. These disciplinary approaches use social and behavioral sciences to improve understanding of the factors that influence the health and well-being of individuals, families, and communities. In addition, these fields develop sound policy, programs, and interventions to improve health and well-being at multiple levels. Finally, through our curricula, we develop the next generation of globally minded public health and human sciences professionals.

The School of Social and Behavioral Health Sciences houses the undergraduate degrees of Human Development and Family Sciences and Public Health. The majors and their options are described below.

The school also houses the MS and PhD in Human Development and Family Studies (see http://health.oregonstate. edu/degrees/graduate/hdfs.)

The school houses the following options of the Master of Public Health (MPH): health management and policy, and health promotion and health behavior. For more information about the MPH program and its areas of concentration, see http://health.oregonstate.edu/ degrees/graduate/public-health/mph.

The school also houses the following concentrations of the Public Health doctoral program: health policy, and health promotion and health behavior, see http://health.oregonstate.edu/degrees/ graduate/public-health/phd-program.

## UNDERGRADUATE PROGRAMS

Human Development and Family

## Sciences Major

The field of human development and family sciences (HDFS) applies an interdisciplinary perspective to understand the development of individuals across the life course and their diverse family, school, and community environments. Students who major in HDFS have diverse and exciting career options in schools and in the helping professions or can pursue advanced academic study in HDFS or related areas.

The School of Social and Behavioral Health Sciences offers a BS in Human Development and Family Sciences with three options:

- Child Development
- Human Development and Family Sciences, General
- Human Services

All three options provide students with the prerequisites for graduate programs in human development and family sciences.

## Family and Consumer Sciences Teacher Training

Students desiring a license to teach family and consumer sciences (grades 5 through 12) should contact the college's Office of Student Success in the Women's Building 105, http://health.oregonstate. edu/success.

## Public Health Major

Public health is an exciting and diverse field for those interested in the health and well-being of populations and their environments. Careers in the public and private sectors offer opportunities to work locally, regionally, nationally, and internationally to promote health and prevent disease. Recognizing that multiple and complex factors affect the public's health, our faculty and students examine environmental issues, access to health care services, health policies, and social and contextual factors as determinants of health.
Students in this major will choose one of the following major options:

- Health Management and Policy
- Health Promotion and Health Behavior
Both options provide students with the prerequisites for graduate programs in public health.


## Health Management and Policy Option

This option provides training and skills in the management of public health, health care programs and agencies, and in the analysis of public health policies. The program is appropriate for those who want to manage health programs in a wide range of institutions, both public and private, and is particularly well-suited for students interested in the business aspects associated with the delivery and financing of health services. Students can also receive a certificate of Gerontology.

## Health Promotion and Health

## Behavior Option

This option prepares students for many career opportunities in the areas of public health promotion, health behavior, and disease prevention. Students learn a variety of skills and strategies that will provide them with the necessary proficiencies to improve population health in diverse settings. The program focuses on the social and behavioral determinants of health and disease across the lifespan, with a particular emphasis on health disparities. Graduates are qualified to assist with the planning, implementing, and evaluation of programs that address health disparities and that are intended to improve the health of diverse populations.

## UNDERGRADUATE MAJORS WITH OPTIONS

## HUMAN DEVELOPMENT AND FAMILY SCIENCES (BS, CRED, HBS)

## Also available via Ecampus.

HDFS majors study interdisciplinary research and theory on human development across the lifespan within the contexts of families, school, work, and communities to prepare for careers in schools and helping professions and to pursue advanced academic degrees. The BS in Human Development and Family Sciences can be pursued through one of three required options listed below:

1. Child Development option
2. Human Development and Family Sciences, General
3. Human Services option

See each option in the HDFS overview for detailed information.
Note: It is possible to choose more than one option. Students should meet with an advisor in the college's Office of Student Success in the Women's Building 105 for additional information.

## Credits Needed to Graduate:

180 credits, 60 of which must be upper division. Credits are to include baccalaureate core courses, HDFS core courses, classes required for each option, and electives.

## Baccalaureate Core (48)

48 credits required of all students; courses may include BCC courses in the HDFS core and options as indicated by an asterisk.
HDFS Core Courses (40-46)
Required of all HDFS students:
COMM 218. *Interpersonal
Communication (3)
H 100. Introduction to Public Health (4)
HDFS 240. *Human Sexuality (3)
HDFS 314. Adult Development and Aging (4)

HDFS 341. Family Studies (4)
HDFS 360. Critical Thinking in Human
Development and Family Sciences (4)
HDFS 361. Applied Research Methods (4)
NUTR 225. General Human Nutrition (3)
PSY 201. *General Psychology (3)
PSY 202. *General Psychology (3)
SOC 204. *Introduction to Sociology (3)
WR 327. *Technical Writing (3)
Choose one of three statistics options below:

1. H 220 . Introduction to Health Data Analysis (3)
2. ST 201, ST 202. Principles of Statistics $(4,4)$
3. ST 351. Introduction to Statistical Methods (4)

## Footnote:

* Baccalaureate Core Course (BCC)

Pre-Professional Human
Development and Family Sciences
Major Code: 457
Major Code: 447

## OPTIONS

## CHILD DEVELOPMENT OPTION

The Child Development option prepares students to work directly with children of all ages and their families. This option is a strong foundation for work in a preschool and Head Start classrooms, early intervention, adolescent intervention, parent education and support, or for graduate work in HDFS, psychology, sociology, or education. With additional course work, students can pursue teacher licensure through the OSU College of Education or through other institutions.

## HDFS Core

HDFS 240. *Human Sexuality (3)
HDFS 314. Adult Development and Aging (4)
HDFS 341. Family Studies (4)
HDFS 360. Critical Thinking in Human
Development and Family Sciences (4)
HDFS 361. Applied Research Methods (4)

## Non-HDFS Courses

COMM 218. *Interpersonal
Communication (3)
NUTR 225. General Human Nutrition (3)
PSY 201. *General Psychology (3)
PSY 202. *General Psychology (3)
SOC 204. *Introduction to Sociology (3)
WR 327. *Technical Writing (3)
Choose one of three statistics options below:

1. H 220 . Introduction to Health Data Analysis (3)
2. ST 201, ST 202. Principles of Statistics $(4,4)$
3. ST 351. Introduction to Statistical Methods (4)

## Child Development Curriculum

(36-39)
HDFS 311 Infant and Child Development (4)
HDFS 313 Adolescent Development (4)
HDFS 330. Fostering Learning in Early
Childhood Development (4)
HDFS 430. ${ }^{\wedge}$ Student Teaching in Early
Childhood Development and Education (12)
HDFS 431. Family, School, and Community
Collaboration (3)
Choose any three (9-12):
ED 140. Introduction to Early Childhood
Education (4) Central Oregon
Community College Only
HDFS 201. *Contemporary Families in the U.S. (3)

HDFS 312. Parenting Research and Application (4)
HDFS 331. Directed Experience in Early
Childhood (3) Cascades Only
HDFS 432. Children and Youth With Special Needs (3)
HDFS 444. Family Violence and Neglect (4)
HDFS 447. *Families and Poverty (4)
HDFS 465. Topics in Human Development and Family Sciences (3)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: $\mathbf{2 2 8}$


## HUMAN DEVELOPMENT AND FAMILY SCIENCE, GENERAL OPTION

Available on the Corvallis and OSU-Cascades campuses and via Ecampus.
Students majoring in Human Development and Family Sciences learn how people change across the life course within the contexts of families, school, work, and communities. Information from many disciplines is applied to the study of individuals and families, preparing students to fully understand people and to develop skills in critical thinking and in research. Students learn about infants and toddlers, teens and adults of all ages, and families.

On completing the HDFS General option, students are prepared to be involved and effective community members and to improve people's lives. The HDFS General option is ideal for students interested in the helping professions and also pairs well with a minor or a second major in liberal studies; pre-medicine or pre-nursing; psychology; public health; sociology; Spanish; or women studies, gender, and sexuality studies. It provides exceptional preparation for graduate work in counseling, education, public policy, social work, or human development and family sciences, each of which can lead to a productive, satisfying career.

## HDFS Core (19)

HDFS 240. *Human Sexuality (3)
HDFS 314. Adult Development and Aging (4)
HDFS 341. Family Studies (4)
HDFS 360. Critical Thinking in Human
Development and Family Sciences (4)
HDFS 361. Applied Research Methods (4)

## Non-HDFS Courses (21-26)

COMM 218. *Interpersonal
Communication (3) (COCC: SP 218)
NUTR 225. General Human Nutrition (3) (COCC: FN 225)
PSY 201. *General Psychology (3) (COCC: PSY 201)
PSY 202. *General Psychology (3) (COCC: PSY 202)
SOC 204. *Introduction to Sociology (3) (COCC: SOC 201)
WR 327. *Technical Writing (3)
Choose one of three statistics options below:
H 220. Introduction to Health Data Analysis (3) (COCC: MTH 243 and MTH 244)

ST 201, ST 202. Principles of Statistics (4,4) (COCC: MTH 243, MTH 244)
ST 351. Introduction to Statistical Methods (4)

## Required for Option (23)

HDFS 311. Infant and Child Development (4)
HDFS 313. Adolescent Development (4)
HDFS 461. ^Program Development and Proposal Writing (4)

## Choose at least 11 credits from the

 following courses not previously taken:ED 140. Introduction to Early Childhood

Education (4) COCC Course
HDFS 201. *Contemporary Families in the U.S. (3)

HDFS 312. Parenting Research and Application (4)
HDFS 331. Directed Experience in Early
Childhood (3) OSU-Cascades Only
HDFS 431. Family, School, and Community Collaboration (3)
HDFS 432. Children and Youth With Special Needs (3)
HDFS 444. Family Violence and Neglect (4)
HDFS 447. *Families and Poverty (4)
HDFS 465. Topics in Human Development and Family Sciences (3)

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
COCC: Central Oregon Community College


## Option Code: 441

## HUMAN SERVICES OPTION

The Human Services option prepares students for entry-level positions in a variety of human services settings including the juvenile justice system, health care settings and hospices, criminal justice agencies, community advocacy groups, the child welfare system, elderly services, children and youth services, substance abuse programs, and many others. Students gain an understanding of the social and human service delivery systems and acquire basic skills to communicate effectively with clients, develop intervention strategies, and solve interpersonal and social problems. At least two internship experiences in human services programs are required for degree completion. Students are prepared to pursue a graduate degree in several areas including counseling, social work, psychology, marriage and family therapy, human development and family sciences, nonprofit administration, public policy, and others.

## HDFS Core

HDFS 240. *Human Sexuality (3)
HDFS 314. Adult Development and Aging (4) HDFS 341. Family Studies (4)
HDFS 360. Critical Thinking in Human
Development and Family Sciences (4) HDFS 361. Applied Research Methods (4)

## Non-HDFS Courses

COMM 218. *Interpersonal
Communication (3)
NUTR 225. General Human Nutrition (3)
PSY 201. *General Psychology (3)
PSY 202. *General Psychology (3)
SOC 204. *Introduction to Sociology (3)
WR 327. *Technical Writing (3)
Choose one of three statistics options below:
H 220. Introduction to Health Data Analysis (3)

ST 201, ST 202. Principles of Statistics $(4,4)$
ST 351. Introduction to Statistical Methods (4)

Human Services (36-47)
HDFS 107. Introduction to Human Services (3)

HDFS 209. Human Services Practicum (4)
(may be repeated for a max. of 8 credits)
HDFS 311. Infant and Child Development
(4)
or HDFS 313. Adolescent Development (4)
HDFS 410. Human Services Internship (6-12)
HDFS 461. ^Program Development and
Proposal Writing (4)
HDFS 462. Skills for Human Services
Professionals (4)

## Choose any three:

ED 140. Introduction to Early Childhood Education (4) COCC Only
HDFS 201. *Contemporary Families in the U.S. (3)

HDFS 311. Infant and Child Development (4)

HDFS 312. Parenting Research and
Application (4)
HDFS 313. Adolescent Development (4)
HDFS 331. Directed Experience in Early
Childhood (3) Cascades Only
HDFS 431. Family, School, and Community
Collaboration (3)
HDFS 432. Children and Youth With Special Needs (3)
HDFS 444. Family Violence and Neglect (4)
HDFS 447. *Families and Poverty (4)
HDFS 465. Topics in Human Development and Family Sciences (3)

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 430
PUBLIC HEALTH (BS, CRED, HBS)
Public Health majors are required to complete the Public Health core and one of two options in order to earn the BS in Public Health degree:
- Health Management and Policy
- Health Promotion and Health Behavior
Before admission to the Public Health major, the student must complete the Public Health pre-major (major code 738), which requires a minimum average GPA of 3.0 in the following four courses. Additionally, a minimum grade of C is required in each.
H 100. Introduction to Public Health (4)
H 210. *Introduction to the Health Care
System (3)
H 220. Introduction to Health Data Analysis (3)
or ST 201. Principles of Statistics (4)
H 225. *Social and Individual Health Determinants (4)
Public Health Core (Both Options)
H 100. Introduction to Public Health (4)
H 210. *Introduction to the Health Care System (3)
H 220. Introduction to Health Data Analysis (3)
or ST 201. Introduction to Statistics (4)
H 225. *Social and Individual Health Determinants (4)
H 319. Introduction to Health Policy (3)
H 320. Introduction to Human Disease (3)
H 344. Foundations of Environmental Health (3)
H 425. Foundations of Epidemiology (3)


## Footnotes:

* Baccalaureate Core Course (BCC)

Pre-Professional Public Health
Major Code: 738
Major Code: 239

## OPTIONS

## HEALTH MANAGEMENT AND POLICY OPTION

## Also available via Ecampus.

The Health Management and Policy minor provides students with a background
in public health, with an emphasis on
the management of health care programs and agencies.
ECON 201. *Introduction to
Microeconomics (4)
H 100. Introduction to Public Health (4)
H 210. *Introduction to the Health Care System (3)
H 220. Introduction to Health Data Analysis
(3) (not required for business majors)

H 225. *Social and Individual Health Determinants (4)
H 250. Introduction to Health Care Management (3)
H 436. Advanced Topics in Health Care Management (3)
Check prerequisites/corequisites for H 250 and $H 436$.
Select 9 credits from the following (business majors select 12 credits):
H 319. Introduction to Health Policy (3)
H 425. Foundations of Epidemiology (3)
H 457. Financial Management of Health Care Organizations (3)
H 458. Reimbursement Mechanisms (3)

## Total credits required=33

Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Option Code: 242


## HEALTH PROMOTION AND

## HEALTH BEHAVIOR OPTION

This option prepares students for many career opportunities in the areas of public health promotion, health behavior, and disease prevention. Students learn a variety of skills and strategies that will provide them with the necessary proficiencies to improve population health in diverse settings. The program focuses on the social and behavioral determinants of health and disease across the lifespan, with a particular emphasis on health disparities. Graduates are qualified to assist with the planning, implementing, and evaluation of programs that address health disparities and that are intended to improve the health of diverse populations.

## Health Promotion and Behavior

Required Option Core (21)
H 310. Health Field Experiences: Peer Helper (3)
or H 349. Peer Helper Skills Development (3)

H 407. Seminar (Sect. 1, Pre-Internship) (2)

H 410. Internship (12)
H 476. ${ }^{\wedge}$ Planning and Evaluating Health Promotion Programs (4)
Required Supporting Courses (16)
BI 101. *General Biology (4)
or BI 102. *General Biology (4)
or BI 103. *General Biology (4)
ES 101. *Introduction to Ethnic Studies (3)
NUTR 225. General Human Nutrition (3)
or NUTR 240. Human Nutrition (3)
PSY 201. *General Psychology (3)
SOC 204. *Introduction to Sociology (3)
WR 222. *English Composition (3) [WR II]
[Effective fall 2017]
Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Option Code: 241


## UNDERGRADUATE MINORS

## EARLY CHILDHOOD <br> DEVELOPMENT AND EDUCATION MINOR

For Non-HDFS Majors at OSUCascades Campus only.

## Required Course Work

HDFS 311. Infant and Child Development (4)
HDFS 330. Fostering Learning in Early Childhood Development (4) At OSUCascades
HDFS 331. Directed Experience in Early Childhood (3) At OSU-Cascades
HDFS 341. Family Studies (4) At OSUCascades
HDFS 431. Family, School, and Community Collaboration (3) At OSU-Cascades
PSY 201. Mind and Brain (3) Provided by COCC
PSY 202. Mind and Society (3) Provided by COCC
Plus 6 credit of upper-division electives with HDFS prefix.
Total=27, including 18 credits of upper-division credits in HDFS
Minor Code: 407

## HEALTH MANAGEMENT AND POLICY MINOR

The Health Management and Policy minor provides students with a background in public health with an emphasis on the management of health care programs and agencies.
ECON 201. *Introduction to
Microeconomics (4)
H 100. Introduction to Public Health (4)
H 210. *Introduction to the Health Care System (3)
H 220. Introduction to Health Data Analysis
(3) (not required for business majors)

H 225. *Social and Individual Health Determinants (4)
H 250. Introduction to Health Care Management (3)
H 436. Advanced Topics in Health Care Management (3)
Check prerequisites/corequisites for H 250 and H 436.
Select 9 credits from the following
(business majors select 12 credits):
H 319. Introduction to Health Policy (3)
H 425. Foundations of Epidemiology (3)
H 432. Economic Issues in Health and
Medical Care (3)
H 434. ^Health Care Law and Regulation (3)
H 457. Financial Management of Health
Care Organizations (3)
H 458. Reimbursement Mechanisms (3)

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Minor Code: 465


## PUBLIC HEALTH MINOR

Also available via Ecampus.
The Public Health minor provides students with a general background in public health. Students with this minor may not take any of the required courses listed below with S/U grading, including the "any other H course" requirement. Students may, however, take additional public health courses not required for the minor with $\mathrm{S} / \mathrm{U}$ grading.
H 100. Introduction to Public Health (4)
H 210. *Introduction to the Health Care
System (3)
H 220. Introduction to Health Data Analysis (3)
or ST 201. Principles of Statistics (4)
H 225. *Social and Individual Health
Determinants (4)
H 319. Introduction to Health Policy (3)
H 320. Introduction to Human Disease (3)
H 344. Foundations of Environmental Health (3)
H 425. Foundations of Epidemiology (3)
Any other H course of at least 3 credits

## Total = $\mathbf{2 9}$ credits

Footnote:

* Baccalaureate Core Course (BCC)

Minor Code: 496

## GRADUATE MAJORS

## HUMAN DEVELOPMENT AND FAMILY STUDIES (MS, PhD, MAIS)

## Graduate Areas of Concentration

 Human development and family studiesThe School of Social and Behavioral Health Sciences offers course work and programs of study in the area of human development and family studies. The Gerontology Program is also administered by the College of Public Health and Human Sciences through the school. Areas of study and degrees granted are described below.

Human Development and Family Studies offers graduate work leading to master of science and doctor of philosophy degrees. Graduate programs take a multidisciplinary approach, preparing students for college and university teaching and research, as well as development, administration, and evaluation of programs serving individuals and families
across the lifespan.
Our research is interdisciplinary with signature themes in (a) transitions across the life course, (b) risk and resilience across the life span, and (c) developmental and family research methods. Our faculty recognizes the critical importance of culture and gender, diversity, and contemporary global perspectives in the discovery of knowledge. We have research emphases in child development, adolescence, adult development and aging, families, rural communities, and cross-national comparison.

Research is an important focus of the Graduate Program in Human Development and Family Studies. The HDFS faculty includes nationally recognized scholars who are widely published in areas such as families and aging; family communication and conflict; child, adolescent, and adult development; intergenerational family relationships; family structure; and gender. We emphasize both quantitative and qualitative methodology.

For more information, contact the Graduate Program in Human Development and Family Studies, College of Public Health and Human Sciences, 437 Waldo Hall, OSU, Corvallis, OR 97331-5102.

Major Code: 4470

## GRADUATE MINORS

## AGING SCIENCES GRADUATE

 MINORThis graduate minor provides interdisciplinary graduate education in the aging sciences through formal course work, research requirements and experiential learning that is aligned with the student's career goals in aging.

The Aging Sciences minor requires that master's students select 15 credits from the following courses. Doctoral students must select 18 credits

## Required Courses:

BB 650. Selected Topics in Biochemistry and Biophysics: Molecular Mechanisms of Aging (3)
CS 607. Seminar: Research and Professional Topics in Aging (1) Taken 4 terms
or KIN 607. Seminar: Research and
Professional Topics in Aging (1) Taken 4 terms
or HDFS 607. Seminar: Research and Professional Topics in Aging (1) Taken 4 terms
GRAD 520. Responsible Conduct of Research (1)
HDFS 565. Topics in Human Development and Family Sciences: Behavioral and Social Sciences of Aging (3)

## Select 4 or more credits (1-2

courses) from the following:

## Computer Science

CS 519. Topics in Computer Science: Data Visualization (4)

CS 519. Topics in Computer Science: Human-Computer Interaction (4)

## Kinesiology

KIN 515. Motor Control and Movement Dysfunction (3)
KIN 525. Biomechanics of Musculoskeletal Injury (3)
KIN 550. Health Promotion for People with Disabilities (3)
KIN 562. Lifespan Sport and Exercise Psychology (3)
KIN 599. Special Topics: Bone Physiology (3) or NUTR 599. Special Topics: Bone Physiology (3)

## Human Development and Family

## Sciences

HDFS 518. Adult Development and Aging (4) HDFS 587. Social Gerontology (3)
HDFS 617. Advanced Topics in Adult Development and Aging (3)

## Nutrition

H 577. Dietary Interventions for Public Health (3) [Terminated fall 2017]
NUTR 514. Health Benefits of Functional Foods, Nutraceuticals, and Dietary Supplements (3)
NUTR 517. Human Nutrition Science (4)
NUTR 518. Human Nutrition Science (4)
NUTR 523. Community Nutrition (4)
NUTR 599. Special Topics in Nutrition Research: Bone Physiology (3) or NUTR 699 Special Topics in Nutrition Research: Bone Physiology (3)
NUTR 599. Special Topics in Nutrition Research: Advances in Cancer Research (3) or NUTR 699. Special Topics in Nutrition Research: Advances in Cancer Research (3)
NUTR 599. Special Topics in Nutrition Research: Advances in Metabolic Disease (3) or NUTR 699. Special Topics in Nutrition Research: Advances in Metabolic Disease (3)

## Philosophy

PHL 544. Biomedical Ethics (4)
PHL 555. Death and Dying (3)

## Psychology

PSY 540. Cognition Research (4)
PSY 598. Health Psychology (4)

## Public Health

H 522. Health, Aging, and Control of Chronic Diseases (4)
H 532. Economic Issues in Health and Medical Care (3)
H 554. Epidemiology of Aging (3)
H 567. Long-Term Care Alternatives (3)
H 568. Financing and Administration of Long-Term Care (3)
H 576. Program Planning/Proposal Writing in Health/Human Services (4)
H 577. Dietary Interventions for Public Health (3) [Terminated fall 2017]

## Sociology

SOC 532. Sociology of Aging (3)
Minor Code: 3755
COMMUNITY HEALTH GRADUATE MINOR

Graduate Areas of Concentration Community health
For more details, contact Sheryl Thor-
burn, Co-Director, 433 Waldo Hall,

Oregon State University, Corvallis, OR 97331-6406, 541-737-9493; email: sheryl. thorburn@oregonstate.edu

## Minor Code: 7180

## GERONTOLOGY GRADUATE

 MINOR
## Graduate Areas of Concentration Gerontology

Gerontology refers to the study of aging, and also includes adult development. The existence of large numbers of individuals over the age of 65 is unprecedented in the history of humankind. In the next ten years, the number of older adults is expected to double in developed countries and quadruple in the developing world. This growth will pose major challenges for societies in addressing the health, economic, and social needs of this population.

To address these challenges, students, researchers, and practitioners in the field of aging will need to take a multidisciplinary approach to solving these challenges, which will require an understanding of biological, psychological, sociocultural, and design and engineering factors. Accordingly, we have designed a multidisciplinary minor, drawing upon faculty across campus, which is tailored to individual student needs.

Students are required to have a 3.0 GPA and to have one of the gerontology faculty on their committee. Students must take 18 credits but can decide the classes in conjunction with their committee. Sample classes include:
H 536. Healthcare Organization Theory and Behavior (3)
H 554. Epidemiology of Aging (3)
H 558. Reimbursement Mechanisms (3)
H 576. Program Planning/Proposal Writing in Health/Human Services (4)
H 568. Financing and Administration of Long-Term Care (3)
HDFS 518. Adult Development and Aging (4)

HDFS 519. The Life Course (4)
HDFS 565. Topics in Human Development and Family Sciences (3):
"Psychosocial Factors in Aging"
"Stress and Coping Across the Lifespan"
HDFS 587. Social Gerontology (3)
HDFS 617. Advanced Topics in Adult
Development and Aging (3)
PHL 544. Biomedical Ethics (4)
PHL 555. Death and Dying (3)
SOC 532. Sociology of Aging (3)

## Minor Code: 4370

## HUMAN DEVELOPMENT AND FAMILY STUDIES GRADUATE <br> MINOR

For more details, see the graduate program director.
Minor Code: 4470

## CERTIFICATES

GERONTOLOGY CERTIFICATE
Carolyn Aldwin, Director
Program on Gerontology
Waldo Hall 437
Oregon State University
Corvallis, OR 97331-5102
541-737-2024
Email: carolyn.aldwin@oregonstate.edu Website: http://health.oregonstate.edu/ sbhs/gerontology

Undergraduate Certificate Program Gerontology

## Graduate Minor <br> Gerontology

Area of Concentration
Gerontology

The Program on Gerontology offers an interdisciplinary approach to the study of aging. Because aging involves physiological, sociological, and psychological processes, gerontology education and research is relevant to many disciplines. Career opportunities in gerontology are extremely diverse and include positions in community services, health sciences, nutrition and dietetics, housing, health and physical education, pharmacy, counseling, health care administration, business, public policy, and many other areas.

Recognizing the diversity of relevant disciplines and career opportunities, the OSU Program on Gerontology offers course work in gerontology through 10 schools/departments. The program is administered through the School of Social and Behavioral Health Sciences.

To be considered a gerontology course, at least 50 percent of the course content must address gerontology-related issues.

In addition to gerontology courses, seminars, field study (310/410/510/610), research (401/501/601), and projects (406/506/606) in gerontology are offered through the Gerontology Program. Field study, research, and projects in gerontology may also be available through other schools/departments. Students register for field study, research, or projects credit in the school or department that best meets their needs for supervision given the nature of the experience.

## Graduate Study in Gerontology

OSU offers over 20 graduate-level gerontology courses plus field study and research opportunities. There are three ways to pursue significant graduate work in gerontology at OSU:

1. Gerontology may be selected as an area of concentration for both master's and doctoral degrees in Human Development and Family

Studies. Students choosing this concentration will select adult development and aging course work and research in their major and may choose an integrated minor in gerontology.
2. Gerontology is an integrated graduate minor (i.e., courses chosen from a variety of schools/ departments) available to graduate students in any major field. The minor requires 18-36 credits, including HDFS 587, Social Gerontology. The balance of the course work is selected from graduate gerontology courses, field study, and/ or research.
3. Gerontology is an area of study in the Master's of Interdisciplinary Studies (MAIS) program. MAIS students are required to take a minimum of 15 credits in gerontology, including HDFS 587, Social Gerontology. The balance of courses is selected from graduate gerontology courses, field study, and/or research.

## Certificate Requirements, Program

 on GerontologyGerontology Core Courses (10 credits)
HDFS 314 Adult Development and Aging (4)
Any two of the following selected
from two different departments:
H 422. Health, Aging and Control of Chronic Disease (4)
NUTR 325. Nutrition Through the Life Cycle (3)
PSY 350. Human Lifespan Development (4)
SOC 355. Death and Dying (4)
Gerontology courses include:
H 422/H 522. Health, Aging and Control of Chronic Diseases (4)
H 432/H 532. Economic Issues in Health and Medical Care (3)
H 436. Advanced Topics in Health Care Management (3)
H 458/H 558. Reimbursement Mechanisms (3)

H 465/H 565. *Public Health and Women: Social and Policy Issues (3)
H 467/H 567. Long-Term Care Alternatives (3)

H 468/H 568. Financing and Administration of Long-Term Care (3)
H 476. ${ }^{\wedge}$ Planning and Evaluating Health Promotion Programs (4)
H 536. Healthcare Organization Theory and Behavior (3)
H 576. Program Planning/Proposal Writing in Health/Human Services (4)
HDFS 314. Adult Development and Aging (4)

HDFS 465/HDFS 565. Topics in Human
Development and Family Sciences (3)
HDFS 518. Adult Development and Aging (4)

HDFS 519. The Life Course (4)
HDFS 587. Social Gerontology (3)
HDFS 617. Advanced Topics in Adult
Development and Aging (3)

PHL 444/PHL 544. *Biomedical Ethics (4)
PHL 455/PHL 555. Death and Dying (3)
PSY 350. Human Lifespan Development (4)
SOC 432/SOC 532. Sociology of Aging (3)
Note: Other courses are approved annually by the Gerontology Program.

## Field study or field projects in Gerontology - Any Department (1-16 credits)

In addition to gerontology courses, seminars, field study (310/410/510/610), research (401/501/601), and projects (406/506/606) in gerontology are offered through the Gerontology Program.

Field study is a vital component of the Gerontology Certificate program. Three to six credits of an approved field experience or an approved research or field project are required. No more than six credits of field study will count toward certificate completion. Field Experience or Internships involve professional level work experience in an agency or organization that serves older adults. To be considered a gerontology field placement, at least half of the student's time must be spent working with or for older individuals.
Ordinarily, nine credits of gerontology course work must be completed prior to beginning field study. Specific requirements for field study are cooperatively developed by the faculty supervisor, student, and a community agency. The type of field study selected should reflect the student's career interests, as well as the student's competencies and the community agency's needs.
Field study in gerontology must be approved by the Program on Gerontology if it is to be used to meet Certificate requirements. Approval forms are available from the Program on Gerontology.
Electives from list of approved Gerontology Classes (12-15 credits) Twelve to 15 credits of gerontology electives are required beyond the gerontology core to complete the minimum of 27 credits of gerontology study. A list of courses approved for electives appears below.

H 320. Introduction to Human Disease (3)
H 422/H 522. Health, Aging and Control of Chronic Diseases (4)
H 432/H 532. Economic Issues in Health and Medical Care (3)
H 436. Advanced Topics in Health Care Management (3)
H 458/H 558. Reimbursement Mechanisms (3)

H 465/H 565. *Public Health and Women: Social and Policy Issues (3)
H 467/H 567. Long-Term Care Alternatives (3)

H 468/H 568. Financing and Administration of Long-Term Care (3)
H 476. ^Planning and Evaluating Health Promotion Programs (4)
H 536. Healthcare Organization Theory and Behavior (3)

H 576. Program Planning/Proposal Writing in Health/Human Services (4)
HDFS 461. ${ }^{\wedge}$ Program Development and Proposal Writing (3)
HDFS 462. Skills for Human Services Professionals (4)
HDFS 465/HDFS 565. Topics in Human
Development and Family Sciences (3)
HDFS 518. Adult Development and Aging (4)
HDFS 519. The Life Course (4)
HDFS 587. Social Gerontology (3)
HDFS 617. Advanced Topics in Adult
Development and Aging (3)
KIN 434. Applied Muscle Physiology (3)
KIN 437. Physical Activity, Aging, and Chronic Disease (4)
NUTR 312. *Issues in Nutrition and Health (3)

NUTR 325. Nutrition Through the Life Cycle (3)
NUTR 423/NUTR 523. Community Nutrition (4)
PHL 444/PHL 544. *Biomedical Ethics (4)
PHL 455/PHL 555. Death and Dying (3)
PSY 350. Human Lifespan Development (4)
SOC 355. Death and Dying (4)

## Additional Requirements

1. A grade of " C " or better in all gerontology courses. Overall GPA of 2.5.
2. Formal application to the program; forms available from the program office in 437 Waldo Hall.
3. Certificate requirements fulfilled within five years following graduation. Students who have not completed certificate requirements upon receipt of the degree may continue as special, postbaccalaureate, or graduate students.

## Major Code: C437

## HEALTH MANAGEMENT AND POLICY GRADUATE CERTIFICATE

For more details about this graduate certificate, see the school advisor.

## Required (12 credits)

H 532. Economic Issues in Health and Medical Care (3)
H 534. Health Care Law and Regulation (3)
H 536. Health Services Administration and Management (3)
H 556. Strategic Management of Health Service Organizations (3)

## Electives ( 6 credits)

H 530. Health Policy Analysis (3)
H 531. Health Care Marketing (3)
[Terminated fall 2017]
H 538. Public and Private Health Insurance (3)

H 539. Health Care Information Systems (3)
H 557. Financial Management of Health
Care Organizations (3)
H 558. Reimbursement Mechanisms (3)
H 567. Long-Term Care Alternatives (3)
H 568. Financing and Administration of
Long-Term Care (3)
H 599. Selected Topics (1-3)
Other electives may be chosen with the
consent of the student's advisor.

## Major Code: CG05 <br> P PUBLIC HEALTH COURSES

H 100. INTRODUCTION TO PUBLIC HEALTH (4), A basic overview of public health. Uses a mix of lectures, guest speakers, classroom activities and homework to help students understand the role of public health in eliminating health disparities, understanding epidemics, and setting policy.
H 100H. INTRODUCTION TO PUBLIC HEALTH (4). A basic overview of public health. Uses a mix of lectures, guest speakers, classroom activities and homework to help students understand the role of public health in eliminating health disparities, understanding epidemics, and setting policy. PREREQS: Honors College approval required.

H 199. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.
H 210. *INTRODUCTION TO THE HEALTH CARE SYSTEM (3). Provides tools to understand and critically assess the health care delivery system, its components, and the challenges created by its structure. The health care system will be considered from the perspective of several main players [e.g., patients, hospitals, doctors, health plans]. (Bacc Core Course)
H 220. INTRODUCTION TO HEALTH DATA
ANALYSIS (3). Introduction to the application of biostatistics and probability to the health sciences. Topics include quantitative analysis and inference, statistical methods in the biosciences, and quantitative study to evaluate and control health problems. PREREQS: MTH 105 or MTH 111 or higher mathematics
H 225. *SOCIAL AND INDIVIDUAL HEALTH DETERMINANTS (4). Overview of the macro (social/system/environmental) and micro (individual) contributors to premature disease, disability and population health. Selected behavioral theories supporting health risks and strategies for the prevention of premature disease/ disability and the promotion of health. (Bacc Core Course)

## H 250. INTRODUCTION TO HEALTH CARE

MANAGEMENT (3). Participants will learn key principles, practices and personalities of health care management. The content is broadly applicable to health care enterprises of every kind: public health organizations, physician practices and clinics, hospitals and health systems, agencies and service organizations, for-profit firms, not-for-profit enterprises, etc. PREREQS: H 210* [C-]

## H 309. PRACTICUM IN HEALTH CARE

SERVICES (3-6). Supervised work experience in a health care service setting or health-related agency or program. Weekly progress reports and post-experience summary report and evaluation will be expected. Preplanned with instructor approval. Open to health care administration majors. Graded P/N. This course is repeatable for a maximum of 12 credits. PREREQS: Junior standing. Instructor consent required.
H 310. HEALTH FIELD EXPERIENCES (3-6). Introductory field experience in a health or health-related worksite. Graded P/N. This course is repeatable for a maximum of 12 credits.
PREREQS: H 210 [C-] and junior standing.

## 312. *HIV/AIDS AND STIS IN MODERN

SOCIETY (3). Fundamental principles relating to etiology, nature, prevention, and control of AIDS and other sexually transmitted diseases in contemporary society; emphasis on social, psychological, legal, economic, and ethical issues surrounding these diseases. (Bacc Core Course)
H 319. INTRODUCTION TO HEALTH POLICY (3). Describe the policy development process, including problem conceptualization, agenda setting, role of interest groups and public opinion, analysis of alternatives and selection of policy alternative. PREREQS: H 210 [C-]

H 320. INTRODUCTION TO HUMAN DISEASE
(3). Fundamental principles relating to etiology, nature, prevention, and control of communicable and noncommunicable diseases in human populations. Special emphasis on disease prevention and health promotion in the high risk diseases of modern, industrialized society.
H 333. *GLOBAL PUBLIC HEALTH (3). Introduction to the field of global health, its history, methods, and key principle; understanding global health inequities through case studies; overview of major global health prevention programs. (Bacc Core Course)
H 344. FOUNDATIONS OF ENVIRONMENTAL
HEALTH (3). Introductory course examining environmentally-linked disease, and health effects associated with toxic substances, food quality, pesticides, air, water, and noise pollution, and solid/hazardous wastes.
H 349. PEER HELPER SKILLS DEVELOPMENT
(3). Prepares the student for an active role as a peer helper in alcohol and drug abuse prevention and health education. Course work will include: drug, alcohol, addiction and other related health issues, basic listening and communication skills, conflict resolution, crisis recognition and referral. A major component will be affective learning situations designed to promote self-awareness and personal growth.
H 364. DRUGS, SOCIETY AND HUMAN
BEHAVIOR (3). Drug use and abuse; theories of addiction; basic principles of drug action regarding the use of sedative and stimulative compounds; alcohol; opiates; hallucinogens; designer drugs; cocaine; and over-the-counter products Particular emphasis on the role of the individuals value orientation, decision-making, and selfresponsibility in treatment and educational approaches to prevention. PREREQS: (PSY 201 [C-] or PSY 202 [C-] )
H 364H. DRUGS, SOCIETY AND HUMAN
BEHAVIOR (3). Drug use and abuse; theories of addiction; basic principles of drug action regarding the use of sedative and stimulative compounds; alcohol; opiates; hallucinogens; designer drugs; cocaine; and over-the-counter products. Particular emphasis on the role of the individual's value orientation. PREREQS: (PSY 201 [C-] or PSY 202 [C-] ) and Honors College approval required.
H 385. SAFETY AND HEALTH STANDARDS
AND LAWS (3). Emphasis on the Occupational Safety and Health Act; study includes the scope and duties under the act, enforcement, and adjudication procedures and OSHA litigation; components of Oregon-OSHA.
H 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
H 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
H 401. RESEARCH AND SCHOLARSHIP (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Instructor's consent required.
H 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits.
H 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Instructor's consent required.
H 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16
credits. PREREQS: Instructor's consent required.
H 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Instructor's consent required.
H 407. SEMINAR (2). Seminar to prepare students for their internship in public health. This course is repeatable for a maximum of 6 credits. PREREQS: HMP (Health Management Promotion) option students are required to take H

436 in preparation and hold junior standing. HPHB Health Promotion and Health Behavior) option students are required to take H 225 and H 320 and hold junior standing.
H 407H. SEMINAR (2). Seminar to prepare students for their internship in public health. This course is repeatable for a maximum of 6 credits. PREREQS: HMP (Health Management Promotion) option students are required to take H 436 in preparation and hold junior standing. HPHB (Health Promotion and Health Behavior) option students are required to take H 225 and H 320 and hold junior standing. Honors College approval required.

H 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits PREREQS: Instructor consent required.
H 409. PRACTICUM (1-6). Supervised work experience in a public health or health care administration setting. Open to majors in public health. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Senior standing and departmental approval

H 410. INTERNSHIP (1-12). Directed field experience with participation in a community, worksite, or health agency program. Experience is individually arranged to meet student needs. Graded P/N. This course is repeatable for a maximum of 24 credits. PREREQS: H 436 and H 407 (HMP only); H 225 and H 320 and H 476 and H 407 (HPHB only)
H 418. PUBLIC HEALTH ETHICS AND ISSUES
(3). Current ethical issues in public health, including gender and ethnicity in employment, pharmaceutical controls, product liability, advertising, and export of high technology PREREQS: Senior standing.

H 421. MENTAL HEALTH (3). Examination of social, governmental, legal and individual mental health issues. Brief overview of some major mental disorders. PREREQS: (H 225 [C-] and H 320 [C-] ) and junior standing.

H 422. HEALTH, AGING AND CONTROL OF CHRONIC DISEASES (4). Epidemiology of the major chronic diseases, risk factors, potential methods of prevention/intervention, ethical issues, and efficacy of current methods of prevention and control. Emphasis on adult populations and public health services, policies, and programs at the local, state, and federal levels designed to promote healthy aging. PREREQS: 9 credits of health course work.
H 425. FOUNDATIONS OF EPIDEMIOLOGY
(3). Measures of disease frequency; measures of effect; association and causation; sources of inaccuracy; experimental and observational study designs. Lec/rec. PREREQS: (H 220 [D-] or ST 201 [D-] ) and junior standing.
H 431. HEALTH CARE MARKETING (3).
Principles, elements and methods of marketing health care services. Role of the consumer, governing body, administration and medical staff as well as impact of professional ethics.

## H 432. ECONOMIC ISSUES IN HEALTH AND

MEDICAL CARE (3). Application of economic principles to the health care field: the demand for medical care and insurance, health care suppliers, health care markets. PREREQS: ( (ECON 201 [C-] or ECON 201H [C-] ) and H 210 [C-] ) and junior standing.

## H 434. ^HEALTH CARE LAW AND

REGULATION (3). Legal aspects of health care delivery; tort law and its applications; professional liability and liability insurance; laws relative to health care institutions, cost controls, antitrust and access. (Writing Intensive Course) PREREQS: H 210 [C] and H 250 [C-] and admission to HMP program and junior standing.
H 436. ADVANCED TOPICS IN HEALTH CARE MANAGEMENT (3). Covers how health services are governed and organized; how health care organizations assess and adapt to
change; constraints/opportunities in shaping organizational performance; leadership; strategic decision-making and the use of evidence-based management in health care. PREREQS: (H 210 [C-] and H 250 [C-] ) and junior standing.
H 445. *OCCUPATIONAL HEALTH (3). Current and historical topics in the area of occupational health, with particular emphasis on the types of materials that produce human health effects; clinical and epidemiologic data used to assess the public health importance of occupational pollutants and to evaluate control strategies. (Bacc Core Course)

H 448. PUBLIC HEALTH TOXICOLOGY (3). Introduction to the concepts and principles of toxicology as they apply to environmental and occupational health PREREQS: H 344 [C-] and One year basic college chemistry and biology and two terms organic chemistry.
H 449. MASS MEDIA AND HEALTH (3).
Designed to examine the effects of mass media on population health, from the negative impact of advertising of cigarettes, alcohol and junk food, to the (hopefully) positive impact of public-health campaigns. PREREQS: (H 225 [C-] and H 320 [C-] ) and junior standing.
H 457. FINANCIAL MANAGEMENT OF HEALTH CARE ORGANIZATIONS (3). Utilization of standard financial tools needed to manage the capital resources of health care organizations. Includes funding capital projects, product costing, budgeting methods, capital formation and investment strategies. PREREQS: H 210 [C-] and H 250 [C-] and BA 215 [C-]

H 458. REIMBURSEMENT MECHANISMS (3). Introduces and analyzes the different types of healthcare reimbursement methodologies used in the U.S. health care system. PREREQS: H 210 [C-] and junior standing.

## H 461. SEXUALITY: A HEALTH SCIENCE

PERSPECTIVE (3). Exploration of the meaning of sexuality from a variety of contemporary health science perspectives; aspects of sex and sexuality fundamental to total health; issues central to the health educator role examined. PREREQS: Senio standing.
H 465. *PUBLIC HEALTH AND WOMEN:
SOCIAL AND POLICY ISSUES (3). Public health approach to the identification of women's health needs in the United States and in other countries as it relates to the intersection of race, ethnicity, social class, sexual orientation, age, and ability. (Bacc Core Course) PREREQS: 6 credits in public health.

H 467. LONG-TERM CARE ALTERNATIVES (3). Overview of the long-term care alternatives. Comparisons of nursing homes with community based facilities; adult day care centers, respite to hospice facilities, social HMOs and other services; cost, quality of life and practicality are addressed.

H 468. FINANCING AND ADMINISTRATION OF LONG-TERM CARE (3). Examines the financing and administration of long term care. Emphasis is on a system-wide overview and specific application to nursing facility management PREREQS: Admission to HMP program.

## H 474. PUBLIC HEALTH AND VIOLENCE

 IN SOCIETY (3). Examination of violence as a major public health issue. Historical, social, environmental, economic, behavioral and psychological aspects of assaultive violence, spousal abuse, rape and sexual assault, child abuse, child sexual abuse, suicide, the effects of the media on violence, drug abuse and violence, and related public health problems in contemporary American society. Emphasis on health and the efficacy of current efforts aimed at ameliorating these problems and potential for alternative public health models for prevention and intervention.H 476. ^PLANNING AND EVALUATING
HEALTH PROMOTION PROGRAMS (4). A
systematic approach to planning, implementing and evaluating health promotion programs in a variety of health related settings. Students will be writing a series of drafts to effectively develop a health promotion program plan. (Writing Intensive Course) PREREQS: (H 225 [C-] and H 320 [C-] ) and at least junior standing.

H 477. DIETARY INTERVENTIONS FOR PUBLIC
HEALTH (3). A public health perspective on the practice of population-based dietary intervention. Examination of relevant theories, research, and practice that pertain to health promoters/ educators. PREREQS: NUTR 225 [C-]

H 480. UNDERGRADUATE EOH SEMINAR (1). Explores current topics in environmental health and safety. EOH faculty will discuss their current research interests; EOH graduate student speakers will share their environmental health and safety internship experiences. Documentaries will be viewed to introduce topics of discussion Features will be discussions relating directly to ongoing, current environmental/occupational health crises, both in the United States and around the world. Graded P/N. This course is repeatable for a maximum of 2 credits. PREREQS: Junior or senior standing.

## 4 489. EMERGENCY AND DISASTER

MANAGEMENT (3). Study of preparedness, response, recovery and business resumption strategies, activities and applications needed to effectively deal with emergency and disaster incidents.

H 491. SELECTED TOPICS (1-3). Recent changes and advances in public health and health care administration and their application to special fields of study. Topics vary from term to term and year to year. This course is repeatable for a maximum of 6 credits. PREREQS: Senior standing.

H 491H. SPECIAL TOPICS (1-3). Recent changes and advances in public health and health care administration and their application to special fields of study. Topics vary from term to term and year to year. This course is repeatable for a maximum of 6 credits. PREREQS: Senior standing and Honors College approval required.

H 494. APPLIED ERGONOMICS (3). Principles of occupational ergonomics for managing optimal worker performance and well-being.
H 495. DESIGN FOR ENVIRONMENT, SAFETY, AND HEALTH (3). Systematic consideration of environmental, safety, and health concerns at the earliest possible stage in the lifecycle design engineering of products, technologies, and manufacturing processes. PREREQS: Junior or senior standing.
H 501. RESEARCH AND SCHOLARSHIP (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

H 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Instructor approval required.

H 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
H 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
H 507. SEMINAR (1-16). Section 1. Internship (1). Graded $P / N$. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required

H 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
H 509. PRACTICUM (1-16). Supervised work experience in a public health or health care administration setting. Open to majors in public
health. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Senior standing and departmental approval.
H 510. INTERNSHIP (1-16). Directed field experience with participation in a community, worksite, or health agency program. Experience is individually arranged to meet student needs. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Graduate standing in Public Health Department, instructor approval required, departmental approval required
H 511. COMMUNITY, CULTURE, AND GLOBAL HEALTH (3). Overview of health issues across cultures, ethnic groups, and regional/national boundaries from a critical and interdisciplinary perspective. Special emphasis on understanding social and behavioral factors that influence health in underserved communities/groups, especially ethnic/racial minorities, women, children, and migrants.
H 512. INTRODUCTION TO ENVIRONMENTAL AND OCCUPATIONAL HEALTH SCIENCES (3). Introduction to environmental and occupational health. Hazards affecting human health are examined in the context of current social, political and regulatory pressures.
H 513. INTEGRATED APPROACH TO PUBLIC
HEALTH (12). An integrated approach to introduce students to the core knowledge and methods used in public health, including evidence-based approaches to public health, public health and health care systems, planning and management to promote health, and policy in public health.
H 514. ENVIRONMENT, SAFETY AND HEALTH SEMINAR (1). One-credit graduate seminar on current topics of interest and importance to the environmental health and occupational safety field. Critical reading of research publications, discussion of controversial issues facing ESH professionals, and/or presentation of current ESH research. This course is repeatable for a maximum of 3 credits.
H 515. RESEARCH METHODS IN SOCIAL AND BEHAVIORAL HEALTH SCIENCES (3). Provides an introduction to quantitative research methods and design. Topics include definition of research problems and questions, hypothesis generation, research design, sampling, variable definition and measurement, data collection, and ethical considerations. Also provides a brief introduction to qualitative and mixed methods.
H 516. RESEARCH METHODS IN GLOBAL
HEALTH (3). Overview of research methods used to understand health, illness, health care, and health-seeking behavior in international settings. Special emphasis on the use of qualitative and mixed methods in international health research.
H 518. PUBLIC HEALTH ETHICS AND ISSUES (3). Current ethical issues in public health, including gender and ethnicity in employment, pharmaceutical controls, product liability, advertising, and export of high technology. PREREQS: Graduate standing.
H 519. DISPLACEMENT, MIGRATION, AND GLOBAL HEALTH (3). Critical examination of health of displaced/migrant populations with an emphasis on health disparities and social determinants. Understanding intersections of humanitarianism, migration, vulnerability, and displacement from a global health perspective
H 520. HEALTH DISPARITIES (3). Health disparities based on race/ethnicity, culture, social class, and rural/urban residence, among others; strategies to reduce disparities, promote health, and prevent disease in diverse populations.

H 521. MENTAL HEALTH (3). Focus upon mental health policy development, in relation to federal and state government services and regulations, implementation of services.
H 522. HEALTH, AGING AND CONTROL OF CHRONIC DISEASES (4). Epidemiology of the major chronic diseases, risk factors, potential
methods of prevention/intervention, ethical issues, and efficacy of current methods of prevention and control. Emphasis on adult populations and public health services, policies, and programs at the local, state, and federal levels designed to promote healthy aging. PREREQS: 9 credits of public health course work.

## H 523. FOUNDATIONS OF PUBLIC HEALTH

 (4). Fundamental principles, concepts and tools used in public health to promote the health of populations. Using a combination of case study method, lecture and discussion, students will develop a broad understanding of public health and recognition of how discipline-specializations address the social, behavioral and environmental determinants of public health. PREREQS: Graduate standing.H 524. INTRODUCTION TO BIOSTATISTICS (4). Quantitative analysis and interpretation of health data including probability distributions, estimation of effects, and hypothesis-tests such as Chi-square, one-way ANOVA, and simple linear regression.
H 525. PRINCIPLES OF EPIDEMIOLOGY
(4). Introduction to the concepts and methods of epidemiology. Topics include measures of population health, screening, study design, measures of association, and interpretation of epidemiological data.
H 526. EPIDEMIOLOGIC METHODS (3). Principles and methods of epidemiologic analysis; standardization; stratified analysis; confounding and its control; planning and conducting epidemiologic research; role of multivariate analysis in epidemiologic research. PREREQS: H 525 [C]

## H 527. CRITICAL ASSESSMENT OF

 INTERNATIONAL HEALTH PROGRAMS (3). Introduces the critical evaluation framework of assessing international health development programs, based on self-determination and community ownership principles. The framework of assessment method includes three levels: upstream evaluation, midstream evaluation, and downstream evaluation. PREREQS: H 528 and H 529 and graduate standing.H 528. GLOBAL HEALTH ISSUES (3). Examines major issues in health developments of global significance, their causes and impacts on international health, and methods and strategies to address them.
H 529. INTERNATIONAL HEALTH (3). Overview of the epidemiological, economic, political, sociological, and cultural factors that impact on international health. Special emphasis on the methods of prevention/intervention utilized in coping with health problems on an international level.
H 530. HEALTH POLICY ANALYSIS (3). Analysis of public policies affecting health care programs, services and organizations and the impact of those programs on citizens; processes by which health policy proposals are generated, promoted, defeated, modified and implemented.
H 531. HEALTH CARE MARKETING (3). Principles, elements and methods of marketing health care services. Role of the consumer, governing body, administration and medical staff as well as impact of professional ethics.
H 532. ECONOMIC ISSUES IN HEALTH AND MEDICAL CARE (3). Application of economics principles to the health care field: the demand for medical care and insurance, health care suppliers, health care markets. PREREQS: ECON 201

H 533. HEALTH SYSTEMS ORGANIZATION (3). Examines the nature of health and health care services and reviews the role of government and the free market on health services. Alternative ways of organizing, financing, and delivery of health care services are explored.
H 534. HEALTH CARE LAW AND REGULATION (3). Legal aspects of health care delivery; tort
law and its applications; professional liability and liability insurance; laws relative to health care institutions, cost controls, antitrust and access.

## H 535. INTERPRETING EPIDEMIOLOGIC

EVIDENCE (3). Intended for students in the human sciences and allied health fields. Introduces basic epidemiology concepts. Topics will include measures of disease frequency, assessing population health, causal logic, quantifying associations between exposures and health outcomes, epidemiologic study design, and threats to study validity (random error, bias, confounding). Examples focus on application of epidemiological methods to a variety of healthrelated fields.

## 536. HEALTHCARE ORGANIZATION THEORY

AND BEHAVIOR (3). Administrative practice in health care settings with emphasis on longterm care and acute care services. Provides a framework for health care systems and managerial process and roles. Focus on operations, planning, marketing, human resources, finance, productivity and control as well as emerging trends in health services.
H 538. PUBLIC AND PRIVATE HEALTH
INSURANCE (3). Introduction to the principles and practices of public or social and commercial health insurance, and their financial reimbursement mechanisms.
H 540. WATER AND HUMAN HEALTH (3). Critically examine the complex relationship between water quality, human activities, and population health.
H 541. AIR QUALITY AND HUMAN HEALTH (3). Examination of the major sources of air pollution, its impact on ecosystems and climate change, and population health. Will also discuss technologies and introduce regulations that are used to control air pollutants.
H 542. ENVIRONMENTAL AND OCCUPATIONAL HEALTH RISK ASSESSMENT (3). Understand concepts, principles and practices in modern environmental and occupational risk analysis and how they are utilized to make evidence-based decisions by regulatory agencies.
H 543. EXPOSURE SCIENCE I (3). Overview of the concepts, principles and practices in modern environmental and occupational exposure assessment. Exposure Science I provides a broad introduction to environmental and occupational exposure assessment methods, while Exposure Science II focuses on sampling and measurement methods.

H 544. ENVIRONMENTAL AND OCCUPATIONAL EPIDEMIOLOGY (3). Examines exposure assessment methodology and epidemiological study designs that are commonly used in environmental and occupational health science in order to characterize the impact of environmental and occupational exposures on population health. PREREQS: H 525 [C] and a graduate level statistics course.

H 545. OCCUPATIONAL HEALTH (3). A broad overview of occupational health including recognizing and preventing risks from toxic chemical, radiation and physical hazards in the workplace.
H 546. EXPOSURE SCIENCE II: SAMPLING AND MEASUREMENT (3). Concepts, principles and practices in modern environmental and occupational exposure assessment are reviewed. Exposure Science I provides a broad introduction to environmental and occupational exposure assessment methods, while Exposure Science II focuses on sampling and measurement methods. Lec/lab. PREREQS: H 543 [C]
H 547. GIS AND PUBLIC HEALTH (3). Applications of geographic information systems (GIS) to public health are reviewed, including mapping, spatial analysis methods, estimating access, and exposure assessment. This course is geared toward individuals involved in public health
who have no (or introductory level) knowledge of GIS.

H 548. PUBLIC HEALTH TOXICOLOGY (3). Introduction to the concepts and principles of toxicology as they apply to environmental and occupational health. PREREQS: H 344 and one year basic college chemistry and biology and two terms organic chemistry.

H 549. MASS MEDIA AND HEALTH (3). Examines the effects of mass media on population health, from the negative impact of advertising of cigarettes, alcohol and junk food, to the (hopefully) positive impact of public health campaigns.
PREREQS: H 571 [C]
H 550. SOCIAL EPIDEMIOLOGY (3). Explores the social determinants of health at the population level. Primary focus is on introduction to methods specific to social epidemiology, but will also provide an overview of current understanding of the empirical associations between social factors and health. PREREQS: H 525 [B] and /or equivalent introductory course in epidemiology, or permission of the instructor.

H 551. APPLIED EPIDEMIOLOGICAL ANALYSIS OF SECONDARY DATA (3). Practical experience performing a hypothesis-driven epidemiological analysis utilizing secondary surveillance or other appropriate data set, writing an analytical plan, appropriate programming for the analysis (using STATA or SAS), understanding the analysis output, preparing tables, and interpreting results. PREREQS: H 526 [B-] and H 560 [B-] and H 580 [B-] and /or instructor consent.

H 552. DISASTER EPIDEMIOLOGY (3). Describe
the impact of natural and manmade disasters on human health, understand epidemiologic methods specific to disasters, and apply fundamental epidemiologic methods to identify and characterize disaster-related adverse health outcomes. PREREQS: H 525 [C]

H 553. APPLIED EPIDEMIOLOGIC METHODS
(3). Builds upon the previous two terms in the three-term epidemiology core methods sequence, through the practical application of epidemiologic methods to the conduct of a student-directed investigation. Core goals are practical skills in hypothesis generation, study design, data management, data analysis, interpretation of results, and communication of findings. PREREQS: H 525 [B] and H 526 [B] and /or instructor permission
H 554. EPIDEMIOLOGY OF AGING (3). An overview of the core principles of the epidemiology of aging is provided. There will be an emphasis on health and disease processes in older adults. Students will learn essential study design and analytic issues that may arise in studies of aging PREREQS: H 525 [C]
H 555. CANCER EPIDEMIOLOGY (3).
Introduction to basic concepts and methodology in cancer epidemiology. PREREQS: H 525 [C]

## H 556. STRATEGIC MANAGEMENT OF

 HEALTH SERVICE ORGANIZATIONS (3).Theories and methodologies of long-range planning and strategic management in health care organizations.
H 557. FINANCIAL MANAGEMENT OF HEALTH CARE ORGANIZATIONS (3). Utilization of standard financial tools needed to manage the capital resources of health care organizations. Includes funding capital projects, product costing, budgeting methods, capital formation and investment strategies. PREREQS: H 210 and H 250
H 558. REIMBURSEMENT MECHANISMS (3).
Techniques used in cost-effectiveness analysis. Examples are drawn from the public health and health economics literature. PREREQS: Graduate standing.
H 559. CONTRACTS AND NEGOTIATION (3).
Different negotiation styles and strategies used in healthcare contracting are explored--distributive,
integrative, and mixed motive negotiation styles. Students examine various contracts and the role the healthcare administrator plays in a variety of health care settings.
H 560. PUBLIC HEALTH SURVEILLANCE (3). An introduction to public health surveillance systems (national and international) for chronic and infectious diseases. Utility of existing surveillance systems for secondary epidemiological data analysis. PREREQS: H 524 [B-] and H 525 [B-] and /or instructor's consent.
H 561. SEXUALITY: A HEALTH SCIENCE PERSPECTIVE (3). Exploration of the meaning of sexuality from a variety of contemporary health science perspectives; aspects of sex and sexuality fundamental to total health; issues central to the health educator role examined. PREREQS: Graduate standing.
H 562. INFECTIOUS DISEASE EPIDEMIOLOGY (3). Understand epidemiologic methods specific to infectious diseases, apply fundamental epidemiologic methods to infectious disease questions, and describe the broad trends in global infectious disease burden. The application methods and principles will be explored through lectures, discussions, assignments and writing projects. PREREQS: H 525 [C]

H 563. PHYSICAL ACTIVITY EPIDEMIOLOGY (3). Physical activity epidemiology will focus on current research, controversial issues, and methodological problems in the epidemiology of physical activity, exercise, and health. PREREQS: H 525 [B-] and H 524 or equivalent
H 564. COMPUTING TOOLS AND HEALTH DATA ANALYSIS (3). Modern computational biostatistics for analyzing health data, emphasizing important technologies and methods for data processing and understanding of how they work. Topics will evolve over time as new procedures are developed. PREREQS: (H 524 [C] or HDFS 530 [C] )
H 565. PUBLIC HEALTH AND WOMEN: SOCIAL AND POLICY ISSUES (3). Public health approach to the identification of women's health needs in the United States and in other countries as it relates to the intersection of race, ethnicity, social class, sexual orientation, age, and ability. PREREQS: 6 credits in public health.

H 566. DATA MINING IN PUBLIC HEALTH (3). An introduction to high-dimensional data analysis and data mining techniques used as an information technology tool to extract previously unknown and potentially useful information from large databases in biology, medicine, and public health. PREREQS: H 581 or permission of instructor; H 564 recommended.

## H 567. LONG-TERM CARE ALTERNATIVES

(3). Overview of the long-term care alternatives. Comparisons of nursing homes with community based facilities; adult day care centers, respite to hospice facilities, social HMOs and other services cost, quality of life and practicality are addressed.

H 568. FINANCING AND ADMINISTRATION OF LONG-TERM CARE (3). Examines the financing and administration of long term care. Emphasis is on a system-wide overview and specific application to nursing facility management.
H 569. MATERNAL AND CHILD HEALTH
(3). Women's reproductive health and health of children stressing causation, management, and prevention of public health problems. Epidemiological analysis of morbidity and mortality in children and women of childbearing age; impact of social, political and economic influences on the health of women and children; comparison of issues and problems of industrialized versus developing nations. Consideration of health issues of interest to the many diverse racial and ethnic groups of women and children in the U.S. as well as the global village.

H 570. WORKFLOW OF DATA ANALYSIS (3). Covers the management of workflow for studies involving data management and coordination
including planning the work, documenting activities, creating, validating, and verifying variables, statistical analyses, replicating findings, and archiving work. Emphasizes tight control of data management: making changes to data in a documented and replicable manner. Lec/rec. PREREQS: HDFS 532 [C] and /or equivalent or permission of instructor.
H 571. PRINCIPLES OF HEALTH BEHAVIOR
(3). Theoretical approaches to behavior change in health promotion/education research and practice; factors influencing health behaviors, ethical behavior change issues, behavioral interventions for special populations.

## H 572. COMMUNITY ORGANIZATION FOR

 HEALTH PROMOTION AND EDUCATION(3). History, theory, and practice of community organizing for health advocacy; focus on group processes, use of media, leadership, coalitions, grass roots methods and social change.
H 573. INTRODUCTION TO MULTILEVEL/ HIERARCHICAL MODELS (3). Introduction to the theory and application of hierarchical models to problems in epidemiology and public health. Hierarchical models will be dealt with using both frequentist and Bayesian frameworks. PREREQS: H 581 or permission of instructor.

H 574. PUBLIC HEALTH AND VIOLENCE IN SOCIETY (3). Examination of violence as a major public health issue. Historical, social, environmental, economic, behavioral and psychological aspects of assaultive violence, spousal abuse, rape and sexual assault, child abuse, child sexual abuse, suicide, the effects of the media on violence, drug abuse and violence, and related public health problems in contemporary American society. Emphasis on health and the efficacy of current efforts aimed at ameliorating these problems and potential for alternative public health models for prevention and intervention.

## H 575. EVALUATION OF HEALTH PROMOTION

AND EDUCATION PROGRAMS (3). Provides theoretical and practical bases for program evaluation. Develops basic skills in a variety of approaches to evaluation, including techniques that are particularly suitable for evaluating health promotion, community health improvement, and related health and social services programs. Course learning is synthesized through designing an evaluation framework and methodology for a relevant program. PREREQS: H 515 [C] and /or instructor consent.
H 576. PROGRAM PLANNING/PROPOSAL WRITING IN HEALTH/HUMAN SERVICES (4). Planning and preparing of proposals for program initiation, financing, delivery and evaluation in health-related settings; emphasis on funding sources, community, individual, and organizational support. PREREQS: 9 credits of graduate course work in public health.
H 577. DIETARY INTERVENTIONS FOR PUBLIC HEALTH (3). A public health perspective on the practice of population-based dietary intervention. Examination of relevant theories, research, and practice that pertain to health promoters/ educators. PREREQS: NUTR 225
H 578. INTRODUCTION TO MOLECULAR EPIDEMIOLOGY I (3). A survey of and introduction to the methods and issues arising in genetics and molecular epidemiology, including key biostatistical methods, study designs, and technologies used in the conduct of these studies. Students will gain experience conducting critical reviews of research papers with respect to study design and biostatistical analysis. PREREQS: (H 524 [C] and H 526 [C] ) and knowledge of and familiarity with basic concepts of molecular biology (DNA replication, transcription, and translation).
H 579. MOLECULAR EPIDEMIOLOGY II (3). An introduction to the data analysis methods arising in genetics and molecular epidemiology. Students will obtain hands-on experience with the analysis
of high-throughput data obtained from populationbased molecular studies. Lec/lab. PREREQS: (H 578 [C] and H 581 [C] ) and H 564

H 580. LINEAR REGRESSION AND ANALYSIS OF TIME TO EVENT DATA (4). Multiple linear regression analysis for measurement data and survival analysis methods for time to event health data, including modes of inference, diagnostics, model selection, and reporting conclusions. Lec/ lab. PREREQS: (H 524 [C] or HDFS 530 [C] )

## H 581. GENERALIZED LINEAR MODELS

 AND CATEGORICAL DATA ANALYSIS (4). Biostatistical methods focusing on binary and count data will provide a foundation for understanding and implementing generalized linear regression and categorical data models that are commonly used to analyze epidemiological and public health data from cohort, casecontrol, and clinical trial study designs. Lec/lab. PREREQS: H 580H 582. ANALYSIS OF CORRELATED HEALTH
DATA (3). Biostatistical methods for clustered, repeated measures, and longitudinal correlated health data, with an introduction to applications of linear and generalized linear mixed models and generalized estimating equations. PREREQS: H 581 [C]

H 583. ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY MANAGEMENT (3). The management principles and practices in the environment, safety and health profession are examined.
H 584. ANALYSIS OF INTERVENTION STUDIES
AND CLINICAL TRIALS (3). Principles of data
analysis from intervention studies and clinical trials, including professional graphical and tabular presentation, reproducibility and reliability of measurements, and controlling the Type I error rate when analyzing multiple endpoints. Basic principles of designing experiments are also covered including blocking, stratification, interaction, and control of variability. PREREQS: (H 524 [C] or HDFS 530 [C] )
H 585. ENVIRONMENT, SAFETY AND
HEALTH POLICY AND LAW (3). Survey of the environment, safety and health policy and law in the United States. Furnishes the basic knowledge and general understanding about policy and law-related issues important to all environmental health and safety professionals. PREREQS: H 385 or graduate standing.
H 586. BAYESIAN BIOSTATISTICS IN PUBLIC
HEALTH (3). An examination of methods for designing and implementing Bayesian analysis to address scientific questions through handson experience with health data. This survey course also covers proper interpretation and communication of results from practical Bayesian methods for biostatistics data analysis, with illustrations of the utility of Bayesian ideas in public health. PREREQS: H 581 [C]
H 587. TIME TO EVENT ANALYSIS OF HEALTH DATA (3). Biostatistical models and methods for survival analysis of time to event data that are routinely encountered in biomedical and health research. PREREQS: (H 524 [C] or HDFS 530 [C] )
H 588. APPLIED OCCUPATIONAL SAFETY AND
HEALTH (3). The management and technical aspects of a workplace safety and health program are identified and assessed. Students completing the course receive a 30-hour OSHA General Industry card.

H 589. EMERGENCY AND DISASTER
MANAGEMENT (3). Study of preparedness, response, recovery and business resumption strategies, activities and applications needed to effectively deal with emergency and disaster incidents.

H 591. SELECTED TOPICS (1-3). Recent changes and advances in public health and health care administration and their application
to special fields of study. Topics vary from term to term and year to year. This course is repeatable for a maximum of 9 credits. PREREQS: Graduate standing.
H 592. SPATIAL EPIDEMIOLOGY (3). An introduction to methods in spatial epidemiology is provided, including spatial exploration of health data, quantifying spatial patterns and clusters, spatial exposure assessment, and explaining patterns and associations. PREREQS: H 547 [C] and H 581 [C] and or equivalent.
H 593. REPRODUCTIVE EPIDEMIOLOGY (3). Focuses on current research, controversial issues, and methodological problems in the epidemiology of reproductive health. PREREQS: H 525 [B-] and H 524 (recommended)

H 594. APPLIED ERGONOMICS (3). Principles of occupational ergonomics for managing optimal worker performance and well-being.

H 595. DESIGN FOR ENVIRONMENT, SAFETY, AND HEALTH (3). Systematic consideration of environmental, safety, and health concerns at the earliest possible stage in the lifecycle design engineering of products, technologies, and manufacturing processes. PREREQS: Graduate standing.
H 596. HEALTHCARE EPIDEMIOLOGY (3). Focus on current research, controversial issues, and methodological problems in the epidemiology of healthcare. Topics include institutional infection control, medical errors, screening and diagnostic esting, cost-effectiveness, and others related to the delivery and assessment of healthcare, with a focus on the US healthcare system specifically. PREREQS: H 525 [B-] and H 524 is recommended

H 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 24 credits.

H 601. RESEARCH AND SCHOLARSHIP (1-16).
This course is repeatable for a maximum of 16 credits.

H 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
H 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

H 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

H 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
H 608. WORKSHOP (1-16). This course s repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

H 610. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

H 612. DOCTORAL SEMINAR IN PUBLIC HEALTH: RESEARCH AND PRACTICE (1). Contemporary research and professional issues specific to the discipline of public health. ncludes responsible conduct of research, writing for publication, professional development and leadership, and faculty research in public health. This course is repeatable for a maximum of 9 credits. PREREQS: Restricted to public health doctoral students.

H 613. INDEPENDENT RESEARCH PROJECT
(1-9). Independent research project for PhD students, including research design, execution or research, and the formal presentation of findings in written form. Student will develop an original research topic based on knowledge and review of the literature in a public health-relevant area of inquiry. Graded $P / N$. This course is repeatable for a maximum of 9 credits.

H 614. RESEARCH MANUSCRIPT (4). PhD
students write a manuscript to submit to a peer-reviewed journal as part of the course requirements. Graded P/N.

## H 615. ADVANCED EVALUATION AND

RESEARCH DESIGN (3). Provides an in-depth examination of advanced research designs and methods for establishing causal statements about the efficacy, effectiveness and generalizability of public health and social service interventions designed to alter public health and social risk or protective factors. PREREQS: H 515 and H 575 or instructor permission.

H 620. ADVANCED TOPICS IN GLOBAL HEALTH INTERVENTION AND PRACTICE (3). Examines the processes and tools involved in planning and evaluating culturally competent health and human service prevention and intervention programs in the global context. Special considerations in program decisionmaking in the global context (community engagement, cultural competence, sustainability, feasibility, political/ethical issues) will be explored Provides a key forum for doctoral students to share ongoing developments in their research and practice drawing from fieldwork as well as attended conferences and meetings.

## H 622. GLOBAL HEALTH SYSTEMS, POLICY

AND POLITICS (3). Focuses on learning to identify key stakeholders in the politics of global health, and to be able to describe political and policy processes involved in negotiating global health decisions. Employment of theories and evidence from both the global North and South to explain political processes affecting public health practice and programs.
H 626. GLOBAL HEALTH SYSTEM FINANCE
AND STRENGTHENING (3). Introduces an analytical framework of health system finance strengthening for global health, from local community to national level and international level. Develops the analytical skill and knowledge for examining the source and mechanism of financing health systems and identify, mobilize, organize, and manage domestic and global health resources. Provides training to examine equity and efficiency of financial burden in a health system, and the strategies to strengthen it.

H 630. QUANTITATIVE HEALTH POLICY
RESEARCH METHODS I (4). Contemporary doctoral-level quantitative health policy/services research methods emphasizing linear regression models, data sources for health policy research, and health policy research literature. PREREQS H 524 [B-] and /or equivalent.

H 632. APPLIED HEALTH ECONOMICS (4). Advanced doctoral-level quantitative health policy/ services research methods emphasizing causal inference when potential endogeneity is present. PREREQS: H 630 [B-] and /or permission of instructor.
H 635. COST EFFECTIVENESS ANALYSIS IN HEALTH AND MEDICAL CARE (3). The primary objective of this course is to introduce students to cost-effectiveness studies in health and medical care. Covers the core concepts of CEA, quality adjusted life years, cost calculations, and decision rules.

## H 638. PUBLIC AND PRIVATE HEALTH

INSURANCE (3). Introduction to the principles and practices of public or social and commercial health insurance, their finance mechanisms, and theoretical foundation behind the selection of certain system of health insurance and finance method. PREREQS: H 533 [C]

H 639. COMMUNITY-BASED PARTICIPATORY
RESEARCH (4). Focuses on initiating and conducting research in partnership with communities. Includes in-depth examination of community-based participatory research (CBPR) elements, principles, theories, and approaches; how researchers can successfully partner with communities; and research with minority and/or underprivileged communities; with examples from
environmental health, gerontology, and health promotion. PREREQS: 9 credits of public health (H) or human development and family sciences (HDFS) graduate course work.
H 642. ENVIRONMENTAL AND REGULATORY RISK ASSESSMENT (3). Understand concepts, principles and practices in modern risk analysis and how they are utilized to make evidencebased decisions in public health. Focus will be on real world examples of risk assessment by environmental and occupational regulatory agencies.
H 650. REPORTING RESULTS: WRITING FOR EPIDEMIOLOGY (3). Applied experience writing a scientific paper to disseminate results, including deciding on authorship, preparing a lay summary, revising and responding to peer review, and serving as a reviewer. PREREQS: H 526 [B-] and H 551 [B-] and H 580 [B-] and /or instructor consent.

## H 651. ADVANCED EPIDEMIOLOGICAL

METHODS (4). Covers advanced topics in epidemiology. Course expands on many of the same topics as H526, and explores them in greater breadth and depth. Topics include causal theory, measures of disease and association, confounding, selection bias, predictive models directed acyclic graphs, effect modification, mediation, indirect and direct effects, study design, and other contemporary topics. PREREQS: H 526 [B-] and H 581 [B-]

## H 652. CAUSAL INFERENCE IN

EPIDEMIOLOGY (3). Discussion of the theoretical framework of causal statistics and the development of modern methods including propensity scores and marginal structural models. Focus is on the inverse probability of treatment weighting; discussion of other estimation methods will be included. Additional topics may include longitudinal causal models, causal mediation, instrumental variables, and other contemporary topics. Applied examples will be used for illustration. PREREQS: H 651 [B-] and /or permission of instructor.

H 659. QUANTITATIVE HEALTH POLICY
RESEARCH METHODS II (4). Advanced doctorallevel quantitative health policy/services research methods emphasizing health care utilization, expenditures, and outcomes data. PREREQS: H 630 [B-] and /or permission of instructor

H 662. ADVANCED METHODS IN INFECTIOUS DISEASE EPIDEMIOLOGY (3). Covers advanced methods and principles for infectious disease research, including framing infectious disease issues into testable hypotheses, designing epidemiologic studies using appropriate sampling strategies, and identifying strengths and weaknesses of various epidemiologic research methods. PREREQS: H 526 [B-] and H 562 [B-] and /or instructor's consent.

## H 671. ADVANCED THEORIES OF HEALTH

 BEHAVIOR (3). Provides an in-depth examination of major theories of health behavior (both health compromising and health enhancing). PREREQS: H 571 or permission of instructor.
## H 672. ADVANCED QUALITATIVE METHODS

IN HEALTH BEHAVIOR (3). Provides an in-depth examination of the use of qualitative methods in health behavior research and practice.
PREREQS: H 515 and SOC 518 and HDFS 538; or permission of instructor.

H 673. MEASUREMENT OF HEALTH BEHAVIOR CONCEPTS (4). Provides in-depth study and field work for graduate students in public health and related fields of the methods used in the conceptualization, development, and evaluation of quantitative measures of health behavior and related concepts. PREREQS: H 524, H 515, and 3 credits in other quantitative research methods or social behavioral methods (e.g., in sociology or psychology or health promotion or education programs) or equivalents, or permission of instructor.

H 675. DEVELOPMENT OF HEALTH BEHAVIOR
INTERVENTIONS (3). Examines the application of social/behavioral theories in health promotion interventions and in conducting intervention research in diverse populations. The course will focus on program development, on implementation strategies, and on translation into practice. PREREQS: (H 571 and H 575 and H 576 ) or equivalents or consent of instructor.

## H 676. ADVANCED TOPICS IN HEALTH

PROMOTION AND HEALTH BEHAVIOR (3).
Examines topics of relevance to health promotion and health behavior. Specific topics include current issues and emerging research findings, with a focus on social and behavior science perspectives, analysis of public health problems, and application of principles and practices of health promotion and health behavior. This course is repeatable for a maximum of 6 credits. PREREQS: H 515 and H 571 or permission of instructor.

## H 681. ADVANCED TOPICS IN

ENVIRONMENTAL AND OCCUPATIONAL
HEALTH AND SAFETY (3). Advanced topics in the environment, safety and health discipline. Content varies with each offering.

H 682. ENVIRONMENTAL AND OCCUPATIONAL HEALTH AND SAFETY: MOVING FROM
RESEARCH TO PRACTICE (3). An examination of research transfer models that can be adapted and implemented to environmental and occupational settings. Case studies and content will vary with each course offering

## 683. ADVANCED RESEARCH METHODS

 IN ENVIRONMENTAL AND OCCUPATIONAL HEALTH (3). Covers advanced methods for environmental and occupational health research, including framing environmental and occupational health issues into testable hypotheses, designing appropriate studies, and identifying strengths and weaknesses of different research methods.H 685. RACE, CLASS, CULTURE AND AGING
(4). Examines the diversity among the older population in health status, health beliefs/ behaviors, and health care, and explores the interaction of culture and structure as determinants of their life chances. The empirical literature used in the course is drawn from the experiences of aging of African-American, Latino, and Asian-Pacific Islander elderly. Taught spring term even years. CROSSLISTED as HDFS 685. PREREQS: 9 credits of public health or HDFS graduate course work, or permission of instructor.
H 699. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.

## ■ HUMAN DEVELOPMENT AND FAMILY SCIENCES COURSES

HDFS 107. INTRODUCTION TO HUMAN
SERVICES (3). An exploration of the human services profession. Emphasis on prevention and early intervention concepts and programs Development of internship search skills, including an introduction to a wide range of human services organizations. PREREQS: Restricted to students in HDFS or OSU Gerontology Programs.

HDFS 199. SPECIAL PROJECTS (1-16). Special projects designed with instructor Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits.

HDFS 201. *CONTEMPORARY FAMILIES IN THE U.S. (3). An introduction to families with application to personal life. Focuses on diversity in family structure, social class, race, gender, work and other social institutions. (Bacc Core Course)

HDFS 209. HUMAN SERVICES PRACTICUM (4). Field experience to learn, primarily through observation, how to apply human service strategies and skills to helping individuals and families served by professional agencies. Supervision by agency and instructor. Requires 90 hours of work on-site. Seminar introduces basic theories and skills through readings, discussion
and reflective exercises. This course is repeatable for a maximum of 8 credits. PREREQS: HDFS 107 [C-] and restricted to students in HDFS, Human Services option. Application required.
HDFS 240. *HUMAN SEXUALITY (3).
Physiological, psychological, social, and
historical influences on sexuality; emphasis on developmental and relationship aspects. (Bacc Core Course)

HDFS 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

HDFS 311. INFANT AND CHILD DEVELOPMENT
(4). Research and theory on development from infancy through middle childhood. Discussion of biological, familial, and sociocultural influences. Development of skills in observing children>s behavior.

HDFS 312. PARENTING RESEARCH AND
APPLICATION (4). Research and theory regarding parenting and parent education, including parenting styles and practices, discipline, parent-child interactions, attachment, and the family context with an emphasis on professional implications for promoting child health and wellbeing.
HDFS 313. ADOLESCENT DEVELOPMENT
(4). Advanced theories and research on physical, social and psychological development during adolescence; emphasizes influences of family, peers, schools and community. PREREQS: Sophomore standing.

## HDFS 314. ADULT DEVELOPMENT AND

AGING (4). Advanced theories and research related to developmental changes and stability in early, middle, and late adulthood. Gender issues, personality, cognition, and adaptation. PREREQS: Upper-division standing.

HDFS 330. FOSTERING LEARNING IN EARLY CHILDHOOD DEVELOPMENT (4). Development of skills in applying theoretical approaches to observing, recording, and interpreting the behavior of young children in order to design interactions that support learning in group settings. PREREQS: (HDFS 211 [C-] or HDFS 311 [C-] ) HDFS 331. DIRECTED EXPERIENCE IN EARLY CHILDHOOD (3). Placement in early childhood program to focus on guidance techniques, classroom management, and implementation of curricula, based on developmental observation, research, and theory. Supplementary weekly seminar, readings, and reports. Lab/rec. Taught on the OSU-Cascades campus only. PREREQS: ( (HDFS 311 [C-] or HDFS 211 [C-] ) and HDFS 330 [C-] ) and application required.
HDFS 341. FAMILY STUDIES (4). Study of family forms, family formation, and family change over the human life course is sociohistorical, economic, political, and cultural context.

## HDFS 360. CRITICAL THINKING IN HUMAN

 DEVELOPMENT AND FAMILY SCIENCES (4).Explores foundations of critical thinking, especially methods for sustaining open-minded inquiry and evaluating evidence and arguments. Current controversies in human development and family policy are targets of debate. PREREQS: HDFS majors only.
HDFS 361. APPLIED RESEARCH METHODS
(4). Basic research methods as they are applied in human development and family studies.
HDFS 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
HDFS 401. RESEARCH (1-6). This course is repeatable for a maximum of 16 credits.
HDFS 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits
HDFS 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
HDFS 405. READING AND CONFERENCE (1-6).

This course is repeatable for a maximum of 16 credits.

HDFS 406. PROJECTS (1-6). This course is repeatable for a maximum of 16 credits.

HDFS 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

HDFS 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.

HDFS 410. HUMAN SERVICES INTERNSHIP (6-12). Field experience to apply theory and evidence-based practices to individual, family, and community problems in professional settings. Supervision by agency and instructor. Requires 300 hours of work on-site. Seminar includes reflection and constructive criticism processes Can be taken across 2 consecutive terms (150 hours each) within the same agency. Graded P/N. This course is repeatable for a maximum of 12 credits. PREREQS: (HDFS 107 [C-] and HDFS 209 [P] and HDFS 462 [C-] ) and junior or senior standing. Restricted to students in HDFS and OSU Gerontology Program. Application required.
HDFS 430. ^STUDENT TEACHING IN
EARLY CHILDHOOD DEVELOPMENT AND
EDUCATION (12). Participation in a researchbased model early childhood program focused on student teaching, program development and evaluation, parent education and administration. Placement to be reserved one year in advance. Lec/lab. (Writing Intensive Course) PREREQS: HDFS 330 [C-]

## HDFS 431. FAMILY, SCHOOL, AND

COMMUNITY COLLABORATION (3). Focus on family, school, community environments and interactions for children from infancy to adolescence. Resources and skills for enhancing child development across these settings are emphasized. PREREQS: (HDFS 311 [C-] or HDFS 313 [C-] ) and HDFS 211 or HDFS 313
HDFS 432. CHILDREN AND YOUTH WITH SPECIAL NEEDS (3). Developmental, educational, and family issues related to children and youth with disabilities and giftedness.
PREREQS: 6 credits of HDFS, SOC or PSY.
HDFS 444. FAMILY VIOLENCE AND NEGLECT (4). Examination of the causes and consequences of family abuse and neglect, including child abuse, domestic violence and elder abuse. PREREQS: 6 credits of HDFS, SOC or PSY.
HDFS 447. *FAMILIES AND POVERTY (4).
Examines families in poverty focusing on causes and consequences of family poverty, including global economic factors, migration patterns, discrimination, and policies and programs for families. Community service required. (Bacc Core Course)
HDFS 447H. *FAMILIES AND POVERTY (4). Examines families in poverty focusing on causes and consequences of family poverty, including global economic factors, migration patterns, discrimination, and policies and programs for families. Community service required. (Bacc Core Course) PREREQS: Honors College approval required.

HDFS 461. ^PROGRAM DEVELOPMENT AND PROPOSAL WRITING (4). Principles of program development and evaluation applied to the development of a proposal for a human services program; analysis of needs and resources, identification of empirically-based strategies, and assessment. (Writing Intensive Course) PREREQS: HDFS 360 [D-]
HDFS 462. SKILLS FOR HUMAN SERVICES PROFESSIONALS (4). Exploration of collaborative, strengths-based methods to resolve individual, family, and community problems. Application of ethical standards to case study, with emphasis on the values of human dignity and social justice. Development of basic helping skills within an empowerment framework. PREREQS: HDFS 107 [C-] and HDFS 209 [P] and junior or senior standing, Human Services option
specialization.
HDFS 465. TOPICS IN HUMAN DEVELOPMENT AND FAMILY SCIENCES (3). Topics and issues in human development and family sciences. Examples: children and the law; gender and families; parenting; aging; relationship development across the lifespan. This course is repeatable for a maximum of 18 credits. PREREQS: 6 credits of HDFS, SOC or PSY

## HDFS 465H. TOPICS IN HUMAN

DEVELOPMENT AND FAMILY SCIENCES (3).
Topics and issues in human development and family sciences. Examples: children and the law; gender and families; parenting; aging; relationship development across the lifespan. This course is repeatable for a maximum of 18 credits. PREREQS: 6 credits of HDFS, SOC or PSY and Honors College approval required.
HDFS 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
HDFS 499H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HDFS 501. RESEARCH (1-6). This course is repeatable for a maximum of 16 credits.
HDFS 502. INDEPENDENT STUDY (1-6). This course is repeatable for a maximum of 16 credits.

HDFS 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

HDFS 505. READING AND CONFERENCE (1-6).
This course is repeatable for a maximum of 16 credits.

HDFS 506. SPECIAL PROBLEMS/SPECIAL
PROJECTS (1-6). This course is repeatable for a maximum of 16 credits.
HDFS 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
HDFS 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
HDFS 509. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits.
HDFS 510. INTERNSHIP (3-15). This course is repeatable for a maximum of 16 credits.
HDFS 511. THEORIES OF HUMAN
DEVELOPMENT (4). Critical examination of significant theories of human development. Emphasizes evolution of theories and impact on current human development research.
HDFS 516. CHILD DEVELOPMENT (4). Study of theories, concepts, and issues related to physical, cognitive, social, and emotional development in infants and children. Covers family contexts, risk and resilience, nature/nurture issues, critical/ sensitive periods, the importance of early experience, and the relationship between basic and applied research. PREREQS: 15 quarter credits of social and behavioral sciences.
HDFS 517. ADOLESCENT DEVELOPMENT (4).
Study of theories, concepts, and issues related to biological, cognitive, social, and emotional development in adolescents. Covers identity formation, family contexts, adolescent sexuality, societal contexts for adolescent development, and risk and resilience processes. PREREQS: 15 quarter credits of behavioral and social sciences.

HDFS 518. ADULT DEVELOPMENT AND AGING (4). Study of theories, concepts, and issues related to biological, cognitive, social, and emotional development throughout adulthood. Covers life transitions, stress-related growth, optimal aging, wisdom, and developmental methods. PREREQS: 15 quarter credits of behavioral and social sciences.
HDFS 519. THE LIFE COURSE (4). Introduces students to key concepts, principles, and controversies in life-course studies. Emphasizes how the nature and rhythm of the life course is structured by time and place. Examines how the
lives of individuals and groups are shaped by history, demography, social institutions, states and policies, and culture.

## HDFS 530. RESEARCH IN HUMAN

DEVELOPMENT AND FAMILY SCIENCES I (4).
An overview of research design, measurement, sampling and evaluation research. Introduces computer applications for data collection and analysis. Lec/lab. PREREQS: Undergraduate statistics and 12 credits of social science courses.

## HDFS 531. RESEARCH IN HUMAN

DEVELOPMENT AND FAMILY SCIENCES II (4). Philosophy and methods of behavioral research including experimental design and advanced evaluation research techniques. Lec/lab/rec. PREREQS: H 524 or HDFS 530

HDFS 532. APPLIED QUANTITATIVE METHODS II: LINEAR REGRESSION (4). Principles and application of general linear models for continuous predictors (e.g., multiple regression). PREREQS: HDFS 531 [B-]
HDFS 533. SOCIAL POLICY AND HUMAN DEVELOPMENT (4). Probes how policies and governments affect human development over the life course. Examines experiences in family, education, work, and health. Families are a central lens for examining effects. Offered alternate years.
HDFS 534. SOCIAL PROGRAM AND POLICY
EVALUATION (4). Models of evaluation and application of applied research methods to social programs and policies. PREREQS: HDFS 531 [C]

## HDFS 538. QUALITATIVE RESEARCH

METHODS I (4). Critical survey of qualitative approaches in social science research. Examines historical roots, epistemological perspectives, and ethical issues. Includes ethnographic and observational methods, interview, grounded theory, case study, and participatory approaches. PREREQS: 15 quarter credits of behavioral and social sciences.
HDFS 539. QUALITATIVE METHODS II (4). Critical survey of qualitative approaches in social science research. Examines historical roots, epistemological perspectives, and ethical issues Includes ethnographic and observational methods, interview, grounded theory, case study, and participatory approaches. Application of qualitative methods through completion of a qualitative research project. PREREQS: HDFS 538 [C]

HDFS 541. FAMILY STUDIES (4). Critical survey of current research in family studies with a focus on diverse family structures and processes. PREREQS: 15 quarter credits of behavioral and social sciences.
HDFS 546. THEORIES OF FAMILY STUDIES (4). An overview of the major theoretical perspectives used in the study of families. Issues of theory construction and evaluation are also covered. Course goal is to enable the student to apply conceptual frameworks to a particular area of interest.
HDFS 547. FAMILIES AND POVERTY (3). Examines families in poverty focusing on causes and consequences of family poverty, including global economic factors, migration patterns, discrimination, and policies and programs for families.
HDFS 565. TOPICS IN HUMAN DEVELOPMENT AND FAMILY SCIENCES (3). Topics and issues in human development and family sciences. Examples: children and the law; gender and families; parenting; aging; relationship development across the lifespan. This course is repeatable for a maximum of 18 credits. PREREQS: 6 credits of HDFS, SOC or PSY
HDFS 587. SOCIAL GERONTOLOGY (3). An introduction to aging research targeted toward understanding demographics of aging societies, lifespan theories, methods of aging research, psychosocial aging processes, family and caregiving issues, housing and long-term care, and current social policies.

HDFS 601. RESEARCH (1-6). This course is repeatable for a maximum of 16 credits.

HDFS 602. INDEPENDENT STUDY (1-6). This course is repeatable for a maximum of 16 credits.

HDFS 603. DISSERTATION (1-16). This course is repeatable for a maximum of 999 credits.

HDFS 605. READING AND CONFERENCE (1-6).
This course is repeatable for a maximum of 16 credits.
HDFS 606. SPECIAL PROJECTS (1-6). This course is repeatable for a maximum of 16 credits.
HDFS 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
HDFS 608. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits.
HDFS 610. PRACTICUM/INTERNSHIP (3-15). This course is repeatable for a maximum of 16 credits.
HDFS 616. ADVANCED TOPICS IN CHILDADOLESCENT DEVELOPMENT (3). Advanced critical study of theory and research related to specific topics of social, emotional, and cognitive development during infancy, childhood and/ or adolescence. This course is repeatable for a maximum of 6 credits.

HDFS 617. ADVANCED TOPICS IN ADULT DEVELOPMENT AND AGING (3). Advanced critical study of theory and research related to specific topics of social and emotional development and stability in adulthood, including later life. This course is repeatable for a maximum of 9 credits.
HDFS 630. QUANTITATIVE METHODS IN
FAMILY AND INDIVIDUAL DEVELOPMENT (3).
Advanced quantitative techniques in human development and family studies. Includes longitudinal designs, structural equation modes. Content varies with each offering. This course is repeatable for a maximum of 9 credits.
PREREQS: HDFS 532 [C]
HDFS 639. COMMMUNITY-BASED
PARTICIPATORY RESEARCH (4). Focuses on initiating and conducting research in partnership with communities. Includes in-depth examination of community-based participatory research (CBPR) elements, principles, theories, and approaches; how researchers can successfully partner with communities; and research with minority and/or underprivileged communities; with examples from environmental health, gerontology, and health promotions. PREREQS: 9 credits of public health or human development and family sciences graduate course work.

## HDFS 665. TEACHING IN HUMAN

DEVELOPMENT AND FAMILY SCIENCES (1). Principles and practices of pedagogy in human development and family sciences related to both on-campus and Ecampus instruction. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 6 credits.
HDFS 685. RACE, CLASS, CULTURE AND
AGING (4). Examines the diversity among the older population in health status, health beliefs/ behaviors, and health care, and explores the interaction of culture and structure as determinants of their life chances. The empirical literature used in the course is drawn from the experiences of aging of African-American, Latino, and Asian-Pacific Islander elderly. Taught spring term even years. CROSSLISTED as H 685. PREREQS: 9 credits of public health or HDFS graduate course work, or permission of instructor.
HDFS 699. SPECIAL TOPICS (1-4). This course is repeatable for a maximum of 8 credits.
HDFS 808. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Application to Early Childhood Leadership Directions.

## 4-H YOUTH DEVELOPMENT EDUCATION COURSES

YDE 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits.
YDE 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
YDE 406. PROJECTS (1-3). This course is repeatable for a maximum of 3 credits. PREREQS Departmental approval required.

YDE 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
YDE 410. INTERNSHIP/WORK EXPERIENCE (1-16). This course is repeatable for a maximum of 16 credits.
YDE 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## OTHER DECREES \& <br> PROCRAMS WHTHIN THE <br> COLLECE OF PUBLIC HEALTH <br> AND HUMAN SCIENCES <br> UNDERGRADUATE MAJORS WITH OPTIONS

## INTERNATIONAL STUDIES (BA, HBA)

See International Programs for information on the International Studies Degree.

## Major Code: 910

## SUSTAINABILITY (BS, HBS)

## Also available via Ecampus.

OSU Main Campus Contact: Ann Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.

OSU-Cascades Campus Contact: Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@osucascades.edu.

## Sustainability Core (17-20)

All Sustainability Majors and Minors must take the five courses that make up the Sustainability Core: SUS 304, SUS 350, an ecological sustainability course (SUS 102 recommended), a social sustainability course (choose one below), and an economic sustainability course (choose one below):

SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)
Ecological Dimensions of Sustainability (3-4)
Select 3 to 4 credits from the following:
BI 301. *Human Impacts on Ecosystems (3)
SUS 102. *Introduction to Environmental Science and Sustainability (4)
Social Dimensions of Sustainability (3-4)
Select 3 to 4 credits from the following:

SOC 381. Social Dimensions of
Sustainability (4)(Ecampus only)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/FES/ANS/FW 485. *Consensus and
Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)(Ecampus, Cascades Campus )

## Economic Dimensions of

Sustainability (3-4)
Select 3 to 4 credits from the following:
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 351. *Natural Resources Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)

## Practicum (3-12)

Sustainability majors are required to complete a minimum of 3 Practicum credits. Before registering for a practicum, students must get practicum approved by Sustainability Double Degree advisor. Email: Sus.advising@oregonstate.edu.
SUS 401. Research (3-12)
SUS 410. Internship (3-12)
SUS 499. Special Topics (3-12)
Note: SUS 410 credits may be achieved by participation in an $\mathrm{IE}_{3}$ Global Internship with advisor approval.

## Remaining Elective Credits (4-16)

In addition to the required credits specified above, students must work with the sustainability program advisor to select courses relevant to their discipline and career path interests.

## Credits total=36

Classes that can be used to fulfill remaining requirements are listed below. Students are NOT limited to taking courses within their primary major of study. The Sustainability advisor(s) will approve courses not listed here if they have an obvious link to sustainability and fulfill the intent of the double degree. See the OSU Sustainability Office list of sustain-ability-related courses.

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)

BA 465. *Systems Thinking and Practice (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 311. Intermediate Microeconomic
Theory (4)
ECON 315. Intermediate Macroeconomic
Theory (4)
MGMT 452. Leadership (4)

## Engineering

BEE 221. Fundamentals of Ecological Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative
Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering Fundamentals (4)
ENVE 322. Fundamentals of Environmental Engineering (4)
HEST 310. *Introduction to Community Engagement and Community-Based Design (3)

## Natural Sciences

ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ATS 320. *The Changing Climate (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 348. *Human Ecology (3)
BI 370. Ecology (3)
BRR 325. *Energy Technology and Social Change (3)
BRR 350. Introduction to Regional Bioenergy (2)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
DHE/WSE 415. *Renewable Materials in the Modern Age (3)
FES 341. Forest Ecology (3)
FES 354. Communities, Natural Areas, and Sustainable Tourism (3)
FES 355. Management for Multiple Resource Values (3)
FES 360. Collaboration and Conflict Management (3)
FES 365. *Issues in Natural Resources Conservation (3) Ecampus or Cascades campus only
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3
FES/FW 445. Ecological Restoration (4)
FES/HORT 455. Urban Forest Planning, Policy and Management (4) Ecampus only
FES/NR/RNG 477. *Agroforestry (3)
FES/SOC/ANS/FW 485. *Consensus and Natural Resources (3)
FOR 462. Natural Resource Policy and Law (3)

FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information Systems in Natural Resource (3)
FW 321. Applied Community and Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society, and Sustainability (3)
FW 435. ${ }^{\wedge}$ Wildlife in Agricultural
Ecosystems (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 309. *Environmental Justice (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 360. GIScience I: Geographic Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and
Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
SOIL 475. Soil Resource Potentials (4)
SOIL 499. Special Topics (1-16)
SUS 103. *Introduction to Climate Change (4)

WSE 111. Renewable Materials for a Green Planet (2)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 392. *Bamboolooza: The Fascinating World of Bamboo (3)
WSE 453. ^Global Trade in Renewable Materials (3)
WSE 455. Marketing and Innovation in Renewable Materials (4)
WSE 473. Bioenergy and Environmental Impact (3)
WSE 475. Environmental Assessment of Building Materials (4)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy, and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ANTH 481. *Natural Resources and
Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and Conflict Management (3)

COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature, Culture and the Environment (4)
FES/SOC/ANS/FW 485. *Consensus and
Natural Resources (3)
HEST 310. *Introduction to Community
Engagement and Community-Based
Design (3)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL/REL 443. *World Views and
Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion, and Politics (4)
PS 374. *Sustainable Living: Practices and Policies (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)

PS 477. International Environmental
Politics and Policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
WGSS 440. *Women and Natural Resources
(3)

WGSS 450. Ecofeminism (3)

## Footnotes:

* Bacc Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Major Code: $\mathbf{8 7 0}$

## UNDERGRADUATE MINORS

## SUSTAINABILITY MINOR

Available on the Corvallis and OSU-Cascades campuses, and via Ecampus.
OSU Main Campus Contact: Ann
Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.

OSU-Cascades Campus Contact: Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@ osucascades.edu.

The Sustainability minor includes core sustainability courses (5) and tailored elective courses to expand students' knowledge and experience of their primary major in the context of sustainability principles and frameworks. Courses from a student's major course of study will not count towards minor requirements. Completion of the Sustainability minor requires 27 credits beyond the 180-credit minimum for graduation.

## Sustainability Core (17-20)

All Sustainability students must take (8):
SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)

## Social Dimensions of

Sustainability:
Select 3 to 4 credits from the following:
SOC 381. Social Dimensions of Sustainability (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC 485/ANS 485/FES 485/FW 485.
*Consensus and Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)
Ecological Dimensions of

## Sustainability:

Select 3 to 4 credits from the following:
BI 306. *^Environmental Ecology (3)
SUS 102. *Introduction to Environmental
Science and Sustainability (4)

## Economic Dimensions of

## Sustainability:

Select 3 to 4 credits from the following:
AEC 250. *Introduction to Environmental
Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)

## Sustainability Individualized Study/

## Elective Credits (7-10)

Students will work with their primary academic advisor and the Sustainability academic advisor to select electives in the theme relevant to their interests for a total of 7-10 credits. Students should discuss with Sustainability advisor to apply elective courses that may not be listed below.

## Total Credits=27

## Elective Courses:

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. Introduction to
Macroeconomics (4)
ECON 315. Intermediate Macroeconomic Theory (4)

## Engineering

BEE 221. Fundamentals of Ecological Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative

Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Electric Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering Fundamentals (4)
ME 312. Thermodynamics (4)

## Natural Sciences

ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 370. Ecology (3)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FOR 462. Natural Resource Policy and Law (3)

FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information
Systems in Natural Resource (3)
FW 321. Applied Community and Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society and Sustainability (3)
FW 435. ^Wildlife in Agricultural
Ecosystems (3)
FW/ANS/FES/SOC 485. *Consensus and Natural Resources (3)
FW 488. Problem Solving in Fisheries and Wildlife Science (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water and the Environment (3)
GEO 309. *Environmental Justice (3)
GEO 453. Resource Evaluation Methods/ EIS (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and
Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)

WSE 321. Chemistry of Renewable Materials (3)

WSE 322. Physical and Mechanical
Properties of Renewable Materials (4)
SOIL 499. Special Topics [Organic Farming] (1-16)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ANTH 481. *Natural Resources and
Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 442. Bargaining and Negotiation
Processes (3)
ENG 482. Studies in American Literature,
Culture and the Environment (4)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL 443. *World Views and Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion and Politics (4)
PS 449. ^Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)

PS 477. International Environmental Politics and policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 381. Social Dimensions of Sustainability (4)
SOC 480. *Environment Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/ANS/FES/FW 485. *Consensus and Natural Resources (3)

## Footnotes:

* Baccalaureate Core Course
^ Writing Intensive Course (WIC)


## Minor Code: 871

PUBLIC HEALTH (MPH, PhD)
Graduate Areas of Concentration Biostatistics (MPH only); environmental and occupational health (MPH, PhD); epidemiology (MPH, PhD); health management and policy (MPH only); health policy (PhD only); health promotion and health behavior (MPH,
PhD); international health (MPH only)'
The PhD and MPH in public health degree programs are summarized below.

For further information about public health graduate programs, contact 541-737-3825 or visit the Public Health major website at http://health.oregonstate.edu/ degrees/graduate/public-health.

The College of Public Health and
Human Sciences is accredited by the

Council on Education for Public Health (CEPD).

## Doctor of Philosophy (PhD) in Public Health

The PhD in Public Health is for individuals who wish to prepare themselves for careers in university teaching, research, consulting, policy development, or other high-level public health positions. There are currently five areas of concentration offered for the PhD degree:

1. Environmental and occupational health;
2. Epidemiology;
3. Global health;
4. Health policy;
5. Health promotion and health behavior.
A master's degree in a relevant field is required before admission into the PhD program.

The PhD program consists of a minimum of 109 credits, including at least 36 graduate credits devoted to preparation of the thesis. Doctoral students take courses in research and quantitative methods, theory, ethics, and their area of emphasis. Each student and his or her doctoral committee jointly determine the student's specific program of doctoral study. This process allows students to design a course of study uniquely suited to their particular needs and career goals. Further information about these requirements is available in the PhD in Public Health website and PhD handbook at http://health.oregonstate.edu/degrees/ graduate/public-health/phd-program.

## Master of Public Health (MPH)

The College of Public Health and Human Sciences offers six options within the MPH degree:

1. Biostatistics
2. Environmental and Occupational Health
3. Epidemiology
4. Global Health
5. Health Management and Policy
6. Health Promotion and Health Behavior
MPH students take a common MPH core of five courses in the following areas:

- Biostatistics
- Environmental health
- Epidemiology
- Health behavior
- Health systems organization

Degree requirements vary by option. See handbooks for option-specific degree requirements: http://health.oregonstate. edu/degrees/graduate/public-health/ graduate-handbooks.

All MPH students must do a 6-credit internship upon completion of their core and option classes. Upon completion of all required course work and the internship, all MPH students must schedule a final oral examination. Students must
receive approval to take the exam from their academic advisors.

## Major Code: $\mathbf{7 5 8 0}$

## OPTIONS

## BIOSTATISTICS OPTION

The Biostatistics graduate option of the MPH program will train students in statistics applied to public health and healthcare settings. Graduates will be able to work in health departments, medical schools, nongovernmental agencies, and CDC and WHO field programs.

## Required

H 526. Epidemiologic Methods (3)
H 580. Linear Regression and Analysis of Time to Event Data (4)
H 581. Generalized Linear Models and Categorical Data Analysis (4)
H 582. Analysis of Correlated Health Data (3)

H 584. Analysis of Intervention Studies and Clinical Trials (3)
ST 521. Introduction to Mathematical Statistics (4)
ST 522. Introduction to Mathematical Statistics (4)
Electives (13 credits)
Option Code: 7581

## ENVIRONMENTAL AND

OCCUPATIONAL HEALTH OPTION
The Environmental and Occupational Health graduate option of the MPH program focuses on understanding the impact of environmental and occupational hazards on human health and society, as well as, developing effective interventions that will control and prevent exposure to hazards.

## Required

GRAD 520. Responsible Conduct of Research (1)
H 542. Environmental and Occupational Health Risk Assessment (3)
H 543. Exposure Science I (3)
H 544. Environmental and Occupational Epidemiology (3)
H 546. Exposure Science II: Sampling and Measurement (3)
H 548. Public Health Toxicology (3)
H 583. Environmental and Occupational Health and Safety Management (3)
Electives (18 credits)

## Option Code: 7582

## EPIDEMIOLOGY OPTION

The Epidemiology graduate option of the MPH program is designed primarily for those interested in using their epidemiologic skills in applied settings - international health, health departments, non-governmental agencies, or CDC and WHO field programs, but can also be the basis for doctoral training in epidemiology or a complement to other doctoral or professional training.

## Required

H 526. Epidemiologic Methods (3)
H 553. Applied Epidemiologic Methods (3)
H 580. Linear Regression and Analysis of
Time to Event Data (4)
H 581. Generalized Linear Models and Categorical Data Analysis (4)
Electives (15 credits)
At least three of the following:
H 550. Social Epidemiology (3)
H 552. Disaster Epidemiology (3)
H 554. Epidemiology of Aging (3)
H 555. Cancer Epidemiology (3)
H 560. Public Health Surveillance (3)
H 562. Infectious Disease Epidemiology (3) H 599. Special Topics (Reproductive Epidemiology) (3)
Option Code: 7583

## GLOBAL HEALTH OPTION

The Global Health graduate option of the MPH program prepares students for public health leadership roles in international health, with an emphasis on health development for those in middle- and low-income nations. Courses focus on understanding complex issues, problem solving and developing analytical skills to critically view global health issues in order to promote progressive, comprehensive, sustainable and equitable community ownership of health development. As part of this interdisciplinary program, students acquire wide-ranging knowledge of international health while also developing an individually designed specialization.

## Required

H 511. Community, Culture and Global Health (3)
H 516. Research Methods for Global Health (3)

H 519. Displacement, Migration, and Global Health (3)
H 527. Critical Assessment of International Health Programs (3)
H 528. Global Health Issues (3)
H 529. International Health (3)

## Electives (18 credits)

Option Code: 7587

## HEALTH MANAGEMENT AND POLICY OPTION

In the Health Management and Policy graduate option of the MPH program, students will develop the ability to think about public health problems in practical ways using sound conceptual frameworks. Public health problems will be viewed from the perspective of those who receive, provide, finance and regulate care.

## Required

H 518. Public Health Ethics and Issues (3) or PHL 544. Biomedical Ethics (4)
H 530. Health Policy Analysis (3)
H 532. Economic Issues in Health and Medical Care (3)
H 536. Healthcare Organization Theory and Behavior (3)
H 556. Strategic Management of Health

## Option Electives

## Four of the following:

H 515. Research Methods in Social and Behavioral Health Sciences (3)
H 531. Health Care Marketing (3)
[Terminated fall 2017]
H 534. Health Care Law and Regulation (3)
H 557. Financial Management of Health Care Organizations (3)
H 558. Reimbursement Mechanisms (3)
H 559. Contracts and Negotiation (3) [Terminated fall 2017]
Other Electives (12 credits)
Option Code: 7584

## HEALTH PROMOTION AND

 HEALTH BEHAVIOR OPTIONIn the Health Promotion and Health Behavior graduate option of the MPH program, students will gain an understanding of the role of behavioral and social influences in public health and learn to apply the principles and practices of health promotion and behavior to address current and emerging public health problems.

## Required

H 515. Research Methods in Social and Behavioral Health Sciences (3)
H 549. Mass Media and Health (3)
H 572. Community Organization for Health Promotion and Education (3)
H 575. Evaluation of Health Promotion and Education Programs (3)
H 576. Program Planning/Proposal Writing in Health/Human Services (4)
Electives (20 credits)
Option Code: 7585

## PUBLIC HEALTH GRADUATE

 MINORFor more details, see a public health program coordinator.

## Minor Code: $\mathbf{7 5 8 0}$

## PUBLIC HEALTH GRADUATE

## CERTIFICATE

Also available via Ecampus.
MPH Core Courses (17 credits)
H 512. Introduction to Environmental and
Occupational Health Sciences (3)
H 524. Introduction to Biostatistics (4)
H 525. Principles of Epidemiology (4)
H 533. Health Systems Organization (3)
H 571. Principles of Health Behavior (3)

## Electives (3 credits)

H 530. Health Policy Analysis (3)
H 536. Healthcare Organizational Theory and Behavior (3)
Total=20 credits
Major Code: CG10

For more than a century, military training has been offered at Oregon State University. Fulfilling a provision of the Morrill Act of 1862, which gave Corvallis College its first public support, an Army Cadet Corps was organized in 1873.

ROTC at Oregon State is made up of the departments of Military Science, Naval Science, and Aerospace Studies. In 1917, the Department of Military Science became responsible for all military training under the National Defense Act of 1916. This act expanded and standardized the training of Army officers by colleges and universities and established the Reserve Officer Training Corps (ROTC). During World War II, OSU became known as the "West Point of the West" for commissioning more officers than any other nonmilitary academy in the nation. At the end of World War II, the secretary of the Navy commissioned the Department of Naval Science (NROTC) on this campus to provide the training of both Navy and Marine Corps officers. On July 1, 1949, the U.S. Air Force activated an AFROTC unit that today is called the Department of Aerospace Studies. OSU is now one of 48 colleges and universities that offer education for all three military departments.

Originally, two years of military science and tactics were required of all able-bodied male students, but since 1962, ROTC has been voluntary. Since 1965, two-year programs have been available for students who have finished two years of college but have not taken ROTC previously.

As opportunities for women to serve as officers in the armed forces grow, opportunities for women to participate in ROTC programs expand. Women have long been eligible to take ROTC course work for credit. Since 1970, they have been enrolled as cadets in Air Force ROTC and, since 1973, have also been enrolled as cadets and midshipmen in the Army and Navy ROTC programs.

## MISSION AND OBJECTIVES

The ROTC selects and prepares young men and women, through a program of instruction coordinated with the student's normal academic curriculum, for commissioning and service as officers in the regular and reserve components of the Army, Navy, Air Force, and Marine Corps.

## UNIFORMS AND ALLOWANCES

Students in each of the units receive uniforms to be worn at drill periods and on special occasions. Travel to and from any summer camps or cruises is paid. While at camp or on a cruise, the members receive food and quarters at government expense in addition to basic pay. (See the individual sections for further information on the various camps and cruises.) Those selected for the scholarship programs receive tuition, books, and fees plus $\$ 300$ to $\$ 500$ a month subsistence pay for up to 40 months.

## FLIGHT TRAINING

Eligible Army, Navy, Marine Corps, and Air Force ROTC students may be selected for flight training upon their successful completion of the program and commissioning.

## HOW TO ENROLL

See the Army, Navy, or Air Force sections of this catalog for enrollment details for the various ROTC programs. All three departments have staff available throughout the year during normal school hours to answer any inquiries regarding the ROTC programs.

## AEROSPACE STUDIES

## Lieutenant Colonel Warren B. Brainard, Commander

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FACULTY
Professor Lt Col Warren B. Brainard, U.S. Air Force

Assistant Professors Capt Jeremy
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## Minor

Aerospace Studies
The Air Force Reserve Officers Training Corps (AFROTC) program, offered by the Department of Aerospace Studies, provides college-level education to prepare interested men and women for commissioning as second lieutenants in the United States Air Force while simultaneously completing any university undergraduate or graduate degree. The program emphasizes leadership, managerial skills, and the development of each student's sense of personal integrity, honor, and individual responsibility.

Aerospace Studies courses are open to all university students and are taught by Air Force officers. Detachment 685 (Aerospace Studies) offers a Minor in Aerospace Leadership for graduating students/cadets. If students desire a career as an Air Force officer, they must complete all AFROTC requirements. University students who attend academic classes only as a special student (there is no stipend for special students) can receive elective credit for the course(s). Except for cadets on AFROTC scholarship, students incur no active-duty service commitment by taking general military courses (GMC) and may drop the courses at any time within the limits of university course-drop policies.
The U.S. Air Force's mission is to "Fly, Fight and Win in Air, Space and Cyber-
space." Whether a student's interest lies in flying advanced aircraft, operating sophisticated outer space systems, defending America's cyberspace infrastructure, researching and developing state-of-theart technology, or working as a language interpreter, defense intelligence officer, medical or legal professional, the Aerospace Studies Department can guide students to exciting and challenging opportunities.

## AFROTC SCHOLARSHIPS

If students qualify, scholarship opportunities are available. A variety of full and partial scholarships are available, and certain scholarships have specific requirements. High school students must apply online by December 1, the year before they begin college in order to compete for a scholarship while still in high school. Students will find application procedures and forms at http://www. afrotc.com/.

Air Force ROTC scholarships cover up to $100 \%$ of tuition, laboratory fees, and incidental expenses. ROTC scholarship students will also receive $\$ 600$ annually for textbooks and a monthly tax-free stipend of up to $\$ 500$. Students must apply and be accepted into the AFROTC program and agree to accept an Air Force officer commission and service commitment upon graduation.

For details on Air Force scholarships, contact the AFROTC Detachment, McAlexander Fieldhouse, Room 303, (541)7373291, (800)633-7352 or email: afrotc@ oregonstate.edu. Website: http://flyingbeavs.com/ or http://www.afrotc.com/.

## ALLOWANCES, UNIFORMS, TEXTBOOKS

Students on an Air Force ROTC scholarship or enrolled in the ROTC Professional Officer Course are paid a monthly stipend of up to $\$ 500$. Uniforms and textbooks for all Aerospace Studies courses are provided by the Air Force.

## Four- or Three-Year Program

The four-or three-year program consists of the General Military Course: six quarters of lower-division Air Force Studies classes, including a laboratory each term, and the Professional Officer Course: six quarters of upper-division Air Force Studies classes, including a laboratory each term. Four- or three-year cadets attend four weeks of expeditionary summer field training (AS 304) prior to their junior year of college.

If you're already in college, it's not too late to experience the benefits of joining Air Force ROTC. There are numerous options for you even if you start after your freshman year. Previous military experience-ROTC, academy, or military service-may allow the Professor of Aerospace Studies to waive all or part of the General Military Course (first-year and
sophomore years) for students enrolled in the four-year AFROTC program. This program provides an opportunity for students who did not enter ROTC previously. Entry is on a competitive basis and the accelerated three-year program is available to students who join their sophomore year. Selectees attend mandatory six-week summer field training session (AS 304) two summers before commissioning with a bachelor's, master's or doctorate degree. Applicants must have one year remaining in college after the five-week field training. The curriculum includes AS 304 (five-week field training); six quarters of upper-division Air Force Studies classes, including a laboratory each term.
Students may enter the first-year class during the fall, winter, or spring term. Sophomore students may take the first-year and sophomore level courses concurrently. Prior to enrolling in the last two years of the program, the Professional Officer Course, the student must meet AFROTC qualification standards and requirements.

## Accelerated (Two-Year) Program

 Specially qualified students are eligible for two-year ROTC scholarships. These scholarships provide up to full college tuition, required fees, textbook allowance, and pay the recipient $\$ 250-400$ per academic month. The two-year program is available for eligible candidates who can complete all AFROTC requirements and their degree in two years from their entrance into the AFROTC program. Cadets will complete the entire Professional Officer Course in two years. A condensed General Military Course curriculum must be completed within the first year as well. Cadets will attend a standard summer Field Training session prior to the start of their senior year. Potential applicants are considered on a case by case basis. Veterans, active duty personnel, and graduate students are encouraged to inquire about special accelerated programs designed for them. One and two-year programs are also open for Law Students and graduate Law Programs. Students already attending law school wishing to serve as Air Force Judge Advocate Generals (JAGs) may apply for the program through the Air Force JAG website. Officer training will be provided by the AFROTC detachment at an accelerated pace to meet Air Force recruiting goals.A highly selective one-year program is available for specially selected eligible candidates who can complete all AFROTC requirements and their degree in one year from their entrance into the AFROTC program. Cadets will complete the entire Professional Officer Course (POC) in one year. A condensed General Military Course (GMC) curriculum
must be completed within the first 1.5 terms. Cadets will attend a standard Field Training session prior to the start of their senior year. Potential applicants are considered on a case by case basis pending departmental approval. To allow for appropriate vetting, applicants must contact the department prior to the end of their junior year. Please contact the Air Force ROTC department for more information.

## GENERAL MILITARY COURSE (GMC)

The 100- and 200-level courses for AFROTC cadets consist of one classroom hour, two hours of leadership laboratory, and two hours of physical fitness per week during the freshman and sophomore years. Uniforms and textbooks are provided. Students may enter the freshman class at the start of autumn or winter quarters. Sophomore students may enter at the start of autumn quarter. A four-week field training-course, normally taken during the summer between the sophomore and junior years, is required for entry into the professional officer courses. Students may receive pay and travel costs for field training.

## PROFESSIONAL OFFICER COURSE (POC)

Cadets selected for enrollment in professional officer courses are enlisted in the Air Force Reserve and receive tax-free monthly subsistence stipends. They are furnished text books and uniforms. Junior- and senior-level classes consist of three hours of academic classes, two hours of leadership laboratory and two hours of physical fitness per week.

## COMMITMENTS

Students in the four-year program incur no obligation during their first two years in AFROTC unless on scholarship. The student agrees to accept a commission, if offered, only after enrolling in AS 311. High school scholarship students incur a commitment at the beginning of their sophomore year. Upon accepting their commissions, students incur a four-year commitment; pilots incur a 10-year obligation after completion of pilot training; combat systems officers and air battle managers incur a six-year obligation after initial training. Graduates pursuing medical school incur a four-year commitment after medical school.

## STANDARDS

Cadets must be U.S. citizens of sound physical condition, maintain academic standards and high moral character. Air Force physical fitness standards must be met prior to attending field training and commissioning.

Cadets must be commissioned as Air Force officers prior to age 30.

## FURTHER EDUCATIONAL OPPORTUNITIES

After completion of AFROTC requirements, advanced degrees may be sought by delaying active duty commitments. Some commissioned officers continue advanced studies through fully-funded Air Force Institute of Technology or other DoD-sponsored programs.

## FIELD TRAINING

Under the Air Force ROTC program, one summer field training session is required, normally after the AS 200 year. Successful completion of field training is required for all cadets prior to membership in the Professional Officer Course. Students are paid varying amounts during field training.

## AEROSPACE STUDIES MINOR

The Department of Air Force Studies offers a minor open to any OSU student. Students gain a broad exposure to the concepts of aerospace power, leadership and management, and general military studies. A student cannot use a course for this minor that is being used for their major.

## Required (18)

AS 311. Leadership Fundamentals, Team
Building and Problem Solving (3)
AS 312. Effective Supervision and Group Conflict Management (3)
AS 313. Leadership, Ethics, Air Force Core
Values and Accountability (3)
AS 411. National Security Affairs (3)
AS 412. World Regional Cultural Studies (3)
AS 413. Preparation for Active Duty (3)

## Electives (minimum 9)

AS 211. The Evolution of Air and Space Power 1860-1945 (1)
AS 212. The Evolution of Air and Space Power 1945-1990 (1)
AS 213. The Evolution of Air and Space
Power 1991-2025 (1)
AS 320. Leadership Laboratory (1)
(maximum of 3 credits)
AS 420. Leadership Laboratory (1)
(maximum of 3 credits)
COMM 322. Small-Group Problem Solving (3)

COMM 440. Theories of Conflict and
Conflict Management (3)
COMM 446. *Communication in
International Conflict and Disputes (3)
HST 316. The American Military, 1607-1865 (4)

HST 317. *Why War? A Historical
Perspective (4)
HST 318. The American Military,
1865-Present (4)
HST 464. American Diplomatic History (4)
HST 465. *American Diplomatic History (4)
MS 211. Military Science II: Foundations of Leadership I (2)
MS 212. Military Science II: Foundations of Leadership II (2)
MS 213. Military Science II: Fundamentals of Military Operations (2)
NS 321. Evolution of Warfare I (3)
NS 322. Evolution of Warfare II (3)

PAX 201. Study of Peace and the Causes of Conflict (3)
PHL 344. *Pacifism, Just War, and Terrorism (4)

PS 201. *Introduction to US Government and Politics (4)
PS 205. *Introduction to International Relations (4)
PS 454. International Law and Organizations (4)

## Total=27

Footnote:

* Baccalaureate Core Course (BCC)


## Minor Code: 804

■ AEROSPACE STUDIES COURSES
AS 111. FOUNDATIONS OF THE AIR FORCE PART I (1). The introduction to the Air Force mission and organization. Featured topics include Air Force dress and appearance stand standards; military customs and courtesies, Air Force heritage, overview of the Department of the Air Force, and Air Force core values. Basic oral and written communication will be assessed. PREREQS: Taken concurrently with AS 120 for fully eligible General Military Course students.
AS 112. FOUNDATIONS OF THE AIR FORCE PART II (1). Second part of the introduction to the Air Force mission and organization. Featured topics include Air Force career opportunities, Air Force benefits, military communication skills, Air Force installations, and look at the basic characteristics of war. Basic oral and written communication will be assessed. PREREQS: Taken concurrently with AS 120 for fully eligible General Military Course students.

AS 113. FOUNDATIONS OF THE AIR FORCE PART III (1). Third part of the introduction of what the Air Force is about and what the Air Force has to offer. Featured topics include basic leadership, team building, interpersonal skills, diversity in the Air Force, and the oath of office and commissioning. Basic oral and written communication will be assessed. PREREQS: Taken concurrently with AS 120 for fully eligible General Military Course students.
AS 120. LEADERSHIP LABORATORY (1). Cadets learn officership, leadership, drill and ceremony, and customs and courtesies. Lab. Graded $P / N$. This course is repeatable for a maximum of 3 credits. PREREQS: Departmental approval. Taken concurrently with AS 111, AS 112 and AS 113. Only offered to students enrolled in the AFROTC officer commissioning program.

AS 211.THE EVOLUTION OF AIR AND SPACE POWER 1860-1945 (1). Study of the development of air power, concepts, and doctrine from its beginnings to the end of World War II. Historical examples examined include balloons, dirigibles, Wright Brotherss first flight, and the role of air power in World War I and II. Oral and written communication skills will be assessed. PREREQS: If enrolled in the AFROTC officer commissioning program, must be taken concurrently with AS 220.
AS 212. THE EVOLUTION OF AIR AND SPACE
POWER 1945-1990 (1). Study of the development of air power, concepts, and doctrine during the Cold War. Historical examples examined include the Berlin Airlift, nuclear deterrence, and the role of air power employment in the Korean and Vietnam conflicts. Oral and written communication skills will be assessed. PREREQS: Taken concurrently with AS 220 if fully eligible General Military Course student.

## AS 213. THE EVOLUTION OF AIR AND SPACE

POWER 1991-2025 (1). Study of the factors contributing to the development of air power, concepts, and doctrine from the Persian Gulf War in 1990 to the present and beyond. Historical examples examined include the air campaigns used in the Gulf War, Kosovo crisis, Operations

Enduring Freedom, Iraqi Freedom, and the Global War on Terrorism. Oral and written communication skills will be assessed. PREREQS: Taken concurrently with AS 220 if fully eligible General Military Course student.
AS 220. LEADERSHIP LABORATORY (1). Cadets are placed in element leadership positions in order to know and comprehend the Air Force concepts of command, discipline, tradition, and courtesies. Lab. Graded P/N. This course is repeatable for a maximum of 10 credits. PREREQS: Departmental approval. AS 220 is taken concurrently with AS 211, AS 212, and AS 213. Only offered to students enrolled in the AFROTC officer commissioning program.

AS 299. SPECIAL TOPICS IN AIR FORCE
STUDIES (1-16). Supervised individual work. This course is repeatable for a maximum of 99 credits. PREREQS: Departmental approval required.
AS 304. FIELD TRAINING (6). Four-week field training supplements campus courses in developing leadership and discipline. Mission, organization, and functions of an Air Force base; marksmanship, survival, and physical training; aircrew and aircraft indoctrination; orientation on specific opportunities in career fields. Conducted at an Air Force base. Graded P/N. PREREQS: Department head approval required.
AS 311. LEADERSHIP FUNDAMENTALS, TEAM BUILDING AND PROBLEM SOLVING (3).
Emphasis on leadership and management fundamentals, team building and problem solving. Case studies are used to examine leadership and management situations as a means of demonstrating and exercising practical application of the concepts being studied. Unique exercises will be utilized to emphasize team building and problem solving. Oral and written communication skills will be assessed. PREREQS: Must take concurrently with AS 320 if fully eligible Professional Officer Course student.

## AS 312. EFFECTIVE SUPERVISION AND

## GROUP CONFLICT MANAGEMENT (3).

Emphasis on situational leadership, group conflict management, effective supervision, professional knowledge, and communicative skills required of an Air Force officer. Unique case studies on leadership and management situations, and group conflict management will be utilized. Oral and written communication skills will be assessed. PREREQS: Taken concurrently with AS 320 if fully eligible Professional Officer Course student.

AS 313. LEADERSHIP, ETHICS, AIR FORCE
CORE VALUES AND ACCOUNTABILITY (3).
Emphasis on leadership ethics, leadership core values, leadership accountability, and professional knowledge. Unique case studies on leadership ethics and accountability will be utilized. Oral and written communication skills will be assessed. PREREQS: Taken concurrently with AS 320 if fully eligible Professional Officer Course Student.
AS 320. LEADERSHIP LABORATORY (1). Cadets are placed in line and staff leadership positions as a preparation for Air Force active duty. Cadet responsibilities include planning, organizing, directing, and controlling the activities of the cadet corps. Lab. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 3 credits. PREREQS: Departmental approval. AS 304. AS 320 is taken concurrently with AS 311, AS 312 and AS 313. Only offered to students enrolled in the AFROTC officer commissioning program.
AS 405. READING AND CONFERENCE (116). Supervised individual work. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

AS 411. NATIONAL SECURITY AFFAIRS (3). Emphasis on the needs for national security, evolution of American defense strategy, policy, and organization. Examination of methods for managing conflict, alliances and regional security to preserve American interests. Arms control, terrorism, and current military issues
will also be addressed. Refinement of oral and written communication skills will be assessed. PREREQS: Taken concurrently with AS 420 if fully eligible Professional Officer Course student.

## AS 412. WORLD REGIONAL CULTURAL

STUDIES (3). Study key transnational issues and religious or ethnic factors that shape the environment Air Force professionals must operate in. Emphasis will be on national security perspective of Africa, South Asia, East Asia, Latin America, Europe, Middle East and former Soviet
Republics in transition. Refinement of oral and written communication skills will be assessed. PREREQS: Taken concurrently with AS 420 if fully eligible Professional Officer Course student.
AS 413. PREPARATION FOR ACTIVE DUTY (3).
Emphasis on current military issues, evaluation systems, military commission, and risk management. Final preparation for the Air Force professional before commissioning. Refinement of oral and written communication skills will be emphasized. PREREQS: Taken concurrently with AS 420 if fully eligible Professional Officer Course student.
AS 420. LEADERSHIP LABORATORY (1). The
senior-level Leadership Laboratory program places cadets in command, line, and staff positions as a preparation for commissioned Air Force service. Cadet responsibilities include planning, organizing, directing, coordinating, and controlling leadership laboratory and the activities of the cadet corps. Lab. Graded P/N. This course is repeatable for a maximum of 6 credits. PREREQS: Departmental approval. AS 304. AS 420 is taken concurrently with AS 411, AS 412 and AS 413. Only offered to students enrolled in the AFROTC officer commissioning program.

## MHLTARY SCIENCE (AROTC)

## LTC Zachary Miller

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## FACULTY

Professor LTC Zachary Miller
Assistant Professors Major Omar Harriott, Major Paul Dyer, Major William Boisvert, Captain Mark Matthey, Master Sargeant Joel Reynolds, Sergeant First Class Eric Adams, Mr. James Miller

## MINOR

Military Science
The Military Science program is intended for students with the characteristics and attributes of a "scholar-athlete-leader." The program is specifically designed to give college students on-campus instruction and experience in the art of organizing, motivating, and leading others. It includes instruction in leadership to develop self-discipline, physical stamina, and professional bearing.
All courses offered by the Department of Military Science are fully accredited and applicable toward fulfilling academic requirements for graduation. The univer-
sity offers each eligible student the opportunity to compete for a commission as an officer in the United States Army while earning a college degree. There are both basic and advanced programs with multiple entry points which can be tailored to a student's needs. Merit scholarship opportunities exist for students in any approved academic discipline, particularly in computer science, engineering, math, and science. Uniforms and books are provided free of charge. There are multiple opportunities for cadets to attend funded internships, training with Army units, multi-week trips to foreign countries across the world, Airborne, and Air Assault Training.

## BASIC PROGRAM

The basic program is voluntary and is open to all students, comprising the 1 and 2 -credit, lower-division courses listed below, and is normally completed during the freshman and sophomore years. Students may also satisfy the advanced program prerequisites or accelerate their progress through previous military experience or by completing MS 214, Military Science: Leader's Training Course (LTC) ( 6 credits) held at Fort Knox, Kentucky during the summer. No military obligation is incurred for participation in basic program classes, and students can decide whether they want to apply for the advanced program. Additionally, students who only want to attend the lecture portion of the lower-division classes may do so and are not expected to wear uniforms.

## ADVANCED PROGRAM

Students who desire to enroll in the two-year advanced program, comprising the 3 -credit, upper-division courses listed below, must apply and be accepted. Only those students who have satisfied the basic program requirements described above are eligible. Enrollment in the Advanced Program requires a contract incurring a Service Commitment in the Army, Army Reserve, or Army National Guard.

Students in the advanced program receive $\$ 450$ to $\$ 500$ per month subsistence allowance during the school year. During the four-week summer Leadership Development Assessment Course (LDAC), they receive room and board, travel expenses to and from the program location, and approximately $\$ 900$ for the period involved. Veteran students enrolled in the ROTC program receive these amounts in addition to any other educational benefits.
The LDAC summer program is normally attended between the cadet's junior and senior years. The university awards 6 credits for successful completion.

## CAMPUS-BASED SCHOLARSHIP PROGRAM

Each year, the Army ROTC program has dedicated four-, three-, and two-year scholarships awarded to local students attending or planning to attend OSU. Applications are accepted any time during the year. Applicants must meet physical requirements, have a minimum cumulative college GPA of 2.50, SAT score of $920+$ or ACT of 19+, no criminal record, and be of good moral character. The scholarship pays full tuition, \$1,200 per year for books, and a stipend of $\$ 300$ to $\$ 500$ per month while the student is in school. For an application, contact the Department of Military Science at 541-737-3511.

## SIMULTANEOUS MEMBERSHIP PROGRAM (SMP)

The Simultaneous Membership Program (SMP) is a voluntary program that allows ROTC students to join the Army National Guard and Army Reserve. Upon graduation from basic training and advanced training, students are eligible for the G.I. Bill, which, combined with tuition assistance, is worth over $\$ 18,000$ per year as a full-time student. Upon degree completion, students earn a commission in the active Army, National Guard or Army Reserve.

## SERVICE OBLIGATION AND ACADEMIC DELAY

Current laws and regulations require each advanced program graduate to accept a commission upon graduation and to fulfill an eight-year military commitment. This may be satisfied by eight years of reserve forces duty in the USAR or ARNG or by a combination of active duty and reserve forces duty, usually four years active duty and four years reserve forces duty.
Delays in reporting to active duty may also be granted for up to four years to selected students who are enrolled in a full-time program of instruction leading to an acceptable advanced degree.

## MILITARY SCIENCE MINOR

Also available at OSU-Cascades.
The Department of Military Science offers a minor which is open to any OSU student.

At least 18 of the 27 credits required in the minor must be military science courses.
Military Science (18)
MS 111. Military Science I: Introduction to Army Leadership and ROTC (1)
MS 112. Military Science I: Introduction to Basic Military Skills (1)
MS 113. Military Science I: Introduction to Tactical Leadership (1)
MS 211. Military Science II: Foundations of Leadership I (2)
MS 212. Military Science II: Foundations of

Leadership II (2)
MS 213. Military Science II: Fundamentals of Military Operations (2)
MS 311. Military Science III: Leadership and Management of Military (3)
MS 312. Military Science III: Leadership and Management of Military (3)
MS 313. Military Science III: Leadership and Management of Military (3)
MS 314. Military Science: Leader
Development and Assessment Course (6)
MS 411. Military Science IV: Adaptive Leadership (3)
MS 412. Military Science IV: Preparation for Officership (3)
MS 413. Military Science IV: Preparation for Officership (3)

## Electives

A minimum of one course must be taken from the History list (minimum 3 credits) and two 3 -credit courses are required (for a total of 6 credits) from the remaining categories. A student cannot use a course for this minor that is also part of their major.

## Anthropology

ANTH 380. *Cultures in Conflict (3)

## Communication

COMM 114. *Argument and Critical
Discourse (3)
COMM 218. *Interpersonal
Communication (3)
COMM 322. Small-Group Problem Solving (3)

COMM 446. *Communication in International Conflict and Disputes (3)

## History

HST 317. *Why War: A Historical
Perspective (4)
HST 318. The American Military, 1865Present (4)
HST 465. *American Diplomatic History (4)
MS 405. Reading and Conference (3)

## Peace Studies

PAX 201. Study of Peace and the Causes of Conflict (3)

## Philosophy

PHL 205. *Ethics (4)
PHL 344. *Pacifism, Just War, and Terrorism (4)

PHL 451. Knowledge and Reality (3)

## Political Science

PS 201. *Introduction to United States Government and Politics (4)
PS 205. *Introduction to International Relations (4)

## Total=27

Footnote:

* Baccalaureate Core Course (BCC)


## Minor Code: 805

■ MILITARY SCIENCE COURSES
MS 111. MILITARY SCIENCE I: INTRODUCTION TO ARMY LEADERSHIP AND ROTC (1).
Introduction to ROTC, and its relationship to the U.S. Army. Role of the army officer, including leadership and management fundamentals. Introduction to land navigation. Lec/lab.
MS 112. MILITARY SCIENCE I: INTRODUCTION TO BASIC MILITARY SKILLS (1). Basic small unit tactics; land navigation; how to read a topographic
map and use a magnetic compass; includes practical exercises. Graded A-F only.
MS 113. MILITARY SCIENCE I: INTRODUCTION TO TACTICAL LEADERSHIP (1). Customs and traditions of the U.S. Army; unit organization and missions. Types of careers available to army officers. Practical exercises. Lec/lab.
MS 130. *MILITARY PHYSICAL CONDITIONING
(1). Prepares military science cadets and university students to excel in the Army Physical Fitness Test (AFPT). (Bacc Core Course) This course is repeatable for a maximum of 11 credits.
MS 211. MILITARY SCIENCE II: FOUNDATIONS OF LEADERSHIP I (2). An examination of effective leadership. Development of interpersonal skills using practical exercises and case studies. Graded A-F only. Lec/lab.
MS 212. MILITARY SCIENCE II:
FUNDAMENTALS OF LEADERSHIP II (2). History of the American soldier from 1775 to 1919; weaponry and tactics of the American Army. Use of battle analysis and war gaming included.
MS 213. MILITARY SCIENCE II:
FUNDAMENTALS OF MILITARY OPERATIONS
(2). Basic U.S. Army tactics at the individual, team, and squad levels. Integration of military skills in offensive and defensive operations. Graded A-F only. Lec/lab.
MS 214. MILITARY SCIENCE: LEADER'S
TRAINING COURSE (LTC) (6). Four weeks of classroom and field training at Fort Knox, Kentucky. Can substitute for the first two years of the ROTC program. PREREQS: Meet minimum enrollment standards for the advanced ROTC program.
MS 311. MILITARY SCIENCE III: LEADERSHIP AND MANAGEMENT OF MILITARY
ORGANIZATION (3). Study of military leadership, management, theory and dynamics of the military team. Applies principles to advanced military operations. Includes leadership, management, and organizational theory; group dynamics; functions of staff organizations; development of the commander,s estimate; combat orders and plans; troop leading procedures; application of leadership concepts in offensive and defensive operations at the squad, platoon, and company level; and fundamentals of small-unit tactics/patrolling. Graded A-F only. Lec/lab.
MS 312. MILITARY SCIENCE III: LEADERSHIP AND MANAGEMENT OF MILITARY
ORGANIZATIONS (3). Study of military leadership, management, theory and dynamics of the military team. Applies principles to advanced military operations. Includes leadership, management, and organizational theory; group dynamics; functions of staff organizations; development of the commanderss estimate; combat orders and plans; troop leading procedures; application of leadership concepts in offensive and defensive operations at the squad, platoon, and company level; and fundamentals of small-unit tactics/patrolling. Graded A-F only. Lec/lab.

## MS 313. MILITARY SCIENCE III: LEADERSHIP

 AND MANAGEMENT OF MILITARYORGANIZATIONS (3). Study of military
leadership, management, theory and dynamics of the military team. Applies principles to advanced military operations. Includes leadership, management, and organizational theory; group dynamics; functions of staff organizations; development of the commander's estimate; combat orders and plans; troop leading procedures; application of leadership concepts in offensive and defensive operations at the squad, platoon, and company level; and fundamentals of small-unit tactics/patrolling. Graded A-F only. Lec/lab.
MS 314. MILITARY SCIENCE: LEADER
DEVELOPMENT AND ASSESSMENT COURSE
(6). Practical and theoretical instruction and training in soldier skills for four weeks. Practical leadership application and experience in a military environment. PREREQS: (MS 311 [D-] and MS

312 [D-] and MS 313 [D-] )
MS 405. READING AND CONFERENCE (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Instructor approval required.
MS 411. MILITARY SCIENCE IV: ADAPTIVE LEADERSHIP (3). Train, mentor and evaluate underclass cadets. Learn duties and responsibilities of Army staff office and apply processes. Execute and assess battalion training events. Understand and employ risk management process and use soldier fitness program to reduce and manage stress. Graded A-F only. Lec/lab.
MS 412. MILITARY SCIENCE IV: PREPARATION FOR OFFICERSHIP (3). Recent military history, national defense policy and its application in current world events. Includes military law; law of land warfare; small-unit administration; and ethics and professionalism with emphasis on applied leadership, management techniques, and ethical decision making. Designed to assist the future army officer with the transition from student to junior officer leader. Graded A-F only. Lec/lab.
MS 413. MILITARY SCIENCE IV: PREPARATION
FOR OFFICERSHIP (3). Recent military history, national defense policy and its application in current world events. Includes military law; law of land warfare; small-unit administration; and ethics and professionalism with emphasis on applied leadership, management techniques, and ethical decision making. Designed to assist the future army officer with the transition from student to junior officer leader. Graded A-F only. Lec/lab.

## MAVAL SCIENCE (NROTC)

CDR Timothy P. Reidy, Jr., USN (US
Navy)
Commanding Officer
104 Naval Science
Oregon State University
Corvallis, OR 97331-5401
541-737-6289
Website: http://nrotc.oregonstate.edu/

## FACULTY

Professor Commander Reidy (USN, Commanding Officer)
Assistant Professors 1st Lieutenant Davis (USMC), Lieutenant DeBoe (USN), Lieutenant Hoffman (USN), Lieutenant Lopez (USN)

## Minors

Naval Science-U.S. Marine Corps
Naval Science-U.S. Navy
The NROTC program was established to educate and train qualified young men and women for service as commissioned officers in the unrestricted line Naval or Marine Corps Service. As the largest single source of Navy and Marine Corps officers, the NROTC program fills a vital need in preparing mature young men and women for leadership and management positions in an increasingly technical Navy and Marine Corps. NROTC midshipmen compete for selection into various warfare areas: pilot, naval flight officer, submarine officer, surface warfare officer, and special warfare officer. Upon successful completion of the program
and graduation from Oregon State University, NROTC midshipmen receive a commission from the president of the United States as an ensign in the U.S. Navy or second lieutenant in the U.S. Marine Corps. The minimum active service requirement upon commissioning is service dependent; it is five years for Navy and four years for the Marines.

## NROTC SCHOLARSHIPS

The Navy offers four-year scholarships to qualified students seeking baccalaureate degrees. Students are selected through national competition, and are appointed midshipmen in the United States Naval Reserve by the secretary of the Navy. The Navy provides uniforms and pays tuition, a $\$ 250$ per term book stipend, and subsistence allowance of $\$ 250$ to $\$ 400$ per month depending on the student's undergraduate status. Scholarship students will be required to attend summer training after their freshman, sophomore, and junior years designed to familiarize them with the warfare areas of the Navy and Marine Corps.

To qualify for a national NROTC scholarship you must be a U.S. citizen not less than 17 years old by September 1 of your first year of college and no more than 23 years old that same year. Additionally you must be physically qualified by Naval or Marine Corps standards and have a minimum SAT score of 530 verbal, 520 math or a minimum ACT score of 22 verbal and 22 math. Sophomores not enrolled in the NROTC program can compete nationally for a two-year scholarship by March of their sophomore year. Competitive applicants should have completed three terms of calculus with a grade of C or better and earned a 3.0 cumulative grade-point average or better.

For more information about Naval ROTC scholarship opportunities, visit http://www.nrotc.navy.mil/ or contact your local Navy-Marine Corps recruiting office. For specific information about OSU NROTC or questions regarding the two-year NROTC scholarships, visit http://nrotc.oregonstate.edu/ or call the unit at 541-737-5620 or 541-737-6289.

## COLLEGE PROGRAM

Students who are not awarded a national scholarship and are accepted to OSU can still participate in Naval ROTC through the college program by applying through the OSU Department of Naval Science. College program midshipmen participate in all aspects of the NROTC program and may be eligible for a scholarship provided they have been active in the program for a minimum of one academic term. To be competitive, a student should not have less than a B (3.0) grade-point average, meet aptitude and physical fitness standards, and receive a favorable recommendation from the professor of naval
science. If selected, students receive the same benefits as national scholarship recipients.

College program midshipmen who are not awarded a scholarship must be selected for "advanced standing" status before beginning their junior year to remain in the NROTC program. If selected for "advanced standing" students receive a monthly subsistence allowance of $\$ 350$ their junior year and $\$ 400$ their senior year. College program midshipmen receive a commission upon graduation and have the same professional opportunities as scholarship midshipmen to select careers in all warfare areas of the Navy and Marine Corps. For specific information about the college program, visit http:// nrotc.oregonstate.edu/ or call the unit at 541-737-5620 or 541-737-6289.

Any university student may take naval science courses for credit. However, such students are classified as naval science students and are not enrolled in the NROTC program.

## NAVAL SCIENCE MINOR <br> REQUIREMENTS

NROTC candidates applying for any of the NROTC programs must:

1. be a citizen of the United States or become a citizen before entering the advanced course;
2. be accepted for admission or enrolled in the university;
3. be at least 17 years of age upon enrollment and under 25 years (27 for the college program) on June 30 of the calendar year in which eligible for commissioning;
4. be physically qualified in accordance with the standards established by the Department of the Navy;
5. possess a satisfactory record of moral integrity and have potential officer characteristics;
6. have no moral obligations or personal convictions preventing them from conscientiously bearing arms and supporting and defending the Constitution of the United States against all enemies foreign and domestic.

## STATUS AND CURRICULUM

Students enrolled in the NROTC program are not on active duty. They wear the uniform only for drills, on special occasions, and during the summer training periods.

The program of study fits into curricula leading to baccalaureate degrees. Additionally, Naval Science-U.S. Navy minor scholarship students must complete three terms of calculus by the end of their sophomore year and three terms of calculus-based physics by the end of their junior year.

## NAVAL SCIENCE-U.S. MARINE CORPS MINOR

The Department of Naval Science offers two minors. Naval Science-U.S. Navy and the Naval Science-U.S. Marine Corps which are open to ROTC students and may include students not pursuing a commission through the ROTC program.
Naval Science-U.S. Marine Corps
Minor Requirements (30 credits)
NS 111. Introduction to Naval Science (3)
NS 112. U.S. Naval History I (3)
NS 113. U.S. Naval History II (3)
NS 211. Leadership and Management (5)
NS 321. Evolution of Warfare I (3)
NS 322. Evolution of Warfare II (3)
NS 413. Leadership and Ethics (4)
NS 421. Amphibious Warfare I (3)
NS 422. Amphibious Warfare II (3)

## Total credits=30

Minor Code: 811

## NAVAL SCIENCE-U.S. NAVY MINOR

The Department of Naval Science offers two minors. Naval Science-U.S. Navy and the Naval Science-U.S. Marine Corps which are open to ROTC students and may include students not pursuing a commission through the ROTC program.

## Naval Science-U.S. Navy Minor

## Requirements ( 36 credits)

NS 111. Introduction to Naval Science (3)
NS 112. U.S. Naval History I (3)
NS 113. U.S. Naval History II (3)
NS 211. Leadership and Management (5)
NS 212. Naval Engineering I (5)
NS 311. Navigation (5)
NS 313. Naval Operations and Seamanship (3)

NS 411. Naval Weapons Systems (5)
NS 413. Leadership and Ethics (4)

## Total credits=36

## Minor Code: 812

- NAVAL SCIENCE COURSES

NS 111. INTRO TO NAVAL SCIENCE (3). Naval organization and administration; organization of the Navy or Marine Corps, the Navy and Marine Corps as a career, responsibilities and commitments as an officer in the Navy or Marine Corps.
NS 112. U.S. NAVAL HISTORY I (3). A study of U.S. seapower and maritime affairs from the American Revolution through 1900. Lec/lab. PREREQS: NS 112, NS 113 must be taken in order.
NS 113. U.S. NAVAL HISTORY II (3). A study of U.S. seapower and maritime affairs from 1900 through present day. Lec/lab. PREREQS: NS 112 [D-]
NS 211. LEADERSHIP AND MANAGEMENT
(5). Overview of the principles, philosophies, and methodologies of effective Naval leadership with emphasis on moral, ethical actions with respect to the principles of authority, responsibility, and accountability as they apply to military organizations.
NS 212. NAVAL ENGINEERING (5). Propulsion, basic engineering systems theory, and concepts application in modern ship and jet propulsion. Course will include auxiliary systems, theory and
design of shipboard auxiliaries, ship design, and damage control/safety procedures. Offered every other winter term. PREREQS: NS 111 [D-]
NS 311. NAVIGATION (5). Introduction to
navigation including piloting, dead reckoning, and
voyage planning. Course includes nautical rules of the road, maneuvering board, relative motion, and shipboard external communications.

## NS 313. NAVAL OPERATIONS AND

SEAMANSHIP (3). Theory of shiphandling,
communications, shipboard evolutions, heavy weather, case study discussions. PREREQS: NS 311 [D-]
NS 321. EVOLUTION OF WARFARE I (3). The art and concepts of warfare from the beginning of recorded history to present [the Age of Napoleon]. PREREQS: NS 321, NS 322 must be taken in order.

NS 322. EVOLUTION OF WARFARE II (3). The art and concepts of warfare post-WWI (from the beginning of the Industrial Revolution) to present, the current world political situation and U.S. foreign policy and their effects on the Naval services, and forecast for the future. PREREQS: NS 321 [D-]
NS 323. NAVAL SCIENCE III: MARINE CORPS OPTION (3). Preparation for officer candidates' school and practical field exercises. For U.S.
Marine Corps candidates option. PREREQS: NS 322 [D-] and /or prior approval required.

NS 405. READING AND CONFERENCE (1-16).
To prepare midshipmen returning from a leave of absence from the Naval ROTC program for commissioning and entrance into the fleet. This course is repeatable for a maximum of 16 credits. PREREQS: Instructor approval required.
NS 411. NAVAL WEAPONS SYSTEMS (5).
Introduction to the theory and development of
U.S. Naval weapons systems, current weapons systems types, platforms, and employment.
Course will include naval weapons systems types, launch platforms, characteristics and employment. PREREQS: NS 111 [D-]
NS 413. LEADERSHIP AND ETHICS (4).
Junior Officer administrative responsibilities with emphasis on moral and ethical decision making of Naval leaders. PREREQS: NS 211 [C-] and approval of Professor of Naval Science required if student has not completed NS 211 with C- or better.
NS 421. FUNDAMENTAL MANEUVER
WARFARE I (3). Amphibious warfare from the beginning of recorded history to WW II.

NS 422. AMPHIBIOUS WARFARE II (3).
Amphibious warfare post-WW II to present, current world political situation and U.S. foreign policy and their effects on the future of expeditionary warfare.

The College of Science faculty and students pursue both curiositydriven, fundamental research to better understand the broader world and use-inspired research to tackle some of the grand challenges of science, engineering, business and education

We offer internationally recognized undergraduate and graduate programs across the life, physical, mathematical and computational sciences. Specifically, we offer courses of study in biology, biochemistry and biophysics, biohealth sciences, microbiology, zoology, chemistry, physics, mathematics and statistics. We also offer 12 pre-professional programs to prepare students for careers in healthcare or medical professions.

The College of Science is an inclusive, welcoming and intellectually stimulating environment to a diverse community. Working together as one, the College of Science is a nucleus of learning, societal engagement, achievement, and discovery.

Research and instruction in the College of Science are enhanced within a university of outstanding professional schools in engineering, oceanography, agriculture, forestry, and pharmacy. Science students can enrich their degrees with courses from these areas. Students also have opportunities to make original discoveries while working on research with world-class scientists.

## MAJORS

The majors of the College of Science are informally divided into the following groups:

## Life Sciences:

Biochemistry and Biophysics, Biochemistry and Molecular Biology, BioHealth Sciences, Biology, Microbiology, Molecular and Cellular Biology (graduate only), Zoology.

## Physical Sciences:

Chemistry and Physics

## Pre-professional Programs:

BioHealth Sciences

## Computational, and Mathematical Sciences:

Mathematics and Statistics (graduate only)

## DOUBLE DEGREES

Undergraduates with majors in the College of Science can earn a second degree in education, innovation management, international studies, or sustainability. See the College of Education, College of Business, International Programs or Department of Forest Ecosystems and Society sections of this catalog for more information.

## PRE-PROFESSIONAL PROGRAMS

The College of Science offers special programs in health-related fields to help students meet entrance requirements for professional schools in clinical laboratory science, dentistry, medicine, optometry, pharmacy, physical therapy, physician assistant, podiatry, and veterinary medicine.

CURRICULA IN SCIENCE
Curricula in science lead to the following degrees: bachelor of arts (BA), bachelor of science (BS), master of arts (MA), master of science (MS), professional science master's (PSM), and doctor of philosophy (PhD). (See the Graduate School for advanced degree requirements.) The college also participates in the Master of Arts in Interdisciplinary Studies (MAIS) program.

## TEACHER CERTIFICATION

All professional teacher education occurs in the College of Education. The following majors in the College of Science are suitable for teaching middle school and high school and have an education option available: biology (pre-education), chemistry (chemistry education), mathematics (secondary teaching emphasis), and physics (physics education).

Certain mathematics courses (MTH 211, MTH 212, MTH 390) are highly recommended for students who plan to teach elementary or secondary mathematics. See the College of Education section of this catalog for admission to the teacher licensure programs.

## SUMMER COURSES FOR SECONDARY SCHOOL SCIENCE AND MATHEMATICS TEACHERS

During the summer session, the College of Science offers a number of courses designed especially for high school teachers of science and/or mathematics. For offerings and full descriptions see the Summer Session website.

## SCHOLARSHIPS

The College of Science offers a variety of scholarships to currently enrolled College of Science students who have taken at least 28 credits at OSU. For more information and application forms contact the College of -Science or see http://www. science.oregonstate.edu/node/108.

## DEGREE REQUIREMENTS

To graduate with a BS degree in the College of Science, undergraduate students must fulfill the following requirements:
University Baccalaureate Core (48)
College of Science Requirements
(These credits can also fulfill part of the baccalaureate core requirements.)

- Mathematical sciences (12)
- Physical, earth, and/or biological sciences (15) to include a two-term sequence (At least one term in biological science and one term in physical or earth science. Must include a two-term sequence in one of these sciences.)
- Department requirements (see each department)
Some departments also grant a BA degree that requires a full year of a collegelevel (200-level or above) foreign language

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## Administration

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Matt Andrews,
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Debbie Farris,
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## Chris Larson,

Director of Partnerships and Industrial Programs, 541-737-6574, chris. larson@oregonstate. edu
and at least 9 credits of College of Liberal Arts electives in addition to credits required for the baccalaureate core. See the department listings for specific requirements.
A minimum 2.00 GPA is required in College of Science majors and minors; ( $\mathrm{S} / \mathrm{U}$ grading is not allowed in science majors or minors).

The curricula are shown for each major; some substitutions can be made with department and college approval. Unless otherwise indicated, the conditions and credits for research, thesis, reading and conference, and seminar are to be arranged with the instructor involved.

## CHEMISTRY

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## FACULTY

Professors Barofsky, Carter, Evans, Gable, Ingle, Keszler, Kong, Lerner, Loveland, Nibler, Remcho, Schuyler, Simonich, Sleight, Subramanian, Watson, Westall, White
Associate Professors Blakemore, Loeser, Maier
Assistant Professors Beaudry, Cheong, Fang
Senior Instructors Drapela, Haak, Nafshun, Pastorek, Walker
Instructors Barth, Firpo, Myles,
Richardson, Sleszynski, Weiss

## ADJUNCT FACULTY

Beckman, Field, Paulenova, Proteau, Tate, Zabriskie

```
Undergraduate Major
Chemistry (BA, BS, CRED, HBA, HBS)
    Track-One Options
    Advanced Biochemistry
    Advanced Chemistry
    Track-Two Options
    Biochemistry
    Business
    Chemistry Education
    Chemical Engineering
    Environmental Chemistry
    Forensic Science
    Materials Science
    Pre-med
```


## Minor

Chemistry

## Graduate Major

Chemistry (MA, MS, PhD)

Graduate Areas of Concentration
Analytical Chemistry
Chemistry
Inorganic Chemistry
Materials Chemistry
Nuclear Chemistry
Organic Chemistry
Physical Chemistry

## Graduate Minor

Chemistry
The Department of Chemistry offers BS, BA, MS, MA, MAIS, and PhD degrees in Chemistry. The facilities, faculty, and curricular offerings in this department are approved by the American Chemical Society.
Chemistry provides a gateway to many professions. An undergraduate chemistry degree may serve as preparation for professional work in chemistry and related sciences; as a foundation to pursue applied fields including pharmaceutical chemistry, forensics, biotechnology, medicine, chemical processing, electronics, agricultural and food science, oceanography, marketing of scientific equipment or supplies, environmental sciences, and atmospheric science. It may also serve as a core for pre-professional students pursuing graduate work in pure or applied chemistry, and for those seeking positions as research chemists and technical experts in commercial laboratories and chemical industries, positions in local, state, and federal government facilities, and for postgraduate work leading to teaching positions in universities, colleges, community colleges, and high schools.

There are several degree programs available to undergraduate chemistry majors. All curricula involve general, organic, analytical, physical, and inorganic chemistry course work, plus two to three years of laboratory work in chemistry.

All chemistry majors take part or all of Experimental Chemistry, a six-term laboratory course sequence consisting of 22 project-style experiments. This program replaces the traditional separate divisional laboratory courses in chemistry taught at many universities. Students in this Integrated Laboratory Program work on two to five projects per term, each of which includes components of synthesis, analysis, theory and report writing spanning all areas of modern chemistry. One goal of the program is to provide students intensive hands-on experience in modern chemical instrumentation and computers as a foundation for both graduate studies and employment in science after graduation.
Most chemistry majors take advantage of the opportunity to become involved in research projects in the department. Working with a research group is an
exciting way to apply ideas and skills acquired in formal course work. Students work closely with a faculty member and research group to set up their projects. Undergraduates also have the opportunity to present their research as a poster at the annual departmental poster session entitled "Chemistry in Action." Scheduling research time is flexible but three hours of work per week are required per credit. Areas of research available are highly varied and include synthesis of new compounds and materials, development and applications of chemical instrumentation, laser spectroscopy, surface science, reaction mechanisms, design and synthesis of polymers and optical materials, environmental chemistry, bioanalytical methods, and nuclear chemistry. Research experience is helpful when considering graduate work in chemistry and provides valuable experience for entering the job market. Students may also obtain valuable experience and credits for internships.

## GRADUATE STUDIES

The Department of Chemistry offers graduate work leading toward Master of Arts, Master of Science, and Doctor of Philosophy degrees in analytical chemistry, inorganic chemistry, nuclear and radiation chemistry, organic chemistry, physical chemistry, and solid state chemistry. The major emphasis of the PhD program is on research. A nonthesis master's degree is available. Most graduate students working on a thesis in chemistry are supported either as graduate teaching assistants or as graduate research assistants.

## CHEMISTRY <br> (BA, BS, CRED, HBA, HBS)

## BS Degree in Chemistry

The BS degree in Chemistry features two tracks, each with a chemistry core and a selection of accompanying options. Students in either track or any option with good academic records and letters of recommendation will be well prepared and competitive for continued graduate education in chemistry or related areas.

- Track One is well suited for students intending to pursue a graduate degree in chemistry or a closely related area. It provides the most rigorous and complete chemistry background and the most extensive laboratory experience. The curriculum is approved by the American Chemical Society (ACS) and has two options: advanced biochemistry and advanced chemistry. Both options include 6-12 credits of career-supportive electives (CSE) in advanced chemistry or related disciplines. These CSE courses are approved by the advisor
and are intended to strengthen the student's background in areas related to career goals. Students choosing the advanced chemistry option must take at least 3 credits in advanced laboratory courses or research. TrackOne graduates are eligible for ACS certification by the department chair and can become full members of the ACS without the requirement of work experience.
- Track Two is suited for chemistry majors who want to gain extensive experience in a secondary area, target a particular career direction or continue with graduate education in chemistry or related areas.
Track Two options include biochemistry, business, chemistry education, chemical engineering, environmental chemistry, forensic science, materials science, and premedicine. The multidisciplinary approach of Track Two enhances preparation and opportunities for employment in electronics, polymers, or biotechnology (the biochemistry, chemical engineering, or materials science options), for careers in environmental science (environmental chemistry option), work in crime labs (forensic science option), or teaching in high schools (chemistry education option). The Track Two curriculum is not approved by the American Chemical Society. It consists of a core of chemistry courses (79-81 credits) and a combination of 8 to 11 courses (30-37 credits) that defines each option.


## BA Degree in Chemistry

The BA degree in Chemistry is appropriate for chemistry students interested in obtaining a broader academic background through a second-language requirement and additional liberal arts courses ( 9 credits). It also includes 6-12 credits of approved career-supportive electives to allow students to choose courses in advanced chemistry or related disciplines to support their career goals. At least 3 credits are to be in advanced laboratory courses or research. This degree may lead to international opportunities, especially if coupled with the International Degree Program at OSU.

## All Undergraduate Chemistry <br> Degrees

Completion of an option is required to earn a degree in Chemistry.

The baccalaureate core requirements are met by:
Fitness: HHS 231, plus HHS 241 (1) or any PAC course (1-2)
Speech (3)
Writing courses (6)
Perspectives courses (12)

One Biology course (4)
One Difference, Power, and Discrimination course (DPD)(3)
Synthesis courses (6)
The quarters in which these are taken are flexible, except that synthesis courses must be taken at the junior and senior level. Chemistry majors or minors may not use $\mathrm{S} / \mathrm{U}$ grading in courses that meet Department of Chemistry or College of Science requirements.

The timing of courses for all degrees and options can be critical, especially because of prerequisites. More detailed information and suggestions about when to take courses are found on the Chemistry Department website at http://chemistry.oregonstate.edu/. Students should meet with their advisor every term. For many options in Track Two, students will also be directed to an additional advisor in another department for courses in that option.

For any option involving biochemistry courses, it is strongly recommended that students select:
BB 314. Cell and Molecular Biology (4), is also recommended. Prereqs for BB 314 are BI 211, BI 212, BI 213, CH 331 or CH 334.
BI 212. *Principles of Biology (4), as the biology course to fulfill the baccalaureate core requirement.
For options in which CH 462, ^Experimental Chemistry II (3), is the recommended WIC course, it is strongly recommended that CH 422, Analytical Chemistry (3), be taken as a corequisite.

Chemistry offers the following courses through the Honors College (HC). Chemistry students in the HC may substitute these courses for courses in the regular sequences:
CH 231H, CH 232H, CH 233H. *General Chemistry ( $4,4,4$ )
and CH $261 \mathrm{H}, \mathrm{CH} 262 \mathrm{H}, \mathrm{CH} 263 \mathrm{H}$.
*Laboratory for CH $231 \mathrm{H}, 232 \mathrm{H}, 233 \mathrm{H}$ (1,1,1)
CH 361H, CH 362 H . Experimental
Chemistry I $(3,3)$
and CH 461 H . Experimental Chemistry II (3)
and CH $462 \mathrm{H}, \mathrm{CH} 463 \mathrm{H}, \mathrm{CH} 464 \mathrm{H}$.
${ }^{\wedge}$ Experimental Chemistry II $(3,3,3)$
Track-One BS Degree in Chemistry
(See the Advanced Biochemistry option and Advanced Chemistry option)

## Chemistry Core (76)

CH 231, CH 232, CH 233. *General Chemistry ( $4,4,4$ )
and CH 271, CH 272, CH 273.
*Laboratory for CH 231, 232, 233 for
Chemistry Majors $(1,1,1)$
CH 334, CH 335, CH 336. Organic Chemistry (3,3,3)
CH 361, CH 362. Experimental Chemistry I (3,3)
CH 421, CH 422. Analytical Chemistry $(3,3)$
CH 440, CH 441, CH 442. Physical
Chemistry ( $3,3,3$ )
MTH 251. *Differential Calculus (4)

MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4) or MTH 306. Matrix and Power Series Methods (4)
MTH 254. Vector Calculus I (4)
PH 211, PH 212, PH 213. *General Physics with Calculus ( $4,4,4$ )
PH 221, PH 222, PH 223. Recitation for Physics $(1,1,1)$

## SAMPLE CURRICULUM (TRACK- <br> ONE BS DEGREE IN CHEMISTRY)

## Freshman Year

CH 231, CH 232, CH 233. *General Chemistry ( $4,4,4$ )
and CH $271, \mathrm{CH} 272, \mathrm{CH} 273$.
*Laboratory for CH 231, 232, 233 for Chemistry Majors $(1,1,1)$
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC course (1-2)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 254. Vector Calculus I (4)
PH 211, PH 221. *General Physics with Calculus $(4,1)$
Perspectives courses (6)
Speech (3)
Writing I (3)

## Sophomore Year

CH 334, CH 335, CH 336. Organic
Chemistry $(3,3,3)$
CH 361, CH 362. Experimental Chemistry I $(3,3)$
MTH 253. Infinite Series and Sequences (4) or MTH 306. Matrix and Power Series Methods (4)
Option courses (6 or 7)
PH 212, PH 213. *General Physics $(4,4)$
and PH 222, PH 223. Recitation for
Physics $(1,1)$
Perspectives courses (6)
Writing II (3)

## Junior Year

BI 212. *Principles of Biology (4)
or BI 102. *General Biology (4)
CH 421, CH 422. Analytical Chemistry $(3,3)$
CH 440, CH 441, CH 442. Physical
Chemistry ( $3,3,3$ )
Perspectives and Synthesis courses (6)
Elective and Option courses (18)

## Senior Year

Elective and Option courses (42-43)
Synthesis course (3)

## Track-Two BS Degree in Chemistry

(See options for Biochemistry, Busi-
ness, Chemistry Education, Chemical
Engineering, Environmental Chemistry, Forensic Science, Materials Science, Pre-Medicine)
Chemistry Core* (79-81)
CH 231, CH 232, CH 233. *General Chemistry ( $4,4,4$ )
and CH 271, CH 272, CH 273.
*Laboratory for CH 231, 232, 233 for Chemistry Majors ( $1,1,1$ )
CH 324. Quantitative Analysis (4)
(For a stronger background in analytical chemistry, instead of CH 324, plus CH 411 and CH 412, substitute CH 421, CH 422, CH 461, CH 411 or CH 412, which adds

2 credits.)
CH 334, CH 335, CH 336. Organic
Chemistry $(3,3,3)$
CH 361, CH 362. Experimental Chemistry I $(3,3)$
CH 411, CH 412. Inorganic Chemistry $(3,3)$
CH 440, CH 441, CH 442. Physical Chemistry $(3,3,3)$
CH 462. ${ }^{\wedge}$ Experimental Chemistry II (3)
or CH 463. ${ }^{\wedge}$ Experimental Chemistry II (3)
or CH 464. ${ }^{\wedge}$ Experimental Chemistry II (3) MTH 251, MTH 252, MTH 254. Differential, Integral and Vector Calculus $(4,4,4)$
PH 211, PH 212, PH 213. *General Physics with Calculus $(4,4,4)$
and PH 221, PH 222, PH 223. Recitation
for Physics 211, 212, 213 (1,1,1)
or PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
*Note: For the Chemical Engineering, Environmental Chemistry, Forensic Science, and Materials Science options, the core requirements are slightly modified.

## SAMPLE CURRICULUM (TRACK-

 TWO BS DEGREE IN CHEMISTRY)
## Freshman Year

BI 212. *Principles of Biology (4)
or BI 102. *General Biology (4)
CH 231, CH 232, CH 233. *General
Chemistry $(4,4,4)$
and CH $271, \mathrm{CH} 272, \mathrm{CH} 273$.
*Laboratory for CH 231, 232, 233 for
Chemistry Majors $(1,1,1)$
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC course (1-2)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
Speech (3)
Writing I (3)
Perspective courses (6)
Electives and Option courses (6)

## Sophomore Year

CH 334, CH 335, CH 336. Organic Chemistry $(3,3,3)$
CH 361, CH 362. Experimental Chemistry I $(3,3)$
MTH 254. Vector Calculus I (4)
PH 211, PH 212, PH 213. *General Physics $(4,4,4)$
and PH 221, PH 222, PH 223. Recitation for Physics 211, 212, $213(1,1,1)$
or PH 201, PH 202, PH 203. *General
Physics $(5,5,5)$
Option courses (6)
Perspective course (3)
Writing II (3)

## Junior Year

CH 324. Quantitative Analysis (4) (For a stronger background in analytical chemistry, substitute CH 421, CH 422, and CH 461.)
CH 440, CH 441, CH 442. Physical Chemistry $(3,3,3)$
CH 462. Experimental Chemistry II (3) or CH 463 or CH 464. ${ }^{\wedge}$ Experimental Chemistry II (3)
Perspectives and Synthesis courses (6)
Electives and Option courses (20)

Senior Year
CH 411, CH 412. Inorganic Chemistry $(3,3)$
Synthesis or Perspective courses (6)
Electives and option courses $(3,3)$

## BA Degree in Chemistry

## Freshman Year

CH 231, CH 232, CH 233. *General
Chemistry $(4,4,4)$
and $\mathrm{CH} 271, \mathrm{CH} 272, \mathrm{CH} 273$.
*Laboratory for CH 231, 232, 233 for Chemistry Majors $(1,1,1)$
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC course (1-2)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
Perspectives (6)
Speech (3)
Writing I (3)
Electives (10)

## Sophomore Year

CH 334, CH 335, CH 336. Organic
Chemistry $(3,3,3)$
CH 361, CH 362. Experimental Chemistry I $(3,3)$
MTH 254. Vector Calculus (4)
PH 211, PH 212, PH 213. *General Physics $(4,4,4)$
and PH 221, PH 222, PH 223. Recitation
for Physics 211, 212, $213(1,1,1)$
or PH 201, PH 202, PH 203. *General
Physics $(5,5,5)$
Perspectives (6)
Writing II (3)
Electives (3)

## Junior Year

BI 211. *Principles of Biology (4)
or BI 101. *General Biology (4)
CH 324. Quantitative Analysis (4) (For a stronger background in analytical chemistry, instead of CH 324, plus CH 411 and CH 412, substitute CH 421, CH 422,
CH 461, CH 411 or CH 412, which adds
2 credits.)
CH 440, CH 441, CH 442. Physical Chemistry $(3,3,3)$
CH 462. Experimental Chemistry II (3) or CH 463 or CH 464. ${ }^{\wedge}$ Experimental Chemistry II (3)
Language (first year) (12)
Perspectives and Synthesis courses (6)
Electives (3)

## Senior Year

CH 411, CH 412. Inorganic Chemistry $(3,3)$
Approved career-supportive electives (9)
(The 9 credits must be approved by the advisor and the department by the end of the winter quarter of the junior year and include 3 credits of lab.)
Synthesis course (3)
Language (second year) (9-12)
Electives (15-18)

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Major Code: 520


## OPTIONS

## ADVANCED BIOCHEMISTRY

## OPTION

This track-one option leads to a degree approved by the American Chemical Society. It is designed for students continuing their chemistry education in graduate school or seeking careers directly in the chemistry workforce. It provides a rigorous chemistry foundation with extensive laboratory experience. The mix of advanced courses in the option is modified to emphasize biochemistry principles and laboratory techniques.
BB 490. Biochemistry 1: Structure and Function (3)
BB 491. Biochemistry 2: Metabolism (3)
BB 492. Biochemistry 3: Genetic
Biochemistry (3)
BB 493. Biochemistry Laboratory Molecular Techniques 1 (3)
BB 494. Biochemistry Laboratory Molecular Techniques 2 (3)
CH 411. Inorganic Chemistry (3)
or CH 412. Inorganic Chemistry (3)
Select two courses from the following (6):

CH 461. Experimental Chemistry II (3)
CH 462. ^Experimental Chemistry II (3)
CH 463. ${ }^{\wedge}$ Experimental Chemistry II (3)
CH 464. ${ }^{\wedge}$ Experimental Chemistry II (3)
Select 6 credits (courses approved by the advisor by the end of the winter quarter of the junior year):

## Career-supportive electives (CSE) (6)

Total=33
Footnote:
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 519
ADVANCED CHEMISTRY OPTION
This track-one option leads to a degree approved by the American Chemical Society. Designed for students continuing their chemistry education in graduate school or seeking careers directly in the chemistry workforce. This provides the most rigorous and complete chemistry foundation with the most extensive laboratory experience. Undergraduate research is strongly encouraged. Knowledge and skills are developed in organic, analytical, physical and inorganic chemistry. Six advanced laboratory courses are required. Students have a choice of electives that support their career goals.
BB 450. General Biochemistry (4)
or BB 490. Biochemistry 1: Structure and
Function (3) and BB 491. Biochemistry 2: Metabolism (3)
CH 411, CH 412. Inorganic Chemistry $(3,3)$
CH 461. Experimental Chemistry II (3)
CH 462, CH 463, CH 464. ${ }^{\wedge}$ Experimental Chemistry II $(3,3,3)$
MTH 256. Applied Differential Equations (4)
or MTH 341. Linear Algebra (3)
Select 12 credits (courses approved by the advisor by the end of the winter quarter of the junior year; must include 3
credits of an upper-division lab, with CH 401 or CH 403 strongly recommended). Career-supportive electives (CSE) (12)
Note: BB 491, Biochemistry 2: Metabolism (3), fulfills 2 credits of Career Supported Electives if taken with BB 490, Biochemistry 1: Structure and Function (3).

## Total=36-38

Option Code: 521

## BIOCHEMISTRY OPTION

The Biochemistry option is for students interested in working in biotechnology areas. Students can earn a BS degree in Chemistry in four years while targeting a career direction in biotechnology or preparing for graduate studies in chemistry. This option includes nine courses in biology, biochemistry including lab, and genetics and molecular biology.

The Biochemistry option is designed for the Track-Two BS degree in Chemistry.
BB 490. Biochemistry 1: Structure and Function (3)
BB 491. Biochemistry 2: Metabolism (3)
BB 492. Biochemistry 3: Genetic
Biochemistry (3)
Select two courses from the
following:
BB 493. Biochemistry Laboratory Molecular
Techniques 1 (3)
BB 494. Biochemistry Laboratory Molecular Techniques 2 (3)

## Plus:

BB 314. Cell and Molecular Biology (4)
BI 212, BI 213. *Principles of Biology $(4,4)$
BI 311. Genetics (4)
Total=31
Footnote:

* Baccalaureate Core Course

Option Code: 518
BUSINESS OPTION
The Business option is designed for chemists interested in, for example, opening a small business, working in sales and marketing, or as preparation for entering the MBA program at OSU ${ }^{1}$. Students earn a BS degree in Chemistry in four years and can also fulfill course work required as part of the minor in Business and Entrepreneurship ${ }^{2}$. This option is also a good stepping stone for law school or graduate studies in chemistry. The option includes six courses in accounting, law, finance, organizational systems. The Business option is designed for the Track-Two BS degree in Chemistry.

## Required (27-28 credits)

BA 215. Fundamentals of Accounting (4)
BA 260. Introduction to Entrepreneurship (4)
BA 351. Managing Organizations (4)
BA 360. Introduction to Financial
Management (4)
BA 390. Marketing (4)
ECON 201. *Introduction to
Microeconomics (4)

ST 314. Introduction to Statistics for Engineers (3)
or ST 351. Introduction to Statistical
Methods (4)
Required Electives (4 credits)
Select one course from among the three following suggested sets:
Suggested for emphasis in small business:
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 363. Technology and Innovation Management (4)
BA 460. Venture Management (4)
OR
Suggested for emphasis in sales and marketing:
BA 491. Personal Selling (4)
OR
Suggested for MBA preparation:
BA 357. Operations Management (4) ${ }^{3}$

## Total=31-32

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{1}$ Students who complete these business courses and some additional courses may apply upon graduation to the OSU College of Business to be accepted into a 45-credit, three-term MBA program. All students serious about pursuing an OSU MBA should make an appointment with the College of Business MBA advisor, 541-7373716, http://business.oregonstate.edu/mba/. Students should also take BA 211, Financial Accounting (4) and BA 213, Managerial Accounting (4) at the undergraduate level.
${ }^{2}$ There are additional requirements for the minor in Business and Entrepreneurship. For example, the minor also requires an orientation course, GPA requirements, and academic residency requirements. You are advised to meet with an advisor in the College of Business.
${ }^{3}$ BA 357 requires a special override from an advisor in the COB because chemistry majors substitute ST 351 or ST 314 for BA 276.
Option Code: 523


## CHEMICAL ENGINEERING

## OPTION

The Chemical Engineering option offers selected chemical engineering concepts that may enhance career opportunities in areas such as electronics, polymers, and biotechnology, or prepare students for graduate studies in chemistry or related fields. Students can earn a BS degree in Chemistry in four years while targeting a career direction. This option includes nine courses in basic engineering and chemical engineering including mass and fluid transport, reaction engineering, and separations processes.
The Chemical Engineering option is designed for the Track-Two BS degree in Chemistry.

The track-two core requirements are slightly modified for the Chemical Engineering option:

## Required/Recommended for Core:

PH 211, PH 212, PH 213. *General Physics with Calculus $(4,4,4)$ Required
CH 462. ^Experimental Chemistry II (3) Recommended

## Chemical Engineering Option

Requirements
CHE 211. Material Balances and Stoichiometry (4) [Terminated 201101]
CHE 212. Energy Balances (4)
[Terminated 201101]
CHE 411. Mass Transfer Operations (4)
CHE 412. Mass Transfer Operations (3)
[Terminated 200901]
CHE 443. Chemical Reaction Engineering (4)
ME 331. Introductory Fluid Mechanics (4)
ME 332. Heat Transfer (4)
MTH 256. Applied Differential Equations (4)
Select one course from below for 3-4 credits:
CH 401. Research (3)
or CHE 401. Research (3)
CHE 213. Process Analysis (4)
[Terminated 200901]
CHE 311. Thermodynamics (3)
CHE 312. Chemical Engineering
Thermodynamics (3)
CHE 331. Transport Phenomena I (4)
CHE 332. Transport Phenomena II (3)
CHE 361. Chemical Process Dynamics and Simulation (3)
CHE 444. Thin Film Materials Processing (4)
CHE 445. Polymer Engineering and Science
(4)
or ENGR 213. Strength of Materials (3)
CHE 461. Process Control (3)
ENGR 321. Materials Science (3)
Total=33-34
Footnote:
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 303
CHEMISTRY EDUCATION OPTION
The Chemistry Education option is directed at students planning to teach high school chemistry or continuing on with graduate education and teaching careers at community colleges. Students can earn a BS degree in Chemistry in four years and obtain experience that can be useful when applying for the Master of Science in Science Education from OSU. This option includes 11 courses covering teaching methods, a secondary area, and undergraduate teaching internship and seminar in chemistry.

The Chemistry Education option is designed for the Track-Two BS degree in Chemistry.
CH 407. Seminar [Chemistry Teaching] (1)
CH 410. Internship [Undergraduate Teaching] (3)
ED 309. Field Practicum (3)
or ED 409. Practicum/Clinical Experience (3)

PSY 202. *General Psychology (3)
SED 412. Technology Foundations for Teaching Math and Science (3)
SED 413. Inquiry in Science and Science Education (3)
Second Endorsement electives (15)
Select one elective course from list below for 3 credits:
ED 216. Purpose, Structure, \& Function of Education in a Democracy (3)

ED 253. Learning Across the Lifespan (3)
PSY 350. Human Lifespan Development (4)
SED 414. Inquiry in Mathematics and Mathematics Education (3)
Note: Courses in the second endorsement area are to be from a list approved by the College of Education and must be different from those required in the chemistry core. The courses in this option are designed to interface with the Professional Teacher Master of Science Education program for prospective high school teachers through the College of Education at OSU.
Total=34-36

## Footnote:

* Baccalaureate Core Course (BCC)

Option Code: 516

## ENVIRONMENTAL

## CHEMISTRY OPTION

The Environmental Chemistry option is structured to provide a quality foundation for working in government, industrial or university labs studying the behavior of chemicals in the environment. It also is suited to graduate education in chemistry or environmental chemistry. Students can earn a BS degree in Chemistry in four years while targeting their career. This option includes 11 courses in biology, microbiology, toxicology, environmental chemistry and health, soil science, and hydrology.

The Environmental Chemistry option is designed for the Track-Two BS degree in Chemistry.
The track-two core requirements are slightly modified for the Environmental Chemistry option:

## Required for Core:

## Replace CH 324 with:

CH 421, CH 422. Analytical Chemistry $(3,3)$ CH 461. Experimental Chemistry II (3)
Only one term of inorganic chemistry:
CH 411. Inorganic Chemistry (3)
or CH 412. Inorganic Chemistry (3)

## Requirements

BB 314. Cell and Molecular Biology (4)
BI 212, BI 213. *Principles of Biology $(4,4)$
MB 302, MB 303. General Microbiology and Lab $(3,2)$
ST 201. Principles of Statistics (4)
or ST 314. Introduction to Statistics for Engineers (3)
TOX 430. Chemical Behavior in the Environment (3)
TOX 455. Ecotoxicology: Aquatic Ecosystems (3)
Select three courses from below for 9-10 credits:
BI 211. *Principles of Biology (4)
BI 370. Ecology (3)
CE/GEO 514. Groundwater Hydraulics (3)
CH 401. Research (3)
CH 692. Environmental Transformation of Organic Compounds (3)
CSS 305. Principles of Soil Science (4) EOU
campus only.
or SOIL 205. *Soil Science (3)
ENVE 531. Fate and Transport of Chemicals
in Environmental Systems (4)
ENVE 532. Aqueous Environmental Chemistry (4)
ENVE 541. Microbial Processes in
Environmental Systems (4)
GEO 487. Hydrogeology (4)
SOIL 535. Soil Physics (3)
SOIL 545. Geochemistry of Soil Ecosystems (4)

TOX 413/TOX 513. Environmental
Toxicology and Risk Assessment (3)
TOX 490/TOX 590. Environmental Forensic Chemistry (3)
Total=35-36
Footnote:

* Baccalaureate Core Course (BCC)

Option Code: 504

## FORENSIC SCIENCE OPTION

The Forensic Science option is appropriate for students interested in working in a crime lab or pursuing a graduate degree in forensic science or chemistry. Students can earn a BS degree in Chemistry in four years and also take a combination of courses that enhance a chemistry major's background in biology, biochemistry, and related areas that can be important in forensic science.

The Forensic Science option is designed for the Track-Two BS degree in Chemistry.

The track-two core requirements are slightly modified for the Forensic Science option as follows:

## Required for Core:

Replace CH 324 with:
CH 421, CH 422. Analytical Chemistry $(3,3)$
CH 461. Experimental Chemistry II (3)
Only one term of inorganic chemistry:
CH 411. Inorganic Chemistry (3)
or CH 412. Inorganic Chemistry (3)

## Requirements

BB 314. Cell and Molecular Biology (4)
BI 212, BI 213. *Principles of Biology $(4,4)$
BB 450, BB 451. General Biochemistry $(4,3)$ or BB 490. Biochemistry 1: Structure and Function (3) and BB 491. Biochemistry 2: Metabolism (3)
BB 494. Biochemistry Laboratory Molecular Techniques 2 (3)
TOX 411/TOX 511. Fundamentals of Toxicology (3)
Select three courses from below for 7-12 credits
BB 492. Biochemistry 3: Genetic
Biochemistry (3)
BI 311. Genetics (4)
CH 401. Research (3)
CH 410. Internship (2-3)
CH 424. Bioanalytical Chemistry (3)
CH 661. Separations: Chromatography and Related Methods (3)
CH 692. Environmental Transformation of Organic Compounds (3)
CH 697. Mass Spectroscopy of Organic Compounds (3)
MB 302. General Microbiology (3)

MB 303. General Microbiology Lab (2)
ST 201. Principles of Statistics (4)
or ST 351. Introduction to Statistical Methods (4)
TOX 490/TOX 590. Environmental Forensic Chemistry (3)

## Total=31-37

## Footnote:

* Baccalaureate Core Course (BCC)

Option Code: 505

## MATERIALS SCIENCE OPTION

The Materials Science option is customized to include applied courses in a variety of materials areas to enhance career opportunities in, for example, electronics, polymers and biotechnology. Students can earn a BS degree in Chemistry in four years while targeting a career in this field or preparing for graduate school in chemistry or related areas.

The Materials Science option is designed for the Track-Two BS degree in Chemistry.

The track-two core requirements are slightly modified for the Materials Science option:
Required/Recommended for Core:
PH 211, PH 212, PH 213. *General Physics with Calculus $(4,4,4)$ Required

## Requirements

CH 445. Physical Chemistry of Materials (3) or ENGR 321. Material Science (3)
CHE 444. Thin-Film Materials Processing (3)
CHE 445. Polymer Engineering and Science (4)

ENGR 322. Mechanical Properties of Materials (4)
MTH 256. Applied Differential Equations (4)
Select four courses from below for 12-14 credits:
CH 401. Research (3)
CH 413. Solid State Chemistry (3-4)
CHE 401. Research (3)
ECE 416. Electronic Materials and Devices (4)
ENGR 211. Statics (3)
ENGR 212. Dynamics (3)
ENGR 213. Strength of Materials (3)
ENGR 221. The Science, Engineering, and
Social Impact of Nanotechnology (3)
ME 316. Mechanics of Materials (3)
Total=27-29
Footnote:

* Baccalaureate Core Course (BCC)

Option Code: 522

## PRE-MEDICINE OPTION

The Pre-Medicine option is directed at students planning to apply to medical or dental school who also wish to target chemistry as a career pathway. A degree in chemistry provides a strong foundation for many professions and postgraduate degrees in chemistry or related areas. Students can earn a BS degree in Chemistry in four years while also taking Pre-Medicine option courses in biology, biochemistry, and related areas that are important components for application to
medical school.
The Pre-Medicine option is designed for the Track-Two BS degree in Chemistry.

## Required

BB 314. Cell and Molecular Biology (4)
BB 450, BB 451. General Biochemistry $(4,3)$ or BB 490. Biochemistry 1: Structure and Function (3) and BB 491. Biochemistry 2: Metabolism (3)
BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
BI 311. Genetics (4)
PHL 444. Biomedical Ethics (4)
ST 351. Introduction to Statistical Methods (4)

## Total=34-35

Footnote:

* Baccalaureate Core Course (BCC)


## Option Code: 690

## CHEMISTRY MINOR

## Also available via Ecampus.

The requirements for a minor in Chemistry include a minimum of 27 credits of chemistry ( CH ) courses.

Choose one of the following com-

## plete general chemistry sequences:

1. CH 121, *CH 122, *CH 123. General Chemistry $(5,5,5)$
2. CH 231, CH 232, CH 233. *General Chemistry $(4,4,4)$ and CH $271, \mathrm{CH}$ 272, CH 273. *Laboratory for CH 231, 232, 233 for Chemistry Majors $(1,1,1)$
3. CH 201, CH 202. Chemistry for Engineering Majors $(3,3)$ and CH 205. Laboratory for Chemistry 202
(1) and CH 123. *General Chemistry (5)

In addition, a minimum of four upperdivision courses of 3 or more credits in at least two areas of chemistry (organic, physical, analytical, inorganic, or nuclear) and including one laboratory course are required. All courses must be taken for a grade (not $\mathrm{S} / \mathrm{U}$ ) and the overall GPA for all chemistry courses must be 2.0 or higher.

## Courses that cannot be used for the minor:

Biochemistry Courses
CH 130. General Chemistry of Living Systems (4)
CH 374. *Technology, Energy, and Risk (3)
CH 401/501/601. Research (1-16)
CH 403/503/603. Thesis (1-16)
CH 407/507/607. Seminar (1-16)
CH 410/510. Internship (1-16)
CH 696. Computer Interfacing (4)
See http://chemistry.oregonstate.edu/ node/1727 for more details about the Chemistry minor.
Footnote:

* Baccalaureate Core Course (BCC)

Minor Code: 520

## CHEMISTRY (MA, MS, PhD)

## Graduate Areas of Concentration

Analytical chemistry, inorganic chemistry, materials chemistry, nuclear chemistry, organic chemistry, physical chemistry
The Department of Chemistry offers graduate work leading toward Master of Arts, Master of Science, and Doctor of Philosophy degrees in Chemistry with concentrations in analytical chemistry, inorganic chemistry, nuclear chemistry, organic chemistry, physical chemistry and solid state chemistry.
All students are required, early in their graduate study, to take a series of graduate courses in their major area. For the PhD , the required written preliminary examinations take the form of a number of "cumulative examinations." Exceptions to this include the concentration in nuclear chemistry, which requires only a single written examination, and concentrations in inorganic chemistry, solid state chemistry or physical chemistry, which require only an oral exam. For each field, there is a list of courses representing subject matter in which competence is required of those electing that field for PhD work, but the major emphasis of the PhD program is on research rather than formal courses. All degrees require a research thesis except for the Master of Science nonthesis degree. There is no departmental requirement of a foreign language. Most graduate students in chemistry are supported either as graduate teaching assistants or as graduate research assistants.

## Major Code: 5200

## CHEMISTRY GRADUATE MINOR

For more details, see the departmental advisor.

## Minor Code: 5200

## $\square$ CHEMISTRY COURSES

CH 101. CHEMISTRY IN YOUR WORLD (3). For students who need some additional preparation before enrolling in a general chemistry course. Explores the impact of chemistry on our everyday lives while acquiring the skills it takes to be successful in general chemistry. PREREQS: Placement Test MPAL(046) or MTH 095* [C-] or MTH 103* [C-] or MTH 111 [C-] or MTH 241 [C-] or MTH 251 [C-] or MTH 251H [C-] or MTH 252 [C-] or MTH 252H [C-]
CH 121. GENERAL CHEMISTRY (5). A general chemistry sequence for students who have had no previous training in chemistry and for those whose college aptitude test scores indicate the need for a more elementary introduction to chemistry. Entering students are expected to have a working knowledge of high school algebra, logarithms, and scientific notation. Lec/lab/rec. (CH 122, CH 123 are Bacc Core Courses) PREREQS: CH 121, CH 122, CH 123 must be taken in order.

CH 122. *GENERAL CHEMISTRY (5). A general chemistry sequence intended for majors in fields other than the physical sciences. Lec/lab/rec. (CH 122 and CH 123 are Bacc Core courses.) PREREQS: CH 121 [C-] or (CH 201 [C-] or (CH 231 [C-] or CH 231H [C-] )) and CH 121, CH 122, CH 123 must be taken in order.

CH 123. *GENERAL CHEMISTRY (5). A general chemistry sequence intended for majors in fields other than the physical sciences. ( CH 122 and CH 123 are Bacc Core courses.) Lec/rec/lab. PREREQS: CH 122 [C-] or ( $((\mathrm{CH} 232$ [C-] or CH 232 H [C-] ) and (CH 262 [C-] or CH 262 H [C-] or CH 272 [C-] )) or (CH 202 [C-] and CH 205 [C-] )) and $\mathrm{CH} 121, \mathrm{CH} 122, \mathrm{CH} 123$ must be taken n order.
CH 124. GENERAL CHEMISTRY (3). A bridge course, allowing students who have taken one term of General Chemistry (CH 121) to complete the equivalent of one full semester of general chemistry. Entering students are expected to have a working knowledge of high school algebra, ogarithms, and scientific notation. Lec/lab.
PREREQS: CH 121 [D-]
CH 125. GENERAL CHEMISTRY (2). A bridge course, allowing students who also take one term of General Chemistry (CH 123) to complete the equivalent of one full semester of General Chemistry. Entering students are expected to have a working knowledge of high school algebra, logarithms, and scientific notation. Lec/lab. Offered via Ecampus only. PREREQS: CH 121 [D-] and CH 124 [D-] and /or one semester of general chemistry at another institution.
CH 130. GENERAL CHEMISTRY OF LIVING SYSTEMS (4). Introduction to organic chemistry and the chemistry of biological systems. Organic nomenclature and fundamental reactions, emphasizing topics such as amino acids, proteins, biochemical energy, and nucleic acids (DNA and RNA). Intended as a terminal course in chemistry, not to serve as a prerequisite to higher numbered chemistry courses. Lec/lab. Does not count toward a chemistry minor.

CH 140. GENERAL, ORGANIC, AND BIOLOGICAL CHEMISTRY (6). An introduction to general, organic, and biological chemistry. Intended as a terminal course in chemistry, not to serve as a prerequisite to higher numbered chemistry courses. Offered via Ecampus only. PREREQS: Entering students are expected to have a working knowledge of high school algebra, logarithms, and scientific notation.
CH 199. SPECIAL TOPICS (1-3). This course is repeatable for a maximum of 3 credits. PREREQS: Departmental approval required.
CH 201. CHEMISTRY FOR ENGINEERING
MAJORS (3). A sequence of selected chemistry topics for pre-engineering students. Lec. PREREQS: MTH 111* [D-] or MTH 112* [D-] or MTH 251* [D-] or MTH 251H* [D-] or MTH 252* [D-] or MTH 252H* [D-] or MTH 254* [D-] or MTH $254 \mathrm{H}^{*}$ [D-] or Placement Test MPAL(060) and CH 201 and CH 202 must be taken in order.

CH 202. CHEMISTRY FOR ENGINEERING MAJORS (3). A sequence of selected chemistry topics for pre-engineering students. Lec. PREREQS: ( CH 121 [C-] or CH 201 [C-] or CH 231 [C-] or CH 231 H [C-] ) and CH 201 and CH 202 must be taken in order.

CH 205. LABORATORY FOR CH 202 (1).
Three-hour weekly session for the development of laboratory skills in general chemistry for engineers. Lec/lab. PREREQS: CH 202* [D-]
CH 211. RECITATION FOR CHEMISTRY 201 (1).
80-minute weekly session for the development of problem-solving skills in general chemistry for engineers. Rec. COREQS: CH 201
CH 212. RECITATION FOR CHEMISTRY 202
(1). One-hour weekly session for the development of problem-solving skills in general chemistry for engineers. Rec. COREQS: CH 202

CH 220. CAREERS IN CHEMISTRY (1). Course for chemistry majors that discusses strategies for success in the study of chemistry and the varied career opportunities available. Topics range from surviving freshman chemistry to choices of advanced classes, study abroad opportunities, internships, getting into and succeeding in
graduate school, choices of chemical careers in academia, industry, government, nongovernmental organizations, and using chemistry as a foundation for careers in other areas such as law and business. Graded P/N.
CH 231. GENERAL CHEMISTRY (4). A general chemistry sequence for students majoring in most sciences, pharmacy, and chemical engineering. CH 231 is a lecture course; CH 261 is the laboratory component. Lec/rec. (Bacc Core Course if taken with CH 261) PREREQS: MTH 111* [C-] or MTH 112* [C-] or MTH 251* [C-] or MTH $251 \mathrm{H}^{*}$ [C-] or MTH 252* [C-] or MTH $252 \mathrm{H}^{*}$ [C-] or MTH $254^{*}$ [C-] or MTH $254 \mathrm{H}^{*}$ [C-] or Placement Test MPAL(060) and CH 231, CH 232, CH 233 must be taken in order.
CH 231H. GENERAL CHEMISTRY (4). A general chemistry sequence for students majoring in most sciences, pharmacy, and chemical engineering. CH 231 H is a lecture course; CH 261 H is the laboratory component. Lec/rec. (Bacc Core Course if taken with CH 261H) PREREQS: MTH $111^{*}$ [C-] or MTH 112* [C-] or MTH 251* [C-] or MTH $251 \mathrm{H}^{*}$ [C-] or MTH 252* [C-] or MTH $252 \mathrm{H}^{*}$ [C-] or MTH 254* [C-] or MTH 254H* [C-] or Placement Test MPAL(060) and CH $231 \mathrm{H}, \mathrm{CH}$ $232 \mathrm{H}, \mathrm{CH} 233 \mathrm{H}$ must be taken in order.
CH 232. GENERAL CHEMISTRY (4). A general chemistry sequence for students majoring in most sciences, pre-pharmacy, and chemical engineering. CH 232 is a lecture course; CH 262 is the laboratory component. Lec/rec. (Bacc Core Course if taken with CH 262) PREREQS: (CH 231 [C-] or CH 231 H [C-] ) or CH 221 [C-] and CH 231, CH 232, CH 233 must be taken in order. CH 262, the laboratory class, is taken concurrently.
CH 232H. GENERAL CHEMISTRY (4). A general chemistry sequence for students majoring in most sciences, pre-pharmacy, and chemical engineering. CH 232 H is a lecture course; CH 262 H is the laboratory component. Lec/rec. (Bacc Core Course if taken with CH 262H) PREREQS: (CH 231 [C-] or CH 231 H [C-] ) or CH 221 [C-] and CH 231, CH 232, CH 233 must be taken in order. CH 262, the laboratory class, is taken concurrently. Honors College approval required.
CH 233. GENERAL CHEMISTRY (4). A general chemistry sequence for students majoring in most sciences, pharmacy, and chemical engineering. CH 233 is a lecture course; CH 263 is the laboratory component. (Bacc Core Course if taken with CH 263) Lec/rec. PREREQS: (CH 232 [C-] or CH 232 H [C-] ) or CH 222 [C-] and $\mathrm{CH} 231, \mathrm{CH}$ 232, CH 233 must be taken in order. CH 263, the laboratory class, is taken concurrently.
CH 233H. GENERAL CHEMISTRY (4). A general chemistry sequence for students majoring in most sciences, pharmacy, and chemical engineering. CH 233H is a lecture course; CH 263 H is the laboratory component. Lec/rec. (Bacc Core Course if taken with CH 263H) PREREQS: (CH 232 [C-] or CH 232 H [C-] ) or CH 222 [C-] and CH 231, CH 232, CH 233 must be taken in order. CH 263, the laboratory class, is taken concurrently. Honors College approval required.
CH 261. *LABORATORY FOR CHEMISTRY 231 (1). A general chemistry laboratory sequence for students majoring in most sciences, pharmacy, and chemical engineering. (Bacc Core Course if taken with CH 231) COREQS: CH 231

CH 261H. *LABORATORY FOR CHEMISTRY 231H (1). A general chemistry laboratory sequence for students majoring in most sciences, pharmacy, and chemical engineering. (Bacc Core Course if taken with CH 231H) PREREQS: Honors College approval required. COREQS: CH 231H

## CH 262. *LABORATORY FOR CHEMISTRY 232

(1). A general chemistry laboratory sequence for students majoring in most sciences, pharmacy, and chemical engineering. (Bacc Core Course if taken with CH 232) PREREQS: CH 261 [D-] or CH 261H [D-] or CH 271 [D-] or CH 221 [D-] or CH

224H [D-] COREQS: CH 232
CH 262H. *LABORATORY FOR CHEMISTRY
232H (1). A general chemistry laboratory sequence for students majoring in most sciences, pharmacy, and chemical engineering. (Bacc Core Course if taken with CH 232 H ) PREREQS: CH 261 [D-] or CH 261H [D-] or CH 271 [D-] or CH 221 [D-] or CH 224H [D-] and Honors College approval required. COREQS: CH 232H

CH 263. *LABORATORY FOR CHEMISTRY 233 (1). A general chemistry laboratory sequence for students majoring in most sciences, pharmacy, and chemical engineering. (Bacc Core Course if taken with CH 233) PREREQS: CH 262 [D-] or CH 262 H [D-] or CH 272 [D-] or CH 222 [D-] or CH 225H [D-] COREQS: CH 233

CH 263H. *LABORATORY FOR CHEMISTRY 233H (1). A general chemistry laboratory sequence for students majoring in most sciences, pharmacy, and chemical engineering. (Bacc Core Course if taken with CH 233 H ) PREREQS: CH 262 [D-] or CH 262 H [D-] or CH 272 [D-] or CH 222 [D-] or CH 225H [D-] and Honors College approval required. COREQS: CH 233 H
CH 271. *LABORATORY FOR CH 231 FOR CHEMISTRY MAJORS (1). A general chemistry laboratory sequence for students majoring in chemistry. (Bacc Core Course if taken with CH 231) COREQS: CH 231

CH 272. *LABORATORY FOR CH 232 FOR CHEMISTRY MAJORS (1). A general chemistry laboratory sequence for students majoring in chemistry. (Bacc Core Course if taken with CH 232) PREREQS: CH 271 [D-] or CH 221 [D-] or CH 224H [D-] COREQS: CH 232

CH 273. *LABORATORY FOR CH 233 FOR CHEMISTRY MAJORS (1). A general chemistry laboratory sequence for students majoring in chemistry. (Bacc Core Course if taken with CH 233) PREREQS: CH 272 [D-] or CH 222 [D-] or CH 225H [D-] COREQS: CH 233
CH 324. QUANTITATIVE ANALYSIS (4). A
basic course in modern chemical analysis. Selfpaced laboratory. CH 130 does not meet the prerequisites for this course. PREREQS: (CH 123 [D-] or CH 223 [D-] or CH 226H [D-] or ((CH 233 [D-] or CH 233H [D-] ) and (CH 263 [D-] or CH 263 H [D-] or CH 273 [D-] ))) and /or one year of general chemistry or instructor approval.

CH 331. ORGANIC CHEMISTRY (4). Service course covering aliphatic and aromatic chemistry. Introduction to nomenclature, mechanism and synthesis. Lec/rec. CH 130 does not meet the prerequisites for this course. PREREQS: ( CH 123 [C-] or CH 223 [C-] or CH 226H [C-] or ((CH 233 [C-] or CH 233H [C-] ) and (CH 263 [C-] or CH 263H [C-] or CH 273 [C-] ))) and one year of general chemistry or instructor approval. CH 331 and CH 332 must be taken in order.
CH 332. ORGANIC CHEMISTRY (4). Service course covering aliphatic and aromatic chemistry. Introduction to nomenclature, mechanism and synthesis. Lec/rec. PREREQS: CH 331 [C-] and one year of general chemistry.
CH 334. ORGANIC CHEMISTRY (3). Professional course for majors in chemistry, biochemistry, chemical engineering and other students who need a year of organic chemistry. In-depth treatment of major classes of organic compounds. Interrelation of mechanistic and synthetic approaches. PREREQS: (CH 123 [D-] or CH 223 [D-] or CH 226H [D-] or ((CH 233 [D-] or CH 233H [D-]) and (CH 263 [D-] or CH 263H [D-] or CH 273 [D-] ))) and one year general chemistry or instructor approval. CH 130 does not meet the prerequisites for this course.
CH 335. ORGANIC CHEMISTRY (3). Professional course for majors in chemistry, biochemistry, chemical engineering and other students who need a year of organic chemistry. In-depth treatment of major classes of organic compounds. Interrelation of mechanistic and synthetic
approaches. PREREQS: CH 334 [D-] and one year general chemistry.

CH 336. ORGANIC CHEMISTRY (3). Professional course for majors in chemistry, biochemistry, chemical engineering and other students who need a year of organic chemistry. In-depth treatment of major classes of organic compounds. Interrelation of mechanistic and synthetic approaches. PREREQS: CH 335 [D-] and one year of general chemistry.
CH 337. ORGANIC CHEMISTRY LABORATORY
(4). Laboratory course in organic chemistry for nonmajors, designed to supplement CH 331 , CH 332 and CH 334, CH 335, CH 336. Lec/lab. PREREQS: (CH 331 [D-] and CH 332 [D-] ) or (CH 334 [D-] and CH 335 [D-] and CH 336 [D-] )
CH 361. EXPERIMENTAL CHEMISTRY I (3). First term of integrated laboratory program for chemistry majors highlighting techniques in organic, physical, and analytical chemistry. First-hand experience is gained using specialized glassware, scientific equipment and instrumentation plus computers. Essential technical laboratory standards and technical writing are emphasized. Lec/lab. PREREQS: ((CH 221 [D-] and CH 222 [D-] and CH 223 [D-] ) or (CH 224H [D-] and CH 225 H [D-] and CH 226H [D-] ) or ((CH 231 [D-] or CH 231H [D-]) and (CH 261 [D-] or CH 261 H [D-] or CH 271 [D-]) and (CH 232 [D-] or CH 232H [D-] ) and (CH 262 [D-] or CH 262 H [D-] or CH 272 [D-] ) and (CH 233 [D-] or CH 233 H [D-] ) and (CH 263 [D-] or CH 263H [D-] or CH 273 [D-] )) and (MTH 251* [D-] or MTH $251 \mathrm{H}^{*}$ [D-]) and (PH 201* [D-] or PH 211* [D-]) and CH $334^{*}$ [D-] ) and departmental approval required. Restricted to chemistry and biochemistry/ biophysics majors.

CH 361H. EXPERIMENTAL CHEMISTRY I
(3). First term of integrated laboratory program for chemistry majors highlighting techniques in organic, physical, and analytical chemistry. First-hand experience is gained using specialized glassware, scientific equipment and instrumentation plus computers. Essential technical laboratory standards and technical writing are emphasized. Lec/lab. PREREQS: ((CH 221 [D-] and CH 222 [D-] and CH 223 [D-] ) or (CH 224 H [D-] and CH 225 H [D-] and CH 226 H [D-] ) or ((CH 231 [D-] or CH 231H [D-] ) and (CH 261 [D-] or CH 261H [D-] or CH 271 [D-] ) and (CH 232 [D-] or CH 232H [D-] ) and (CH 262 [D-] or CH 262 H [D-] or CH 272 [D-]) and (CH 233 [D-] or CH 233 H [D-] ) and (CH 263 [D-] or CH 263H [D-] or CH 273 [D-] )) and (MTH 251* [D-] or MTH 251H* [D-] ) and (PH 201* [D-] or PH 211* [D-]) and CH $334^{*}$ [D-] ) and Restricted to chemistry and biochemistry/biophysics majors. Honors College approval required.
CH 362. EXPERIMENTAL CHEMISTRY I (3).
First-level integrated laboratory course for majors in chemistry and related disciplines, covering experimental techniques of analytical, inorganic, organic and physical chemistry. Lec/lab. PREREQS: ((CH 361 [D-] or CH 361 H [D-]) and CH 335* [D-] )

## CH 362H. EXPERIMENTAL CHEMISTRY I

(3). First-level integrated laboratory course for majors in chemistry and related disciplines, covering experimental techniques of analytical, inorganic, organic and physical chemistry. Lec/ lab. PREREQS: ((CH 361 [D-] or CH 361H [D-] ) and $\mathrm{CH} 335^{*}$ [D-] ) and Honors College approval required.

CH 374. *TECHNOLOGY, ENERGY, AND RISK (3). Decision-making in a technical, democratic society. Discussion of current issues such as acid rain, toxic organic chemicals in the environment, energy resources, etc. Does not meet the prereq for any other chemistry course. Does not meet requirements for chemistry minor. (Bacc Core Course) PREREQS: Completion of baccalaureate core in physical science.
CH 390. ENVIRONMENTAL CHEMISTRY (3).
Sources, reactions, transport, effects, and fates
of chemical species in water, soil, air, and living environments and the effects of technology thereon. PREREQS: CH 331 [D-] or CH 334 [D-]
CH 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CH 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS:
Departmental approval required.
CH 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

CH 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CH 407. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CH 407H. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required. Honors College approval required.

CH 410. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
CH 411. INORGANIC CHEMISTRY (3).
Fundamental principles of inorganic chemistry including atomic structure, bonding models for molecules and solids, symmetry, acid/base chemistry, oxidation-reduction, and metal-ligand complexes. PREREQS: One year of general chemistry. College-level physics is recommended.
CH 412. INORGANIC CHEMISTRY (3).
Descriptive chemistry of the elements, focusing on main-group compounds, transition metal complexes, and solid-state chemistry. PREREQS: CH 411 [D-] and /or instructor approval.

CH 413. SOLID STATE CHEMISTRY (3-4). Basic principles of chemistry are applied to descriptions of structure-property relationships in inorganic solids. Topics include crystal structure, materials synthesis, chemical bonding, electronic properties, optical properties, and magnetism. Students who register for 4 credits will perform independent study of an advanced topic based on research literature. This course is repeatable for a maximum of 4 credits. PREREQS: CH 442 [D-] or CH 542 [D-]
CH 418. NUCLEAR CHEMISTRY (3). Radioactive decay, nuclear properties, nuclear structure, alpha, beta, and gamma decay, nuclear reactions, fission, interaction of radiation with matter, chemical techniques, radiation safety, and nuclear instrumentation. PREREQS: Should enroll concurrently in (CH 440 or CH 540) or PH 314.

CH 419. RADIOACTIVE TRACER METHODS
4). Radionuclides, radioactivity, and radiotracer methods as research tools in physical and biological science. Lec/lab. PREREQS: Two years of college chemistry.
CH 421. ANALYTICAL CHEMISTRY (3). A professional sequence for majors in chemistry and related disciplines. Chemical equilibrium, analytical electrochemistry, separations, spectroscopy, instrumentation, and treatment of data. PREREQS: One year of general chemistry and one year of college physics. Should enroll concurrently in CH 440 or CH 540.

CH 422. ANALYTICAL CHEMISTRY (3). A professional sequence for majors in chemistry and related disciplines. Chemical equilibrium, analytical electrochemistry, separations, spectroscopy, basic electronics and instrumentation, and treatment of data. PREREQS: One year of general chemistry and one year of college physics. Should enroll concurrently in CH 441 or CH 541.

CH 424. BIOANALYTICAL CHEMISTRY (3). Analytical methods employed in the study of biologically important molecules. Separations
(chromatography, electrophoresis), spectroscopy, mass spectrometry, biosensors, and immunoassays. Lec/lab. Not offered every year. PREREQS: One year of organic chemistry and one term of organic chemistry laboratory.
CH 435. STRUCTURE DETERMINATION BY SPECTROSCOPIC METHODS (3). Use of
ultraviolet, infrared, nuclear magnetic resonance, and mass spectra for determination of structures and stereochemistry of complex organic molecules. PREREQS: (CH 336 [D-] and (CH 442 [D-] or CH 542 [D-] ))
CH 440. PHYSICAL CHEMISTRY (3).
Thermodynamics, electrochemistry, solutions, kinetic theory of gases, chemical kinetics, quantum theory and statistical mechanics, molecular structure and spectroscopy. PREREQS: (MTH 254 [D-] or MTH 254H [D-] ) and one year of general chemistry and one year of college physics CH 440, CH 441, CH 442 must be taken in order.

CH 441. PHYSICAL CHEMISTRY (3).
Thermodynamics, electrochemistry, solutions, kinetic theory of gases, chemical kinetics, quantum theory and statistical mechanics, molecular structure and spectroscopy. PREREQS: (MTH 254 [D-] or MTH 254H [D-] ) and one year of general chemistry and one year of college physics CH 440, CH 441, CH 442 must be taken in order.

CH 442. PHYSICAL CHEMISTRY (3).
Thermodynamics, electrochemistry, solutions, kinetic theory of gases, chemical kinetics, quantum theory and statistical mechanics, molecular structure and spectroscopy. PREREQS: (MTH 254 [D-] or MTH 254H [D-] ) and CH 441 [D-] and one year of general chemistry and one year of college physics. CH 440, CH 441, CH 442 must be taken in order.
CH 445. PHYSICAL CHEMISTRY OF
MATERIALS (3). Structure of solid materials.
Relationship between structure and mechanical, thermal, and electrical properties of materials used in high technology. Offered alternate years. PREREQS: (CH 442 [D-] or CH 542 [D-] )
CH 450. INTRODUCTORY QUANTUM
CHEMISTRY (3). Elementary wave mechanics and matrix mechanics of atoms and molecules. Quantum basis of chemical structure. Not offered every year. PREREQS: (CH 442 [D-] or CH 542 [D-] ) and one year college physics.
CH 453. CHEMICAL THERMODYNAMICS (3).
The laws of chemical thermodynamics applied to analyze properties of gases, gas mixtures, liquid solutions, fluctuations, critical phenomena, and magnetic systems. Not offered every year. PREREQS: (CH 442 [D-] or CH 542 [D-] )
CH 461. EXPERIMENTAL CHEMISTRY II (3). Second-level integrated laboratory course for majors in chemistry and related disciplines, covering experimental techniques of analytical, inorganic, organic and physical chemistry. Lec/lab. PREREQS: ((CH 362 [D-] or CH 362H [D-] ) and $\mathrm{CH} 421^{*}$ [D-] and CH 440* [D-] )
CH 461H. EXPERIMENTAL CHEMISTRY II
(3). Second-level integrated laboratory course for majors in chemistry and related disciplines, covering experimental techniques of analytical, inorganic and physical chemistry. Lec/Lab. PREREQS: ((CH 362 [D-] or CH 362H [D-] ) and CH 421* [D-] and CH 440* [D-] ) and Honors College approval required
CH 462. ^EXPERIMENTAL CHEMISTRY II (3). Second-level integrated laboratory course for majors in chemistry and related disciplines, covering experimental techniques of analytical, inorganic, organic and physical chemistry. Lec/lab. (Writing Intensive Course) PREREQS: ((CH 362 [D-] or CH 362 H [D-] ) and $\mathrm{CH} 441^{*}$ [D-] and (CH 324 [D-] or CH 461 [D-] or CH 461H [D-] )) and CH 422 is recommended.

CH 462H. ^EXPERIMENTAL CHEMISTRY II
(3). Second-level integrated laboratory course for majors in chemistry and related disciplines,
covering experimental techniques of analytical inorganic, organic and physical chemistry. Lec/lab. (Writing Intensive Course) PREREQS: ((CH 362 [D-] or CH 362H [D-] ) and CH 441* [D-] and (CH 324 [D-] or CH 461 [D-] or CH 461H [D-] )) and CH 422 is recommended. Honors College approval required.

CH 463. ^EXPERIMENTAL CHEMISTRY II
(3). Second-level integrated laboratory course for majors in chemistry and related disciplines, covering experimental techniques of analytical, inorganic, organic and physical chemistry. Lec/lab. (Writing Intensive Course) PREREQS: ((CH 362 [D-] or CH 362H [D-] ) and (CH 324 [D-] or CH 461 [D-] or CH 461 H [D-] ) and CH 442* [D-] )
CH 463H. ^ EXPERIMENTAL CHEMISTRY II
(3). Second-level integrated laboratory course for majors in chemistry and related disciplines, covering experimental techniques of analytical, inorganic, organic and physical chemistry. Lec/ lab. (Writing Intensive Course) PREREQS: ((CH 362 [D-] or CH 362H [D-] ) and (CH 324 [D-] or CH 461 [D-] or CH 461H [D-] ) and CH $442^{*}$ (D-] ) and Honors College approval required.
CH 464. ^EXPERIMENTAL CHEMISTRY II
(3). Second-level integrated laboratory course for majors in chemistry and related disciplines, covering experimental techniques of analytical, inorganic, organic and physical chemistry. Lec/lab. (Writing Intensive Course) PREREQS: ((CH 362 [D-] or CH 362H [D-] ) and CH 442* [D-] ) and (CH 461 or CH 461 H or CH 324 is recommended).

CH 464H. ^EXPERIMENTAL CHEMISTRY II (3). Second-level integrated laboratory course for majors in chemistry and related disciplines, covering experimental techniques of analytical, inorganic, organic and physical chemistry. Lec/ lab. (Writing Intensive Course) PREREQS: ((CH 362 [D-] or CH 362H [D-] ) and CH 442* [D-] ) and (CH 461 or CH 461 H or CH 324 is recommended) Honors College approval required.
CH 471. ADVANCED ORGANIC CHEMISTRY (3). Principles of synthetic organic chemistry. Particular emphasis will be directed at understanding stereochemical outcomes in carbon-carbon bond-forming reactions (DielsAlder, aldol, and pericyclic reactions). Other topics will include oxidation/reduction reactions, organometallic chemistry, and enantioselective methodologies. PREREQS: (CH 336 [D-] or CH 337 [D-] )

CH 490. COMPUTER PROGRAMMING FOR
SCIENTISTS (3). Programming, numerical and graphical analysis, problem solving, simulations and use of databases for information handling and retrieval. Applications to problems in chemistry. PREREQS: MTH 252 [D-] or MTH 252H [D-]

CH 501. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

CH 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

CH 505. READING AND CONFERENCE (1-16),
This course is repeatable for a maximum of 16 credits.
CH 506. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
CH 507. SEMINAR (1-16). Student should enroll in the seminar section that meets the specific divisional requirements for credits and grading scheme or that is designated for teaching or mentoring programs. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

CH 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.
CH 511. INORGANIC CHEMISTRY (4).
Fundamental principles of inorganic chemistry including atomic structure, bonding models for molecules and solids, symmetry, acid/base chemistry, oxidation-reduction, metal-ligand complexes, sol-gel chemistry and nanochemistry.

PREREQS: CH 442 or CH 542 is recommended

## CH 512. INORGANIC CHEMISTRY (4).

Descriptive chemistry of the elements, focusing on main-group compounds, transition metal complexes, and solid-state chemistry. PREREQS: CH 511 [C] and /or instructor approval.
CH 513. SOLID STATE CHEMISTRY (3-4). Basic principles of chemistry are applied to descriptions of structure-property relationships in inorganic solids. Topics include crystal structure, materials synthesis, chemical bonding, electronic properties, optical properties, and magnetism. Students who register for 4 credits will perform independent study of an advanced topic based on research literature. This course is repeatable for a maximum of 4 credits. PREREQS: CH 442 or CH 542

## CH 516. RADIOCHEMISTRY (4). Selected

 methods in radiochemical analysis. Actinide chemistry, activation analysis, radionuclide solvent extraction, and microbial reactions with radionuclides. Designed for majors in chemistry, chemical engineering, nuclear engineering, and radiation health physics. Lec/lab. CROSSLISTED as NSE 516. This course is repeatable for a maximum of 12 credits. PREREQS: ((NE 531 [C] or RHP 531 [C] ) and RHP 536 [C] ) and /or instructor approval required.CH 518. NUCLEAR CHEMISTRY (3). Radioactive decay, nuclear properties, nuclear structure, alpha, beta, and gamma decay, nuclear reactions, fission, interaction of radiation with matter, chemical techniques, radiation safety, and nuclear instrumentation. PREREQS: Should concurrently enroll in (CH 440 or CH 540 ) or PH 314.

CH 519. RADIOACTIVE TRACER METHODS
4). Radionuclides, radioactivity, and radiotracer methods as research tools in physical and biological science. Lec/lab. PREREQS: Two years of college chemistry.
CH 521. ANALYTICAL CHEMISTRY (3). A professional sequence for majors in chemistry and related disciplines. Chemical equilibrium, analytical electrochemistry, separations, spectroscopy, instrumentation, and treatment of data. PREREQS: One year of college chemistry, one year of college physics. Should concurrently enroll in CH 540.

CH 522. ANALYTICAL CHEMISTRY (3). A professional sequence for majors in chemistry and related disciplines. Chemical equilibrium, analytical electrochemistry, separations, spectroscopy, basic electronics and instrumentation, and treatment of data. PREREQS: One year of college chemistry, one year of college physics. Should concurrently enroll in CH 541.

CH 524. BIOANALYTICAL CHEMISTRY (3).
Analytical methods employed in the study of biologically important molecules. Separations (chromatography, electrophoresis), spectroscopy, mass spectrometry, biosensors, and immunoassays. Lec/lab. Not offered every year CROSSLISTED as VMB 524. PREREQS: One year of organic chemistry and one term of organic chemistry laboratory.
CH 535. STRUCTURE DETERMINATION BY SPECTROSCOPIC METHODS (3). Use of ultraviolet, infrared, nuclear magnetic resonance, and mass spectra for determination of structures and stereochemistry of complex organic molecules. PREREQS: CH 336 and $(\mathrm{CH} 442$ or CH 542)
CH 540. PHYSICAL CHEMISTRY (3).
Thermodynamics, electrochemistry, solutions, kinetic theory of gases, chemical kinetics, quantum theory and statistical mechanics, molecular structure and spectroscopy. PREREQS: MTH 254 and one year of college chemistry and one year of college physics. $\mathrm{CH} 540, \mathrm{CH} 541, \mathrm{CH}$ 542 must be taken in order.

CH 541. PHYSICAL CHEMISTRY (3)
Thermodynamics, electrochemistry, solutions, kinetic theory of gases, chemical kinetics,
quantum theory and statistical mechanics, molecular structure and spectroscopy. PREREQS: CH 540

CH 542. PHYSICAL CHEMISTRY (3).
Thermodynamics, electrochemistry, solutions, kinetic theory of gases, chemical kinetics, quantum theory and statistical mechanics, molecular structure and spectroscopy. PREREQS: CH 541

CH 545. PHYSICAL CHEMISTRY OF
MATERIALS (3). Structure of solid materials. Relationship between structure and mechanical, thermal, and electrical properties of materials used in high technology. Offered alternate years. PREREQS: CH 442 or CH 542

CH 550. INTRODUCTORY QUANTUM
CHEMISTRY (3). Elementary wave mechanics and matrix mechanics of atoms and molecules. Quantum basis of chemical structure. Not offered every year. PREREQS: CH 542 [C] and one year college physics.

CH 553. CHEMICAL THERMODYNAMICS (3).
The laws of chemical thermodynamics applied to analyze properties of gases, gas mixtures, liquid solutions, fluctuations, critical phenomena and magnetic systems. Not offered every year. PREREQS: CH 542
CH 571. ADVANCED ORGANIC CHEMISTRY 3). Principles of synthetic organic chemistry. Particular emphasis will be directed at understanding stereochemical outcomes in carbon-carbon bond-forming reactions (DielsAlder, aldol, and pericyclic reactions). Other topics will include oxidation/reduction reactions, organometallic chemistry, and enantioselective methodologies. PREREQS: CH 336 or CH 337

## CH 582. CHEMISTRY AND MATERIALS OF

 BATTERIES AND SUPER CAPACITORS (3).Examines the chemistry and materials currently in use and proposed for future primary and secondary batteries and supercapacitors. After a brief historical review, we will examine in detail the state-of-the-art technologies including lithium-ion, lithium, and sodium-sulfur batteries and electrochemical double-layer capacitors, and future technologies such as metal-air and lithiumsulfur. Class discussions will focus on structure/ performance relationships and other issues such as environmental impact, safety and cost. Offered via Ecampus only. PREREQS: Full year of general chemistry. College-level physics is recommended. Additional chemistry or materials science background is recommended.

## CH 584. INSTRUMENTS AND ONLINE

INTERACTIONS IN THE SCIENCES (3). Examine methods and technologies for and incorporating virtual instruments and online interactions into laboratory courses to support learners in becoming critical thinkers and creative producers of their knowledge and understanding in science. PREREQS: Basic computer literacy and one year of general chemistry, physics or biology
CH 590. COMPUTER PROGRAMMING FOR SCIENTISTS (3). Programming, numerical and graphical analysis, problem solving, simulations and use of databases for information handling and retrieval. Applications to problems in chemistry. PREREQS: MTH 252
CH 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
CH 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
CH 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

CH 607. SEMINAR (1-16). Student should enroll in the seminar section that meets the specific divisional requirements for credits and grading scheme or that is designated for teaching or mentoring programs. This course is repeatable for a maximum of 16 credits.

CH 614. SELECTED TOPICS IN INORGANIC CHEMISTRY (4). Nonsequence courses designed to acquaint the advanced graduate student with recent advances in fields such as solid state chemistry, theoretical inorganic chemistry, spectroscopy and magnetism, chemistry of coordination compounds, kinetics and mechanisms of inorganic reactions, acid-base theory and reactions in nonaqueous solvents, organometallic chemistry, and chemistry of the less familiar elements. Not offered every year. This course is repeatable for a maximum of 8 credits. PREREQS: CH 413 or CH 513

## 615. SELECTED TOPICS INORGANIC

CHEMISTRY (4). Focus is on cutting edge
research topics in inorganic materials chemistry, which will evolve from year-to-year to stay up-todate. Current journal articles, software programs, and lab demonstrations will be utilized. Students will learn both content of a research area, as well as tools used in the practice.
CH 616. SELECTED TOPICS IN INORGANIC
CHEMISTRY (4). Nonsequence courses designed to acquaint the advanced graduate student with the principles of X-ray diffraction as applied to the structural characterization of both single crystals and powders. Not offered every year. PREREQS: CH 413 or CH 513
CH 630. ADVANCED ORGANIC CHEMISTRY (3) Molecular orbital bonding theory, orbital symmetry, reaction mechanisms, stereoisomerism, conformational analysis, and advanced methods of synthesis. Not offered every year. PREREQS: CH 336 and (CH 442 or CH 542 )

CH 631. ADVANCED ORGANIC CHEMISTRY (4) Carbon-carbon bond forming reactions, reaction mechanisms, stereoisomerism, conformational analysis, and advanced methods of synthesis. Not offered every year. PREREQS: CH 630

CH 632. ADVANCED ORGANIC CHEMISTRY (3) Molecular orbital bonding theory, orbital symmetry, reaction mechanisms, stereoisomerism, conformational analysis, and advanced methods of synthesis. Not offered every year. PREREQS: CH 336 and (CH 442 or CH 542)
CH 633. HYPOTHESIS, EVIDENCE, AND ARGUMENT IN ORGANIC CHEMISTRY (2). Immerses the student in the tools of scientific method as applied to current research topics in the chemical literature. The student will perform an extensive review of a modern topic in organic chemistry, prepare a written summary and analysis of this literature review and make a public oral presentation and discussion. This course is repeatable for a maximum of 4 credits. PREREQS: CH 632 [C] and /or instructor permission.

## CH 636. SELECTED TOPICS IN ORGANIC

CHEMISTRY (3). Nonsequence courses designed to acquaint students with recent advances in organic chemistry and their application to special fields of study. Topics covered vary from term to term and year to year. Topics include: theoretical organic chemistry, recent advances in reaction mechanisms, advanced synthesis, free radical reactions, organic sulfur chemistry, and biosynthesis of natural products. CH 636 , CH 637, CH 638 need not be taken in order. Not offered every year. This course is repeatable for a maximum of 12 credits.

## CH 637. SELECTED TOPICS IN ORGANIC

CHEMISTRY (3). Nonsequence courses designed to acquaint students with advances in organic chemistry, specifically focusing on biosynthesis of natural products and enzyme reaction mechanisms. CH 636, CH 637, CH 638 need not be taken in order. This course is repeatable for a maximum of 12 credits.

## CH 638. SELECTED TOPICS IN ORGANIC

CHEMISTRY (3). Nonsequence courses designed to acquaint students with recent advances in organic chemistry and their application to special fields of study. Topics covered vary from term to term and year to year. Topics include:
theoretical organic chemistry, recent advances in reaction mechanisms, advanced synthesis, free radical reactions, organic sulfur chemistry, and biosynthesis of natural products. CH 636 , CH 637, CH 638 need not be taken in order. Not offered every year. This course is repeatable for a maximum of 12 credits.

CH 651. QUANTUM MECHANICS OF ATOMS AND MOLECULES (3). Not offered every year. PREREQS: CH 450 or CH 550

CH 652. QUANTUM MECHANICS OF MOLECULAR SPECTROSCOPY (3). Not offered every year. PREREQS: CH 651
CH 660. SPECTROCHEMICAL ANALYSIS (3).
Theoretical concepts and methodology of optical spectrochemical methods of analysis, components of spectrometers, flame and electrothermal atomic spectrophotometry, ICP atomic emission spectrometry, molecular absorption and fluorescence spectrometry. PREREQS: CH 442 or CH 542
CH 661. SEPARATIONS: CHROMATOGRAPHY AND RELATED METHODS (4). Theory, instrumentation, and practice of modern separation techniques (gas chromatography, liquid chromatography, electrokinetic separations) and sample preparation methods; handling and interpretation of chromatographic and electrophoretic data. PREREQS: CH 440 or CH 540 (Thermodynamics) recommended or instructor's permission.
CH 662. ANALYTICAL ELECTROCHEMISTRY
(4). Study of current, voltage and time relationships in electrochemical cells. Offered alternate years. PREREQS: CH 442 recommended or instructor permission.

CH 680. SELECTED TOPICS IN PHYSICAL
CHEMISTRY (3). Nonsequence courses designed to acquaint students with recent advances in physical chemistry. Topics include molecular structure dynamics determination (UV-visible, near-IR light sources, $x$-ray, electron and neutron diffraction), spectroscopy (ultrafast, nonlinear, multidimensional, multiphoton, magnetic resonance, photoelectron), physical chemistry of condensed phase systems (biomolecules, aqueous solution, novel materials, ionic, molecula and liquid crystals, critical phenomena, mass transport), theoretical chemistry (chemical bonding, scattering theory, group theory, dynamics), electronic structure theory of molecules, structural dynamics of complex systems. Need not be taken in order. Not offered every year. This course is repeatable for a maximum of 12 credits. PREREQS: CH 550 [B-] and graduate standing.
CH 681. SELECTED TOPICS IN PHYSICAL
CHEMISTRY (2). Nonsequence courses designed to acquaint students with recent advances in physical chemistry. Topics include molecular structure determination (x-ray, electron and neutron diffraction), spectroscopy (nonlinear and multiphoton, magnetic resonance, photoelectron, Moessbauer effect), physical chemistry of condensed phases (ionic, molecular and liquid crystals, critical phenomena, mass transport), theoretical chemistry (chemical bonding, scattering theory, group theory, dynamics), electronic structure theory of molecules. Need not be taken in order. Not offered every year. This course is repeatable for a maximum of 12 credits. PREREQS: Graduate standing.
CH 682. SELECTED TOPICS IN PHYSICAL CHEMISTRY (2). Nonsequence courses designed to acquaint students with recent advances in physical chemistry. Topics include molecular structure determination (x-ray, electron and neutron diffraction), spectroscopy (nonlinear and multiphoton, magnetic resonance, photoelectron,

Moessbauer effect), physical chemistry of condensed phases (ionic, molecular and liquid crystals, critical phenomena, mass transport), heoretical chemistry (chemical bonding, scattering theory, group theory, dynamics), electronic structure theory of molecules. Need not be taken in order. Not offered every year. This course is repeatable for a maximum of 12 credits. PREREQS: Graduate standing.
CH 683. SELECTED TOPICS IN ANALYTICAL CHEMISTRY (2). Nonsequence courses designed to acquaint the advanced graduate student with recent advances in analytical chemistry. Not offered every year. This course is repeatable for a maximum of 12 credits. PREREQS: Graduate standing or instructor approval required.
CH 684. SELECTED TOPICS IN ANALYTICAL CHEMISTRY (2). Nonsequence courses designed to acquaint the advanced graduate student with recent advances in analytical chemistry. Not offered every year. This course is repeatable for a maximum of 12 credits. PREREQS: Graduate standing or instructor approval required.
CH 685. SELECTED TOPICS IN ANALYTICAL CHEMISTRY (2). Nonsequence courses designed to acquaint the advanced graduate student with recent advances in analytical chemistry. Not offered every year. This course is repeatable for a maximum of 12 credits. PREREQS: Graduate standing or instructor approval required.
CH 686. SELECTED TOPICS IN NUCLEAR AND RADIATION CHEMISTRY (2). Nonsequence courses designed to acquaint the advanced graduate student with recent advances in nuclear and radiation chemistry. Not offered every year. This course is repeatable for a maximum of 12 credits. PREREQS: Graduate standing or instructor approval required.
CH 687. SELECTED TOPICS IN NUCLEAR AND RADIATION CHEMISTRY (2). Nonsequence courses designed to acquaint the advanced graduate student with recent advances in nuclear and radiation chemistry. Not offered every year. This course is repeatable for a maximum of 12 credits. PREREQS: Graduate standing or instructor approval required.

CH 688. SELECTED TOPICS IN NUCLEAR AND RADIATION CHEMISTRY (2). Nonsequence courses designed to acquaint the advanced graduate student with recent advances in nuclear and radiation chemistry. Not offered every year. This course is repeatable for a maximum of 12 credits. PREREQS: Graduate standing or instructor approval required.
CH 692. ENVIRONMENTAL TRANSFORMATION
OF ORGANIC COMPOUNDS (3). Chemical, photochemical, and biological transformation reactions of organic compounds in the environment. Test methods and predictive models for determining the persistence of organic compounds in the environment. Offered alternate years. PREREQS: CH 336 and CH 440 or instructor approval required.
CH 696. COMPUTER INTERFACING (4). Introduction to the use of microcomputers for data acquisition and data manipulation in the laboratory. The emphasis will be on the use of software and hardware for the IBM-compatible personal computer. Programming in Visual Basic and Windows languages will be covered, as well as use of commercial software and hardware. Familiarity with analog signal conditioning and simple digital circuitry will be assumed.
CH 697. MASS SPECTROMETRY OF ORGANIC COMPOUNDS (4). Physical principles of mass spectrometric instrumentation and interpretation of the mass spectra of organic compounds and biomolecules. Not offered every year.

## MATHEMATICS

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## FACULTY

Professors Bogley, Burton, Dascaliuc, De Leenheer, Dick, Dray, Escher, Faridani, Finch, Flahive, Higdon, Ossiander, Peszynska, Pohjanpelto, Restrepo, Schmidt, Showalter, Thomann, Waymire Associate Professors Bokil, Gibson, Kovchegov, Swisher
Assistant Professors Beisiegel, Cozzi, Dalziel, Guo, Koslicki, Lockwood, Petsche
Adjunct Professors Batten (ME),
Manogue (PH)
Adjunct Associate Professor
Medlock (VBS), Zhang (ECE)

## Undergraduate Major

Mathematics (BS, CRED, HBS)

## Options

Applied and Computational Mathematics Mathematical Biology
Secondary Teaching Emphasis
Statistics

## Minors

Actuarial Science
Mathematics

## Graduate Major

Mathematics (MA, MAIS, MS, PhD)
Graduate Areas of Concentration
Actuarial Science
Algebra
Analysis
Applied Mathematics
Computational Mathematics
Differential Equations
Financial Mathematics
Geometry
Mathematics Education
Number Theory
Numerical Analysis
Topology
Probability

## Graduate Minor

Mathematics

The department offers programs leading to the BS, MA, MS, and PhD degrees in Mathematics. Undergraduate minors are offered in Mathematics and Actuarial Science.

Students interested in teaching mathematics at the secondary level should contact a departmental advisor and discuss
the Secondary Teaching Emphasis option available under the Mathematics major. Likewise, students interested in careers in the area of financial mathematics or as actuaries should meet with a member of the departmental Actuarial Sciences Committee.
Additional information pamphlets about both the undergraduate and graduate programs are available on the Department of Mathematics website.

## DEPARTMENTAL REQUIREMENTS

The Mathematics major requirements at the upper division comprise about 45 credits of course work. This leaves about 45 credits of free electives that can be used to design a degree program in mathematics that is tailored to each major's particular interests.

## MATHEMATICS (BS, CRED, HBS)

The BS degree in Mathematics requires a common core of courses at the lowerdivision level and junior-level followed by senior-level depth and breadth requirements. The upper-division requirements in the major total 45-50 credits. Thus, a mathematics major has ample opportunity to take further mathematics courses focused toward specific interests and career goals. Programs supporting interdisciplinary interests are strongly encouraged.
The following requirements are specific to the BS degree in Mathematics. Students must also satisfy OSU degree and baccalaureate core requirements.
A grade of at least C- and a GPA of 2.25 are required in all mathematics courses used to fulfill degree requirements. No course used to fulfill requirements for the mathematics major or any of its options may be taken $\mathrm{S} / \mathrm{U}$.

## Lower-Division Requirements (28)

MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4)
MTH 254. Vector Calculus I (4)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4) PH 211. *General Physics with Calculus (4)

## Upper-Division Requirements:

(45-50)
Part A. Required Mathematics Core Classes (24)
MTH 311, MTH 312. Advanced Calculus (4,4) MTH 341. Linear Algebra I (3)
MTH 342. Linear Algebra II (4)
MTH 343. Introduction to Modern Algebra (3)

MTH 355. Discrete Mathematics (3)
One of the following writing
intensive courses (WIC) (3):
MTH 323. ${ }^{\wedge}$ Mathematical Modeling (3)
MTH 333. $\wedge$ Fundamental Concepts of Topology (3)
MTH 338. ${ }^{\wedge}$ Non-Euclidean Geometry (3)

Part B: Computational Requirement
(3)

One of the following courses is required. This course can be used to satisfy one requirement in either Part C or Part D.
MTH 321. Introductory Applications of Mathematical Software (3)
MTH 351. Introduction to Numerical Analysis (3)
MTH 440. Computational Number Theory (3)

MTH 441. Applied and Computational Algebra (3)
MTH 451. Numerical Linear Algebra (3)
MTH 452. Numerical Solution of Ordinary Differential Equations (3)
Part C: Area Course Work (15)
Mathematics courses at the 400 level are offered in the 6 areas listed below. Five 400-level classes satisfying (a) and (b) are required.
(a) Depth requirement: A pair of classes from one of the 6 areas is required. Some exceptions are noted.
(b) Breadth requirement: One course each from 3 of the 5 remaining areas.

## Algebra and Number Theory:

(MTH 443 cannot be used in a pair to satisfy (a).)
MTH 440. Computational Number Theory (3)
MTH 441. Applied and Computational Algebra (3)
MTH 442. Applied and Computational Algebra (3)
MTH 443. Abstract Linear Algebra (3)

## Analysis:

(MTH 483 cannot be used in a pair to satisfy (a).)
MTH 411. Real Analysis (3)
MTH 412. Real Analysis (3)
MTH 413. Real Analysis (3)
MTH 483. Complex Variables (3)
Applied Mathematics:
(MTH 480 and MTH 481 cannot both be used to satisfy program requirements.)
MTH 420. Models and Methods of Applied Mathematics (3)
MTH 427. Introduction to Mathematical Biology (3)
MTH 480. Systems of Ordinary Differential Equations (3)
MTH 481. Applied Ordinary Differential Equations (3)
MTH 482. Applied Partial Differential Equations (3)
Geometry and Topology:
MTH 430. Metric Spaces and Topology (3)
MTH 434. Introduction to Differential Geometry (3)
MTH 435. Differential Geometry (3)
MTH 437. General Relativity (3)

## Numerical Analysis:

MTH 451. Numerical Linear Algebra (3)
MTH 452. Numerical Solution of Ordinary Differential Equations (3)
MTH 453. Numerical Solution of Partial Differential Equations (3)

## Probability:

MTH 463. Probability I (3)
MTH 464. Probability II (3)
MTH 465. Probability III (3)

## MTH 467. Actuarial Mathematics (3)

Part D: Electives (6)
Two additional upper-division elective courses of a mathematical nature are required.
This includes non-blanket numbered (not X99- or X0X-numbered) upperdivision MTH courses, upper-division ST courses, or other courses of a mathematical nature approved by the departmental head advisor. MTH 390 is not allowed.

## Total=180

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Major Code: 560


## OPTIONS

## APPLIED AND COMPUTATIONAL

 MATHEMATICS OPTIONThe Applied and Computational option offers Mathematics majors an opportunity to concentrate much of their upper-division course work in the area of applied and computational mathematics. This degree option is designed to allow students to focus on applied mathematics, modeling, and computation after completing core junior and lower-division mathematics requirements.

A grade of at least C- and a GPA of 2.25 are required in all mathematics courses used to fulfill degree requirements. No course used to fulfill requirements for the mathematics major or any of its options may be taken $\mathrm{S} / \mathrm{U}$.
The lower-division requirements for the Applied and Computational Mathematics option are the same as those for the Mathematics BS degree. The upperdivision requirements are as follows.

## Upper-Division Requirements:

(51-52)

## Part A. Required Applied and

 Computational Mathematics Core Classes (27)All of the following courses are required.
MTH 311, MTH 312. Advanced Calculus $(4,4)$
MTH 323. ^Mathematical Modeling (3)
MTH 341. Linear Algebra I (3)
MTH 342. Linear Algebra II (4)
MTH 343. Introduction to Modern Algebra (3)
MTH 355. Discrete Mathematics (3)
MTH 483. Complex Variables (3)
Part B. Area Course Work (15)
Five courses from the following 9 classes are required. Either MTH 453 or MTH 482 must be included. (Note: Only one of MTH 480 and MTH 481 can be used to satisfy requirements for a degree in Mathematics.):
MTH 420. Models and Methods of Applied Mathematics (3)
MTH 440. Computational Number Theory (3)
MTH 441. Applied and Computational
Algebra (3)

MTH 451. Numerical Linear Algebra (3)
MTH 452. Numerical Solution of Ordinary Differential Equations (3)
MTH 453. Numerical Solution of Partial Differential Equations (3)
MTH 480. Systems of Ordinary Differential Equations (3)
MTH 481. Applied Ordinary Differential Equations (3)
MTH 482. Applied Partial Differential Equations (3)

## Part C. Probability or Statistics

## (3-4)

One of the following 4 classes is required.
MTH 361. Introduction to Probability (3)
MTH 463. Probability I (3)
ST 351. Introduction to Statistical Methods (4)

ST 421. Introduction to Mathematical Statistics (4)

## Part D. Electives (6)

Two additional upper-division elective courses of a mathematical nature are required.

This includes non-blanket numbered (not X99- or X0X-numbered) upperdivision MTH courses, upper-division ST courses, other courses of a mathematical nature approved by the departmental head advisor, or a two-term thesis project with a graduate faculty member. MTH 390 is not allowed.

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Option Code: 692

## MATHEMATICAL

BIOLOGY OPTION
In addition to the usual required lowerdivision mathematics courses and the junior core courses, mathematics majors in the Mathematical Biology option have an opportunity to concentrate much of their further course work on applied mathematics, mathematical biology, modeling and computation.

A grade of at least C- and a GPA of 2.25 are required in all mathematics courses used to fulfill degree requirements. No course used to fulfill requirements for the mathematics major or any of its options may be taken $\mathrm{S} / \mathrm{U}$.
Lower-Division Requirements (41)
BI 211. *Principles of Biology (4)
BI 212. *Principles of Biology (4)
BI 213. *Principles of Biology (4)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4)
MTH 254. Vector Calculus I (4)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4)
CH 231. *General Chemistry (4) and CH
261. *Laboratory for Chemistry 231 (1)

## Upper-Division Requirements <br> (52-53)

## Part A: Required Mathematics Core

Courses (24)
MTH 311. Advanced Calculus (4)
MTH 312. Advanced Calculus (4)
MTH 341. Linear Algebra I (3)
MTH 342. Linear Algebra II (4)
MTH 343. Introduction to Modern Algebra (3)

MTH 355. Discrete Mathematics (3)
And one of the following writing
intensive courses (WIC) is required:
MTH 323. ${ }^{\wedge}$ Mathematical Modeling (3) (preferred)
MTH 333. ${ }^{\wedge}$ Fundamental Concepts of Topology (3)
MTH 338. ^Non-Euclidean Geometry (3)
Part B: Required Area Course Work
in Mathematics and Statistics (16)
MTH 427. Introduction to Mathematical Biology (3)
MTH 428. Stochastic Elements in
Mathematical Biology (3)
MTH 463. Probability I (3)
MTH 480. Systems of Ordinary Differential Equations (3)
One of the following courses is required:
ST 351. Introduction to Statistical Methods (4)

ST 411. Methods of Data Analysis (4)
Part C: Directed Electives (12-13)
One of the following courses is required:
MTH 483. Complex Variables (3)
MTH 430. Metric Spaces and Topology (3)
One of the following courses is required:
MTH 420. Models and Methods of Applied Mathematics (3)
MTH 440. Computational Number Theory (3)

MTH 441. Applied and Computational Algebra (3)
MTH 464. Probability II (3)
MTH 482. Applied Partial Differential Equations (3)
One of the following courses is required:
MTH 351. Introduction to Numerical Analysis (3)
MTH 451. Numerical Linear Algebra (3)
MTH 452. Numerical Solution of Ordinary Differential Equations (3)
One of the following courses, or
another upper-division life science course approved by a mathematics
advisor, is required:
BI 311. Genetics (4)
BI 351. Marine Ecology (3)
BI 370. Ecology (3)
BI 445. Evolution (3)
BOT 341. Plant Ecology (4)
BOT 442. Plant Population Ecology (3)
BOT 476. Introduction to Computing in the
Life Sciences (3)
CS 446. Biological Networks (3)
FW 320. Introductory Population Dynamics (4)

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 737


## SECONDARY TEACHING <br> EMPHASIS OPTION

Students preparing for careers teaching mathematics at the secondary level may major in mathematics with the following transcript-visible option. This option helps prepare students to pursue a teaching licensure program in their fifth year. Option requirements and a suggested timeline follow.

A grade of at least C- and a GPA of 2.25 are required in all mathematics courses used to fulfill degree requirements. No course used to fulfill requirements for the mathematics major or any of its options may be taken $\mathrm{S} / \mathrm{U}$.

## Freshman Year (45)

MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4) PH 211. *General Physics with Calculus (4) Baccalaureate core courses (29)

## Sophomore Year (45)

MTH 254. Vector Calculus I (4)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4)
MTH 341. Linear Algebra (3)
Baccalaureate core courses (13)
Other electives (17)

## Junior Year (45)

A grade of at least C- and a GPA of 2.25 are required in all upper-division mathematics courses used to fulfill degree requirements.
ED 309. Field Practicum (3)
MTH 311, MTH 312. Advanced Calculus $(4,4)$
MTH 338. ^Non-Euclidean Geometry (3)
MTH 342. Linear Algebra II (4)
MTH 343. Introduction to Modern Algebra (3)

MTH 355. Discrete Mathematics (3)
MTH 361. Introduction to Probability (3)
Baccalaureate core courses (6)
Other electives (12)

## Senior Year (45)

MTH 491, MTH 492, MTH 493. Algebra and Geometric Transformations $(3,3,3)$
SED 414. Inquiry in Mathematics and Mathematics Education (3)
ST 351. Introduction to Statistical Methods (4)

Electives (29)

- Students wanting a stronger background in statistics may substitute ST 421 for ST 351.
- Students wanting a stronger background in probability may substitute MTH 463, Probability I, (usually taken in the senior year) for MTH 361.
- Students wanting a stronger background in mathematics should choose some electives from the $400-$ level courses listed in the Mathematics major.


## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 234


## STATISTICS OPTION

The Statistics option offers Mathematics majors an opportunity to concentrate their senior level course work in the area of statistics and probability after completing core junior and lower-division mathematics requirements. This degree option is designed to allow a focus on the study of the mathematical theory underlying statistics while simultaneously developing expertise in statistical applications.
A grade of at least C- and a GPA of 2.25 are required in all mathematics courses used to fulfill degree requirements. No course used to fulfill requirements for the mathematics major or any of its options may be taken $\mathrm{S} / \mathrm{U}$.
The lower-division requirements for the Statistics option are the same as those for the Mathematics BS degree. The upper-division requirements are as follows.

## Upper-Division Requirements (55-56):

## Part A. Required Mathematics Core

## Classes (24)

MTH 311, MTH 312. Advanced Calculus (4,4)
MTH 341. Linear Algebra I (3)
MTH 342. Linear Algebra II (4)
MTH 343. Introduction to Modern Algebra (3)

MTH 355. Discrete Mathematics (3)
One of the following writing intensive courses (WIC) (3):
MTH 323. ${ }^{\wedge}$ Mathematical Modeling (3)
MTH 333. $\wedge$ Fundamental Concepts of Topology (3)
MTH 338. ^Non-Euclidean Geometry (3)
Part B: Statistics and Probability
Core Classes (22)
MTH 463. Probability I (3)
MTH 464. Probability II (3)
ST 411. Methods of Data Analysis (4)
ST 412. Methods of Data Analysis (4)
ST 421. Introduction to Mathematical Statistics (4)
ST 422. Introduction to Mathematical Statistics (4)

## Part C: Depth in Statistics or

Probability (3-4)
One course from the following list is required.
MTH 465. Probability III (3)
MTH 467. Actuarial Mathematics (3)
ST 413. Methods of Data Analysis (4)
ST 415. Design and Analysis of Planned Experiments (3)
ST 431. Sampling Methods (3)
ST 439. Survey Methods (3)
ST 441. Probability, Computing, and Simulation in Statistics (4)
ST 443. Applied Stochastic Models (3)
Part D: Breadth in Mathematics (6)
One course from each of 2 of the following 5 areas is required.
Note: MTH 321. Introductory Applications of Mathematical Software (3), can be substituted for one of the two area classes.

Algebra and Number Theory:
MTH 440. Computational Number Theory (3)

MTH 441. Applied and Computational Algebra (3)

## Analysis:

MTH 411. Real Analysis (3)
MTH 483. Complex Variables (3)
Applied Mathematics:
MTH 420. Models and Methods of Applied Mathematics (3)
MTH 427. Introduction to Mathematical Biology (3)
MTH 480. Systems of Ordinary Differential Equations (3)
MTH 481. Applied Ordinary Differential Equations (3)
Geometry and Topology:
MTH 430. Metric Spaces and Topology (3)
MTH 434. Introduction to Differential Geometry (3)
Numerical Analysis:
MTH 351. Introduction to Numerical Analysis (3)
MTH 451. Numerical Linear Algebra (3)
MTH 452. Numerical Solution of Ordinary Differential Equations (3)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 658


## UNDERGRADUATE MINORS

## ACTUARIAL SCIENCE MINOR

A minimum GPA of 2.0 is required in this minor. No course used to fulfill requirements for this minor may be taken $\mathrm{S} / \mathrm{U}$.

## Required (22)

MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4) or MTH 306. Matrix and Power Series Methods (4)
MTH 254. Vector Calculus I (4)
MTH 341. Linear Algebra I (3)
MTH 361. Introduction to Probability (3)
Select at least 2 courses from the following upper-division courses (6-8):
MTH 351. Introduction to Numerical Analysis (3)
MTH 463. Probability I (3)
MTH 464. Probability II (3)
MTH 465. Probability III (3)
MTH 467. Actuarial Mathematics (3)
ST 411. Methods of Data Analysis (4)
ST 412. Methods of Data Analysis (4)
ST 413. Methods of Data Analysis (4)
ST 421. Introduction to Mathematical Statistics (4)
ST 422. Introduction to Mathematical Statistics (4)
ST 441. Probability, Computing, and Simulation in Statistics (4)
ST 443. Applied Stochastic Models (3) Restriction: The Actuarial Science minor must include 28 credits, at least 12 of which must be upper-division credits.

- Except for MTH 306 and MTH 341, upper-division courses used to satisfy a student's major requirements
may not also be used to satisfy requirements for the Actuarial Science minor.
- Except for MTH 306 and MTH 341, upper-division courses used to satisfy a student's additional minor program may not also be used to satisfy requirements for the Actuarial Science minor.


## Total=28-30

Footnote:

* Baccalaureate Core Course (BCC)

Minor Code: 563

## MATHEMATICS MINOR

A minimum GPA of 2.0 is required in this minor. No course used to fulfill requirements for this minor may be taken $\mathrm{S} / \mathrm{U}$.

## Required

MTH courses numbered 231 or higher (30 credits)
MTH courses numbered 311 or higher (15 credits)
MTH 311. Advanced Calculus (4)
or MTH 341. Linear Algebra I (3)

## Strongly Recommended:

MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 254. Vector Calculus I (4)
Note: MTH 390, Foundations of Elementary Mathematics (4), may not be used for credit in the Mathematics minor.

## Footnote:

* Baccalaureate Core Course (BCC)

Minor Code: 560
MATHEMATICS
(MA, MS, PhD, MAIS)
Graduate Areas of Concentration
Actuarial science, algebra, analysis, applied mathematics, computational mathematics, differential equations,
financial mathematics, geometry, mathematics education, number theory, numerical analysis, topology, probability
The Department of Mathematics offers graduate work leading to the Master of Science, Master of Arts, and Doctor of Philosophy degrees. Graduate areas of concentration are actuarial science, algebra, analysis, applied mathematics, computational mathematics, differential equations, financial mathematics, geometry, mathematics education, number theory, numerical analysis, topology, probability.
For the MS and MA, a thesis, an expository paper, or successful completion of the PhD qualifying examination is required.
Major Code: 5600
MATHEMATICS GRADUATE MINOR
For more details, see the departmental advisor.
Minor Code: 5600

## ■ MATHEMATICS COURSES

MTH 065. ELEMENTARY ALGEBRA (3).
Arithmetic of signed numbers, order of operations, simplifying algebraic expressions, solutions of linear equations, and inequalities. Rules of exponents, addition, subtraction, and multiplication of polynomials, factoring, solution of quadratic equations by factoring, reducing rational expressions. Word problems involving linear equations, graphing of linear equations, inequalities. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: Placement Test MPT(05) or Placement Test MPAL(015) and (MPT=Math Placement Test score of 05 ; MPAL=Math Placement Test-ALEKS score of 15\%)
MTH 095. INTERMEDIATE ALGEBRA (3). Addition, subtraction, multiplication, and division of rational expressions, long division of polynomials, solutions of fractional equations, applications involving linear equations. Fractional equations, inequalities, literal equations, and variations. Negative and fractional exponents, radicals, solutions of quadratic equations, and complex numbers. Cartesian coordinates, graphs of linear equations and inequalities, distance formula, slope, equations of lines, solutions of systems of linear equations in two unknowns and inequalities. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 065 [C-] or Placement Test MPT(11) or Placement Test MPAL(030) and (MPT=Math Placement Test score of 11; MPAL=Math Placement Test-ALEKS score of 30\%)

MTH 102. ALGEBRAIC FOUNDATIONS (3). This course is designed primarily for EOP students. They will use various computing technologies to explore realistic and interesting situations in which algebra is used. As they work through explorations, they will work with many of the fundamental ideas of algebra, ideas they will find important in their daily lives.

MTH 103. ALGEBRAIC REASONING (4). Graphing data, functions, rate of change, linear equations, systems of linear equations, linear inequalities, linear functions, absolute value functions, quadratic functions, exponential functions. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 065 [C-] or Placement Test MPT(11) or Placement Test MPAL(030) and (MPT=Math Placement Test score of 11; MPAL=Math Placement Test-ALEKS score of 30\%)

## MTH 105. *INTRODUCTION TO

CONTEMPORARY MATHEMATICS (3).
Elementary linear programming, combinatorics, descriptive statistics, elementary probability, exponential growth and decay, examples of major mathematical ideas and models. Lec/rec. (Bacc Core Course) PREREQS: MTH 095 or MTH 103 or (MPT=Math Placement Test score of 17; MPAL=Math Placement Test-ALEKS score of 46\%) recommended.

MTH 111. *COLLEGE ALGEBRA (4). Polynomial equations and inequalities, polynomial functions and graphs, inverse functions, exponential and logarithmic functions, elementary mathematical modeling and applications. Lec/rec. All courses used to satisfy MTH prerequisites must be completed with a C- or better. (Bacc Core Course) PREREQS: MTH 095 [C-] or MTH 103 [C-] or Placement Test MPT(17) or Placement Test MPAL(046) and (MPT=Math Placement Test score of 17; MPAL=Math Placement Test-ALEKS score of 46\%)
MTH 112. *ELEMENTARY FUNCTIONS (4).
Triangle trigonometry, circular functions and graphs, trigonometric equations and identities, inverse trigonometric functions, polar coordinates, vectors and applications. Lec/rec. All courses used to satisfy MTH prerequisites must be completed with C- or better. (Bacc Core Course) PREREQS: MTH 111 [C-] or Placement Test MPT(24) or

Placement Test MPAL(060) and (MPT=Math Placement Test score of 24 ; MPAL=Math Placement Test-ALEKS score of 60\%)
MTH 150X. PRECALCULUS (4). Trigonometry. Exponential, logarithmic and trigonometric functions. Lec/rec. PREREQS: MTH 111 [C-] or Placement Test MPT(24) or Placement Test MPAL(060)
MTH 199. SPECIAL TOPICS (1-16). Maximum 3 credits per term, 9 credits total. Does not meet university group requirement in physical science. This course is repeatable for a maximum of 9 credits.
MTH 211. *FOUNDATIONS OF ELEMENTARY
MATHEMATICS (4). Introduction to problem solving, sets, whole numbers, number theory, fractions, decimals, percent, ratio and proportion integers. Intended primarily for prospective elementary teachers. All courses used to satisfy MTH prerequisites must be completed with C- or better. (Bacc Core Course) PREREQS: MTH 095 [C-] or MTH 103 [C-] or MTH 111 [C-] or MTH 112 C-] or Placement Test MPT(17) or Placement Test MPAL(046) and (MPT=Math Placement Test score of 17; MPAL=Math Placement Test-ALEKS score of $46 \%$ )
MTH 212. FOUNDATIONS OF ELEMENTARY MATHEMATICS (4). Rational and real numbers, probability, statistics, and informal geometry. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 211 [C-]
MTH 228. CALCULUS AND PROBABILTITY FOR THE LIFE SCIENCES II (4). Continuation of MTH 227 with more general population growth models. Antidifferentiation; The Fundamental Theorem of Calculus applied to solving continuous growth models. Continuous random variables. Basic linear algebra of small systems sufficient to calculate eigenvalues and eigenvectors and appreciate their use in life science applications. Lec/rec. PREREQS: MTH 227 [C-] or MTH 251 [C-] or MTH 251H [C-]
MTH 231. ELEMENTS OF DISCRETE
MATHEMATICS (4). Elementary logic and set theory, functions, direct proof techniques, contradiction and contraposition, mathematical induction and recursion, elementary combinatorics, basic graph theory, minimal spanning trees. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 112 [C-] or Placement Test MPT(33) or Placement Test MPAL(075) and (MPT=Math Placement Test score of 33; MPAL=Math Placement Test-ALEKS score of 75\%)
MTH 232. ELEMENTS OF DISCRETE
MATHEMATICS (4). Combinatorics, algorithms and complexity, graphs and trees. Lec/rec. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 231
MTH 241. *CALCULUS FOR MANAGEMENT AND SOCIAL SCIENCE (4). Elementary differential and integral calculus of polynomial, logarithmic, and exponential functions and their applications to business, management and social sciences. Lec/rec. All courses used to satisfy MTH prerequisites must be completed with C - or better. (Bacc Core Course) PREREQS: MTH 111 [C-] or Placement Test MPT(24) or Placement Test MPAL(060) and (MPT=Math Placement Test score of 24; MPAL=Math Placement Test-ALEKS score of $60 \%$ )
MTH 245. *MATHEMATICS FOR MANAGEMENT, LIFE, AND SOCIAL SCIENCES (4). Techniques of counting, probability and elements of statistics including binomial and normal distributions. Introductory matrix algebra. Elements of linear programming. Lec/rec. All courses used to satisfy MTH prerequisites must be completed with C - or better. (Bacc Core Course) PREREQS: MTH 111 [C-] or Placement Test MPT(24) or Placement Test

MPAL(060) and (MPT=Math Placement Test score of 24; MPAL=Math Placement Test-ALEKS score of 60\%)

MTH 251. *DIFFERENTIAL CALCULUS (4).
Differential calculus for engineers and scientists.
Rates of change: the derivative, velocity, and acceleration. The algebraic rules of differential calculus and derivatives of polynomial, rational, and trigonometric functions. Maximum-minimum problems, curve sketching, and other applications. Antiderivatives and simple motion problems. Lec/ rec. All courses used to satisfy MTH prerequisites must be completed with a C- or better. (Bacc Core Course) PREREQS: MTH 112 [C-] or Placement Test MPT(33) or Placement Test MPAL(075) and (MPT=Math Placement Test score of 33; MPAL=Math Placement Test-ALEKS score of 75\%)

MTH 251H. *DIFFERENTIAL CALCULUS (4).
Differential calculus for engineers and scientists. Rates of change: the derivative, velocity, and acceleration. The algebraic rules of differential calculus and derivatives of polynomial, rational, and trigonometric functions. Maximum-minimum problems, curve sketching, and other applications. Antiderivatives and simple motion problems. Lec/ rec. All courses used to satisfy MTH prerequisites must be completed with C - or better. (Bacc Core Course) PREREQS: MTH 112 [C-] or Placement Test MPT(33) or Placement Test MPAL(075) and (MPT=Math Placement Test score of 33; MPAL=Math Placement Test-ALEKS score of $75 \%)$. Honors College approval required.

MTH 252. INTEGRAL CALCULUS (4). Definite integrals, elementary applications to area, force, and work. Integral tables and basic techniques of integration, calculus of logarithmic and exponential functions, polar coordinates, applications to areas, volumes, force, work, and growth and decay problems. Lec/rec. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 251 [C-] or MTH 251H [C-]

MTH 252H. INTEGRAL CALCULUS (4). Definite integrals, elementary applications to area, force, and work. Integral tables and basic techniques of integration, calculus of logarithmic and exponential functions, polar coordinates, applications to areas, volumes, force, work, and growth and decay problems. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 251 [C-] or MTH 251H [C-] and Honors College approval required
MTH 253. INFINITE SERIES AND SEQUENCES
(4). Indeterminate forms. Improper integrals. Sequences and series, especially Taylor's formula and power series. Applications to numerical estimation with error analysis. Series with complex terms and the Euler identities. Lec/rec. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 252 [C-] or MTH 252H [C-]

MTH 254. VECTOR CALCULUS I (4). Vectors, vector functions, and curves in two and three dimensions. Surfaces, partial derivatives, gradients, and directional derivatives. Multiple integrals in rectangular, polar, cylindrical, and spherical coordinates. Physical and geometric applications. Lec/rec. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 252 [C-] or MTH 252H [C-]
MTH 254H. VECTOR CALCULUS I (4). Vectors, vector functions, and curves in two and three dimensions. Surfaces, partial derivatives, gradients, and directional derivatives. Multiple integrals in rectangular, polar, cylindrical, and spherical coordinates. Physical and geometric applications. Lec/rec. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 252 [C-] or MTH 252H [C-] and Honors College approval required.
MTH 255. VECTOR CALCULUS II (4). Brief review of vector functions, space curves,
gradients, and directional derivatives. Introduction to vector analysis: vector fields, divergence, curl, line integrals, surface integrals, conservative fields, and the theorems of Gauss and Stokes with applications to force, work, mass, and charge. Lec/ rec. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 254 [C-] or MTH 254H [C-]

MTH 255H. VECTOR CALCULUS II (4). Brief review of vector functions, space curves, gradients, and directional derivatives. Introduction to vector analysis: vector fields, divergence, curl, line integrals, surface integrals, conservative fields, and the theorems of Gauss and Stokes with applications to force, work, mass, and charge. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 254 [C-] or MTH 254H [C-] and Honors College approval required

## MTH 256. APPLIED DIFFERENTIAL

EQUATIONS (4). First order linear and nonlinear equations, and second order linear equations. Applications to electric circuits and mechanical oscillators. Introduction to the Laplace transform and higher order equations. Solution methods and applications appropriate for science and engineering. (Familiarity with complex numbers and Euler's identities is highly desirable.) Lec/ rec. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 254 [C-] or MTH 254H [C-] and /or instructor approval required.

## MTH 256H. APPLIED DIFFERENTIAL

EQUATIONS (4). First order linear and nonlinear equations, and second order linear equations. Applications to electric circuits and mechanical oscillators. Introduction to the Laplace transform and higher order equations. Solution methods and applications appropriate for science and engineering. (Familiarity with complex numbers and Euler's identities is highly desirable.) All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 254 [C-] or MTH 254H [C-] and /or instructor approval required. Honors College approval required.
MTH 268. MATHEMATICAL IDEAS IN BIOLOGY
(4). Mathematical models of biological systems, with emphasis on population dynamics and ecology. Integral calculus with applications to biology. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 251 [D-] or MTH 251H [D-]

MTH 299. SPECIAL TOPICS (0-16). Maximum 3 credits per term, 9 credits total. This course is repeatable for a maximum of 9 credits

## MTH 306. MATRIX AND POWER SERIES

METHODS (4). Introduction to matrix algebra, determinants, systematic solution to linear systems, and eigenvalue problems. Convergence and divergence of series with emphasis on power series, Taylor series expansions, convergence tests for power series, and error estimates for truncated series used in practical approximations. Lec/rec. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 252 [C-] or MTH 252H [C-]

MTH 306H. MATRIX AND POWER SERIES METHODS (4). Introduction to matrix algebra, determinants, systematic solution to linear systems, and eigenvalue problems. Convergence and divergence of series with emphasis on power series, Taylor series expansions, convergence tests for power series, and error estimates for truncated series used in practical approximations. Lec/rec. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 252 [C-] or MTH 252H [C-] and Honors College approval required

MTH 311. ADVANCED CALCULUS (4). Rigorous development of calculus, axiomatic properties of R, topology of the real line, convergence of sequences and series of real numbers, functions, limits of functions, basic properties of continuity
and derivatives. Brief treatment of Riemann integration, improper integrals, sequences of functions, pointwise and uniform convergence, introductory aspects of multivariable calculus. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: (MTH 255 [C-] or MTH 255H [C-] ) and MTH 355 [C-]

MTH 312. ADVANCED CALCULUS (4). Rigorous development of calculus, axiomatic properties of R, topology of the real line, convergence of sequences and series of real numbers, functions, limits of functions, basic properties of continuity and derivatives. Brief treatment of Riemann integration, improper integrals, sequences of functions, pointwise and uniform convergence, introductory aspects of multivariable calculus. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 311 [C-] and MTH 342* [C-]

MTH 321. INTRODUCTORY APPLICATIONS OF MATHEMATICAL SOFTWARE (3). An introduction to select mathematical software packages to support problem solving and applications. Topics include using computational resources to solve basic numerical and symbolic problems in mathematics, visualization and presentation of data, creation of simple programming scripts, and applications of basic programming techniques to promote mathematical understanding. The scientific typesetting language LaTeX will also be covered. All courses used to satisfy MTH prerequisites must be completed with a C- or better. PREREQS: (MTH 252 [C-] or MTH 252 H [C-] ) and (MTH 341 [C-] or MTH 306 [C-] or MTH 306H [C-] )

MTH 323. ^MATHEMATICAL MODELING (3). A variety of mathematical modeling techniques will be introduced. Students will formulate models in response to practical problems drawn from the literature of ecology, environmental sciences, engineering or other fields. Informal writing assignments in class and formal written presentation of the models will be required. All courses used to satisfy MTH prerequisites must be completed with C- or better. (Writing Intensive Course) PREREQS: (MTH 256 [C-] or MTH 256 H [C-] ) and MTH 341 [C-] and /or instructor approval.

MTH 333. ^FUNDAMENTAL CONCEPTS OF TOPOLOGY (3). Open and closed sets, continuity compactness, connectedness, winding number, fixed point theorems in the plane. All courses used to satisfy MTH prerequisites must be completed with C- or better. (Writing Intensive Course) PREREQS: MTH 341 [C-] or MTH 355 [C-]

## MTH 338. ^NON-EUCLIDEAN GEOMETRY

(3). Introduction to non-Euclidean geometries. Selected topics such as hyperbolic and elliptic geometry, spherical geometry, projective geometry, geometries arising from alternative metrics. All courses used to satisfy MTH prerequisites must be completed with C - or better. (Writing Intensive Course) PREREQS: MTH 252 [C-] or MTH 252H [C-]
MTH 341. LINEAR ALGEBRA I (3). Matrix
algebra, determinants, systems of linear equations, subspaces, an introductory study of eigenvalues and eigenvectors.All courses used to satisfy MTH prerequisites must be completed with C- or better PREREQS: MTH 254 [C-] or MTH 254H [C-]
MTH 342. LINEAR ALGEBRA II (4). Abstract (real or complex) vector spaces, linear transformations, inner product spaces, orthogonality, eigenspaces and diagonalization, spectral theorems, singular value decomposition. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 341 [C-]

## MTH 343. INTRODUCTION TO MODERN

ALGEBRA (3). Introduction to rings and fields with an emphasis on the integers and polynomial rings; selected applications. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 341 [C-] and MTH

355 [C-]
MTH 351. INTRODUCTION TO NUMERICAL
ANALYSIS (3). Introduction to the computation of approximate solutions to mathematical problems that cannot be solved by hand: analysis of errors; rootfinding for nonlinear equations in one variable; interpolation of functions; numerical integration. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: (MTH 253 [C-] or MTH 306 [C-] or MTH 306H [C-] ) and programming experience.
MTH 355. DISCRETE MATHEMATICS (3).
Proof analysis and development in the context of discrete mathematics for math majors transitioning to upper-division course work. Topics include elementary logic and set theory, quantifiers, basic counting principles, elementary combinatorics, equivalence relations, the binomial theorem, and mathematical induction. Additional topics may include recurrence relations, generating functions, and introductory graph theory. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 253 [C-] and MTH 341 recommended.
MTH 361. INTRODUCTION TO PROBABILITY
(3). Probability problem solving using concepts developed in calculus. Topics include probability models, discrete and continuous random variables, expectation and variance, the law of large numbers, and the central limit theorem. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 253 [C-] or MTH 306 [C-] or MTH 306H [C-]

## MTH 390. FOUNDATIONS OF ELEMENTARY

 MATHEMATICS (4). Measurement, congruence, similarity, coordinate and transformational geometry. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 212 [C-]MTH 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MTH 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
MTH 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MTH 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MTH 405. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MTH 406. PROJECTS (1-3). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MTH 407. SEMINAR (3). This course is repeatable for a maximum of 99 credits. PREREQS: Departmental approval required

MTH 410. OCCUPATIONAL INTERNSHIP
(3-12). Planned and supervised training experience at selected government, industrial, or business placement sites. Must be followed by a one-hour post-internship seminar. Consult departmental head advisor. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Junior standing in mathematics, cumulative 3.00 GPA in mathematics, head advisor/departmental approval required.
MTH 411. REAL ANALYSIS (3). Topological concepts in metric, normed, and inner-product spaces. Properties of continuous functions, including the Stone-Weierstrass theorem. Introduction to function spaces, contraction mappings, fixed points, and applications. Lebesgue measure and integration in one and several variables, basic convergence theorems, Lebesgue spaces, Fubini's theorem, and applications to Fourier transforms and probability.

All courses used to satisfy MTH 411 prerequisites must be completed with $\mathrm{B}+$ or better. PREREQS: MTH 312 [B+] and MTH 341 [B+]
MTH 412. REAL ANALYSIS (3). Topological concepts in metric, normed, and inner-product spaces. Properties of continuous functions, including the Stone-Weierstrass theorem. Introduction to function spaces, contraction mappings, fixed points, and applications Lebesgue measure and integration in one and several variables, basic convergence theorems, Lebesgue spaces, Fubini's theorem, and applications to Fourier transforms and probability. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 411 [C-] or MTH 511 [C-]
MTH 413. REAL ANALYSIS (3). Topological concepts in metric, normed, and inner-product spaces. Properties of continuous functions, including the Stone-Weierstrass theorem. Introduction to function spaces, contraction mappings, fixed points, and applications. Lebesgue measure and integration in one and several variables, basic convergence theorems, Lebesgue spaces, Fubini's theorem, and applications to Fourier transforms and probability. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 412 [C-] or MTH 512 [C-]

## MTH 420. MODELS AND METHODS OF

 APPLIED MATHEMATICS (3). Discrete and continuous mathematical models and methods for analysis, including linear analysis, equilibrium and minimum principles, calculus of variations, principal component analysis and orthogonal expansions, asymptotic and Fourier analysis, least squares, constrained and unconstrained optimization, inverse problems, and Monte Carlo techniques. Particular models and methods covered may vary annually. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: (MTH 256 [C-] or MTH 256H [C-] ) and MTH 341 [C-] and junior standing or above.MTH 427. INTRODUCTION TO MATHEMATICAL BIOLOGY (3). Modeling and mathematical analysis of biological processes using first principles at scales ranging from the molecular to the population level. Deterministic models are studied in both discrete and continuous time and analyzed using linearization principles, linear and nonlinear stability techniques, phase plane methods, and methods from partial differential equations. Results obtained from mathematical analysis will be qualitatively interpreted and applied to the biological process under investigation. All courses used to satisfy MTH prerequisites must be completed with a C - or better. PREREQS: (MTH 256 [C-] or MTH 256H [C-] ) and MTH 341 [C-]

## MTH 428. STOCHASTIC ELEMENTS IN

 MATHEMATICAL BIOLOGY (3). An introduction to stochastic modeling of biological processes. The stochastic models covered may include Markov processes in both continuous and discrete time, urn models, branching processes, and coalescent processes. The biological applications may include genetic drift, population dynamics, genealogy, demography, and epidemiology. Mathematical results will be qualitatively interpreted and applied to the biological process under investigation. PREREQS: MTH 341 [C] and (MTH 361 [C] or MTH 463 [C] or MTH 563 [C] )MTH 430. METRIC SPACES AND TOPOLOGY (3). Fundamental notions of metric space topology. Examples of Euclidean, non-Euclidean and other fundamental metric spaces including the Hilbert Cube and two-dimensional surfaces Characterization and classification results for metric spaces. Selected applications of topology, possibly including the structure of molecules and/ or networks. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 342 [C-] or MTH 355 [C-] and /or instructor approval. MTH 311 is recommended.

MTH 434. INTRODUCTION TO DIFFERENTIAL
GEOMETRY (3). Curves and surfaces in Euclidean space; geodesics; curvature; introduction to tensor algebra and differential forms; selected applications. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: (MTH 255 [C-] or MTH 255H [C-] ) and MTH 342 [C-] and (MTH 311 recommended)
MTH 435. DIFFERENTIAL GEOMETRY (3).
Differentiable 2-manifolds; curvature; geodesics; tensor algebra and the algebra of exterior differential forms with emphasis on Euclidean space; differentiation of tensors and forms; integration of forms; selected applications. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 434 [C-] or MTH 534 [C-] and /or instructor approval required.

MTH 437. GENERAL RELATIVITY (3). Geometry of special relativity. Tensor analysis, metrics, geodesics, curvature. Einstein field equations, cosmological models, black holes. Selected topics such as global structure, conserved quantities, spinors. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: (MTH 434 [C-] or MTH 534 [C-] ) and MTH 311 is recommended.
MTH 440. COMPUTATIONAL NUMBER THEORY
(3). Development of the number theory used in some basic tests of primality and methods of factoring integers. Applications to cryptology. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 231 [C-] or MTH 343 [C-] or MTH 355 [C-]
MTH 441. APPLIED AND COMPUTATIONAL
ALGEBRA (3). Applications of fundamental
algebraic systems to topics such as factorization of polynomials, finding roots of polynomials, error correcting codes. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 343 [C-] and (MTH 342 [C-] or MTH 440 [C-] or MTH 540 [C-] ) and /or instructor approval required.

MTH 442. APPLIED AND COMPUTATIONAL ALGEBRA (3). Applications of fundamental algebraic systems to topics such as factorization of polynomials, finding roots of polynomials, error correcting codes. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 441 [C-] or MTH 541 [C-] and /or instructor approval required.
MTH 443. ABSTRACT LINEAR ALGEBRA (3).
Abstract vector spaces. Linear transformations, eigenvalues and eigenvectors, the Jordan canonical form, inner product spaces. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 342 [C-] or MTH 343 [C-]

## MTH 451. NUMERICAL LINEAR ALGEBRA

(3). Computation of solutions of linear systems using direct and iterative methods; least-squares solution of overdetermined systems; computation of eigenvalues and eigenvectors. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 341 [C-] and programming experience or instructor approval required. MTH 342 and MTH 351 are recommended.

MTH 452. NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS (3).
Numerical solution of initial-value problems using Runge-Kutta methods and linear multistep methods; introduction to boundary-value problems Analysis of stability, accuracy, and implementation of methods. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: (MTH 256 [C-] or MTH 256H [C-] ) and (MTH 306 [C-] or MTH 306H [C-] or MTH 341 [C-] ) and programming experience required and junior standing required. MTH 351 or MTH 451 or MTH 551 recommended.

MTH 453. NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS (3). Numerical solution of boundary value problems and initialboundary value problems using finite difference and finite element methods. Analysis of stability, accuracy, and implementation of methods. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 452 [C-] or MTH 552 [C-] and /or instructor approval required.
MTH 463. PROBABILITY I (3). An introduction to probability theory; topics covered include: the axioms of probability, probability spaces and models, independence, random variables; densities, distributions, expectation, and variance; probability inequalities, the law of large numbers, and the binomial central limit theorem. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 312 [C-] and /or instructor approval required.
MTH 464. PROBABILITY II (3). Transformations of random variables; sums of independent random variables, generating functions, characteristic functions, the central limit theorem and other weak limit theorems. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: (MTH 463 [C-] or MTH 563 [C-] ) and MTH 341 [C-] and /or instructor approval required.
MTH 465. PROBABILITY III (3). Random variables, central limit theorem; distributions of standard statistics; Markov chains, continuous and discontinuous stochastic processes. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 464 [C-] or MTH 564 [C-] and /or instructor approval required.
MTH 467. ACTUARIAL MATHEMATICS (3). Foundations of actuarial science from the point of view of mathematical models that arise in the design and management of insurance systems. Most models will be life insurance based. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 463 [C-] or MTH 563 [C-] or ST 421 [C-] and /or instructor approval required.
MTH 480. SYSTEMS OF ORDINARY
DIFFERENTIAL EQUATIONS (3). Systems of two first-order differential equations, phase portraits, linearization and the stability of equilibria, conservative systems, reversible systems, limit cycles and the Poincare-Bendixson Theorem. Additional topics selected from Hamiltonian systems, Hopf bifurcation or Lorenz equations and chaos. MTH 480 and MTH 481 cannot both be taken for credit. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: (MTH 256 [C-] or MTH 256 H [C-] ) and MTH 341 [C-]
MTH 481. APPLIED ORDINARY DIFFERENTIAL EQUATIONS (3). Linear and nonlinear systems of ordinary differential equations, elementary stability theory, higher order equations, boundary value problems, series solution of ordinary differential equations. All courses used to satisfy MTH prerequisites must be completed with a C - or better. PREREQS: (MTH 256 [C-] or MTH 256H [C-] ) and (((MTH 253 [C-] or MTH 253H [C-]) and MTH 341 [C-] ) or (MTH 306 [C-] or MTH 306H [C-] ))

## MTH 482. APPLIED PARTIAL DIFFERENTIAL

EQUATIONS (3). Partial differential equations,
Bessel's and Legendre's equations, Fourier analysis, separation of variables, transform methods. All courses used to satisfy MTH prerequisites must be completed with a C - or better. PREREQS: MTH 480 [C-] or MTH 481 [C-] or MTH 581 [C-] and /or instructor approval required.
MTH 483. COMPLEX VARIABLES (3).
Introduction to the complex differential and integral calculus: Cauchy's theorem and formula, the residue calculus, power series and Laurent series, harmonic functions, conformal mapping, and applications. All courses used to satisfy MTH
prerequisites must be completed with a C- or better. PREREQS: (MTH 256 [C-] or MTH 256H [C-] ) and (MTH 253 [C-] or MTH 306 [C-] or MTH 306 H [C-] )

## MTH 490. INTENSIVE SUMMER RESEARCH IN

MATHEMATICS (12). Combination of seminar, lectures, and individual research projects designed to introduce students to research mathematics This course is repeatable for a maximum of 99 credits. PREREQS: Open to participants in the OSU Undergraduate Summer Research Program in Mathematics (REU program).

## MTH 491. ALGEBRA AND GEOMETRIC

TRANSFORMATIONS (3). Ordered fields, number systems (natural, integer, rational, real, and complex), fundamental theorems of arithmetic and algebra, algebraic and transcendental numbers, constructible points and numbers and the classical geometric constructions, Polya's problem solving heuristics and strategies. Intended primarily for prospective mathematics teachers. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 341 [C-]
MTH 492. ALGEBRA AND GEOMETRIC
TRANSFORMATIONS (3). Major results of Euclidean geometry, axiom systems for Euclidean geometry, dependency tree of Euclidean theorems, groups of geometric transformations with applications to symmetries of plane and solid objects, Euler's formula, tilings and tesselations, isometries and similitudes of the plane (translations, rotations, reflections, glide reflections, dilations). Intended primarily for prospective mathematics teachers. All courses used to satisfy MTH prerequisites must be completed with C- or better. PREREQS: MTH 491 [C-] or MTH 591 [C-]

## MTH 493. ALGEBRA AND GEOMETRIC

TRANSFORMATIONS (3). Geometric
transformations as real, complex, and matrix functions, invariants and genealogy of geometric transformations, extensions to transformations of the sphere and of three-dimensional space, selected applications chosen from fractals, analysis of frieze and crystallographic patterns, problem solving, groups of symmetries, computer graphics, and the use of dynamic geometry software. Intended primarily for prospective mathematics teachers. All courses used to satisfy MTH prerequisites must be completed with C - or better. PREREQS: MTH 492 [C-] or MTH 592 [C-]
MTH 499. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MTH 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MTH 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
MTH 505. READING AND CONFERENCE (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MTH 506. PROJECTS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MTH 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MTH 508. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MTH 510. OCCUPATIONAL INTERNSHIP (3-12). Planned and supervised training experience at selected government, industrial, or business placement sites. Must be followed by a one-hour post-internship seminar. Consult departmental head advisor. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MTH 511. REAL ANALYSIS (3). Topological concepts in metric, normed, and inner-product spaces. Properties of continuous functions, including the Stone-Weierstrass theorem. Introduction to function spaces, contraction mappings, fixed points, and applications Lebesgue measure and integration in one and several variables, basic convergence theorems, Lebesgue spaces, Fubini's theorem, and applications to Fourier transforms and probability. All courses used to satisfy MTH prerequisites must be completed with B+ or better. PREREQS: MTH 312 and MTH 341

MTH 512. REAL ANALYSIS (3). Topological concepts in metric, normed, and inner-product spaces. Properties of continuous functions, including the Stone-Weierstrass theorem. Introduction to function spaces, contraction mappings, fixed points, and applications. Lebesgue measure and integration in one and several variables, basic convergence theorems, Lebesgue spaces, Fubini's theorem, and applications to Fourier transforms and probability. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 411 or MTH 511
MTH 513. REAL ANALYSIS (3). Topological concepts in metric, normed, and inner-product spaces. Properties of continuous functions, including Stone-Weierstrass theorem. Introduction to function spaces, contraction mappings, fixed points, and applications. Lebesgue measure and integration in one and several variables, basic convergence theorems, Lebesgue spaces, Fubini's theorem, and applications to Fourier transforms and probability. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 412 or MTH 512
MTH 520. MODELS AND METHODS OF APPLIED MATHEMATICS (3). Discrete and continuous mathematical models and methods for analysis, including linear analysis, equilibrium and minimum principles, calculus of variations, principal component analysis and orthogonal expansions, asymptotic and Fourier analysis, least squares, constrained and unconstrained optimization, inverse problems, and Monte Carlo techniques. Particular models and methods covered may vary annually. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: (MTH 256 or MTH 256H) and MTH 341 and junior standing or above.
MTH 524. DYNAMICAL SYSTEMS THEORY AND APPLICATIONS (3). Theory, models, and problems for discrete and/or continuous dynamical systems. Depending on term, the emphasis may be toward deterministic or stochastic systems. Topics generally include stability theory, periodic behavior, and chaotic systems. Models selected from biology, economics, fluid dynamics, and electrical and mechanical systems. May be repeated once for credit with a different topic. All courses used to satisfy MTH prerequisites must be completed with C or better. This course is repeatable for a maximum of 6 credits. PREREQS: MTH 341-MTH 342, MTH 311-MTH 312, MTH 361 or consent of instructor.
MTH 525. DYNAMICAL SYSTEMS THEORY AND APPLICATIONS (3). Theory, models, and problems for discrete and/or continuous dynamical systems. Depending on term, the emphasis may be toward deterministic or stochastic systems. Topics generally include stability theory, periodic behavior, and chaotic systems. Models selected from biology, economics, fluid dynamics, and electrical and mechanical systems. May be repeated once for credit with a different topic. All courses used to satisfy MTH prerequisites must be completed with C or better. This course is repeatable for a maximum of 6 credits. PREREQS: MTH 341 and MTH 342 and MTH 311 and MTH 312 and MTH 361 or consent of instructor.
MTH 527. INTRODUCTION TO MATHEMATICAL BIOLOGY (3). Modeling and mathematical analysis of biological processes using first
principles at scales ranging from the molecular to the population level. Deterministic models are studied in both discrete and continuous time and analyzed using linearization principles, linear and nonlinear stability techniques, phase plane methods, and methods from partial differential equations. Results obtained from mathematical analysis will be qualitatively interpreted and applied to the biological process under investigation. All courses used to satisfy MTH prerequisites must be completed with a C or better. PREREQS: (MTH 256 or MTH 256H) and MTH 341

## MTH 528. STOCHASTIC ELEMENTS IN

MATHEMATICAL BIOLOGY (3). An introduction to stochastic modeling of biological processes. The stochastic models covered may include Markov processes in both continuous and discrete time, urn models, branching processes, and coalescent processes. The biological applications may include genetic drift, population dynamics, genealogy, demography, and epidemiology. Mathematical results will be qualitatively interpreted and applied to the biological process under investigation. All courses used to satisfy MTH prerequisites must be completed with a C or better. PREREQS: MTH 341 and (MTH 361 or MTH 463 or MTH 563)

## MTH 531. GENERAL TOPOLOGY AND

 FUNDAMENTAL GROUPS (3). Topological spaces and maps. Separation axioms, compactness, convergence, extension theorems, metrizability and compactification. Product spaces and simplicial complexes. Definition and basic properties of the fundamental group functor, with applications to the theory of covering spaces. Selected topics from dimension theory, manifold theory, and other areas of topology. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 531 and MTH 532 must be taken in order.MTH 532. GENERAL TOPOLOGY AND FUNDAMENTAL GROUPS (3). Topological spaces and maps. Separation axioms, compactness, convergence, extension theorems, metrizability and compactification. Product spaces and simplicial complexes. Definition and basic properties of the fundamental group functor, with applications to the theory of covering spaces Selected topics from dimension theory, manifold theory, and other areas of topology. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 531 and MTH 532 must be taken in order.

MTH 534. INTRODUCTION TO DIFFERENTIAL
GEOMETRY (3). Curves and surfaces in Euclidean space; geodesics; curvature; introduction to tensor algebra and differential forms; selected applications. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: (MTH 255 or MTH 255H) and MTH 342 and (MTH 311 recommended)
MTH 535. DIFFERENTIAL GEOMETRY (3). Differentiable 2-manifolds; curvature; geodesics; tensor algebra and the algebra of exterior differential forms with emphasis on Euclidean space; differentiation of tensors and forms; integration of forms; selected applications. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: (MTH 434 or MTH 534) or instructor approval required.

MTH 537. GENERAL RELATIVITY (3). Geometry of special relativity. Tensor analysis, metrics, geodesics, curvature. Einstein field equations, cosmological models, black holes. Selected topics such as global structure, conserved quantities, spinors. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 434 [C] or MTH 534 [C] and MTH 311 is recommended.
MTH 540. COMPUTATIONAL NUMBER THEORY (3). Development of the number theory used in some basic tests of primality and methods of factoring integers. Applications to cryptology. All courses used to satisfy MTH prerequisites must
be completed with C or better. PREREQS: MTH 231 or MTH 343 or MTH 355

## MTH 541. APPLIED AND COMPUTATIONAL

ALGEBRA (3). Applications of fundamental algebraic systems to topics such as factorization of polynomials, finding roots of polynomials, error correcting codes. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 343 and (MTH 342 or MTH 440 or MTH 540) or instructor approval required.
MTH 542. APPLIED AND COMPUTATIONAL
ALGEBRA (3). Applications of fundamental algebraic systems to topics such as factorization of polynomials, finding roots of polynomials, error correcting codes. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: (MTH 441 or MTH 541) or instructor approval required.
MTH 543. ABSTRACT LINEAR ALGEBRA (3). Abstract vector spaces. Linear transformations, eigenvalues and eigenvectors, the Jordan canonical form, inner product spaces. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 342 and MTH 343
MTH 551. NUMERICAL LINEAR ALGEBRA
(3). Computation of solutions of linear systems using direct and iterative methods; least-squares solution of overdetermined systems; computation of eigenvalues and eigenvectors. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 341 and programming experience or instructor approval required. MTH 342 and MTH 351 are recommended.

## MTH 552. NUMERICAL SOLUTION OF

ORDINARY DIFFERENTIAL EQUATIONS (3).
Numerical solution of initial-value problems using Runge-Kutta methods and linear multistep methods; introduction to boundary-value problems Analysis of stability, accuracy, and implementation of methods. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: (MTH 256 or MTH 256H) and (MTH 306 or MTH 306H or MTH 341) and programming experience required and junior standing required. MTH 351 or MTH 451 or MTH 551 recommended.
MTH 553. NUMERICAL SOLUTION OF PARTIAL DIFFERENTIAL EQUATIONS (3). Numerical solution of boundary value problems and initialboundary value problems using finite difference and finite element methods. Analysis of stability, accuracy, and implementation of methods. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: (MTH 452 or MTH 552) or instructor approval required.
MTH 563. PROBABILITY I (3). An introduction to probability theory; topics covered include: the axioms of probability, probability spaces and models, independence, random variables; densities, distributions, expectation, and variance; probability inequalities, the law of large numbers, and the binomial central limit theorem. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 312 or instructor approval required.
MTH 564. PROBABILITY II (3). Transformations of random variables; sums of independent random variables, generating functions, characteristic functions, the central limit theorem and other weak limit theorems. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: (MTH 463 or MTH 563) and MTH 341 or instructor approval required.
MTH 565. PROBABILITY III (3). Random variables, central limit theorem; distributions of standard statistics; Markov chains, continuous and discontinuous stochastic processes. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: (MTH 464 or MTH 564) or instructor approval required.
MTH 567. ACTUARIAL MATHEMATICS (3).
Foundations of actuarial science from the point
of view of mathematical models that arise in the design and management of insurance systems. Most models will be life insurance based. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: (MTH 463 or MTH 563) or ST 421.

## MTH 574. NUMBER SYSTEMS AND

OPERATIONS IN K-8 MATHEMATICS (3).
Key ideas and topics in number systems, operations, place value, and algorithms critical for the mathematics content knowledge of elementary teachers in grades K-8. Based on the recommendations of The Mathematical Education of Teachers by the Conference Board of the Mathematical Sciences. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 390 or instructor approval required.
MTH 575. COMPARING GEOMETRIES IN
K-8 MATHEMATICS (3). Key ideas and topics in Euclidean and non-Euclidean geometries critical for the mathematics content knowledge of elementary teachers in grades K-8. Based on the recommendations of The Mathematical Education of Teachers by the Conference Board of the Mathematical Sciences. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 390 or instructor approval required.
MTH 576. ALGEBRA AND FUNCTION IN
K-8 MATHEMATICS (3). Key ideas and topics in algebra and function concepts critical for the mathematics content knowledge of elementary teachers in grades K-8. Based on the recommendations of The Mathematical Education of Teachers by the Conference Board of the Mathematical Sciences. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 390 or instructor approval required.
MTH 578. PROBABILITY AND DATA ANALYSIS IN K-8 MATHEMATICS (3). Key ideas and topics in probability, data analysis, and statistics critical for the mathematics content knowledge of elementary teachers in grades K-8. Based on the recommendations of The Mathematical Education of Teachers by the Conference Board of the Mathematical Sciences. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 390 or instructor approval required.
MTH 581. APPLIED ORDINARY DIFFERENTIAL EQUATIONS (3). Linear and nonlinear systems of ordinary differential equations, elementary stability theory, higher order equations, boundary value problems, series solution of ordinary differential equations. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: (MTH 256 or MTH 256H) and (((MTH 253 or MTH 253H) and MTH 341) or (MTH 306 or MTH 306H))
MTH 582. APPLIED PARTIAL DIFFERENTIAL
EQUATIONS (3). Partial differential equations, Bessel's and Legendre's equations, Fourier analysis, separation of variables, transform methods. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 480 or MTH 481 or MTH 581 or instructor approval required.
MTH 583. COMPLEX VARIABLES (3).
Introduction to the complex differential and integral calculus: Cuachy's theorem and formula, the residue calculus, power series and Laurent series, harmonic functions, conformal mapping, and applications. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: (MTH 256 or MTH 256H) and (MTH 253 or MTH 306 or MTH 306H)

## MTH 590. TOPICS IN SECONDARY

MATHEMATICS (3). Key ideas and topics in discrete mathematics critical for the mathematics content knowledge of middle and high school teachers in grades 6-12. Based on the recommendations of The Mathematical Education
of Teachers by the Conference Board of the Mathematical Sciences. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 390 or instructor approval required.

## MTH 591. ALGEBRA AND GEOMETRIC

TRANSFORMATIONS (3). Ordered fields, number systems (natural, integer, rational, real, and complex), fundamental theorems of arithmetic and algebra, algebraic and transcendental numbers, constructible points and numbers and the classical geometric constructions, Polya's problem solving heuristics and strategies. Intended primarily for prospective mathematics teachers. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 341

## MTH 592. ALGEBRA AND GEOMETRIC

TRANSFORMATIONS (3). Major results of Euclidean geometry, axiom systems for Euclidean geometry, dependency tree of Euclidean theorems, groups of geometric transformations with applications to symmetries of plane and solid objects, Euler's formula, tilings and tesselations, isometries and similitudes of the plane (translations, rotations, reflections, glide reflections, dilations). Intended primarily for prospective mathematics teachers. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 491 or MTH 591
MTH 593. ALGEBRA AND GEOMETRIC TRANSFORMATIONS (3). Geometric transformations as real, complex, and matrix functions, invariants and genealogy of geometric transformations, extensions to transformations of the sphere and of three-dimensional space, selected applications chosen from fractals, analysis of frieze and crystallographic patterns, problem solving, groups of symmetries, computer graphics, and the use of dynamic geometry software. Intended primarily for prospective mathematics teachers. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 492 or MTH 592

## MTH 594. NUMBER SYSTEMS AND

OPERATIONS IN SECONDARY MATHEMATICS
(3). Key ideas and topics in number systems, operations, place value, and algorithms critical for the mathematics content knowledge of middle and high school teachers in grades 6-12. Based on the recommendations of The Mathematical Education of Teachers by the Conference Board of the Mathematical Sciences. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 390 or instructor approval required.
MTH 595. COMPARING GEOMETRIES IN SECONDARY MATHEMATICS (3). Key ideas and topics in Euclidean and non-Euclidean geometries critical for the mathematics content knowledge of middle and high school teachers in grades 6-12. Based on the recommendations of The Mathematical Education of Teachers by the Conference Board of the Mathematical Sciences. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 390 or instructor approval required.
MTH 596. ALGEBRA AND FUNCTION IN SECONDARY MATHEMATICS (3). Key ideas and topics in algebra and function concepts critical for the mathematics content knowledge of middle and high school teachers in grades 6-12. Based on the recommendations of The Mathematical Education of Teachers by the Conference Board of the Mathematical Sciences. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 390 or instructor approval required.
MTH 598. PROBABILITY AND DATA ANALYSIS IN SECONDARY MATHEMATICS (3). Key ideas and topics in probability, data analysis, and statistics critical for the mathematics content knowledge of middle and high school teachers in grades 6-12. Based on the recommendations of

The Mathematical Education of Teachers by the Conference Board of the Mathematical Sciences. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 390 or instructor approval required.
MTH 599. SPECIAL TOPICS (0-16). Topics may vary. This course is repeatable for a maximum of 18 credits. PREREQS: Instructor approval required.

MTH 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MTH 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
MTH 605. READING AND CONFERENCE (116). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MTH 606. SPECIAL PROJECTS (1-16). Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MTH 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MTH 611. COMPLEX ANALYSIS (3). Basic theory of analytic functions of a complex variable, including Cauchy's theorem, residue theorem, analytic continuation, conformal mappings, entire, and meromorphic functions. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: (MTH 411 or MTH 511). MTH 611 and MTH 612 must be taken in order.

MTH 612. COMPLEX ANALYSIS (3). Basic
theory of analytic functions of a complex variable, including Cauchy's theorem, residue theorem, analytic continuation, conformal mappings, entire, and meromorphic functions. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 611

## MTH 614. FUNCTIONAL ANALYSIS (3).

Topological vector spaces, generalized functions, operator theory. Normally offered alternate years. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 513

MTH 619. TOPICS IN ANALYSIS (1-12). This course is repeatable for a maximum of 12 credits.

## MTH 621. PARTIAL DIFFERENTIAL

EQUATIONS (3). Partial differential equations of physics, including those of potential theory, wave propagation, and heat flow, treated by classical means, generalized functions and variational principles. Square summable function methods and integral equations. This course is the first in a year-long sequence of MTH 621, MTH 622, MTH 623. All courses used to satisfy MTH prerequisites must be completed with C or better. This course is repeatable for a maximum of 6 credits. PREREQS: 6 credits of senior-level analysis or instructor consent. MTH 621, MTH 622, MTH 623 must be taken in order.

## MTH 622. PARTIAL DIFFERENTIAL

EQUATIONS (3). Partial differential equations of physics, including those of potential theory, wave propagation, and heat flow, treated by classical means, generalized functions and variational principles. Square summable function methods and integral equations. This course is the first in a year-long sequence of MTH 621, MTH 622, MTH 623. All courses used to satisfy MTH prerequisites must be completed with C or better. This course is repeatable for a maximum of 6 credits. PREREQS: MTH 621 [C] and /or instructor consent.

## MTH 623. PARTIAL DIFFERENTIAL

EQUATIONS (3). Partial differential equations of physics, including those of potential theory, wave propagation, and heat flow, treated by classical means, generalized functions and variational principles. Square summable function methods
and integral equations. This course is the third one in year-long sequence. All courses used to satisfy MTH prerequisites must be completed with C or better. This course is repeatable for a maximum of 6 credits. PREREQS: MTH 621 [C] and MTH 622 [C] and /or instructor consent.
MTH 627. ADVANCED PARTIAL DIFFERENTIAL
EQUATIONS (3). Advanced theory including existence proofs and distributional approach Normally offered fall term in odd years. All courses used to satisfy MTH prerequisites must be completed with C or better. This course is repeatable for a maximum of 6 credits. PREREQS: MTH 413 or MTH 513 or instructor consent.

MTH 628. ADVANCED PARTIAL DIFFERENTIAL EQUATIONS (3). Advanced theory including existence proofs and distributional approach. Normally offered winter term in even years. All courses used to satisfy MTH prerequisites must be completed with C or better. This course is repeatable for a maximum of 6 credits. PREREQS: MTH 627 or consent of instructor.

MTH 634. ALGEBRAIC TOPOLOGY (3).
Simplicial and singular homology, products, and cohomology; applications to fixed-point and separation theorems. Topics selected from homotopy, manifold and obstruction theory. Normally offered alternate years. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 532. MTH 634, MTH 635, MTH 636 must be taken in order.
MTH 635. ALGEBRAIC TOPOLOGY (3).
Simplicial and singular homology, products, and cohomology; applications to fixed-point and separation theorems. Topics selected from homotopy, manifold and obstruction theory. Normally offered alternate years. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 532 and MTH 634
MTH 636. ALGEBRAIC TOPOLOGY (3).
Simplicial and singular homology, products, and cohomology; applications to fixed-point and separation theorems. Topics selected from homotopy, manifold and obstruction theory. Normally offered alternate years. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 532 and MTH 635
MTH 644. ABSTRACT ALGEBRA I (3). Group theory, rings and fields, Galois theory. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: Graduate standing in mathematics or a related field, or instructor approval required. MTH 443 or MTH 543 is recommended.
MTH 645. ABSTRACT ALGEBRA II (3).
Group theory, rings and fields, Galois theory. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: Graduate standing in mathematics or a related field, or instructor approval required. MTH 644 is recommended.
MTH 649. TOPICS IN ALGEBRA AND NUMBER
THEORY (3). This course is repeatable for a maximum of 27 credits.

MTH 654. NUMERICAL ANALYSIS (3). Advanced topics in numerical analysis, such as finite volume methods and finite element methods for partial differential equations, numerical methods for inverse problems, and image processing. All courses used to satisfy MTH prerequisites must be completed with C or better. This course is repeatable for a maximum of 12 credits. PREREQS: Familiarity with numerical methods and graduate standing, or instructor's consent. Course-specific prerequisites may be announced.

MTH 655. NUMERICAL ANALYSIS (3). Advanced topics in numerical analysis, such as finite volume methods and finite element methods for partial differential equations, numerical methods for inverse problems, and image processing. All courses used to satisfy MTH prerequisites
must be completed with C or better. This course is repeatable for a maximum of 12 credits. PREREQS: Familiarity with numerical methods and graduate standing, or instructor's consent. Course-specific prerequisites may be announced.
MTH 656. NUMERICAL ANALYSIS (3). Advanced topics in numerical analysis, such as finite volume methods and finite element methods for partial differential equations, numerical methods for inverse problems, and image processing. All courses used to satisfy MTH prerequisites must be completed with C or better. This course is repeatable for a maximum of 12 credits. PREREQS: Familiarity with numerical methods and graduate standing, or instructor's consent. Course-specific prerequisites may be announced.
MTH 657. TOPICS IN APPLIED MATHEMATICS
(1-12). Previous topics have included turbulence, financial mathematics and probability methods in partial differential equations. This course is repeatable for a maximum of 12 credits.

## MTH 658. TOPICS IN MATHEMATICAL

MODELING (1-12). Mathematical treatment of topics of current interest in the physical and biological sciences and technology. May be repeated for credit when topic varies. This course is repeatable for a maximum of 12 credits. PREREQS: Instructor approval required.

MTH 659. TOPICS IN NUMERICAL ANALYSIS (1-12). This course is repeatable for a maximum of 12 credits.
MTH 664. PROBABILITY THEORY (3).
General theory of probability measures and random variables, including weak convergence, characteristic functions, central limit theory, conditional expectations, martingales. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 411 or MTH 511 or equivalent.
MTH 665. PROBABILITY THEORY (3).
General theory of probability measures and random variables, including weak convergence, characteristic functions, the central limit theorem and the Brownian motion process. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 664
MTH 669. TOPICS IN STOCHASTIC
PROCESSES (1-12). Previous topics have included Markov processes, martingales, branching processes, and stochastic differential equations. This course is repeatable for a maximum of 12 credits.
MTH 674. DIFFERENTIAL GEOMETRY OF MANIFOLDS (3). Differentiable manifolds, tangent bundles, vector fields and flows, submanifolds, Riemannian metrics, differential forms, integration on manifolds. Selected topics such as foliations, Lie groups, and de Rham cohomology. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 341 and (MTH 411 or MTH 511). MTH 674 or MTH 675 must be taken in order.

## MTH 675. DIFFERENTIAL GEOMETRY OF

 MANIFOLDS (3). Differentiable manifolds, connections in linear bundles, Riemannian manifolds and submanifolds. Selected topics such as variational theory of geodesics, harmonic forms, and characteristic classes. Normally offered alternate years. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 674MTH 676. TOPICS IN TOPOLOGY (3). This course is repeatable for a maximum of 27 credits.
MTH 679. TOPICS IN GEOMETRY (1-12). This course is repeatable for a maximum of 12 credits.

## MTH 680. MODERN APPROACHES TO

CALCULUS (3). Alternative approaches to calculus instruction based on the availability of computers and calculators. Applications of symbolic-graphical calculators, spreadsheets, symbolic algebra systems, and graphics packages to the teaching of calculus. All courses used to
satisfy MTH prerequisites must be completed with C or better. PREREQS: MTH 253 and instructor approval required.

## MTH 682. TEACHING AND LEARNING

PROBABILITY AND STATISTICS (3).
Experimental, activity-based approaches to introductory probability and statistics are explored. Topics include computer simulations, exploratory data analysis, misuses of statistics, and misconceptions of probability. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: Instructor approval required.

MTH 684. COMPUTERS AND MATHEMATICS
(3). A variety of mathematical problems are investigated with a laboratory approach using microcomputers and a wide variety of software. Problems may be taken from number theory, calculus, geometry, probability, and elementary numerical analysis. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: Ability to program in either BASIC or PASCAL and instructor approval required.
MTH 685. ADVANCED PROBLEM SOLVING (3).
Mathematical problem solving using the heuristic approach of George Polya. Problems may be taken from a variety of areas, including number theory, calculus, geometry, probability, abstract and linear algebra. All courses used to satisfy MTH prerequisites must be completed with C or better. PREREQS: Instructor approval required.

MTH 689. TOPICS IN MATHEMATICS EDUCATION (1-12). Topics may vary. This course is repeatable for a maximum of 12 credits.
MTH 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## PHYSICS

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## FACULTY

Professors Jansen, Lee, Manogue, McIntyre, Schellman, Tate
Associate Professors Giebultowicz, Lazzati, Minot, Ostroverkhova, Roundy, Schneider
Assistant Professors Gire, Graham, Qiu, Sun
Instructor Bannon, Coffin, Hadley, Ketter, Milstein, Walsh

## ADJUNCT FACULTY

Herman, Keszler, Kornilovich

## Undergraduate Major

Physics (BA, BS, CRED, HBA, HBS)

## Options

Applied Physics
Biological Physics
Chemical Physics
Computational Physics
Geophysics
Mathematical Physics
Optical Physics
Physics Teaching/Physics

## Minor

Physics

## Graduate Majors

Applied Physics (MS, PSM) [To be terminated pending approval.]
Physics (MA, MAIS, MS, PhD)
Graduate Areas of Concentration
Atomic Physics
Computational Physics
Nuclear Physics
Optical Physics
Particle Physics
Physics Education
Solid State Physics
Relativity

## Graduate Minor

Physics
Physics is the study of the fundamental structure of matter and the interactions of its constituents. Physicists are concerned with the development of concepts needed for a precise description of nature and with experiments to test such concepts.

For students of science and engineering, the study of physics provides the basic foundation needed to understand the
complex workings of the material world, from the forces that build atoms to those that build bridges. For students of the liberal arts, the study of physics provides an introduction to modern ideas about the most fundamental and elemental aspects of nature and how those ideas developed in their cultural and historical context. Physics is a basic and indispensable tool in all technical fields, and its development figures prominently in any discussion of the intellectual history of our civilization.

## UNDERGRADUATE DEGREE PROGRAMS

The department offers several programs leading to degrees in physics. A basic physics curriculum in the College of Science stresses the detailed and advanced preparation needed for graduate work or employment in physics.
Options are available within the physics degree program that prepare students for graduate work or employment in an allied field, such as applied physics, biophysics, chemical physics, geophysics, mathematical physics, optical physics, and physics teaching.

Other programs are offered that train students for careers in physics teaching. A Physics minor is available for students majoring in other areas of science and engineering.

The Department of Physics offers the upper-division curriculum, Paradigms in Physics. Many of the junior-year courses are taught in 2 -credit intensive modules, meeting seven hours a week for about three weeks.

## GRADUATE DEGREES

Graduate programs leading to the MA, MS, and PhD are offered, emphasizing theoretical or experimental studies in the areas of atomic physics, computational physics, nuclear physics, optical physics, particle physics, and solid state physics. The MS degree has both thesis and nonthesis options. Comprehensive written and oral examinations must be passed before the student can become a candidate for an advanced degree.

## CAREERS

A multitude of opportunities exists for students who complete undergraduate degrees in physics. They include employment in technological industries, including electronics, computers, optics, materials science, and aerospace; graduate study leading to an advanced degree in physics or a related area such as mathematics, Earth sciences, computer science, engineering, or astronomy; and degree programs leading to professions such as law or medicine, with specialties in areas in which a physics background is essential.

## PREPARATION

Recommended high school preparation for students who plan to major in physics includes one year each of chemistry and physics and four years of mathematics through analytic geometry. Mathematics preparation is especially important; students who are not ready to start calculus (MTH 251, *Differential Calculus) upon entering may be delayed in their progress toward a degree. Students anticipating transfer to OSU from another institution are encouraged to contact the Department of Physics as early as possible to discuss their placement in the course curricula.

## ADVISING

Each undergraduate student is assigned an advisor who helps select the most appropriate degree program and assists in planning the curriculum. Minor variations in the requirements for degrees are possible, but must be discussed with the advisor and approved at an early stage in curriculum planning. Near the end of the degree program, the advisor can help the student to apply for employment or admission to graduate programs.

## OPTIONS

Students desiring to combine the study of physics with that of another related subject should consider the options below, or should consult with a Department of Physics advisor about substituting upper-division work in a related field for certain of the upper-division physics requirements. All such substitutions must constitute a coherent program in related areas and must be approved in advance by the Department of Physics. In each case, the program must include at least 3 credits of PH 403, ^Thesis, to satisfy the university's writing intensive course (WIC) requirements.

## ASTRONOMY

The Department of Physics offers an introductory course, PH 104, *Descriptive Astronomy. Three online courses (PH 205, PH 206, PH 207) and several on-campus special topics courses also are offered. Students who desire careers in astronomy can design a curriculum under the Geophysics option, which includes related course work in geology and in atmospheric sciences. This curriculum would qualify the student for graduate work in astronomy.

## GRADUATION REQUIREMENTS

All undergraduate students must satisfy the university requirements for graduation (see the description of the OSU Baccalaureate Core in this catalog) and the college requirements (see the description in the College of Science section).

Grades of C- or better must be attained in all courses required for the Physics
major. Courses in which a lower grade is received must be repeated until a satisfactory grade is received.

## PHYSICS

(BA, BS, CRED, HBA, HBS)

## Required Courses

All physics majors must complete the following courses:
CH 231, CH 232, CH 233. *General Chemistry ( $4,4,4$ )
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233 (1,1,1)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4) or MTH 306. Matrix and Power Series Methods (4)
MTH 254. Vector Calculus I (4)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4)
MTH 341. Linear Algebra I (3)
PH 211, PH 212, PH 213. *General Physics with Calculus (4,4,4)
and PH 221, PH 222, PH 223. Recitations for PH 211, PH 212, PH 213 (1,1,1)
PH 315. Physics of Contemporary
Challenges (3)
PH 335. Techniques of Theoretical Mechanics (3)
PH 365, PH 356, PH 357. Computational Physics Lab $(1,1,1)$
PH 411. Electronics (3)
PH 422. Paradigms in Physics: Static Fields (3)

PH 423. Paradigms in Physics: Energy and Entropy (3)
PH 424. Paradigms in Physics: Oscillations and Waves (3)
PH 425. Paradigms in Physics: Quantum Fundamentals (3)
PH 426. Paradigms in Physics: Central Forces (3)
PH 427. Paradigms in Physics: Periodic Systems (3)
PH 401. Research (3)
PH 403. ^Thesis (3)

## Bachelor of Science in Physics

For graduation with a Bachelor of Science degree in Physics under the basic physics option, additional course requirements consist of:
PH 415. Computer Interfacing and Instrumentation (3)
or PH 464. Scientific Computing II (3)
PH 431. Capstones in Physics:
Electromagnetism (3)
PH 441. Capstones in Physics: Thermal and Statistical Physics (3)
PH 451. Capstones in Physics: Quantum Mechanics (3)
PH 481. Physical Optics (4)
And at least 6 additional credits chosen from among the non-blanket Physics courses at the 400 -level or beyond, or related courses in another department with the approval of the head undergraduate advisor.

## Bachelor of Arts in Physics

To graduate with a Bachelor of Arts degree
in Physics, additional course requirements consist of:

## Two courses chosen from:

PH 431. Capstones in Physics: Electromagnetism (3)
PH 441. Capstones in Physics: Thermal and Statistical Physics (3)
PH 451. Capstones in Physics: Quantum Mechanics (3)
In addition, the student must complete 9 credits of approved electives in the College of Liberal Arts and must complete or demonstrate proficiency in the second year of a foreign language.

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Major Code: 590

## OPTIONS

## APPLIED PHYSICS OPTION

## Math (27)

MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4) or MTH 306. Matrix and Power Series Methods (4)
MTH 254. Vector Calculus I (4)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4)
MTH 341. Linear Algebra I (3)
Chemistry (15)
CH 231, CH 232, CH 233. *General
Chemistry (4,4,4)
and CH 261 , CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
(1,1,1)
Physics Core (45)
PH 211, PH 212, PH 213. *General Physics with Calculus ( $4,4,4$ )
and PH 221, PH 222, PH 223. Recitation
for Physics 211, 212, 213 (1,1,1)
PH 315. Physics of Contemporary
Challenges (3)
PH 335. Techniques of Theoretical
Mechanics (3)
PH 365, PH 366, PH 367. Computational Physics Lab $(1,1,1)$
PH 411. Electronics (3)
PH 422. Paradigms in Physics: Static Fields (3)
PH 423. Paradigms in Physics: Energy and Entropy (3)
PH 424. Paradigms in Physics: Oscillations and Waves (3)
PH 425. Paradigms in Physics: Quantum Fundamentals (3)
PH 426. Paradigms in Physics: Central Forces (3)
PH 427. Paradigms in Physics: Periodic Systems (3)

## Senior-level Physics (15)

PH 401. Research (3)
PH 403. ^Thesis (3)
Select two courses chosen from:
PH 431. Capstones in Physics:
Electromagnetism (3)
PH 441. Capstones in Physics: Thermal and Statistical Physics (3)
PH 451. Capstones in Physics: Quantum Mechanics (3)

## Applied Physics Electives (15)

Plus 15 credits of approved upper-division courses in physics or engineering at the 400 level or beyond, including at least one laboratory course, which form a coherent set. At least 8 of these credits must be in engineering.

## Total=117

Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Option Code: 589

## BIOLOGICAL PHYSICS OPTION

The Biological Physics option allows students to focus part of their course load on work in the field of biophysics.

## Math (27)

MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4) or MTH 306. Matrix and Power Series Methods (4)
MTH 254. Vector Calculus I (4)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4)
MTH 341. Linear Algebra I (3)

## Chemistry (15)

CH 231, CH 232, CH 233. *General Chemistry $(4,4,4)$
and CH 261 , CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
(1,1,1)

## Physics Core (45)

PH 211, PH 212, PH 213. *General Physics with Calculus (4,4,4)
and PH 221, PH 222, PH 223. Recitation
for Physics 211, 212, 213 (1,1,1)
PH 315. Physics of Contemporary Challenges (3)
PH 335. Techniques of Theoretical Mechanics (3)
PH 365, PH 366, PH 367. Computational Physics Lab (1,1,1)
PH 411. Electronics (3)
PH 422. Paradigms in Physics: Static Fields (3)

PH 423. Paradigms in Physics: Energy and Entropy (3)
PH 424. Paradigms in Physics: Oscillations and Waves (3)
PH 425. Paradigms in Physics: Quantum Fundamentals (3)
PH 426. Paradigms in Physics: Central Forces (3)
PH 427. Paradigms in Physics: Periodic Systems (3)

## Senior-level Physics (15)

PH 401. Research (3)
PH 403. ^Thesis (3)

## Select two courses chosen from:

PH 431. Capstones in Physics:
Electromagnetism (3)
PH 441. Capstones in Physics: Thermal and Statistical Physics (3)
PH 451. Capstones in Physics: Quantum Mechanics (3)

## Biological Physics Electives (15)

Plus 15 credits of approved upper-division courses in physics or biological sci-
ence at the 400 level or beyond, including at least one laboratory course, which form a coherent set. At least 8 of these credits must be in biological science.
Total=117

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 586


## CHEMICAL PHYSICS OPTION

Math (27)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4)
or MTH 306. Matrix and Power Series Methods (4)
MTH 254. Vector Calculus I (4)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4)
MTH 341. Linear Algebra I (3)
Chemistry (15)
CH 231, CH 232, CH 233. *General
Chemistry ( $4,4,4$ )
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233 (1,1,1)

## Physics Core (45)

PH 211, PH 212, PH 213. *General Physics with Calculus ( $4,4,4$ )
and PH 221, PH 222, PH 223. Recitation for Physics 211, 212, 213 (1,1,1)
PH 315. Physics of Contemporary Challenges (3)
PH 335. Techniques of Theoretical Mechanics (3)
PH 365, PH 366, PH 367. Computational Physics Lab (1,1,1)
PH 411. Electronics (3)
PH 422. Paradigms in Physics: Static Fields (3)

PH 423. Paradigms in Physics: Energy and Entropy (3)
PH 424. Paradigms in Physics: Oscillations and Waves (3)
PH 425. Paradigms in Physics: Quantum Fundamentals (3)
PH 426. Paradigms in Physics: Central Forces (3)
PH 427. Paradigms in Physics: Periodic Systems (3)

## Senior-level Physics (15)

PH 401. Research (3)
PH 403. ^Thesis (3)
Select two courses chosen from:
PH 431. Capstones in Physics:
Electromagnetism (3)
PH 441. Capstones in Physics: Thermal and Statistical Physics (3)
PH 451. Capstones in Physics: Quantum Mechanics (3)

## Chemical Physics Electives (15)

Plus 15 credits of approved upperdivision courses in physics or chemistry at the 400 level or beyond, including at least one laboratory course, which form a coherent set. At least 8 of these credits must be in chemistry.

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 588


## COMPUTATIONAL PHYSICS <br> OPTION

Math (27)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4) or MTH 306. Matrix and Power Series Methods (4)
MTH 254. Vector Calculus I (4)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4)
MTH 341. Linear Algebra I (3)
Chemistry (15)
CH 231, CH 232, CH 233. *General
Chemistry $(4,4,4)$
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
(1,1,1)

## Physics Core (45)

PH 211, PH 212, PH 213. *General Physics with Calculus $(4,4,4)$
and PH 221, PH 222, PH 223. Recitation
for Physics 211, 212, 213 (1,1,1)
PH 315. Physics of Contemporary
Challenges (3)
PH 335. Techniques of Theoretical
Mechanics (3)
PH 365, PH 366, PH 367. Computational Physics Lab I,II,III ( $1,1,1$ )
PH 411. Electronics (3)
PH 425. Paradigms in Physics: Quantum Fundamentals (3)
PH 423. Paradigms in Physics: Energy and Entropy (3)
PH 424. Paradigms in Physics: Oscillations and Waves (3)
PH 427. Paradigms in Physics: Periodic Systems (3)
PH 422. Paradigms in Physics: Static Fields (3)

PH 426. Paradigms in Physics: Central Forces (3)

## Senior-level Physics (12)

PH 401. Research (3)
PH 403. ^Thesis (3)
Two courses chosen from:
PH 431. Capstones in Physics:
Electromagnetism (3)
PH 441. Capstones in Physics: Thermal and Statistical Physics (3)
PH 451. Capstones in Physics: Quantum Mechanics (3)

## Computational Physics Electives

## (15)

Plus 15 credits of approved upperdivision courses in physics or computational science at the 400 level or beyond, including at least one laboratory course, which form a coherent set. At least 8 of these credits must be in computational science.

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 592


## GEOPHYSICS OPTION

## Math (27)

MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4) or MTH 306. Matrix and Power Series Methods (4)
MTH 254. Vector Calculus I (4)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4)
MTH 341. Linear Algebra I (3)

## Chemistry (15)

CH 231, CH 232, CH 233. *General Chemistry (4,4,4)
and CH 261 , CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233

## (1,1,1)

Physics Core (45)
PH 211, PH 212, PH 213. *General Physics with Calculus (4,4,4)
and PH 221, PH 222, PH 223. Recitation
for Physics 211, 212, 213 (1,1,1)
PH 315. Physics of Contemporary
Challenges (3)
PH 335. Techniques of Theoretical Mechanics (3)
PH 365, PH 366, PH 367. Computational Physics Lab $(1,1,1)$
PH 411. Electronics (3)
PH 422. Paradigms in Physics: Static Fields (3)

PH 423. Paradigms in Physics: Energy and Entropy (3)
PH 424. Paradigms in Physics: Oscillations and Waves (3)
PH 425. Paradigms in Physics: Quantum Fundamentals (3)
PH 426. Paradigms in Physics: Central Forces (3)
PH 427. Paradigms in Physics: Periodic Systems (3)

## Senior-level Physics (15)

PH 401. Research (3)
PH 403. ${ }^{\wedge}$ Thesis (3)

## Select two courses chosen from:

PH 431. Capstones in Physics:
Electromagnetism (3)
PH 435. Capstones in Physics: Classical Mechanics (3)
PH 451. Capstones in Physics: Quantum Mechanics (3)

## Geophysics Electives (15)

Plus 15 credits of approved upper-division courses in physics or earth science at the 400 level or beyond, including at least one laboratory course, which form a coherent set. At least 8 of these credits must be in earth science.

## Total=117

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Option Code: 593


## MATHEMATICAL PHYSICS OPTION

Math (27)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4)
or MTH 306. Matrix and Power Series
Methods (4)
MTH 254. Vector Calculus I (4)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4)
MTH 341. Linear Algebra I (3)

## Chemistry (15)

CH 231, CH 232, CH 233. *General Chemistry ( $4,4,4$ )
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233 (1,1,1)

## Physics Core (45)

PH 211, PH 212, PH 213. *General Physics with Calculus (4,4,4)
and PH 221, PH 222, PH 223. Recitation
for Physics 211, 212, 213 (1,1,1)
PH 315. Physics of Contemporary
Challenges (3)
PH 335. Techniques of Theoretical Mechanics (3)
PH 365, PH 366, PH 367. Computational Physics Lab (1,1,1)
PH 411. Electronics (3)
PH 422. Paradigms in Physics: Static Fields (3)

PH 423. Paradigms in Physics: Energy and Entropy (3)
PH 424. Paradigms in Physics: Oscillations and Waves (3)
PH 425. Paradigms in Physics: Quantum Fundamentals (3)
PH 426. Paradigms in Physics: Central Forces (3)
PH 427. Paradigms in Physics: Periodic Systems (3)

## Senior-level Physics (15)

PH 401. Research (3)
PH 403. ^Thesis (3)

## Select two courses chosen from:

PH 431. Capstones in Physics:
Electromagnetism (3)
PH 441. Capstones in Physics: Thermal and Statistical Physics (3)
PH 451. Capstones in Physics: Quantum Mechanics (3)

## Mathematical Physics Electives (15)

Plus 15 credits of approved upper-division courses in physics or mathematics at the 400 level or beyond, including at least one laboratory course, which form a coherent set. At least 8 of these credits must be in mathematics.

## Total=117

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Option Code: 587

## OPTICAL PHYSICS OPTION

## Math (27)

MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4) or MTH 306. Matrix and Power Series Methods (4)
MTH 254. Vector Calculus I (4)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4)
MTH 341. Linear Algebra I (3)

## Chemistry (15)

CH 231, CH 232, CH 233. *General Chemistry $(4,4,4)$
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
(1,1,1)

## Physics Core (45)

PH 211, PH 212, PH 213. *General Physics with Calculus ( $4,4,4$ )
and PH 221, PH 222, PH 223. Recitation for Physics 211, 212, 213 ( $1,1,1$ )
PH 315. Physics of Contemporary Challenges (3)
PH 335. Techniques of Theoretical Mechanics (3)
PH 365, PH 366, PH 367. Computational Physics Lab (1,1,1)
PH 411. Electronics (3)
PH 425. Paradigms in Physics: Quantum Fundamentals (3)
PH 423. Paradigms in Physics: Energy and Entropy (3)
PH 424. Paradigms in Physics: Oscillations and Waves (3)
PH 427. Paradigms in Physics: Periodic Systems (3)
PH 422. Paradigms in Physics: Static Fields (3)

PH 426. Paradigms in Physics: Central Forces (3)

## Senior-level Physics (12)

PH 401. Research (3)
PH 403. ^Thesis (3)
Two courses chosen from:
PH 431. Capstones in Physics:
Electromagnetism (3)
PH 441. Capstones in Physics: Thermal and Statistical Physics (3)
PH 451. Capstones in Physics: Quantum Mechanics (3)
Optical Physics Electives (15)
Plus 15 credits of approved upperdivision courses in physics or optics at the 400 level or beyond, including at least one laboratory course, which form a coherent set. At least 8 of these credits must be in optics.

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 594


## PHYSICS TEACHING/PHYSICS

## OPTION

## Math (27)

MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 253. Infinite Series and Sequences (4) or MTH 306. Matrix and Power Series Methods (4)
MTH 254. Vector Calculus I (4)
MTH 255. Vector Calculus II (4)
MTH 256. Applied Differential Equations (4)
MTH 341. Linear Algebra I (3)

## Chemistry (15)

CH 231, CH 232, CH 233. *General
Chemistry ( $4,4,4$ )
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
(1,1,1)

## Physics Core (45)

PH 211, PH 212, PH 213. *General Physics with Calculus $(4,4,4)$
and PH 221, PH 222, PH 223. Recitation
for Physics 211, 212, 213 ( $1,1,1$ )
PH 315. Physics of Contemporary Challenges (3)
PH 335. Techniques of Theoretical Mechanics (3)
PH 365, PH 366, PH 367. Computational Physics Lab $(1,1,1)$
PH 411. Electronics (3)
PH 422. Paradigms in Physics: Static Fields (3)

PH 423. Paradigms in Physics: Energy and Entropy (3)
PH 424. Paradigms in Physics: Oscillations and Waves (3)
PH 425. Paradigms in Physics: Quantum Fundamentals (3)
PH 426. Paradigms in Physics: Central Forces (3)
PH 427. Paradigms in Physics: Periodic Systems (3)

## Senior-level Physics (15)

PH 401. Research (3)
PH 403. ${ }^{\wedge}$ Thesis (3)
Select two courses from below:
PH 431. Capstones in Physics:
Electromagnetism (3)
PH 441. Capstones in Physics: Thermal and Statistical Physics (3)
PH 451. Capstones in Physics: Quantum Mechanics (3)

## Physics Education Electives (15)

Plus 15 credits of approved upper-
division courses in physics or education at the 400 level or beyond, including at least one laboratory course, which form a coherent set. At least 8 of these credits must be in education.

## Total=117

Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Option Code: 777
PHYSICS MINOR
Requirements
PH 211, PH 212, PH 213. *General Physics With Calculus $(4,4,4)$
PH 315. Physics of Contemporary Challenges (3)
Plus at least 12 credits of upper-
division courses approved by the head undergraduate advisor.


## Footnote:

* Baccalaureate Core Course (BCC)

Minor Code: 590

## GRADUATE MAJORS

APPLIED PHYSICS (MS, PSM)
To be terminated pending approval of proposal 90296.
Janet Tate, Director
Department of Physics
301 Weniger Hall
Corvallis OR 97331
541-737-1700

Email: tate@physics.oregonstate.edu Website: http://psm.science.oregonstate. edu/

The worlds of science and business are increasingly interconnected, creating strong demand for individuals who can bridge these two disciplines. The Professional Science Master's (PSM) in Applied Physics at OSU is the first program of its kind in the Pacific Northwest and was created with the help of professional affiliates who are leaders in industries dependent on applications of physics either to produce or to exploit contemporary technologies. In Oregon, industries such as semiconductor manufacturing, optical and electronic instrumentation, and software have become the dominant employers, replacing lumbering, fishing and other traditional resource-based industries. Applied physicists study photovoltaic technology, optoelectronics, energy and communication systems, imaging of cells and nanostructures, and many other subjects. An internship providing job experience in a technology-rich environment as well as special training in business management, communications, and ethics to complement core science uniquely qualify PSM Physics graduates for these diverse careers.

The PSM program can usually be completed in two years, based on fulltime study and at least 54 credits. The technical curriculum is based on a core of graduate courses in the fundamental subjects of physics. Core physics courses (four courses selected from: PH 531, PH 535, PH 541, PH 551, PH 621, PH 631, PH 641, and PH 651) will cover topics such as electromagnetism, statistical and thermal physics and quantum mechanics. Elective courses develop skills in modeling, statistical analysis, and data management or in scientific fields closely related to physics (e.g., materials, energy etc.). Professional courses are required in communication, research ethics, and business management (PSM 513, PSM 565, PSM 566, PSM 567, COMM 550 and PHL 547). These courses are designed to be taken in sequence during the first academic year. Students are required to complete a 3 to 6 month internship (6-12 credits) in lieu of thesis research (PH 510).

For general information about PSM programs, contact the PSM Director, 2082 Cordley Hall, Corvallis OR 97331, 541-737-5259; email: kirstin.carroll@ oregonstate.edu.

## Degree Requirements (54 credits)

Core physics courses (12)
Electives (18)
Professional courses (18)
Internship (6)
Major Code: 5890

## PHYSICS (MA, MS, PhD, MAIS)

Graduate Areas of Concentration
Atomic physics, computational physics, nuclear physics, optical physics, particle physics, physics education, relativity, solid state physics
The Department of Physics offers courses and research experience leading to the Master of Arts, Master of Science, and Doctor of Philosophy degrees. Advanceddegree candidates may pursue thesis research in experimental, computational, or theoretical AMO (atomic, molecular, and optical) physics, nuclear and particle physics, or solid state physics. Special programs are available for students who are preparing for careers in undergraduate teaching. Thesis and nonthesis programs are offered that lead to the MS and MA degrees. A written comprehensive examination must be passed prior to the nonthesis master's final oral or the PhD preliminary oral examination. There are no foreign language requirements.

The department maintains a vigorous colloquium program in which wellknown physicists present lectures on current research. Students are invited to participate in topical seminars offered regularly in each of the major research areas for the discussion of research results and for studies of specialized subjects at an advanced level.
Fellowships and assistantships are offered to qualified graduate students. A descriptive brochure is available from the Department of Physics.

## Major Code: 5900

## PHYSICS GRADUATE MINOR

For more details, see the departmental advisor.

## Minor Code: 5900 <br> ■ PHYSICS COURSES

PH 104. *DESCRIPTIVE ASTRONOMY (4). Historical and cultural context of discoveries concerning planets and stars and their motions. Topics include the solar system, the constellations, birth and death of stars, pulsars and black holes. An accompanying laboratory is used for demonstrations, experiments, and projects, as well as for outdoor observations. Lec/lab. (Bacc Core Course)
PH 104H. *DESCRIPTIVE ASTRONOMY (4).
Historical and cultural context of discoveries concerning planets and stars and their motions. Topics include the solar system, the constellations, birth and death of stars, pulsars and black holes. An accompanying laboratory is used for demonstrations, experiments, and projects, as well as for outdoor observations. Lec/lab. (Bacc Core Course) PREREQS: Honors College approval required.

PH 106. *PERSPECTIVES IN PHYSICS (4), A descriptive and non-mathematical study of the development of physical concepts and their historical and philosophical context. The emphasis is on the origin, meaning, significance, and limitations of these concepts and their role in the evolution of current understanding of the universe. Concepts to be covered include Copernican astronomy, Newtonian mechanics, energy, electricity and magnetism, relativity, and quantum theory. Intended primarily for non-science

## students. Lec/lab. (Bacc Core Course)

## PH 111. *INQUIRING INTO PHYSICAL

PHENOMENA (4). Development of conceptual understandings through investigation of everyday phenomena. Emphasis is on questioning, predicting, exploring, observing, discussing, and writing in physical science contexts. Students document their initial thinking, record their evolving understandings, and write reflections upon how their thinking changed and what fostered their learning. Lec/lab. (Baccalaureate Core Course)
PH 199. SPECIAL STUDIES (1-16). One-credit sections are graded pass/no pass. This course is repeatable for a maximum of 99 credits. PREREQS: Departmental approval required.

PH 201. *GENERAL PHYSICS (5). Introductory survey course covering a broad spectrum of classical and modern physics with applications. Topics include dynamics, vibrations and waves, electricity and magnetism, optics, and modern physics. Laboratory and recitation sections accompany the lectures. Mathematical preparation should include college algebra and trigonometry. Lec/lab/rec. (Bacc Core Course) PREREQS: MTH 111 and MTH 112. PH 201, PH 202, PH 203 must be taken in order.
PH 202. *GENERAL PHYSICS (5). Introductory survey course covering broad spectrum of classical and modern physics with applications Topics include dynamics, vibrations and waves, electricity and magnetism, optics, and modern physics. Laboratory and recitation sections accompany the lectures. Mathematical preparation should include college algebra and trigonometry. Lec/lab/rec. (Bacc Core Course) PREREQS: MTH 111 and MTH 112 and PH 201
PH 203. *GENERAL PHYSICS (5). Introductory survey course covering broad spectrum of classical and modern physics with applications. Topics include dynamics, vibrations and waves, electricity and magnetism, optics, and modern physics. Laboratory and recitation sections accompany the lectures. Mathematical preparation should include college algebra and trigonometry. Lec/lab/rec. (Bacc Core Course) PREREQS: MTH 111 and MTH 112 and PH 202

PH 205. *SOLAR SYSTEM ASTRONOMY
(4). History, laws, and tools of astronomy. Composition, motion, and origin of the sun, planets, moons, asteroids, and comets. An accompanying laboratory is used for demonstrations, experiments, and projects, as well as for outdoor observations. The courses in the astronomy sequence (PH 205, PH 206, PH 207) can be taken in any order. Lec/lab. (Bacc Core Course)
PH 206. *STARS AND STELLAR EVOLUTION (4). Properties of stars; star formation, evolution, and death; supernovae, pulsars, and black holes. An accompanying laboratory is used for demonstrations, experiments, and projects, as well as for outdoor observations. The courses in the astronomy sequence (PH 205, PH 206, PH 207) can be taken in any order. Lec/lab. (Bacc Core Course)
PH 207. *GALAXIES, QUASARS, AND COSMOLOGY (4). Nature and content of galaxies, properties of quasars, and the cosmic background radiation. Emphasis on the BigBang model and its features. An accompanying laboratory is used for demonstrations, experiments, and projects, as well as for outdoor observations. The courses in the astronomy sequence (PH 205, PH 206, PH 207) can be taken in any order. Lec/lab. (Bacc Core Course)
PH 211. *GENERAL PHYSICS WITH CALCULUS (4). A comprehensive introductory survey course intended primarily for students in the sciences and engineering. Topics include mechanics, wave motion, thermal physics, electromagnetism, and optics. Elementary calculus is used. Laboratory work accompanies the lectures. Lec/lab/rec. (Bacc Core Course) PREREQS: MTH 251. COREQ:

MTH 252. Concurrent enrollment in a PH 221 recitation section is strongly recommended.

PH 212. *GENERAL PHYSICS WITH CALCULUS
(4). A comprehensive introductory survey course intended primarily for students in the sciences and engineering. Topics include mechanics, wave motion, thermal physics, electromagnetism, and optics. Elementary calculus is used. Laboratory work accompanies the lectures. Lec/lab. (Bacc Core Course) PREREQS: PH 211 [D-] and MTH 252. COREQ: MTH 254. Concurrent enrollment in PH 222, Recitation for Physics 212, is strongly recommended.

PH 213. *GENERAL PHYSICS WITH CALCULUS (4). A comprehensive introductory survey course intended primarily for students in the sciences and engineering. Topics include mechanics, wave motion, thermal physics, electromagnetism, and optics. Elementary calculus is used. Laboratory work accompanies the lectures. Lec/lab/rec. (Bacc Core Course) PREREQS: MTH 254 and PH 212. Concurrent enrollment in a recitation section is strongly recommended.
PH 221. RECITATION FOR PHYSICS 211 (1). One-hour weekly session for the development of problem-solving skills in calculus-based general physics. Lec/rec. Graded P/N. COREQS: PH 211

PH 221H. RECITATION FOR PHYSICS 211 (1). One-hour weekly session for the development of problem-solving skills in calculus-based general physics. Lec/rec. PREREQS: Honors College approval required. Students must take COREQS: PH 211 or PH 211H.
PH 222. RECITATION FOR PHYSICS 212 (1).
One-hour weekly session for the development of problem-solving skills in calculus-based general physics. Graded P/N. COREQS: PH 212
PH 222H. RECITATION FOR PHYSICS 212 (1). One-hour weekly session for the development of problem-solving skills in calculus-based general physics. Lec/rec. PREREQS: Honors College approval required. Students must take COREQS: PH 212 or PH 212H.

PH 223. RECITATION FOR PHYSICS 213 (1). One-hour weekly session for the development of problem-solving skills in calculus-based general physics. Lec/rec. Graded P/N. COREQS: PH 213
PH 223H. RECITATION FOR PHYSICS 213 (1). One-hour weekly session for the development of problem-solving skills in calculus-based general physics. Lec/rec. PREREQS: Honors College approval required. Students must take COREQS: PH 213 or PH 213H.
PH 265. SCIENTIFIC COMPUTING (3). Basic computational tools and techniques for courses in science and engineering. Project approach to problem solving using symbolic and compiled languages with visualization. Basic computer literacy assumed. PREREQS: Concurrent enrollment in MTH 251.
PH 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PH 313. *ENERGY ALTERNATIVES (3). Exploration of the challenges and opportunities posed by dwindling resources; physical and technological basis of our current energy alternatives; new or controversial technologies such as nuclear or solar power; overview of resource availability, patterns of energy consumption, and current governmental policies. (Bacc Core Course) PREREQS: Upper-division standing and 12 credits of introductory science.
PH 314. INTRODUCTORY MODERN PHYSICS (4). An elementary introduction to relativity and quantum theory, emphasizing the experiments that revealed the limitations of classical physics. Applications include the properties of atoms, nuclei, and solids. Laboratory work accompanies lectures. Lec/lab. PREREQS: PH 213. COREQ: MTH 256.

PH 315. PHYSICS OF CONTEMPORARY
CHALLENGES (3). An introduction to thermal and quantum physics in the context of contemporary challenges faced by our society, such as power generation, energy efficiency, and global warming. PREREQS: PH 211
PH 331. *SOUND, HEARING, AND MUSIC
(3). Basic course in the physics, technology, and societal implications of sound. Intended for students in nontechnical majors. Topics include wave motion, hearing and the perception of sound, noise pollution, music and musical instruments, architectural acoustics, and sound recording and reproduction. (Bacc Core Course) PREREQS: Upper-division standing and one year of university science, or instructor approval required.
PH 332. *LIGHT, VISION, AND COLOR (3). Basic physics of light, optical instruments (lenses, telescopes, microscopes), the eye and visual perception, colors, photography, environmental lighting, lasers and holography. For nontechnical majors. (Bacc Core Course) PREREQS: Upperdivision standing and one year of university science or instructor approval required.
PH 335. TECHNIQUES OF THEORETICAL
MECHANICS (3). Newtonian, Lagrangian, and Hamiltonian classical mechanics. Special relativity with relativistic mechanics. PREREQS: Recommended prerequisites are PH 212 and MTH 254.
PH 365. COMPUTATIONAL PHYSICS LAB
(1). A project-driven laboratory experience in computational physics. Includes the use of basic mathematical and numerical techniques in computer calculations leading to solutions for typical physical problems. Topics to be covered will coordinate with the Paradigms in Physics course sequence. PREREQS: PH 213 [C-] and this course is expected to be taken alongside the Paradigms.
PH 366. COMPUTATIONAL PHYSICS LAB
(1). A project-driven laboratory experience in computational physics. Includes the use of basic mathematical and numerical techniques in computer calculations leading to solutions for typical physical problems. Topics to be covered will coordinate with the Paradigms in Physics course sequence. PREREQS: PH 213 [C-] and this course is expected to be taken alongside the Paradigms.
PH 367. COMPUTATIONAL PHYSICS LAB
(1). A project-driven laboratory experience in computational physics. Includes the use of basic mathematical and numerical techniques in computer calculations leading to solutions for typical physical problems. Topics to be covered will coordinate with the Paradigms in Physics course sequence. PREREQS: PH 213 [C-] and this course is expected to be taken alongside the Paradigms.
PH 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PH 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

PH 401. RESEARCH (1-16). A research project under the supervision of a faculty member, whose approval must be arranged by the student in advance of registration. This course is repeatable for a maximum of 16 credits. PREREQS:
Departmental approval required.
PH 403. ^THESIS (1-16). A research project leading to a thesis under the supervision of a faculty member, whose approval must be arranged by the student in advance of registration. (Writing Intensive Course) This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PH 405. READING AND CONFERENCE (1-
16). An independent study project under the supervision of a faculty member, whose approval must be arranged by the student in advance
of registration. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

PH 407. SEMINAR (1-16). Departmental seminars or colloquium. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits.
PH 407H. SEMINAR (1-16). Departmental seminars or colloquium. This course is repeatable or a maximum of 16 credits. PREREQS: Honors College approval required.

PH 410. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

PH 411. ANALOG AND DIGITAL ELECTRONICS
(3). Circuit theory. Passive dc and ac circuits including filters, resonance, complex impedance and Fourier analysis. Operational amplifiers, gates and combinational logic. Semiconductor principles diodes, transistors, BJTs and FETs. Multiplexing, flip-flops and sequential logic, 555 timer, registers and memory, DAC, ADC. PREREQS: PH $314^{*}$. PH 411 and PH 412 must be taken in order.
PH 412. ANALOG AND DIGITAL ELECTRONICS (3). Circuit theory. Passive dc and ac circuits including filters, resonance, complex impedance and Fourier analysis. Operational amplifiers, gates and combinational logic. Semiconductor principles, diodes, transistors, BJTs and FETs. Multiplexing, flip-flops and sequential logic, 555 timer, registers and memory, DAC, ADC. PREREQS: PH 314* and PH 411

PH 415. COMPUTER INTERFACING AND INSTRUMENTATION (3). Applications of computers as scientific instruments, with emphasis on hardware and instrumentation, online data acquisition, and computer contro of experiments. PREREQS: Upper-division or graduate standing; PH 412/PH 512 or equivalent background in electronics; and instructor approval required. Departmental approval required.
PH 422. PARADIGMS IN PHYSICS: STATIC FIELDS (3). Theory of static electric, magnetic, and gravitational potentials and fields using the techniques of vector calculus in three dimensions. PREREQS: PH 213 and MTH 255
PH 423. PARADIGMS IN PHYSICS: ENERGY AND ENTROPY (3). Thermodynamics and canonical statistical mechanics. PREREQS: PH 213
PH 424. PARADIGMS IN PHYSICS:
OSCILLATIONS AND WAVES (3). Dynamics
of mechanical and electrical oscillation using Fourier series and integrals; time and frequency representations for driven damped oscillators, resonance; one-dimensional waves in classical mechanics and electromagnetism; normal modes. PREREQS: PH 213 and PH 411 and MTH 256
PH 425. PARADIGMS IN PHYSICS: QUANTUM FUNDAMENTALS (3). Introduction to quantum mechanics through Stern-Gerlach spin measurements. Probability, eigenvalues, operators, measurement, state reduction, Dirac notation, matrix mechanics, time evolution. Quantum behavior of a one-dimensional well. PREREQS: PH 213. COREQ: MTH 341

PH 426. PARADIGMS IN PHYSICS: CENTRAL FORCES (3). Gravitational and electrostatic forces; angular momentum and spherical harmonics, separation of variables in classical and quantum mechanics, hydrogen atom. PREREQS: PH 213 and PH 422 and PH 425. COREQ: PH 335

## PH 427. PARADIGMS IN PHYSICS: PERIODIC

 SYSTEMS (3). Quantum waves in position and momentum space; Bloch waves in onedimensional periodic systems, and the reciprocal lattice; coupled harmonic oscillators; phonons. PREREQS: PH 424 and PH 425. COREQ: PH 315PH 431. CAPSTONES IN PHYSICS:
ELECTROMAGNETISM (3). Static electric and magnetic fields in matter, electrodynamics,

Maxwell equations, electromagnetic waves, wave guides, dipole radiation. PREREQS: (PH 424 or 524) and (PH 426 or PH 526)

PH 435. CAPSTONES IN PHYSICS: CLASSICAL MECHANICS (3). Newtonian, Lagrangian and Hamiltonian formulations of classical mechanics: single-particle motion, collisions, variational methods, and normal coordinate description of coupled oscillators. PREREQS: (PH 424 or PH 524) and (PH 426 or PH 526)

PH 441. CAPSTONES IN PHYSICS: THERMAL AND STATISTICAL PHYSICS (3). Entropy and quantum mechanics; canonical Gibbs probability; ideal gas; thermal radiation; Einstein and Debye lattices; grand canonical Gibbs probability; ideal Fermi and Bose gases; chemical reactions and phase transformations. PREREQS: (PH 423 or PH 523) and (PH 451 or PH 551)

PH 451. CAPSTONES IN PHYSICS: QUANTUM MECHANICS (3). Wave mechanics, Schroedinger equation, operators, harmonic oscillator, identical particles, atomic fine structure, approximation methods and applications. PREREQS: (PH 424 or PH 524) and (PH 425 or PH 525) and (PH 426 or PH 526)
PH 455. ASTROPHYSICS (3). Physics of stars and the cosmos. PREREQS: PH 213; PH 315 or equivalent junior-level background in modern physics and thermodynamics.

PH 461. CAPSTONES IN PHYSICS:
MATHEMATICAL METHODS (3). Complex algebra, special functions, partial differential equations, series solutions, complex integration, calculus of residues. PREREQS: (PH 424 or PH 524) and (PH 426 or PH 526) and MTH 256

PH 464. SCIENTIFIC COMPUTING II (3).
Mathematical, numerical, and conceptual elements forming foundations of scientific computing: computer hardware, algorithms, precision, efficiency, verification, numerical analysis, algorithm scaling, profiling, and tuning. Lec/lab.

PH 465. COMPUTATIONAL PHYSICS (3).
The use of basic mathematical and numerical techniques in computer calculations leading to solutions for typical physical problems. Topics to be covered include models and applications ranging from classical mechanics and electromagnetism to modern solid state and particle physics. PREREQS: PH 464 or PH 564
PH 481. PHYSICAL OPTICS (4). Wave propagation, polarization, interference, diffraction, and selected topics in modern optics. PREREQS: (PH 431 or PH 531) or equivalent.
PH 482. OPTICAL ELECTRONIC SYSTEMS (4). Photodetectors, laser theory, and laser systems. Lec/lab. CROSSLISTED as ECE 482/ECE 582. PREREQS: ECE 391 or (PH 481 or PH 581) or equivalent.
PH 483. GUIDED WAVE OPTICS (4). Optical fibers, fiber mode structure and polarization effects, fiber interferometry, fiber sensors, optical communication systems. Lec/lab. CROSSLISTED as ECE 483/ECE 583. PREREQS: (ECE 391* or PH 481*)

PH 495. INTRODUCTION TO PARTICLE AND NUCLEAR PHYSICS (3). Elementary particles and forces, nuclear structure and reactions. PREREQS: PH 451 or PH 551
PH 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
PH 501. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PH 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
PH 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval
required.
PH 507. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.
PH 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.

PH 511. ANALOG AND DIGITAL ELECTRONICS (3). Circuit theory. Passive dc and ac circuits including filters, resonance, complex impedance and Fourier analysis. Operational amplifiers, gates and combinational logic. Semiconductor principles, diodes, transistors, BJTs and FETs. Multiplexing flip-flops and sequential logic, 555 timer, registers and memory, DAC, ADC. PH 511 and PH 512 must be taken in order. PREREQS: PH 314*
PH 512. ANALOG AND DIGITAL ELECTRONICS
(3). Circuit theory. Passive dc and ac circuits including filters, resonance, complex impedance and Fourier analysis. Operational amplifiers, gates and combinational logic. Semiconductor principles, diodes, transistors, BJTs and FETs. Multiplexing, flip-flops and sequential logic, 555 timer, registers and memory, DAC, ADC. PREREQS: PH $314^{*}$ and PH 511
PH 515. COMPUTER INTERFACING AND INSTRUMENTATION (3). Applications of computers as scientific instruments, with emphasis on hardware and instrumentation, online data acquisition, and computer control of experiments. PREREQS: Upper-division or graduate standing; (PH 412 or PH 512) or equivalent background in electronics; and instructor approval required. Departmental approval required.
PH 531. CAPSTONES IN PHYSICS:
ELECTROMAGNETISM (3). Static electric and magnetic fields in matter, electrodynamics, Maxwell equations, electromagnetic waves, wave guides, dipole radiation. PREREQS: (PH 424 or PH 524) and (PH 426 or PH 526)

PH 541. CAPSTONES IN PHYSICS: THERMAL AND STATISTICAL PHYSICS (3). Entropy and quantum mechanics; canonical Gibbs probability; ideal gas; thermal radiation; Einstein and Debye lattices; grand canonical Gibbs probability; ideal Fermi and Bose gases; chemical reactions and phase transformations. PREREQS: (PH 423 or PH 523) and (PH 451 or PH 551)

PH 551. CAPSTONES IN PHYSICS: QUANTUM MECHANICS (3). Wave mechanics, Schroedinger equation, operators, harmonic oscillator, identical particles, atomic fine structure, approximation methods and applications. PREREQS: (PH 424 or PH 524) and (PH 425 or PH 525) and (PH 426 or PH 526)
PH 555. ASTROPHYSICS (3). Physics of stars and the cosmos. PREREQS: PH 213; PH 315 or equivalent junior-level background in modern physics and thermodynamics.

## PH 561. MATHEMATICAL PHYSICS (3).

Fundamental mathematical techniques needed for graduate students in physics. Topics include vector spaces and operators; fourier series, integrals, and transforms; partial differential equations; special functions, distributions, and delta functions, Green's functions; complex analysis.

PH 562. MATHEMATICAL PHYSICS (3). Fundamental mathematical techniques needed for graduate students in physics. Topics include vector spaces and operators; fourier series, integrals, and transforms; partial differential equations; special functions, distributions, and delta functions; Green's functions; complex analysis.

PH 564. SCIENTIFIC COMPUTING II (3). Mathematical, numerical, and conceptual elements forming foundations of scientific computing: computer hardware, algorithms, precision, efficiency, verification, numerical analysis, algorithm scaling, profiling, and tuning. Lec/lab.

PH 575. INTRODUCTION TO SOLID STATE PHYSICS (3). Introduction to condensed matter physics for majors in physics, chemistry, and
engineering. Topics include band structure, free electron behavior, optical properties, magnetism, and lattice excitations. PREREQS: (PH 451 or PH 551) or equivalent. COREQ: PH 427 or PH 527

PH 581. PHYSICAL OPTICS (4). Wave
propagation, polarization, interference, diffraction, and selected topics in modern optics. PREREQS: (PH 431 or PH 531 ) or equivalent
PH 582. OPTICAL ELECTRONIC SYSTEMS (4). Photodetectors, laser theory, and laser systems. Lec/lab. CROSSLISTED as ECE 482/ECE 582.
PREREQS: (PH 481 or PH 581) or equivalent
PH 583. GUIDED WAVE OPTICS (4). Optical fibers, fiber mode structure and polarization effects, fiber interferometry, fiber sensors, optical communication systems. Lec/lab. CROSSLISTED as ECE 483/ECE 583. PREREQS: (ECE 391* or PH 481* or PH 581*)
PH 585. ATOMIC, MOLECULAR, AND OPTICAL PHYSICS (3). Atomic and molecular structure, interaction with electromagnetic fields, atomic and molecular spectra, spectroscopic techniques, laser theory, nonlinear optics. PREREQS: (PH 431 or PH 531) or (PH 451 or PH 551)

PH 591. BIOLOGICAL PHYSICS (3). Basic physics principles applied to the kinetics and dynamics of molecular and cellular processes. Ion channels, two-state systems, dynamics of molecular motors, cell signalling, and multicellular phenomena. PREREQS: PH 320 and PH 421 and PH 422 and PH 423 or equivalent juniorlevel background in classical mechanics, electromagnetism, and thermodynamics
PH 595. INTRODUCTION TO PARTICLE AND NUCLEAR PHYSICS (3). Elementary particles and forces, nuclear structure and reactions. PREREQS: PH 451 or PH 551

PH 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

PH 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
PH 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
PH 605. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

PH 607. SEMINAR (1-16). This course is repeatable for a maximum of 16 credits.

PH 621. DYNAMICS OF SINGLE- AND MULTIPARTICLE SYSTEMS (3). Introduction to theory of non-linear systems. Chaos in Hamiltonian and dissipative systems. Lyapunov exponents, fractal geometries. PREREQS: PH 435 or PH 535 or equivalent.
PH 631. ELECTROMAGNETIC THEORY
(3). Electrostatics; multipole expansion; magnetostatics; radiation fields; dynamics of relativistic particles and electromagnetic fields. PREREQS: PH 431 or PH 531 or equivalent. PH $631, \mathrm{PH} 632, \mathrm{PH} 633$ must be taken in order.

PH 632. ELECTROMAGNETIC THEORY
(3). Electrostatics; multipole expansion; magnetostatics; radiation fields; dynamics of relativistic particles and electromagnetic fields. PREREQS: PH 631 and (PH 431 or PH 531 or equivalent)
PH 633. ELECTROMAGNETIC THEORY
(3). Electrostatics; multipole expansion; magnetostatics; radiation fields; dynamics of relativistic particles and electromagnetic fields. PREREQS: PH 632 and (PH 431 or PH 531 or equivalent)
PH 641. STATISTICAL THERMOPHYSICS (3).
Macroscopic thermodynamics and kinetic theory. Classical and quantal statistical ensembles; partition functions. Applications to atoms and molecules, clustering, solids, radiation. PREREQS: PH 435 or PH 535. PH 641, PH 642 must be taken in order.
PH 642. STATISTICAL THERMOPHYSICS (3).
Macroscopic thermodynamics and kinetic theory. Classical and quantal statistical ensembles; partition functions. Applications to atoms and molecules, clustering, solids, radiation. PREREQS: PH 641
PH 651. QUANTUM MECHANICS (3). Basic principles of nonrelativistic quantum theory and applications. Schroedinger theory, quantum theory of angular momentum, matrix mechanics, perturbation theory, identical particles, scattering PREREQS: (PH 435 or PH 535) and (PH 451 or PH 551) or equivalents. PH 651, PH 652, PH 653 must be taken in order.
PH 652. QUANTUM MECHANICS (3). Basic principles of nonrelativistic quantum theory and applications. Schroedinger theory, quantum theory of angular momentum, matrix mechanics, perturbation theory, identical particles, scattering. PREREQS: (PH 435 or PH 535) and (PH 451 or PH 551) or equivalents and PH 651
PH 653. QUANTUM MECHANICS (3). Basic principles of nonrelativistic quantum theory and applications. Schroedinger theory, quantum theory of angular momentum, matrix mechanics, perturbation theory, identical particles, scattering. PREREQS: (PH 435 or PH 535 ) and ( PH 451 or PH 551) or equivalents and PH 652
PH 654. ADVANCED QUANTUM THEORY (3).
Scattering theory, second quantization and many body theory, relativistic quantum mechanics, quantization of fields, quantum electrodynamics, and elementary particles. PREREQS: PH 653. PH 654, PH 655, PH 656 must be taken in order.
PH 671. SOLID STATE PHYSICS, ELECTRON
TRANSPORT (2). Fundamentals of solid state physics, Boltzmann transport, phonon and defect scattering, quantum transport, transport in magnetic field, localization, Mott-insulator transition, electron tunneling, superconductivity. Offered in alternate years. PREREQS: Basic knowledge of electromagnetism and quantum mechanics.

PH 672. SOLID STATE PHYSICS, THEORY
(2). The many-body problem, density functional theory, excited states properties, BCS theory of superconductivity. Offered in alternate years. PREREQS: PH 575 and PH 654 and basic knowledge of electromagnetism and quantum mechanics.
PH 673. SOLID STATE PHYSICS,
NANOSCIENCE AND NANOTECHNOLOGY (2). Introduction to nanoscience and nanotechnology; semiconductor quantum wells, wires, and dots; bulk metals vs nanoparticles; molecular ensembles vs single molecules; fabrication of nanoparticles and nanostructured materials; scanning probe microscopy; advanced optical imaging and manipulation. Offered in alternate years. PREREQS: Basic knowledge of electromagnetism and quantum mechanics.
PH 674. SOLID STATE PHYSICS, MAGNETISM
(2). Magnetism of atoms; interaction between magnetic atoms, magnetic ordering in crystalline solids; excitations in magnetic solids; temperature dependent phenomena in magnetic solids; magnetism of metals, alloys, insulators and semiconductors; topics of considerable interest in contemporary research. PREREQS: Basic knowledge of electromagnetism and quantum mechanics.
PH 681. ATOMIC, MOLECULAR AND OPTICAL PHYSICS, MODERN OPTICS (2). Maxwell's equations in matter; refraction, phase and group indices; material and geometry dispersion; effective-medium regime. Not offered every year. PREREQS: Basic knowledge of electromagnetism and quantum mechanics.
PH 682. ATOMIC, MOLECULAR, OPTICAL PHYSICS, SEMICONDUCTOR OPTICS (2).
Linear response theory; polarization effects; interband excitations and emissions; low dimensional systems; excitons; phonons; semiconductor lasers; photovoltaics. Offered alternate years. PREREQS: Basic knowledge of electromagnetism and quantum mechanics.
PH 683. ATOMIC, MOLECULAR AND OPTICAL
PHYSICS, NONLINEAR OPTICS (2). Coherent nonlinear electromagnetic phenomena; harmonic generation and parametric mixing; quantum mechanical description of multi-photon interactions; incoherent multi-photon interactions; coherent nonlinear optical phenomena and spectroscopies. Offered in alternate years. PREREQS: Basic knowledge of electromagnetism and quantum mechanics.
PH 684. ATOMIC, MOLECULAR AND
OPTICAL PHYSICS, ULTRAFAST OPTICS (2).
Introduction of ultrafast optical science; short pulse propagation in linear media; pulse stretching and compressing; Q-switching and mode-locking; characterization of femtosecond lasers; coherent optical effects. Offered in alternate years. PREREQS: Basic knowledge of electromagnetism and quantum mechanics.

PH 699. SPECIAL TOPICS: BIOLOGICAL
PHYSICS (3).

## SCHOOL OF LIFE SCIENCES

The School of Life Sciences has three departments:

1. Biochemistry and Biophysics
2. Integrative Biology
3. Microbiology

## DEPARTMENT OF <br> BIOCHEMISTRY AND BIOPHYSICS

The Department of Biochemistry and Biophysics is part of the School of Life Sciences.
P. Andrew Karplus, Head

2011 Ag and Life Sciences
Oregon State University
Corvallis, OR 97331-7305
541-737-2769
Email: karplusp@oregonstate.edu
Website: http://biochem.science.oregonstate.edu

## FACULTY

Professors Ahern, Andrews, Barbar, Beckman, Hagen, Karplus, Merrill
Associate Professors Frietag,
Gombart, Greenwood, Hsu, McFadden, Mehl
Assistant Professors Hendrix,
Johnson, Nyarko, Perez
Senior Instructors Rajagopal
Instructor Van Zee
Associate Professor, Senior
Research Cooley

## Undergraduate Majors

Biochemistry and Biophysics (BS, CRED, HBS)
Biochemistry and Molecular Biology (BS, CRED, HBS)

## Options

Advanced Molecular Biology Computational Molecular Biology Pre-Medicine/Biochemistry and Molecular Biology

## Graduate Major

Biochemistry and Biophysics (MA, MAIS, MS, PhD)

Graduate Areas of Concentration Biochemistry
Biophysics

## Graduate Minor

Biochemistry and Biophysics
The two majors, Biochemistry and Biophysics, and Biochemistry and Molecular Biology, provide a foundation in both the physical and biological sciences. They are designed to help students prepare for careers in the health sciences, for technical employment at the BS level, or for graduate study in the life sciences. Graduates of the department's
programs have found challenging careers in medicine, dentistry, clinical chemistry, biotechnology, genetics, cell biology, forensic science, pharmacology, physiology, toxicology, and nutrition, as well as in biochemistry or biophysics. Others have used the degree as a springboard to nontechnical careers that benefit from a broad scientific background, including business, intellectual property law, journalism, and health care administration.

## UNDERGRADUATE STUDIES

High school students interested in careers in biochemistry or biophysics should prepare for college by taking four years of mathematics and at least one year each of physics and chemistry. Additional course work in biology, computer science, written and spoken English, and foreign languages is highly desirable. Students transferring from a community college should have completed one year each of the following by the end of the sophomore year, if they plan to graduate in four years' total time: general chemistry, organic chemistry, calculus-based physics, general biology and three semesters or four quarters of calculus, including vector calculus.

Biochemists, biophysicists, and molecular biologists find employment in colleges and universities, in medical schools, in government and private research institutes, in hospitals, and in industry. Industrial employers include chemical companies, food-processing plants, drug manufacturers, the cosmetic industry, and manufacturers of agricultural chemicals (fertilizers, pesticides, etc.). Biochemistry is extensively intertwined with biotechnology, which is the use of modern techniques in biology to achieve practical objectives. This has greatly expanded the industrial market for biochemists and biophysicists. Some rewarding careers require completion of a doctoral degree-PhD or a professional degree. This is essential for anyone who wants to direct an independent research program.

Dr. Kevin Ahern is the lead undergraduate advisor and is the one most familiar with undergraduate program requirements and career opportunities. The alternate advisors are Drs. Karplus, Merrill, Nyarko, Perez, Rajagopal, and Van Zee. Also, students are encouraged to seek out any other member of the faculty for informal advice.

The department has defined curricular requirements (see below), which lead to a BS degree in Biochemistry and Biophysics or BS degree in Biochemistry and Molecular Biology. All upper-division students are encouraged to take additional elective courses in areas related to their major fields of interest (e.g., chemistry, microbiology, genetics, nutrition, physics, pharmacy, biology, or computer science). All
students are strongly encouraged to carry out a research project in the laboratory of a faculty member.

## UNDERGRADUATE MAJORS WITH OPTIONS

## BIOCHEMISTRY AND BIOPHYSICS

 (BS, HBS)Accredited by the American Society for Biochemistry and Molecular Biology.
Freshman Year (45)
BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
CH 231, CH 232, CH 233. *General
Chemistry ( $4,4,4$ )
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
$(1,1,1)$
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC course (1)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
MTH 254. Vector Calculus I (4)
WR 121. *English Composition (3)

## Sophomore Year (46)

BB/BI 317. ^Scientific Theory and Practice (3)
BI 311. Genetics (4)
CH 334, CH 335, CH 336. Organic Chemistry (3,3,3)
CH 361, CH 362. Experimental Chemistry I $(3,3)$
MTH 253. Infinite Series and Sequences (4) or MTH 256. Applied Differential Equations (4)
or MTH 306. Matrix and Power Series Methods (4)
PH 211, PH 212, PH 213. *General Physics with Calculus (4,4,4)
Electives (8)

## Junior Year (44) ${ }^{1}$

BB 314. Cell and Molecular Biology (4) [Not
required but strongly recommended.]
BB 490. Biochemistry 1: Structure and Function (3)
BB 491. Biochemistry 2: Metabolism (3)
BB 492. Biochemistry 3: Genetic
Biochemistry (3)
BB 493. Biochemistry Laboratory Molecular Techniques 1 (3)
and BB 497. Basic Nucleic Acid and Protein Sequence Analysis (1)
BB 494. Biochemistry Laboratory Molecular Techniques 2 (3)
and BB 496. Biochemistry Laboratory Molecular Modeling (1)
CH 440, CH 441, CH 442. Physical Chemistry $(3,3,3)$
Electives (18)

## Senior Year (45)

BB 481. Macromolecular Structure (3)
BB 482. Molecular Biophysics (3) [Pending approval 92028]
BB 483. Advanced Biochemistry and
Biophysics: Capstone (3)
BB 498. ASBMB Certification Exam (0)
Elective (credits to reach 180 total)
Total=180

## SAMPLE 4-YEAR PLAN:

 BIOCHEMISTRY AND BIOPHYSICS YEAR 1 (46 CR)
## Fall

BI 211. *Principles of Biology (4)
BB 111. Introduction to Biochemistry and Biophysics Research (1)
CH 231. *General Chemistry (4)
CH 261. *Laboratory for Chemistry 231 (1)
MTH 251. *Differential Calculus (4)

## Winter

BI 212. *Principles of Biology (4)
CH 232. *General Chemistry (4)
CH 262. *Laboratory for Chemistry 232 (1)
MTH 252. Integral Calculus (4)
WR 121. *English Composition (3)

## Spring

BI 213. *Principles of Biology (4)
CH 233. *General Chemistry (4)
CH 263. *Laboratory for Chemistry 233 (1)
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical
Discourse (3)
or COMM 218. *Interpersonal
Communication (3)
MTH 254. Vector Calculus (4)

## Year 2 (46 cr)

## Fall

BB 314. Cell and Molecular Biology (4)
CH 334. Organic Chemistry (3)
PH 211. *General Physics with Calculus (4) Bacc Core Course (3)

## Winter

CH 335. Organic Chemistry (3)
HHS 231. *Lifetime Fitness for Health (2)
PH 212. *General Physics with Calculus (4)
MTH 256. Applied Differential Equations (4)
Bacc Core Course (3)

## Spring

BB 317. ${ }^{\wedge}$ Scientific Theory and Practice (3)
CH 336. Organic Chemistry (3)
PH 213. *General Physics with Calculus (4)
Bacc Core Course (3)
Elective (3)

## Year 3 (45 cr)

## Fall

BB 490. Biochemistry 1: Structure and
Function (3)
CH 361. Experimental Chemistry (3)
CH 440. Physical Chemistry (3)
Bacc Core Course (3)

## Electives (3)

## Winter

BB 491. Biochemistry 2: Metabolism (3)
CH 362. Experimental Chemistry (3)
CH 441. Physical Chemistry (3)
Bacc Core Course (3)
Electives (3)

## Spring

BB 492. Biochemistry 3: Genetic
Biochemistry (3)
CH 441. Physical Chemistry (3)
Bacc Core Course (3)
Electives (6)
Year 4 (45 cr)

## Fall

BB 481. Macromolecular Structure (3)

BB 493. Biochemistry Laboratory Molecular Techniques 1 (3)
BB 497. Basic Nucleic Acid and Protein Sequence Analysis (1)
Bacc Core Course (3)
Electives (5)

## Winter

BB 482. Molecular Biophysics (3)
BB 494. Biochemistry Laboratory Molecular Techniques 2 (3)
BB 496. Biochemistry Laboratory Molecular Modeling (1)
Electives (8)

## Spring

BB 483. Advanced Biochemistry and Biophysics: Capstone (3)
BB 498. ASBMB Certification Exam (0)
Bacc Core Course (3) Electives (9)

## Total=182

Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
${ }^{\mathbf{1}} \mathrm{CH} 361$ and 362 can be taken in the junior year with BB 493, BB 494, BB 496, BB 497 being taken in the senior year
Major Code: 506


## BIOCHEMISTRY AND MOLECULAR BIOLOGY (BS, CRED, HBS)

The BS degree in Biochemistry and Molecular Biology provides a degree path centered on the molecular basis of living systems with training in molecular genetics, biochemistry, and cell biology, as well as in rapidly developing areas such as bioinformatics. Majors must select an option either in Advanced Molecular Biology, Computational Molecular Biology, or Pre-medicine/Biochemistry and Molecular Biology. The first two options are designed for students interested in careers in the biotechnology and pharmaceutical industries or graduate work in the molecular life sciences, with the second especially well-suited for students interested in computational aspects of molecular biology. The third option is ideal for students interested in careers in medicine and related health professions. Students majoring in Biochemistry and Molecular Biology cannot seek a double major in Biochemistry and Biophysics, Biology, Biohealth Sciences, Botany, Microbiology or Zoology.

Completion of an option is required to earn a degree in Biochemistry and Molecular Biology.
Students are required to achieve a C - or better in the following courses (or their honors counterparts) required for the Biochemistry and Molecular Biology major:

BI 211, BI 212, BI 213, CH 231/CH
261, CH 232/CH 262 and CH 233/CH
263, MTH 251, MTH 252.

## Core

BB 111. Introduction to Biochemistry and Biophysics Research (1)

BB 314. Cell and Molecular Biology (4)
BB 315. Molecular Biology Lab (3)
BB 317. ^Scientific Theory and Practice (3)
BB 481. Macromolecular Structure (3)
BB 486. Advanced Molecular Genetics (capstone) (3)
BB 490. Biochemistry 1: Structure and Function (3)
BB 491. Biochemistry 2: Metabolism (3)
BB 492. Biochemistry 3: Genetic
Biochemistry (3)
BB 494. Biochemistry Laboratory Molecular Techniques 2 (3)
BB 498. ASBMB Certification Exam (0)
BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
CH 231, CH 232, CH 233. *General Chemistry (4,4,4)
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233 (1,1,1)
CH 334, CH 335, CH 336. Organic Chemistry (3,3,3)
CH 337. Organic Chemistry Lab (4) or CH 324. Quantitative Analysis (4)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
ST 351. Introduction to Statistical Methods (4)

## Total Credits=96

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## SAMPLE 4-YEAR PLAN: <br> BIOCHEMISTRY AND <br> MOLECULAR BIOLOGY

Selection of one option is required.

## Year 1 (44 cr)

## Fall

BI 211. *Principles of Biology (4)
BB 111. Introduction to Biochemistry and
Biophysics Research (1)
CH 231. *General Chemistry (4)
CH 261. *Laboratory for Chemistry 231 (1)
WR 121. *English Composition (3)

## Winter

BI 212. *Principles of Biology (4)
CH 232. *General Chemistry (4)
CH 262. *Laboratory for Chemistry 232 (1)
HHS 231. *Lifetime Fitness for Health (2)
MTH 251. *Differential Calculus (4)

## Spring

BI 213. *Principles of Biology (4)
CH 233. *General Chemistry (4)
CH 263. *Laboratory for Chemistry 233 (1)
COMM 111. *Public Speaking (3)
or COMM 114. *Argument and Critical Discourse (3)
or COMM 218. *Interpersonal
Communication (3)
MTH 252. Integral Calculus (4)

## Year 2 (44 cr)

## Fall

BB 314. Cell and Molecular Biology (4)
CH 334. Organic Chemistry (3)
PH 201. *General Physics (5)
Bacc Core Course (3)

## Winter

CH 335. Organic Chemistry (3)
PH 202. *General Physics (5)
ST 351. Introduction to Statistical Methods (4)

Bacc Core Course (3)

## Spring

BB 317. ^Scientific Theory and Practice (3)
CH 336. Organic Chemistry (3)
PH 203. *General Physics (5)
BB 315. ^Molecular Biology Laboratory (3)

## Year 3 (47 cr)

Fall
BB 490. Biochemistry 1: Structure and
Function (3)
CH 337. Organic Chemistry Laboratory (4)
Bacc Core Course (3)
Option Course (3)
Electives (3)

## Winter

BB 491. Biochemistry 2: Metabolism (3)
CH 324. Quantitative Analysis (4)
Bacc Core Course (3)
Option Course (3)
Electives (3)

## Spring

BB 492. Biochemistry 3: Genetic
Biochemistry (3)
Bacc Core Course (6)
Option Course (3)
Electives (3)
Year 4 (45 cr)
Fall
BB 481. Macromolecular Structure (3)
Bacc Core Course (3)
Option Course (6)
Electives (3)

## Winter

BB 494. Biochemistry Laboratory Molecular Techniques 2 (3)
Bacc Core Course (3)
Option Course (3)
Electives (6)

## Spring

BB 486. Advanced Molecular Genetics (3)
BB 498. ASBMB Certification Exam (0)
Option Course (3)
Electives (9)

## Total=180

Major Code: 971

## OPTIONS

## ADVANCED MOLECULAR BIOLOGY OPTION

The Advanced Molecular Biology option is designed for students interested in pursuing graduate work in molecular life sciences or entering the workforce in the biotechnology and pharmaceutical industries. It provides advanced training in genomics, epigenetics and other areas of current research in molecular biology, in addition to the core courses in the major. Students are strongly encouraged to participate in undergraduate research, and up to six research credits can be
applied to the Upper-division Science Elective requirements. Faculty advisors work with students to help them identify electives, research opportunities, and professional internships that align with their interests.

## Core (2 credits)

BB 496. Biochemistry Laboratory Molecular Modeling (1)
BB 497. Basic Nucleic Acid and Protein Sequence Analysis (1)

## Electives

Select 19 or more credits from the following:
BB 401. Undergraduate Research (1-6 credits allowed)
BB 460. Advanced Cell Biology (3)
BB 484. Chromatin and Epigenetics (3)
BB 485. Applied Bioinformatics (3)
BI 311. Genetics (4)
BI 445. Evolution (3)
BOT 460. Functional Genomics (3)
BOT 475. Comparative Genomics (4)
BOT 476. Introduction to Computing in the Life Sciences (3)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)
MB 310. Bacterial Molecular Genetics (3)
or MB 456. Microbial Genetics and Biotechnology (3)
MB 416. Immunology (3)
MB 420. Microbial Genomes,
Biogeochemistry, and Diversity (3)
ST 352. Introduction to Statistical Methods (4)

Z 425. Embryology and Development (5)
Z 438. Behavioral Neurobiology (3)

## Total=21 credits

Option Code: 972

## COMPUTATIONAL MOLECULAR BIOLOGY OPTION

The Computational Molecular Biology option is designed for students interested in the interface of molecular biology, computer science, and statistics. It provides strong preparation for graduate school in computational biology as well as the biotechnology and pharmaceutical industry workforce. This option couples the comprehensive core training in biochemistry and molecular biology with advanced course work in mathematics, statistics, computer science, and bioinformatics. Students are strongly encouraged to participate in undergraduate research, and up to six research credits can be applied to the Upper-division Science Elective requirements. Faculty advisors work with students to identify elective courses, undergraduate research opportunities, and professional internships that support their individual interests.

## Core

BB 485. Applied Bioinformatics (3)
CS 161. Introduction to Computer Science I (4)

## Electives

Select 14 or more credits from the following:
BB 401. Undergraduate Research (1-6 credits allowed)
BI 311. Genetics (4)
BOT 460. Functional Genomics (3)
BOT 475. Comparative Genomics (4)
BOT 476. Introduction to Computing in the Life Sciences (3)
CS 162. Introduction to Computer Science II (4)
CS 261. Data Structures (4)
CS 325. Analysis of Algorithms (4)
CS 420. Graph Theory with Applications to Computer Science (3)
CS 446. Biological Networks (3)
MB 420. Microbial Genomes,
Biogeochemistry, and Diversity (3)
MTH 231. Elements of Discrete
Mathematics (4)
ST 352. Intro to Statistical Methods (4) or ST 411, 412. Methods of Data Analysis $(4,4)$

## Total=21 or more credits

Option Code: 973

## PRE-MEDICINE/BIOCHEMISTRY AND MOLECULAR BIOLOGY <br> OPTION

Biochemistry and Molecular Biology students interested in a career in medicine should choose this option. It may also be suitable for students interested in some other health professions and these students should first consult with their advisor. In addition to offering a rigorous foundation in biochemistry, molecular and cellular biology, chemistry, and genetics, the Pre-medicine option meets the requirements for most medical schools in the U.S. by providing students with training in psychology, ethics and social sciences. Students have a wide choice of medically relevant electives in areas such as physiology, microbiology, and immunology. Students are strongly encouraged to participate in undergraduate research. Faculty pre-med advisors guide students to integrate undergraduate research and other relevant professional opportunities into their undergraduate experience and to prepare themselves as strong candidates for admission to the professional schools of their interest.

## Core

BI 109. Health Professions: Medical (1)

## Electives

Select 20 or more credits from the following:
Psychology-Select 3 or more credits:
PSY 201. *General Psychology (3)
PSY 202. *General Psychology (3)
Ethics-Select 3 or more credits:
PHL 205. *Ethics (4)
PHL/REL 444. *Biomedical Ethics (4)
Additional Social Science-Select 3 or more credits:
ANTH 383. *Introduction to Medical
Anthropology (3)

SOC 204. *Introduction to Sociology (3)
Science Electives-Select 10 or more credits:
BB 332. *Molecular Medicine (3)
BB 401. Undergraduate Research (1-3
credits allowed)
BI 311. Genetics (4)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

MB 310. Bacterial Molecular Genetics (3) or MB 456. Microbial Genetics and Biotechnology (3)
MB 416. Immunology (3)
MB 430. Bacterial Pathogenesis (3)
MB 434. Virology (3)
Z 431. Vertebrate Physiology I (3)
Z 432. Vertebrate Physiology II (3)
Z 437. Vertebrate Endocrinology (4)

## Total=21 or more credits

Option Code: 974

## BIOCHEMISTRY AND BIOPHYSICS (MA, MS, PhD, MAIS)

Graduate Areas of Concentration Biochemistry, biophysics
The Department of Biochemistry and Biophysics offers graduate work leading to the Master of Science, Master of Arts, and Doctor of Philosophy degrees. Most graduate students are admitted for study toward the PhD.

The PhD program requires course work in biochemistry and biophysics, passing written and oral examinations, participating in the departmental seminar program, and research leading to a doctoral thesis. Although most students in the department receive financial support in the form of research assistantships, all students are expected to participate to a limited degree in the teaching program of the department, regardless of the source of support. In general, financial support is provided for PhD candidates only.

## Major Code: 5060

## BIOCHEMISTRY AND BIOPHYSICS GRADUATE MINOR

## Required (15)

BB 550, BB 551. General Biochemistry $(4,3)$ or BB 590. Biochemistry 1: Structure and Function (3)
or BB 591. Biochemistry 2: Metabolism (3) or BB 592. Biochemistry 3: Genetic Biochemistry (3)
Plus BB-related graduate level courses with
BB graduate advisor approval (6-8)

## Pre-approved Courses

BB 581. Macromolecular Structure(3)
BB 582. Molecular Biophysics (3) [Pending approval]
BB 583. Advanced Biochemistry and
Biophysics: Capstone (3)
BB 593. Biochemistry Laboratory Molecular Techniques 1 (3)
BB 594. Biochemistry Laboratory Molecular Techniques 2 (3)

BB 650. Selected Topics in Biochemistry and Biophysics: Cell cycle and cancer (3)
BB 650. Selected Topics in Biochemistry and Biophysics: Protein evolution (3)
BB 651. Selected Topics in Biochemistry and Biophysics: Epigenetics (3)
BB 651. Selected Topics in Biochemistry and Biophysics: Macromolecular Interactions (3)

BB 651. Selected Topics in Biochemistry and Biophysics: Membrane Biochemistry (3)
BB 651. Selected Topics in Biochemistry and Biophysics: Protein NMR Spectroscopy (3)
BB 651. Selected Topics in Biochemistry and Biophysics: Protein Homeostasis, Aging, Disease (3)
BB 652. Selected Topics in Biochemistry and Biophysics: Oxidative Stress (3)
BB 652. Selected Topics in Biochemistry and Biophysics: Protein X-ray Crystallography (3)

MCB 525. Techniques in Molecular and Cellular Biology (3)
MCB 554. Genome Organization, Structure, and Maintenance (4)
MCB 555. Genome Expression and Regulation (4)
MCB 556. Cell and Developmental Biology (4)

## Minor Code: 5060

## ■ BIOCHEMISTRY AND BIOPHYSICS COURSES

BB 100. THE MOLECULES OF LIFE (2).
A brief introduction to molecular biology for nonspecialists. Subjects vary, but have included biochemical basis of the origin of life, biochemical genetics, biochemical aspects of memory and behavior, mutagenesis, bioenergetics and nutrition, and environmental biochemistry.

## BB 111. INTRODUCTION TO BIOCHEMISTRY

 AND BIOPHYSICS RESEARCH (1). Designed to introduce biochemistry and biophysics students to departmental research opportunities and advisors.BB 314. CELL AND MOLECULAR BIOLOGY
(4). Fundamental concepts of prokaryotic and eukaryotic cell biology. Emphasizes cell structure and function at the molecular level. Lec/rec. PREREQS: ( Bl 211 [C-] or $\mathrm{BI} 211 \mathrm{H}[\mathrm{C}-]$ ) and (BI 212 [C-] or $\mathrm{BI} 212 \mathrm{H}[\mathrm{C}-]$ ] and ( BI 213 [C-] or BI 213 H [C-] )) and (CH 331* [C-] or CH 334* [C-] )
BB 314H. CELL AND MOLECULAR BIOLOGY
(4). Fundamental concepts of prokaryotic and eukaryotic cell biology. Emphasizes cell structure and function at the molecular level. Lec/rec. PREREQS: ( $(\mathrm{BI} 211$ [C-] or $\mathrm{BI} 211 \mathrm{H}[\mathrm{C}-]$ ) and (BI 212 [C-] or Bl 212 H [C-] ) and ( BI 213 [C-] or BI 213H [C-] )) and (CH 331* [C-] or $\mathrm{CH} 334^{*}$ [C-] )

## BB 315. ^MOLECULAR BIOLOGY

LABORATORY (3). Laboratory projects exploring
the transmission of genetic information from storage to function will introduce students to fundamental molecular biology concepts and techniques, including isolation of DNA, construction of recombinant plasmids, quantification of gene expression in model organisms, polymerase chain reaction, and analysis of protein expression and subcellalar localization. Lec/lab. (Writing Intensive Course) CROSSLISTED as BI 315. PREREQS: BI 314* [D-] or $\mathrm{BI} 314 \mathrm{H}^{*}$ [D-] or BB $314^{*}$ [D-] or BB $314 \mathrm{H}^{*}$

## [D-]

BB 317. ^SCIENTIFIC THEORY AND
PRACTICE (3). Teaches students the practice of biological science. Topics cover scientific theory, communications, and critical evaluation. CROSSLISTED as BI 317. (Writing Intensive Course) PREREQS: (BI 213 [D-] or BI 213H [D-] ) and /or equivalent.

BB 331. *INTRODUCTION TO MOLECULAR BIOLOGY (3). Course dealing with the molecular basis of cellular function, with emphasis upon modern developments, and the foundation for practical applications of this knowledge. The course will involve the conceptual background necessary to appreciate the applications of molecular biology. Throughout the course opportunities will be given to discuss public policy issues and questions: What are the moral and practical problems that flow from identification of an individual as being at risk for a late-appearing genetic disorder, such as Huntington's disease or certain cancers? Does the scientific or public value of knowing the entire DNA sequence of the human genome justify a situation in which individual or small-scale research cannot be supported? What issues arise when the fruits of biological research, mostly publicly funded, are commercialized? Should a novel organism be patented? How can biotechnology be applied to environmental problems? (Bacc Core Course) PREREQS: (CH 122 [D-] or CH 202 [D-] or CH 222 [D-] or CH 225 H [D-] or ( CH 232 [D-] or CH 232H [D-] ) or (CH 262 [D-] or CH 262H [D-] or CH 272 [D-] )))
BB 332. *MOLECULAR MEDICINE (3). Provides students an understanding of medical advances from a rapidly evolving molecular point of view. Advances in knowledge of the human genome arising from DNA sequencing efforts and major leaps in understanding of the regulating cellular growth and division are presented in an easy-tounderstand fashion appropriate for students in all majors. Course discussions and assignments will cover implications of advances in molecular medicine from ethical, economic, technical and societal standpoints. The aim of the course is to present technical material in a way that non-scientists will understand and conversely to summarize ethical, economic, and philosophical considerations in a way that the scientists understand the implications of these technologies. (Bacc Core Course) PREREQS: Any biology course.
BB 350. ELEMENTARY BIOCHEMISTRY (4).
Service course for students desiring a short
introduction to biochemistry. Four lectures weekly. PREREQS: (CH 331 [D-] and CH 332* [D-] ) and / or equivalent.
BB 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
BB 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
BB 401. UNDERGRADUATE RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
BB 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
BB 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

BB 405H. READING AND CONFERENCE (1-16) This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
BB 407. BIOCHEMISTRY/BIOPHYSICS SEMINAR (1-16). Informal seminars presenting information about research problems and careers and research programs on campus in biochemistry or biophysics. This course is repeatable for a maximum of 99 credits.

## BB 407H. BIOCHEMISTRY/BIOPHYSICS

SEMINAR (1-16). Informal seminars presenting information about research problems and careers and research programs on campus in biochemistry or biophysics. This course is repeatable for a maximum of 99 credits. PREREQS: Honors College approval required.

BB 410. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits.

BB 450. GENERAL BIOCHEMISTRY (4). Sequence course for students with a limited background in physical chemistry. BB 450/BB 550, three lectures and one recitation. BB 451/BB 551, three lectures. PREREQS: (CH 332 [D-] or CH 336 [D-] ) and BB 450 and BB 451 must be taken in order.

BB 451. GENERAL BIOCHEMISTRY (3).
Sequence course for students with a limited background in physical chemistry. BB 450/BB 550, three lectures and one recitation. BB 451/BB 551, three lectures. PREREQS: (BB 450 [D-] or BB 450H [D-] ) and BB 450 and BB 451 must be taken in order.

BB 460. ADVANCED CELL BIOLOGY (3). History and theory of cell biology; microscopy and ther techniques to study cells and organelles; membranes; organelles; protein import; cell signaling; cytoskeleton; polarity; cell cycle; stem cells; pattern formation; cancer biology PREREQS: BB 314 [C-] or BI 314 [C-] or BI 314H [C-] or BB 451 [C-] or BB 492 [C-]
BB 481. MACROMOLECULAR STRUCTURE (3). An introduction to structural biology, the discipline focused on understanding the structural properties of biological macromolecules--especially proteins and nucleic acids--and relating them to their function. Introduces students to the vocabulary and tools of this discipline, covering both the fundamental physico-chemical principles governing the structure and function of biological macromolecules and a selected set of widely used experimental and theoretical approaches to their characterization. This is done through lectures, and textbook and literature readings. Graduate students receive additional experience in scientific reading, writing and presentation through a literature-based term project. PREREQS: BB 450 [D-] or BB 490 [D-]
BB 482. BIOPHYSICS (3). Sequence professiona course covering quantitative properties of biological systems and biological phenomena using concepts derived from mathematics and physics. PREREQS: (BB 481 [D-] and CH 442 [D-] )

## BB 483. ADVANCED BIOCHEMISTRY

AND BIOPHYSICS: CAPSTONE (3).
Covers applications of advanced biophysical techniques, and how these fit within the larger context of biochemistry, biology and society. Explores techniques and their applications to macromolecules as well as the scientific process. Techniques discussed include in vitro, in vivo, and in silico methods, with an emphasis on biomolecular interactions. PREREQS: BB 482 [D-] or BB 582 [D-]
BB 484. CHROMATIN AND EPIGENETICS (3).
An in-depth look at "chromatin" (the complex generated by DNA, RNA and complex protein) and how it behaves during gene activation and silencing. Specific examples of long-lasting gene regulation (across cell cycles) will be used to describe the concept of "epigenetic" gene regulation by modification of DNA or proteins. The class will combine more traditional lectures with discussion periods where primary research papers will be analyzed. The target audience is third- and fourth-year students as well as graduate students. PREREQS: ((BI 314 [C-] or BI 314H [C-] or BB 314 [C-] or BB 314H [C-]) and (BI 315 [C-] or BB 315 [C-] or BB 493 [C-] or BB 493 H [C-] )) and prerequisites can be waived with instructor permission.
BB 485. APPLIED BIOINFORMATICS (3). The fundamentals of bioinformatics are presented, which will enable an understanding of the software and methods used in answering questions in bioinformatics. The student will gain a working knowledge of the bioinformatics analysis of contemporary techniques such as databases, gene and genome annotations, functional annotations, sequence alignment, motif finding,
secondary structure prediction, phylogenetic tree construction, high-throughput sequence data, ChIP-Seq peak identification, transcriptome profiling by RNA-Seq, microRNA discovery and target prediction. PREREQS: BI 314 [C-] or BI 314 H [C-] and /or equivalent or by instructor approval.

BB 486. ADVANCED MOLECULAR GENETICS
(3). Combines analyses of state-of-the-art primary literature with lectures that give a historical perspective on some of the most important "model" organisms used in biology, i.e. organisms that have been widely used to decipher the general "rules for life" on the planet. These include examples among the bacteria, plants, fungi, worms, flies and mammals. PREREQS: (BI 314 [C-] or BI 314 H [C-] or BB 314 [C-] ) and (BI 315 [C-] or BB 315 [C-] ) and BB 492 [D-] and prerequisites can be waived with instructor permission.
BB 490. BIOCHEMISTRY 1: STRUCTURE AND FUNCTION (3). Sequence professional course to meet the requirements of majors in biochemistry and biophysics. The first course in the series, BB 490/BB 590, covers how the structure and function of biological macromolecules arises from the organic chemistry of their fundamental building blocks. The organic chemistry of biochemistry will be a focus, including the mechanisms by which enzymes catalyze biological reactions. PREREQS: (CH 332 [C-] or CH 336 [C-] ) and BB 490, BB 491, BB 492 must be taken in order.
BB 491. BIOCHEMISTRY 2: METABOLISM (3). Sequence professional course to meet the requirements of majors in biochemistry and biophysics. The second course in a series, BB 491/BB 591 covers the mechanisms and regulation of the pathways by which cells break down fuel molecules, conserve some of the released energy in the form of reactive nucleotides, and use this energy to create biological building blocks from simpler metabolites PREREQS: (BB 490 [D-] or BB 590 [D-] )

## BB 492. BIOCHEMISTRY 3: GENETIC

 BIOCHEMISTRY (3). Sequence professional course to meet the requirements of majors in biochemistry and biophysics. The third course in the series, BB 492/BB 592 focuses on genetic biochemistry, including the synthesis of nucleotides, DNA synthesis and repair, RNA synthesis and processing, and protein synthesis and modification. PREREQS: (BB 490 [D-] or BB 590 [D-]) and (BB 491 [D-] or BB 591 [D-]) and BB 490/BB 590, BB 491/BB 591, and BB 492/BB 592 must be taken in order.
## BB 493. BIOCHEMISTRY LABORATORY

MOLECULAR TECHNIQUES 1 (3). Laboratory course to accompany BB 450, BB 451 or BB 490, BB 491, BB 492. Lec/lab. PREREQS: (BB 451 [D-] or BB 451H [D-] ) or BB 492 [D-]

BB 494. BIOCHEMISTRY LABORATORY MOLECULAR TECHNIQUES 2 (3). Laboratory to accompany BB 450, BB 451 or BB 490, BB 491, BB 492. Lec/lab. PREREQS: BB 493 [D-] or BB 593 [D-] or BB 315 [D-] or BI 315 [D-]

## BB 496. BIOCHEMISTRY LABORATORY

MOLECULAR MODELING (1). Introduces students from biochemistry and related fields to the fundamentals of computer-based analyses of protein structure and to hands-on manipulation of three-dimensional images. COREQS: BB 494
BB 497. BASIC NUCLEIC ACID AND PROTEIN SEQUENCE ANALYSIS (1). Course teaching students how to carry out computer-based analyses of nucleic acid and protein sequences. COREQS: BB 493

BB 498. ASBMB CERTIFICATION EXAM (0). A comprehensive, standardized test administered by the American Society of Biochemistry and Molecular Biology and used as a direct assessment of the discipline specific knowledge of seniors in the majors administered by the Biochemistry and Biophysics department. A pass
will be given to all students who complete the exam. Contact the Biochemistry and Biophysics Program for more information. PREREQS: Biochemistry and Biophysics major with senior standing.
BB 499. SPECIAL TOPICS (3).
BB 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
BB 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
BB 505. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
BB 507. SEMINAR (1-2). Section 1: Descriptions of campus research programs in biochemistry and biophysics, 1 credit fall. Graded P/N. Student presentations of current research literature, 1 credit winter and spring. Should be taken by all entering departmental graduate students. Section 2: Presentation of departmental research seminar, 2 credits any term. PhD candidates in biochemistry and biophysics present a departmental research seminar in the third or fourth year. One registers in the term the seminar is presented. This course is repeatable for a maximum of 16 credits.

BB 550. GENERAL BIOCHEMISTRY (4).
Sequence course for students with a limited background in physical chemistry. BB 450/BB 550, three lectures and one recitation. BB 451/BB 551 and BB 452, three lectures. PREREQS: CH 332. BB 550, BB 551 must be taken in order.

BB 551. GENERAL BIOCHEMISTRY (3).
Sequence course for students with a limited background in physical chemistry. BB 450/BB 550, three lectures and one recitation. BB 451/BB 551 and BB 452, three lectures. PREREQS: BB 550
BB 560. ADVANCED CELL BIOLOGY (3). History and theory of cell biology; microscopy and other techniques to study cells and organelles; membranes; organelles; protein import; cell signaling; cytoskeleton; polarity; cell cycle; stem cells; pattern formation; cancer biology PREREQS: BB 314 or BI 314 or BI 314 H or BB 492 or BB 451

BB 581. MACROMOLECULAR STRUCTURE
(3). An introduction to structural biology, the discipline focused on understanding the structural properties of biological macromolecules-especially proteins and nucleic acids--and relating them to their function. Introduces students to the vocabulary and tools of this discipline, covering both the fundamental physico-chemical principles governing the structure and function of biological macromolecules and a selected set of widely used experimental and theoretical approaches to their characterization. This is done through lectures, and textbook and literature readings. Graduate students receive additional experience in scientific reading, writing and presentation through a literature-based term project. PREREQS: BB 450 or BB 490

BB 582. BIOPHYSICS (3). Sequence professional course covering quantitative properties of biological systems and biological phenomena using concepts derived from mathematics and physics. PREREQS: BB 581 [C] and CH 442

## BB 583. ADVANCED BIOCHEMISTRY

## AND BIOPHYSICS: CAPSTONE (3).

Covers applications of advanced biophysical techniques, and how these fit within the larger context of biochemistry, biology and society. Explores techniques and their applications to macromolecules as well as the scientific process. Techniques discussed include in vitro, in vivo, and in silico methods, with an emphasis on biomolecular interactions. PREREQS: BB 582 [C]

## BB 584. CHROMATIN AND EPIGENETICS (3).

An in-depth look at "chromatin" (the complex generated by DNA, RNA and complex protein) and how it behaves during gene activation and silencing. Specific examples of long-lasting
gene regulation (across cell cycles) will be used to describe the concept of "epigenetic" gene regulation by modification of DNA or proteins. The class will combine more traditional lectures with discussion periods where primary research papers will be analyzed. The target audience is third- and fourth-year students as well as graduate students. PREREQS: (BI 314 or BI 314 H ) and BI 315. Prerequisites can be waived with instructor permission.
BB 585. APPLIED BIOINFORMATICS (3). The fundamentals of bioinformatics are presented, which will enable an understanding of the software and methods used in answering questions in bioinformatics. The student will gain a working knowledge of the bioinformatics analysis of contemporary techniques such as databases, gene and genome annotations, functional annotations, sequence alignment, motif finding, secondary structure prediction, phylogenetic tree construction, high-throughput sequence data, ChIP-Seq peak identification, transcriptome profiling by RNA-Seq, microRNA discovery and target prediction. PREREQS: BI 314 or BI 314 H or equivalent or by instructor approval.

## BB 586. ADVANCED MOLECULAR GENETICS

(3). Combines analyses of state-of-the-art primary literature with lectures that give a historical perspective on some of the most important "model" organisms used in biology, i.e. organisms that have been widely used to decipher the general "rules for life" on the planet. These include examples among the bacteria, plants, fungi, worms, flies and mammals. PREREQS: (BI 314 or BI 314 H ) and BI 315 and BB 492. Prerequisites can be waived with instructor permission.
BB 590. BIOCHEMISTRY 1: STRUCTURE AND FUNCTION (3). Sequence professional course to meet the requirements of majors in biochemistry and biophysics. The first course in the series, BB 490/BB 590, covers how the structure and function of biological macromolecules arises from the organic chemistry of their fundamental building blocks. The organic chemistry of biochemistry will be a focus, including the mechanisms by which enzymes catalyze biological reactions. PREREQS: (CH 332 or CH 336). BB 590, BB 591, BB 592 must be taken in order.

BB 591. BIOCHEMISTRY 2: METABOLISM
(3). Sequence professional course to meet the requirements of majors in biochemistry and biophysics. The second course in a series, BB 491/BB 591 covers the mechanisms and regulation of the pathways by which cells break down fuel molecules, conserve some of the released energy in the form of reactive nucleotides, and use this energy to create biological building blocks from simpler metabolites. PREREQS: BB 590 [C] and /or BB 490
BB 592. BIOCHEMISTRY 3: GENETIC BIOCHEMISTRY (3). Sequence professional course to meet the requirements of majors in biochemistry and biophysics. The third course in the series, BB 492/BB 592 focuses on genetic biochemistry, including the synthesis of nucleotides, DNA synthesis and repair, RNA synthesis and processing, and protein synthesis and modification. PREREQS: BB 590 [C] and BB 591 [C] and BB 590, BB 591, and BB 592 must be taken in order.

## BB 593. BIOCHEMISTRY LABORATORY

MOLECULAR TECHNIQUES 1 (3). Laboratory course to accompany BB 450, BB 451 or BB 490, BB 491, BB 492. Lec/lab. PREREQS: (BB 451 or BB 451H) or BB 492

## BB 594. BIOCHEMISTRY LABORATORY

MOLECULAR TECHNIQUES 2 (3). Laboratory to accompany BB 450, BB 451 or BB 490, BB 491, BB 492. Lec/lab. PREREQS: BB 493 or BB 593 or BB 315 or BI 315

BB 596. BIOCHEMISTRY LABORATORY
MOLECULAR MODELING (1). A course to introduce students from biochemistry and related fields to the fundamentals of computer-based analyses of protein structure and to hands-on manipulation of three-dimensional images. COREQS: BB 594

BB 597. BASIC NUCLEIC ACID AND PROTEIN SEQUENCE ANALYSIS (1). Course teaching students how to carry out computer-based analyses of nucleic acid and protein sequences. COREQS: BB 593
BB 599. SPECIAL TOPICS (3).
BB 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
BB 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.

BB 605. READING \& CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.

BB 607. SEMINAR (1-2). Section 1: Descriptions of campus research programs in biochemistry and biophysics, 1 credit fall. Graded P/N. Student presentations of current research literature, 1 credit winter and spring. Should be taken by all entering departmental graduate students Section 2: Presentation of departmental research seminar, 2 credits any term. PhD candidates in biochemistry and biophysics present a departmental research seminar in the third or fourth year. One registers in the term the seminar is presented. This course is repeatable for a maximum of 16 credits.
BB 650. SELECTED TOPICS IN BIOCHEMISTRY AND BIOPHYSICS (3). Nonsequence courses designed to acquaint student with current research in biochemistry and biophysics. Courses include enzyme kinetics, cell cycle and cancer, neurochemistry, oxidative stress, cell adhesion and motility. Most courses offered alternate years. This course is repeatable for a maximum of 18 credits.
BB 651. SELECTED TOPICS IN BIOCHEMISTRY AND BIOPHYSICS (3). Nonsequence courses designed to acquaint student with current research in biochemistry and biophysics. Courses include cell surfaces, enzyme kinetics, metabolism, neurochemistry, trace element metabolism, biological oxidations, and bioenergetics. Most courses offered alternate years. This course is repeatable for a maximum of 18 credits.

BB 652. SELECTED TOPICS IN BIOCHEMISTRY AND BIOPHYSICS (3). Nonsequence courses designed to acquaint student with current research in biochemistry and biophysics. Courses include enzyme kinetics, metabolism, neurochemistry, trace element metabolism, biological oxidations, and bioenergetics. Most courses offered alternate years. This course is repeatable for a maximum of 18 credits.
BB 662. HORMONE ACTION (3). Mechanisms of action of peptide and steroid hormones and related compounds at the cellular level. CROSSLISTED as ANS 662, MCB 662. PREREQS: BB 551 [C] or BB 592 [C]

## SCHOOL OF LIFE SCIENCES <br> DEPARTMENT OF <br> INTECRATIVE BIOLOCY

## Virginia M. Weis, Head

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## FACULTY

Professors Arnold, Blaustein, Blouin, De Leenheer, Giebultowicz, Hacker, Lubchenco, Lytle, Maddison, Mason, Menge, Sponaugle, Taylor, Weis
Associate Professors Chan, Denver, Jolles, Warrick
Assistant Professors Barreto, Burke, Dalziel, Grorud-Colvert, Henkel, Meyer, Milligan, Novak, Strother, Tennessen, Terry
Senior Instructors 2 Blair, Lavery
Senior Instructors 1 Cheung, Kayes, Quick
Instructors Biga, Bouwma, Kirk, Landys, Pepe, Rose
Professional Faculty Duncan, LeongKee, Marshall, McLeod, Olarra

## Undergraduate Majors

Biology (BS, HBS)

## Options <br> Ecology

Genetics
Marine Biology
Physiology and Biology
Pre-Dentistry/Biology
Pre-Education
Pre-Medicine/Biology
Pre-Veterinary Medicine
Zoology (BS, CRED, HBS)

## Minors

Biology
Marine Biology and Ecology

## Graduate Major

Integrative Biology (MS, PhD)
Graduate Areas of Concentration
Behavioral Ecology
Behavioral Endocrinology
Cell Biology
Chemical Ecology
Conservation Biology
Developmental Biology
Evolutionary Biology
Genetics
Genomics
Host-Microbe Interactions

Marine Ecology<br>Paleontology<br>Physiology<br>Population Biology

## Graduate Minor <br> Integrative Biology

The Department of Integrative Biology (IB) is part of the School of Life Sciences and receives support for its academic program from the College of Science. In addition to the faculty's activities in research and service, it has teaching responsibilities in the Biology and Zoology majors and Biology minor, as well as courses taken by nearly every undergraduate major at Oregon State University (OSU).

## UNDERGRADUATE DEGREES

IB offers undergraduate BS degrees in Biology and Zoology. The undergraduate Biology major was created for students who wish to obtain broad, interdisciplinary training in the biological sciences. Biology is a common destination for students interested in health professions and provides excellent training for graduate programs in the life sciences. It also offers undergraduate options in Ecology, Genetics, Marine Biology, PreDentistry, Pre-Education, Pre-Medicine, and Pre-Veterinary Medicine. The Zoology major prepares students for a wide range of careers from animal care to research. Both majors benefit from the wealth of departmental course offerings and faculty field and laboratory research. Because of the interdisciplinary nature of the program, students majoring in Biology or Zoology cannot seek a dual major or double degree in both majors or in the BioHealth Sciences and Fisheries and Wildlife majors.

## GRADUATE DEGREES

IB is a vertically integrated department with an internationally recognized graduate program. Faculty work at the level of the cell, organism, and community and have expertise in areas of behavioral ecology, marine biology and ecology, disease ecology, evolutionary biology, conservation biology, environmental physiology, population genetics, genomics, chemical ecology, cell and developmental biology, symbiosis and paleobiology. Detailed information on the graduate faculty and program is available from the Department of Integrative Biology website. IB offers MS and PhD degrees.

## DEPARTMENTAL REQUIREMENT

## Biology Major Field Test

Biology and Zoology majors are required to take a comprehensive, two-hour Biology Major Field Test in order to graduate.

For further information, go to http:// ib.oregonstate.edu/advising/MFT-info.

## UNDERGRADUATE MAJORS AND OPTIONS

## BIOLOGY (BS, HBS)

Also available at OSU-Cascades campus.
The undergraduate BS degree in Biology is designed for students seeking an interdisciplinary background in the life sciences. The major couples a comprehensive biological, physical and quantitative sciences core with a variety of electives that can be catered to meet specific professional goals. Biology majors receive excellent training for graduate and professional programs.
Corvallis Campus students may choose to complete one transcript-visible option in Ecology, Genetics, Marine Biology, PreDentistry/Biology, Pre-Education Biology, Pre-Medicine/Biology, or Pre-Veterinary Medicine. Options in the Biology major require fifteen or fewer additional credits (one term) beyond the basic Biology major and most students can complete the additional course work in four years.

Students in the Biology major must complete BI 211 or BI 211 H, BI 212 or BI 212 H , and BI 213 or BI 213 H with a Cor better to continue on to upper-division Biology (BI) and Zoology (Z) course work. Students must also complete CH $231 / 261$, CH $232 / 262$ or CH $233 / 263$ and CH 331 with a C- or better to continue on to upper-division Chemistry (CH) course work.
Students majoring in Biology cannot seek a dual or double major in Biochemistry and Biophysics, Biochemistry and Molecular Biology, Biohealth Sciences, Microbiology or Zoology.

The BI 197 or 198 seminar must be completed by all first-year students. The BI 298 Integrated Professional Development I: Life Sciences must be completed by all Corvallis campus students.

The major sections and courses within them are arranged in the order they are generally completed.
For further information, see MyDegrees or the Integrative Biology website at http://ib.oregonstate.edu.
Biology Core Courses (103-107 credits)

## Biology Seminars

BI 197. Biology Pre-Health First-Year Seminar (1)
or BI 198. Biology and Zoology First-Year Seminar (1)
BI 298. Integrated Professional
Development: Life Sciences I (1)

## Baccalaureate Core

Communications
Select one of the following:
COMM 111. *Public Speaking (3)

COMM 218. *Interpersonal communication
(3) (for pre-health students except veterinary medicine)
Baccalaureate Core Writing II
Select one of the following (HC 199,
WR 327 or WR 362 recommended):
HC 199. *Honors Writing (3)
WR 222. *English Composition (3)
WR 327. *Technical Writing (3)
WR 362. *Science Writing (3)
Mathematics and Statistics Core
MTH 251. *Differential Calculus (4) and MTH 252. Integral Calculus (4)
or MTH 227. *Mathematics for the Life Sciences: Calculus, Probability and Linear Algebra (4) and MTH 228. *Mathematics for the Life Sciences: Calculus, Probability and Linear Algebra (4)
ST 351. Introduction to Statistical Methods (4)

ST 352. Introduction to Statistical Methods (4)
or ST 411, ST 412. Methods of Data
Analysis $(4,4)$ (alternative series is ST 351 , 411 and 412)

## Chemistry and Physics Core

CH 231, CH 232, CH 233. *General Chemistry $(4,4,4)$
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233 (1,1,1)
CH 331, CH 332 Organic Chemistry $(4,4)$ and CH 337. Organic Chemistry Laboratory (4)
PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
BB 450, BB 451. General Biochemistry $(4,3)$

## Biological Sciences Core

Biology students must complete the BI 211, BI 212, BI 213 or BI 211 H, BI 212 H , BI 213 H with a C- or better to continue on to take upper-division Biology (BI) and Zoology (Z) course work. These courses are arranged in the order they are generally taken.
BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
BI 370. Ecology (3)
BI 311. Genetics (4)
BB 314. Cell and Molecular Biology (4)
BI 445. Evolution (3)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

## BI 498 Senior Biology Major Field Test (0 credits)

Biology majors are required to take a comprehensive, two-hour Biology Major Field Test their final OSU term (or spring term if they will graduate in summer) in order to graduate: BI 498. Senior Biology Major Field Test (0 credits). For further information, go to http://ib.oregonstate. edu/advising/MFT-info.

## Biology Electives (19-28 credits)

Declaring an option will alter the elective categories below, and all options automatically clear the Upper-division Science Electives requirement. See the individual options or MyDegrees for details. Biology and Society electives also
count as baccalaureate core courses.
Biology and Society
Select one course from the following or see option:
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
BB 331. *Introduction to Molecular Biology (3)

BB 332. *Molecular Medicine (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 345. *Introduction to Evolution (3)
BI 347. *Oceans in Peril (3)
BI 348. *Human Ecology (3)
BI 420. *Viruses in Modern Society (3)
BOT 324. *Fungi in Society (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FW 350. *Endangered Species, Society and Sustainability (3)
H 312. *HIV/AIDS and STIS in Modern Society (3)
HSTS 416. *History of Medicine Pre-1800 (4)
MB 330. *Disease and Society (3)
PHL/REL 443. *World Views and
Environmental Values (3)
Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)

## Organismal Biology

Select one course from the following or see option:
BOT 313. Plant Structure (4)
BOT 321. Plant Systematics (4)
BOT 416. Aquatic Botany (4)
BOT 461. Mycology (5)
Z 361. Invertebrate Biology (3)
and Z 362. Invertebrate Biology
Laboratory (2)
Z 365. Biology of Insects (4)
Z 371. Vertebrate Biology (3)
and Z 372. Vertebrate Biology Laboratory (2)

Z 422. Comparative/Functional Vertebrate Anatomy (5)
Z 461. Marine and Estuarine Invertebrate Zoology (4) (Taught at Hatfield Marine Science Center)
Z 477. Aquatic Entomology (4)

## Physiology

Select one course from the following or see option:
BOT 331. Plant Physiology (4)
BOT 332. Laboratory Techniques in Plant Biology (3)
BOT 488. Environmental Physiology of Plants (3)
Z 423. Environmental Physiology (3)
Z 425. Embryology and Development (5)
Z 431. Vertebrate Physiology I (3)
Z 432. Vertebrate Physiology II (3)
Z 440. Insect Physiology (3)
Writing Intensive Course (WIC)
Select one course the following or see option:
BB/BI 317. ${ }^{\wedge}$ Scientific Theory and Practice (3)

BI 306. *^Environmental Ecology (3)
BI/Z 319. ${ }^{\wedge}$ Critical Thinking and
Communication in the Life Sciences (3)
BI 371. ${ }^{\wedge}$ Ecological Methods (3)
BI 373. ${ }^{\wedge}$ Field Methods in Marine Ecology (3)

BI/MB 385. ^Emerging Infectious Disease and Epidemics (3)
BI 388. ${ }^{\wedge}$ Special Topics in Biology (3)
BOT 323. ${ }^{\wedge}$ Flowering Plants of the World (3)
HSTS 415. *^Theory of Evolution and
Foundation of Modern Biology (4)
PHL 474. ${ }^{\wedge}$ Philosophy of Biology (4)

## Upper-division Science Electives (complete an option or two of the three tracks below):

Track I Integrative Biology Course (select one course):
BI 358. Symbiosis and the Environment (3)
BI 375. Field Methods in Ecological
Restoration (5) (OSU Cascades)
BI 427. Paleobiology (4)
BI 456. Phylogenetics (4)
BI 481. Biogeography (3)
BI 483. Population Biology (3)
BI 495. Disease Ecology (3)
MB 480. General Parasitology (3)
Z 350. Animal Behavior (3)
Z 361. Invertebrate Biology (3)
and Z 362. Invertebrate Biology
Laboratory (2) [If not used above.]
Z 371. Vertebrate Biology (3)
and Z 372. Vertebrate Biology Laboratory
(2) [If not used above.]

Z 425. Embryology and Development (5) [If not used above.]
Z 437. Vertebrate Endocrinology (4)
Z 438. Behavioral Neurobiology (3)
Z 461. Marine and Estuarine Invertebrate
Zoology (4) (Hatfield Marine Science
Center) (if not used above)
Z 475. Insect Biodiversity Survey (4)
Track II Experiential Credits (complete
any combination of three credits of the
following):
BI 309. Teaching Practicum (1-3 credits) by approval
BI 401. Research and Scholarship (1-3 credits) -by approval
BI 406. Projects: Curatorial Assistant (1-3 credits) -by approval
BI 409. Advanced Teaching Practicum (1-3 credits) -by approval
BI 410. Internship (1-3 credits) -by approval or international internships approved by the Biology Chief Advisor

## Track III Upper-division Science Elective

Course (select one course):
Select an additional 3+ credit, 300-400 level course from the College of Science
(BB, BHS, BI, BOT, CH, MB, MTH, PH, ST, Z) not used to complete other major requirements. Some courses are excluded (see below). Science courses outside of COS and courses and internships completed internationally may be used by Biology Chief Advisor approval. Courses from other majors, minors or Baccalaureate Core Synthesis requirements not used to meet other major requirements may also be used.

EXCLUDED COURSES: 401-410 credits (except as outlined above or by approval), BB 350 , BB $490-$ BB 492, BI 331-BI 333, BI 341-BI 343, CH 334, CH 335, CH 336, ST 314, Z 331-Z 333, Z 341, Z 343, Z 361/Z 362, Z 461 and any 399 or 499 courses not specifically approved by
the Biology Chief Advisor.

## Total=180

Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)


## SAMPLE FOUR-YEAR PLANS:

## BIOLOGY

Biology - TRACK I
Year 1
Fall (15)
BI 197 Biology Pre-Health First-Year Seminar (1)
or BI 198. Biology and Zoology First-Year Seminar (1)
CH 231. *General Chemistry (4) and CH
261. Laboratory for Chemistry 231 (1)

MTH 111. *College Algebra (4)
or MTH 112. *Elementary Functions (4)
Bacc Core (3)
PAC Course (1-2)
or HHS 231. *Lifetime Fitness for Health (2)
Winter (15)
CH 232. *General Chemistry (4) and CH
262. Laboratory for Chemistry 232 (1)

MTH 112. *Elementary Functions (4)
Bacc Core (3)
Bacc Core (3)
Spring (16)
BI 298. Integrated Professional Development: Life Sciences I (1)
CH 233. *General Chemistry (4) and CH
263. Laboratory for Chemistry 233 (1)

MTH 251. *Differential Calculus (4) or MTH 227. *Calculus and Probability for the Life Sciences I (4)
Bacc Core (3)
Bacc Core (3)

## Year 2

## Fall (15)

BI 211. *Principles of Biology (4)
CH 331. Organic Chemistry (4)
MTH 252. *Integral Calculus (4) or MTH 228. Calculus and Probability for the Life Sciences II (4)
Bacc Core (3)
Winter (15)
BI 212. *Principles of Biology (4)
CH 332. Organic Chemistry (4)
ST 351. Introduction to Statistical Methods (4)

Bacc Core (3)

## Spring (15)

BI 213. *Principles of Biology (4)
CH 337. Organic Chemistry Laboratory (4)
ST 352. Introduction to Statistical Methods (4)

## Bacc Core (3)

## Year 3

Fall (15)
BB 450. General Biochemistry (4)
BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
PH 201. *General Physics (5)
Bacc Core (3)

## Winter (14)

BB 451. General Biochemistry (3)

BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4) or BI 370. Ecology (3)
PH 202. *General Physics (5)
Bacc Core (3)

## Spring (14)

BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
or BI 445. Evolution (3)
PH 203. *General Physics (5)
Biology and Society (3)
or Organismal Biology (3)
or Physiology (3)
or Writing Intensive Course (3)
Bacc Core (3)

## Year 4

Fall (11)
BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
or BI 445. Evolution (3)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

Biology and Society (3)
or Organismal Biology (3)
or Physiology (3)
or Writing Intensive Course (3)

## Winter (6)

Biology and Society (3)
or Organismal Biology (3)
or Physiology (3)
or Writing Intensive Course (3)
Upper-Division Science Elective (3)

## Spring (3)

BI 498. Senior Biology Field Test (0)
Upper-Division Science Elective (3)
Add electives to reach 180 credits by graduation.

## Biology - TRACK II

Year 1
Fall (15)
BI 197 Biology Pre-Health First-Year Seminar (1)
or BI 198. Biology and Zoology First-Year Seminar (1)
BI 211. *Principles of Biology (4)
CH 231. *General Chemistry (4) and CH
261. Laboratory for Chemistry 231 (1)

Bacc Core (3)
PAC Course (1-2)
or HHS 231. *Lifetime Fitness for Health (2)

## Winter (16)

BI 212. *Principles of Biology (4)
CH 232. *General Chemistry (4) and CH
262. Laboratory for Chemistry 232 (1)

Bacc Core (3)
Bacc Core (3)

## Spring (17)

BI 298. Integrated Professional
Development: Life Sciences I (1)
BI 213. *Principles of Biology (4)
CH 233. *General Chemistry (4) and CH
263. Laboratory for Chemistry 233 (1)

MTH 251. *Differential Calculus (4)
or MTH 227. *Calculus and Probability for
the Life Sciences I (4)
Bacc Core (3)

## Year 2

Fall (12)
CH 331. Organic Chemistry (4)
PH 201. *General Physics (5)
MTH 252. *Integral Calculus (4) or MTH 228. Calculus and Probability for the Life Sciences II (4)
Bacc Core (3)

## Winter (15)

BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
CH 332. Organic Chemistry (4)
PH 202. *General Physics (5)
Bacc Core (3)

## Spring (14)

BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4) or BI 370. Ecology (3)
CH 337. Organic Chemistry Laboratory (4)
PH 203. *General Physics (5)
Bacc Core (3)

## Year 3

## Fall (15)

BB 450. General Biochemistry (4)
BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
or BI 445. Evolution (3)
ST 351. Introduction to Statistical Methods (4)

Bacc Core (3)

## Winter (14)

BB 451. General Biochemistry (3)
BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4) or BI 370. Ecology (3)
or BI 445. Evolution (3)
ST 352. Introduction to Statistical Methods (4)

Bacc Core (3)

## Spring (14)

BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
or BI 445. Evolution (3)
Biology and Society (3)
or Organismal Biology (3)
or Physiology (3)
or Writing Intensive Course (3)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

Bacc Core (3)

## Year 4

Fall (11)
Biology and Society (3)
or Organismal Biology (3)
or Physiology (3)
or Writing Intensive Course (3)
Bacc Core (3)

## Winter (6)

Biology and Society (3)
or Organismal Biology (3)
or Physiology (3)
or Writing Intensive Course (3)
Upper-Division Science Elective (3)

## Spring (3)

BI 498. Senior Biology Field Test (0)
Biology and Society (3)
or Organismal Biology (3)
or Physiology (3)
or Writing Intensive Course (3)
Upper-Division Science Elective (3)
Add electives to reach 180 credits by graduation.

## Biology - TRACK III

Year 1
Fall (15)
BI 211. *Principles of Biology (4)
BI 197 Biology Pre-Health First-Year Seminar (1)
or BI 198. Biology and Zoology First-Year Seminar (1)
CH 231. *General Chemistry (4) and CH
261. Laboratory for Chemistry 231 (1)

## Bacc Core (3)

PAC Course (1-2)
or HHS 231. *Lifetime Fitness for Health (2)

## Winter (16)

BI 212. *Principles of Biology (4)
CH 232. *General Chemistry (4) and CH
262. Laboratory for Chemistry 232 (1)

Bacc Core (3)
Bacc Core (3)

## Spring (17)

BI 213. *Principles of Biology (4)
BI 298. Integrated Professional Development: Life Sciences I (1)
CH 233. *General Chemistry (4) and CH
263. Laboratory for Chemistry 233 (1)

MTH 251. *Differential Calculus (4)
or MTH 227. *Calculus and Probability for the Life Sciences I (4)
Bacc Core (3)

## Year 2

Fall (15)
BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
or BI 445. Evolution (3)
CH 331. Organic Chemistry (4)
MTH 252. *Integral Calculus (4)
or MTH 228. Calculus and Probability for the Life Sciences II (4)
Bacc Core (3)

## Winter (14)

BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
or BI 445. Evolution (3)
CH 332. Organic Chemistry (4)
ST 351. Introduction to Statistical Methods (4)

Bacc Core (3)

## Spring (14)

BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
or BI 445. Evolution (3)
CH 337. Organic Chemistry Laboratory (4)
ST 352. Introduction to Statistical Methods (4)

Bacc Core (3)
Year 3
Fall (15)
BB 450. General Biochemistry (4)
BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
or BI 445. Evolution (3)
PH 201. *General Physics (5)
Bacc Core (3)

## Winter (14)

BB 451. General Biochemistry (3)
PH 202. *General Physics (5)
Biology and Society (3)
or Organismal Biology (3)
or Physiology (3)
or Writing Intensive Course (3)
Bacc Core (3)

## Spring (13)

MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)
PH 203. *General Physics (5)
Biology and Society (3)
or Organismal Biology (3)
or Physiology (3)
or Writing Intensive Course (3)

## Year 4

Fall (3)
Biology and Society (3)
or Organismal Biology (3)
or Physiology (3)
or Writing Intensive Course (3)

## Winter (6)

Biology and Society (3)
or Organismal Biology (3)
or Physiology (3)
or Writing Intensive Course (3)
Upper-Division Science Elective (3)

## Spring (3)

BI 498. Senior Biology Field Test (0)
Upper-Division Science Elective (3)
Add electives to reach 180 credits by graduation.
Major Code: 509

## OPTIONS

## ECOLOGY OPTION

The Biology major Ecology option is designed to provide students with a strong background in the theory and applications of ecology and environmental studies. It couples the core biological sciences background from the Biology major with required ecology, conservation, field methods, and environmental policy course work. A variety or upperdivision ecology and organismal biology electives can be chosen based on individual interests. Undergraduate research and internship experience are strongly recommended for option students, and three credits can be applied to the Electives. The Ecology option provides excellent preparation for graduate programs in ecology.

Options in the Biology major require

15 or fewer additional credits (one term) beyond the basic Biology major, and most students can complete the additional Ecology option course work in four years. Courses used to satisfy the Ecology option requirements also satisfy the Biology and Society, Organismal Biology, Physiology, Writing Intensive Course and Upper-division Science Elective requirements for the Biology major.

It is recommended that Ecology option students take ST 411 and ST 412, Methods of Data Analysis, in place of ST 352, Introduction to Statistical Methods, for the major statistics requirement.

Several Ecology option courses may also be used to satisfy areas of the baccalaureate core, and it is recommended that students take COMM 111, *Public Speaking (3), to complete the Biology major baccalaureate core communications requirement.

For further information, see My-
Degrees or the Integrative Biology web-
site at http://ib.oregonstate.edu.

## Plant Organismal Biology

Select one course from the following:
BOT 321. Plant Systematics (4)
BOT 416. Aquatic Botany (4)
RNG 353. Wildland Plant Identification (4)

## Animal Organismal Biology

Select one course from the following:
Z 361. Invertebrate Biology (3)
and Z 362. Invertebrate Biology Laboratory (2)

Z 371. Vertebrate Biology (3)
and Z 372. Vertebrate Biology Laboratory (2)

Z 477. Aquatic Entomology (4)

## Ecological Methods/Writing

## Intensive Course (WIC)

BI 371. ${ }^{\wedge}$ Ecological Methods (3) or BI 373. ${ }^{\wedge}$ Field Methods in Marine Ecology (3)

## Behavior and Physiological Ecology

Z 350. Animal Behavior (3)
Z 423. Environmental Physiology (3) or BOT 488. Environmental Physiology of Plants (3)

## Population Ecology

Select one course from the following:
BI 483. Population Biology (3)
BOT 442. Plant Population Ecology (3)
FW 320. Introductory Population Dynamics (4)

Community and Ecosystem Ecology
Select one course from the following:
BI 306. *^Environmental Ecology (3)
BI 351. Marine Ecology (3)
BI 481. Biogeography (3)
FES 341. Forest Ecology (3)
FW 321. Applied Community and
Ecosystem Ecology (3)
FW 456. Limnology (5)
FW 479. Wetlands and Riparian Ecology (3)
GEO 484. Introduction to Biogeochemistry (3)

OC/FW 434. Estuarine Ecology (4)

## Conservation and Human Impacts

Select one course from the following:
BI 301. *Human Impacts on Ecosystems (3)
BI 348. *Human Ecology (3)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)

## Environmental Policy

Select one course from the following:
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FOR 462. Natural Resource Policy and Law (3)

FW 350. *Endangered Species, Society and Sustainability (3)
FW 415. Fisheries and Wildlife Law and Policy (3)
PS 475. Environmental Politics and Policy (4)
Upper-division Electives (Select
two courses or one course and
three experiential learning credits):
Track I. Ecology Elective Course(s)
Select one or two courses from below:
BI 358. Symbiosis and the Environment (3)
BI 375. Field Methods in Ecological
Restoration (5) (taught at Cascades)
BI/FW 421. Aquatic Biological Invasions (4)
BI 427. Paleobiology (4)
BI 481. Biogeography (3) (if not taken above)
BI 483. Population Biology (3) (if not taken above)
BI 495. Disease Ecology (3)
BOT 341. Plant Ecology (4)
CH 390. Environmental Chemistry (3)
ENT 420. Insect Ecology (3)
FES/FW 452. Biodiversity Conservation in Managed Forests (3)
or FW 458. Mammal Conservation and Management (4)
or HORT 318. ^Applied Ecology of Managed Ecosystems (3)
FES/FW 445. Ecological Restoration (3)
FW 462. Ecosystem Services (3)
MB 448. Microbial Ecology (3)
ST 435. Quantitative Ecology (3)
Z 475. Insect Biodiversity Survey (4)
Track II. Experiential Learning Credits
Complete any combination of three credits of the following if taking only one course above:
BI 401. Research and Scholarship (1-3 credits) -by approval
BI 406. Projects: Curatorial Assistant (1-3 credits) -by approval
BI 410. Internship (1-3 credits) -by approval or international internships approved by the Biology Chief Advisor

## Total=34-42 credits

Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 715


## GENETICS OPTION

The Biology major Genetics option is designed to provide a solid background in genetic theory and methods, as well as their application to evolutionary questions. Option students couple the core biological sciences background from the Biology major with genetics laboratoryintensive course work in addition to electives in the areas of evolutionary genetics and bioinformatics. Undergraduate research or internship experience is strongly recommended for option students, and three credits can be applied to the Upper-division Science Elective requirements. The Genetics option is an excellent way to prepare for graduate programs in genetics and evolutionary biology.

Options in the Biology major require fifteen or fewer additional credits (one term) beyond the basic Biology major, and most students can complete the additional course work in the Genetics option in four years.
Courses used to satisfy the Genetics option requirements also satisfy the Physiology, Writing Intensive and Upperdivision Science Elective requirements for the Biology major.

The statistics courses in the Genetics option also complete half of the Biology major statistics requirement (ST 352).
It is recommended that Genetics option students take COMM 111, *Public Speaking (3), to complete the Biology major baccalaureate core communications requirement.

For further information, see MyDegrees or the Integrative Biology website at http://ib.oregonstate.edu.

## Core ( 22 credits)

BB/BI 315. Molecular Biology Laboratory (3)
or BB 493 Biochemistry Laboratory
Molecular Techniques 1 (3) (BB/BI 315 recommended)
BB 494. Biochemistry Laboratory Molecular
Techniques 2 (3)
BI 483. Population Biology (3)
ST 411, ST 412. Methods of Data Analysis
$(4,4)$ (following completion of ST 351)
Z 425. Embryology and Development (5)

## Writing Intensive Course

Select one course from the following:
BB/BI 317. ^Scientific Theory and Practice (3)
BI/Z 319. ${ }^{\wedge}$ Critical Thinking and
Communication in the Life Sciences (3)

## Evolutionary Genetics Elective

Select one course from the following:
BB 486. Advanced Molecular Genetics (3)
BI 456. Phylogenetics (4)
BOT 460. Functional Genomics (3)
BOT 475. Comparative Genomics (4)

## Bioinformatics

Select one course from the following:
BB 485. Applied Bioinformatics (3)
BOT 476. Introduction to Computing in the Life Sciences (3)

## Upper-Division Elective (complete one of the tracks below) <br> Track I Experiential Learning Credits <br> (complete any combination of three credits of the following): <br> BI 401. Research and Scholarship (1-3 <br> credits) -by approval <br> BI 410. Internship (1-3 credits) -by approval or international internships approved by the Biology Chief Advisor

Track II Science Course (select one course): One 3+ credit, 300-400 level course from the College of Science (BB, BHS, BI, BOT, CH, MB, MTH, PH, ST, and Z) may be used to meet this requirement with the exception of the courses listed below as excluded. Students who do not complete BI 315 Molecular Biology Laboratory as part of the Genetics option must take a qualifying WIC course which can be used to meet this requirement. Other science courses outside of College of Science and courses taken internationally may be used by biology chief advisor approval. Courses from other majors, minors or baccalaureate core requirements not used to meet requirements above may also be used.

EXCLUDED COURSES: 401-410 credits (except as outlined above or by approval), BB 350, BB 490-BB 492, BI 331-BI 333, BI 341-BI 343, CH 334, CH 335, CH 336, ST 314, Z 361/Z 362, Z 461 and any 399 or 499 courses not specifically approved.

## Total=28-29 credits

## Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course (WIC)


## Option Code: 517

## MARINE BIOLOGY OPTION

The Marine Biology option is designed to give students a strong background in the biology of marine organisms and their habitats. The core biological sciences background of the Biology major is coupled with field and laboratory course work in marine biology, ecology, conservation, and oceanography. The option emphasizes research and includes experiential courses completed in residence at the OSU Hatfield Marine Science Center in Newport, Oregon. Additional research or internship experience is strongly recommended for option students, and three credits can be applied to the option electives. The Marine Biology option provides excellent preparation for graduate programs in marine biology. Students completing the Marine Biology option cannot seek the Marine Biology and Ecology minor.
Options in the Biology major require 15 or fewer additional credits (one term) beyond the basic Biology major, and most students can complete the additional Marine Biology option course work in four years. At least one term in residence at Hatfield Marine Science

Center is required (spring). Courses used to satisfy the Marine Biology option also satisfy the Biology and Society, Organismal Biology, Physiology, Writing Intensive Course and the Upper-division Science Electives in the Biology major.
The Marine Biology option requires acceptance into the BI 450 Marine Biology and Ecology course, which is typically taken spring term of junior year at Hatfield Marine Science Center. The course covers marine invertebrates, algae and fishes, as well as sections on marine ecology, conservation and policy. Students apply to, and are accepted, the fall term before the spring they plan to attend. Applications are available in the Integrative Biology office in Cordley Hall 3029.
It is recommended that Marine Biology option students take COMM 111 *Public Speaking (3) to complete the Biology major baccalaureate core communications requirement.

For further information, see MyDegrees or the Integrative Biology website at http://ib.oregonstate.edu.

## Core

BI 150. Introduction to Marine Biology (3) or select an additional upper-division marine elective below
BI $4500^{\wedge}$ Marine Biology and Ecology (15) (Admission by application only) (Taught at Hatfield Marine Science Center)
OC 201. *Oceanography (4)
OC 440. Introduction to Biological
Oceanography (4) (recommended)
or OC/FW 434. Estuarine Ecology (4)
Z 423. Environmental Physiology (3)
Oceans and Society (select one course from the following):
AEC 353. Introduction to Coastal and
Marine Resource Economics (3)
BI 347. *Oceans in Peril (3)
OC 333. Oceans, Coasts and People (3)

## Upper-division Elective

Complete one of the tracks below. If you did not complete BI 150, Introduction to Marine Biology, above, select a Marine Elective Course to replace it.

## Track I Marine Elective Course

## Select one course:

BI/FW 302. Biology and Conservation of Marine Mammals (4) (Taught at Hatfield Marine Science Center) (FW 301 lab is optional but recommended)
BI 358. Symbioses and the Environment (3)
BI/FW 421. Aquatic Biological Invasions (4)
(Taught at Hatfield Marine Science Center)
FW 316. Systematics of Fishes (3)
or FW 472. Advanced Ichthyology (3)
FW 331. Ecology of Marine and Estuarine
Birds (4) (Taught at Hatfield Marine
Science Center)
FW/BI 464. Marine Conservation Biology (3)
FW 469. Methods in the Physiology and
Behavior of Marine Megafauna (3) (Taught
at Hatfield Marine Science Center)
FW 476. Fish Physiology (4)
MB 314. Aquatic Microbiology (3)

Track II Experiential Learning Credits Complete any combination of three credits of the following:
BI 401. Research and Scholarship (1-3 credits) (By approval)
BI 406. Projects: Curatorial Assistant (1-3 credits) (By approval)
BI 410. Internship (1-3 credits) - by approval

## Total 35-36 credits

Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 572


## PHYSIOLOGY AND BEHAVIOR OPTION

The Biology major Physiology and Behavior option is designed to provide a rigorous foundation in the comparative physiology and behavior of animals. Core biological sciences from the Biology major are coupled with course work in behavior, physiology and organismal biology. Undergraduate research or internship experience is strongly recommended for option students, and three credits can be applied to the electives for the option. The Physiology and Behavior option provides excellent preparation for graduate programs in animal behavior, physiology and other areas of organismal biology.
Options in the Biology major require fifteen or fewer additional credits (one term) beyond the basic Biology major, and most students can complete the additional course work in the Physiology and Behavior option in four years. Courses used to satisfy the Physiology and Behavior option requirements also satisfy the Organismal Biology, Physiology, Writing Intensive Course and Upperdivision Science Elective requirements for the Biology major.
Students may pursue either the Physiology and Behavior, Pre-Dental, Pre-Medical or Pre-Veterinary Medicine options with the Biology major-no dual combinations are permitted.

It is recommended that Physiology and Behavior option students take COMM 111, *Public Speaking (3), to complete the Biology major Baccalaureate Core communications requirement. Students should also consider taking PSY 202, General Psychology (3), which is optional but required for some of the Psychology elective courses.
For further information, see MyDegrees or the Integrative Biology website at http://ib.oregonstate.edu.

## Core (23-25 credits):

PSY 201. General Psychology (3)
BB/BI 315. Molecular Biology Laboratory (3)
or BB 493. Biochemistry Laboratory Molecular Techniques I (3)
or Z 425. Embryology and Development (5)
BI/Z 319. ${ }^{\wedge}$ Critical Thinking and
Communications in the Life Sciences (3) Z 350. Animal Behavior (3)

Z 431. Vertebrate Physiology I (3)
Z 432. Vertebrate Physiology II (3)
Z 441. Vertebrate Physiology Laboratory (2)
or Z 442. Vertebrate Physiology
Laboratory (2)
Z 438. Behavioral Neurobiology (3)

## Organismal Biology:

Select one course from below:
Z 361. Invertebrate Biology (3)
and Z 362. Invertebrate Biology
Laboratory (2)
Z 371. Vertebrate Biology (3)
and Z 372. Vertebrate Biology Lab (2)
Z 422. Comparative/Functional Vertebrate Anatomy (5)
Z 461. Marine and Estuarine Invertebrate Zoology (4) (Taught at Hatfield Marine Science Center)

## Physiology and Behavior:

Select one course from below:
ANS 441. Topics in Animal Learning (3)
BI 358. Symbiosis and the Environment (3)
PSY 340. Cognition (4)
or ANS 341. Animal Behavior and
Cognition (3)
PSY 432. Physiological Psychology (3)
Z 423. Environmental Physiology (3)
Z 425. Embryology and Development (5) (if not used above)
Z 437. Vertebrate Endocrinology (3)

## Additional Upper-Division Science

 ElectiveComplete one of the two tracks below:
Track I. Additional Physiology and
Behavior Course
Select from the list above.
Track II. Experiential Learning
Complete any combination of three credits of the following:
BI 401. Research and Scholarship (1-3 credits) -by approval
BI 410. Internship (1-3 credits) -by approval or international internships approved by the Biology Chief Advisor.

## Track III. Upper-division Science Elective

 CourseSelect an additional 3+ credit, 300-400 level course from the College of Science
(BB, BHS, BI, BOT, CH, MB, MTH, PH, ST, Z) not used to complete other major requirements. Some courses are excluded (see below). Science courses outside of COS and courses and internships completed internationally may be used by Biology Chief Advisor approval. Courses from other majors, minors or Baccalaureate Core Synthesis requirements not used to meet other major requirements may also be used.

EXCLUDED COURSES: 401-410 credits, BB 350, BB 490-BB 492, BI 331BI 333, BI 341-BI 343, CH 334, CH 335, CH 336, ST 314, and any 399 or 499 courses not specifically approved.

## Total=33-36 credits

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 743


## PRE-DENTISTRY/BIOLOGY OPTION

The Pre-Dentistry/Biology option is designed to meet the requirements for most dental schools in the U.S., but students should consult the requirements for specific schools before they apply because requirements can change. The option couples the comprehensive biological sciences background of the Biology major with human physiology laboratory experiences and important social science requirements. Dedicated health profession advisors work with Pre-Dentistry/ Biology option students to integrate essential professional experiences during their time at OSU.

Options in the Biology major require fifteen or fewer additional credits (one term) beyond the basic Biology major, and most students can complete the additional Pre-Dentistry/Biology option course work in four years. Students may not complete any combination of the Pre-Medical, Pre-Dental option or Physiology and Behavior options. Completion of the Pre-Dental option requires a 3.0 cummulative GPA in major and option course work. Courses used to satisfy the Pre-Dentistry/Biology option requirements also satisfy the Organismal Biology, Physiology, Writing Intensive Course and Upper-division Science Electives requirements in the Biology major. Several courses may also be used to satisfy areas of the baccalaureate core.

Students may pursue either the PreDentistry, Pre-Veterinary Medicine, Pre-Medicine or Physiology and Behavior options within the Biology major -no combinations of these options are permitted.

Students may pursue either the PreMedicine, Pre-Dental or Physiology and Behavior options within the Biology major - no dual combinations of these options are permitted.

Students interested in private practice should also consider taking BA 215, Fundamentals of Accounting (3), or BA 260, Introduction to Entrepreneurship (4).

It is recommended that Pre-Dentistry/ Biology option students take COMM 218, *Interpersonal Communication (3), to complete the Biology major baccalaureate core communications requirement.

The option sections and courses within them are arranged in the order they are generally completed.

For further information, see MyDegrees or the Integrative Biology website at http://ib.oregonstate.edu.

## Core ( $\mathbf{2 6}$ credits)

BHS 107. Health Professions: Dental (1) PHL 205. *Ethics (4)
or PHL/REL 444. *Biomedical Ethics (4) PSY 201, 202. *General Psychology $(3,3)$ BI 331, BI 332, BI 333. Advanced Human Anatomy and Physiology (3,3,3) BI 341, BI 342, BI 343. Advanced Human

Anatomy and Physiology Laboratory $(2,2,2)$

## Writing Intensive Course (WIC)

Select one course from the following:
BB/BI 317. ^Scientific Theory and Practice (3)

BI/Z 319. ${ }^{\wedge}$ Critical Thinking and
Communication in the Life Sciences (3)
HSTS 417. *^History of Medicine (4)

## Physiology Elective

Select one course from the following:
BI 451. Functional Anatomy of the Human Muscular System (4) (By application only - limited summer enrollment)

PSY 432. Physiological Psychology (4)
Z 425. Embryology and Development (5)
Z 438. Behavioral Neurobiology (3)
Upper-division Elective (complete

## one of the tracks below):

Track I Experiential Learning Credits
(complete any combination of three credits of the following):
BI 309. Teaching Practicum (1-3 credits) by approval
BI 401. Research and Scholarship (1-3 credits) -by approval
BI 409. Advanced Teaching Practicum (1-3 credits) -by approval
Track II Science Elective Course (select one course):
One 3+ credit, 300-400 level course from the College of Science (BB, BHS, BI, BOT, CH, MB, MTH, PH, ST, and Z) may be used to meet this requirement with the exception of the courses listed below as excluded. Other science courses outside of COS and courses or internships taken internationally may be used by Biology chief advisor approval. Courses from other majors, minors or baccalaureate core requirements not used to meet requirements above may also be used.

EXCLUDED COURSES: 401-410 credits (except as outlined above or by approval), BB 350, BB 490-BB 492, BI 331-BI 333, BI 341-BI 343, CH 334, CH 335, CH 336, ST 314, Z 361/362, Z 461 and any 399 or 499 courses not specifically approved.

## Total=35-40 credits

Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course (WIC)
Option Code: 713


## PRE-EDUCATION BIOLOGY OPTION

The Biology major Pre-Education option is designed to complete the requirements for the OSU Science Education master's degree and other U.S. graduate licensure programs for secondary education, but students should consult the requirements for specific schools before they apply because requirements can change. The option couples the strong background of the Biology major with core science education and science electives, as well as a required practicum experience. Dedicated education advisors work with Pre-

Education option students to integrate teaching and other essential professional experiences during their time at OSU.
Options in the Biology major require 15 or fewer additional credits (one term) beyond the basic Biology major, and most students can complete the additional Pre-Education option course work in four years. Courses used to satisfy the Pre-Education option requirements also satisfy the upper-division science electives requirements in the Biology major. The courses selected below must total 15 or more upper-division (300-400) credits.

It is recommended that Pre-Education option students take COMM 111 *Public Speaking (3) to complete the Biology major OSU Baccalaureate Core communications requirement.

For further information, see MyDegrees or the Integrative Biology website at http://ib.oregonstate.edu.
Science Education Core (10 credits)
HDFS 313. Adolescent Development (4)
SED 412/SED 512. Technology Foundations for Teaching Math and Science (3)
SED 413/SED 513. Inquiry in Science and Science Education (3)

## Practicum Experience (complete

three or more credits)
Select 3 or more credits involving middle and/or high school experience-this must total 60
hours or more of classroom experience:
ED 309. Field Practicum (3)
ED 409. Practicum/Clinical Experience
(September Experience) (1-3)

## Chemistry Course

Select one course from the following:
BB 493. Biochemistry Laboratory Molecular
Techniques 1 (3)
CH 324. Quantitative Analysis (4)
CH 390. Environmental Chemistry (3)

## Integrated Science Courses

Select two courses from the

## following:

ATS 210. Introduction to Atmospheric
Sciences (3) [Terminated fall 2017]
ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
GEO 201. *Physical Geology (4)
GEO 202. *Earth Systems Science (4)
GEO 203. *Evolution of Planet Earth (4)
GEO 221. *Environmental Geology (4)
GEO 305. *Living With Active Cascade
Volcanoes (3)
GEO 306. *Minerals, Energy, Water and the Environment (3)
GEO 307. *National Park Geology and
Preservation (3)
GEOG 323. ^Climatology (4)
OC 201. *Oceanography (4)

## Total=22-25 credits

Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 226

PRE-MEDICINE/BIOLOGY OPTION
The Pre-Medicine/Biology option is designed to meet the requirements for most medical schools (Track I) or physician assistant schools (Track II) in the U.S., but students should consult the requirements for specific schools before they apply because requirements can change. The option couples the comprehensive biological sciences background of the Biology major with intensive physiology laboratory experiences and important social science requirements. Dedicated health profession advisors work with Pre-Medicine/Biology option students to integrate essential professional experiences during their time at OSU

Options in the Biology major require fifteen or fewer additional credits (one term) beyond the basic Biology major, and most students can complete the additional Pre-Medicine/Biology option course work in four years. Biology students may obtain a Pre-Medicine option by satisfying the Core and either Track I or Track II below with a 3.0 or higher cummulative GPA in major and option course work. Courses used to satisfy the Pre-Medicine option requirements also satisfy the Biology and Society, Organismal Biology, Physiology, Writing Intensive Course and Upper-Division Science Electives requirements in the Biology major. Several courses may also be used to satisfy areas of the baccalaureate core.

Students may pursue either the PreMedicine, Pre-Dentistry, Pre-Veterinary Medicine or Physiology and Behavior options within the Biology major-no dual combinations of these options are permitted.
Students interested in private practice should also consider taking BA 215, Fundamentals of Accounting (3), or BA 260, Introduction to Entrepreneurship (4).

It is recommended that Pre-Medicine/ Biology option students take COMM 218, *Interpersonal Communication (3), to complete the Biology major baccalaureate core communications requirement.
The option sections and courses within them are arranged in the order they are generally completed.
For further information, see MyDegrees or the Integrative Biology website at http://ib.oregonstate.edu.

## Core (19-21 credits)

PHL 205. *Ethics (4)
or PHL/REL 444. *Biomedical Ethics (4)
PSY 201, 202. *General Psychology (3,3)
SOC 204. *Introduction to Sociology (3)

## Writing Intensive Course (WIC)

 Select one course from the following: BI/BB 317. ^Scientific Theory and Practice (3)BI/Z 319. ${ }^{\wedge}$ Critical Thinking and
Communication in the Life Sciences (3) BI/MB 385. ^Emerging Infectious Diseases and Epidemics (3)

HSTS 417. ^*History of Medicine (4)
Medicine, Health and Society Select one course from the following:
ANTH 352. *Anthropology, Health and Environment (3)
ANTH 383. *Introduction to Medical Anthropology (3)
ANTH 474. Cross-Cultural Health and Healing (4)
BB 332. *Molecular Medicine (3)
BI 420. *Viruses in Modern Society (3)
H 210. *Introduction to the Health Care System (3)
H 225. *Social and Individual Health Determinants (4)
H 312. *HIV/AIDS and STIs in Modern Society (3)
H 320. Introduction to Human Disease (3)
H 333. *Global Public Health (3)
HSTS 416. *History of Medicine Pre-1800 (4)
MB 330. *Disease and Society (3)
SOC 350. Health, Illness and Society (4)
Track I Pre-Medicine (17-21 credits)
BI 109. Health Professions: Medical (1)
Z 431. Vertebrate Physiology I (3)
and Z 441. Vertebrate Physiology Laboratory (2)
Z 432. Vertebrate Physiology II (3)
and Z 442. Vertebrate Physiology Laboratory (2)

## Biological Science/Psychology

 ElectiveSelect one course from the following:
MB 416. Immunology (3)
MB 430. Bacterial Pathogenesis (3)
MB 434. Virology (3)
MB 436. The Human Microbiome (3)
MB 480. General Parasitology (3)
PSY 330. Brain and Behavior (4)
PSY 381. Abnormal Psychology (4)
PSY 432. Physiological Psychology (4)
PSY 433. Psychopharmacology (4)
PSY 498. Health Psychology (4)
TOX 411. Fundamentals of Toxicology (3)
Z 422. Comparative/Functional Vertebrate Anatomy (5)
Z 425. Embryology and Development (5)
Z 437. Vertebrate Endocrinology (4)
Z 438. Behavioral Neurobiology (3)
Upper-Division Elective (complete one of the tracks below):
Track I Experiential Learning Credits
(complete any combination of three
credits of the following or GS $\mathbf{4 1 0}$ Medical
Preceptorship):
BI 309. Teaching Practicum (1-3 credits) by approval
BI 401. Research and Scholarship (1-3 credits) -by approval
BI 409. Advanced Teaching Practicum (1-3 credits) -by approval
Track II Science Elective Course (select one course):
One 3+ credit, 300-400 level course from the College of Science (BB, BHS, BI, BOT, CH, MB, MTH, PH, ST, and Z) may be used to meet this requirement with the exception of the courses listed below as excluded. Other science courses outside of COS and courses or internships taken internationally may be used by Biology
chief advisor approval. Courses from other majors, minors or Baccalaureate Core requirements not used to meet requirements above may also be used.

EXCLUDED COURSES: 401-410 credits (except as outlined above or by approval), BB 350, BB 490-BB 492, BI 331-BI 333, BI 341-BI 343, CH 334, CH 335, CH 336, ST 314, Z 361/362, Z 461 and any 399 or 499 courses not specifically approved.

## Track II Pre-Physician Assistant

## (24-26 credits)

PHAR 210. Terminology of the Health Sciences (2)
PSY 350. Human Lifespan Development (4)
or PSY 381. Abnormal Psychology (4)
BI 331, BI 332, BI 333. Advanced Human Anatomy and Physiology (3,3,3)
BI 341, BI 342, BI 343. Advanced Human Anatomy and Physiology Laboratory $(2,2,2)$
Upper-division Elective (complete one of the tracks below):
Track I Experiential Learning Credits
(complete any combination of three
credits of the following):
BI 309. Teaching Practicum (1-3 credits) by approval
BI 401. Research and Scholarship (1-3 credits) -by approval
BI 409. Advanced Teaching Practicum (1-3 credits) -by approval
Track II Science Elective Course (select one course):
One 3+ credit, 300-400 level course from the College of Science (BB, BHS, BI, BOT, CH, MB, MTH, PH, ST, and Z) may be used to meet this requirement with the exception of the courses listed below as excluded. Other science courses outside of COS and courses or internships taken internationally may be used by Biology chief advisor approval. Courses from other majors, minors or baccalaureate core requirements not used to meet requirements above may also be used.
EXCLUDED COURSES: 401-410 credits (except as outlined above or by approval), BB 350, BB 490-BB 492, BI 331-BI 333, BI 341-BI 343, CH 334, CH 335, CH 336, ST 314, Z 361/362, Z 461 and any 399 or 499 courses not specifically approved.

## Total=36-47 credits

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 714


## PRE-VETERINARY MEDICINE OPTION

The Biology major Pre-Veterinary Medicine option is designed to meet OSU College of Veterinary Medicine prerequisites and other U.S. veterinary schools, but students should consult the requirements for specific schools before they apply because requirements can change. The PreVeterinary Medicine option couples the
strong biological sciences background of the Biology major with core animal physiology laboratories and animal-focused science electives. Dedicated professional advisors work with Pre-Veterinary Medicine option students to integrate animal handling and other essential professional experiences during their time at OSU.

Options in the Biology major require fifteen or fewer additional credits (one term) beyond the basic Biology major, and most students can complete the additional Pre-Veterinary Medicine option course work in four years. Completion of the Pre-Veterinary Medicine option requires a 3.0 cummulative GPA in major and option course work. Courses used to satisfy the Pre-Veterinary Medicine option requirements also satisfy the Organismal Biology, Physiology, Writing Intensive Course and Upper-division Science Elective requirements in the Biology major. Several courses may also be used to satisfy areas of the baccalaureate core.
Students may pursue either the PreVeterinary Medicine, Pre-Dentistry, Pre-Medicine or Physiology and Behavior options within the Biology major-no dual combinations of these options are permitted.
Students interested in private practice should also consider taking BA 215, Fundamentals of Accounting (3), or BA 260 Introduction to Entrepreneurship (4).

It is recommended that Pre-Veterinary Medicine option students take COMM 111, *Public Speaking (3), to complete the Biology major baccalaureate core communications requirement.
The option sections and courses within them are arranged in the order they are generally completed.

For further information, see MyDegrees or the Integrative Biology website at http://ib.oregonstate.edu.

## Core ( $\mathbf{2 0}$ credits)

VMB 110. Preveterinary Medicine (1)
PHL 205. *Ethics (4)
or PHL/REL 444. *Biomedical Ethics (4)
Z 431. Vertebrate Physiology I (3) and Z
441. Vertebrate Physiology Laboratory (2)

Z 432. Vertebrate Physiology II (3) and Z
442. Vertebrate Physiology Laboratory (2)

Z 422. Comparative/Functional Vertebrate Anatomy (5)
or Z 371. Vertebrate Biology (3) and Z
372. Vertebrate Biology Laboratory (2)

## Writing Intensive Course

Select one option from the following:
BB/BI 317. ^ ^Scientific Theory and Practice (3) BI/Z 319. ${ }^{\wedge}$ Critical Thinking and
Communications in the Life Sciences (3)
HSTS 437. ${ }^{\wedge}$ History of Animals in Science (4)

## Science Elective

Select one course from the following:
ANS 302. Common Diseases of Companion Animals (4)
ANS 311. Principles of Animal Nutrition (3)
FW 427. Principles of Wildlife Diseases (4)

MB 480. General Parasitology (3)
TOX 411. Fundamentals of Toxicology (3)
Z 350. Animal Behavior (3)
Z 425. Embryology and Development (5)
Z 437. Vertebrate Endocrinology (4)
Z 438. Behavioral Neurobiology (3)
Additional Upper-division Elective (complete one of the tracks below)
Track I Experiential Learning Credits (complete any combination of three credits of the following):
BI 309. Teaching Practicum (1-3 credits) by approval
BI 401. Research and Scholarship (1-3 credits) -by approval
BI 409. Advanced Teaching Practicum (1-3 credits) -by approval
Track II Science Elective Course (select one course):
One 3+ credit, 300-400 level course from the College of Science (BB, BHS, BI, BOT, CH, MB, MTH, PH, ST, and Z) may be used to meet this requirement with the exception of the courses listed below as excluded. Other science courses outside of $\operatorname{COS}$ and courses or internships taken internationally may be used by Biology chief advisor approval. Courses from other majors, minors or baccalaureate core requirements not used to meet requirements above may also be used.
EXCLUDED COURSES: 401-410 credits (except as outlined above or by approval), BB 350, BB 490-BB 492, BI 331-BI 333, BI 341-BI 343, CH 334, CH 335, CH 336, ST 314, Z 361/362, Z 461 and any 399 or 499 courses not specifically approved.

## Total=29-34 credits

## Footnotes:

* Baccalaureate Core Course
^ Writing Intensive Course (WIC)
Option Code: 584


## ZOOLOGY (BS, HBS)

]The Zoology major offers scientific training in the diversity, organismal biology, ecology, and evolution of animals. The major core provides a solid foundation in the biological sciences while electives allow students to cater course work to meet specific interests in animal biology. Zoology majors enter such varied fields as animal care and husbandry, curatorial and museum management, laboratory animal research, field biology and conservation, and environmental management and policy. The Zoology major is not suitable for pre-veterinary medicine students as it does not include the required prerequisite course work (see the option in Pre-Veterinary Medicine in the Biology major).

Students in the Zoology major must complete BI 211 or BI 211 H , BI 212 or BI 212 H and BI 213 or BI 213 H with a C- or better to continue on to upper-division Biology (BI) and Zoology (Z) course work. Students must also complete their General Chemistry series and CH 331 Organic

Chemistry with a C- in each term to move on to other Chemistry ( CH ) course work.

Students majoring in Biology, BioHealth Sciences, Fisheries and Wildlife Sciences, or Zoology cannot seek a dual or double major in any combination of these four majors. Zoology majors cannot seek the Biology minor.
The BI 198 seminar must be completed by all first-year students. The BI 298 Integrated Professional Development I: Life Sciences must be completed by all students.
For further information, see MyDegrees or the Integrative Biology website at http://ib.oregonstate.edu.

## Zoology Core Courses (89 credits)

BI 198. Biology and Zoology First Year
Seminar (1)
BI 298. Integrated Professional
Development: Life Sciences I (1)

## Baccalaureate Core

Communications Course:
COMM 111. *Public Speaking (3)

## Baccalaureate Core Writing II

## Course

Select one of the following (HC 199, WR 327 or WR 362 recommended):
HC 199. *Honors Writing (3)
WR 222. *English Composition (3)
WR 327. *Technical Writing (3)
WR 362. *Science Writing (3)
Mathematics and Physical Sciences
Core:
MTH 251. *Differential Calculus (4)
and MTH 252. Integral Calculus (4)
or MTH 227. *Mathematics for the Life Sciences: Calculus, Probability and Linear Algebra (4)
and MTH 228. *Mathematics for the
Life Sciences: Calculus, Probability and
Linear Algebra (4)
CH 231, CH 232, CH 233. *General
Chemistry ( $4,4,4$ ) and CH 261, CH 262,
CH 263. *Laboratory for Chemistry 231, 232, 233 (1,1,1)
or CH 121. General Chemistry (5)
and CH 122, CH 123 *General Chemistry $(5,5)$
CH 331, CH 332. Organic Chemistry $(4,4)$
ST 351, ST 352. Introduction to Statistical
Methods (4, 4)

## Biological Sciences Core:

BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
BI 370. Ecology (3)
BI 311. Genetics (4)
BB 314. Cell and Molecular Biology (4)
BI 445. Evolution (3)
BI 483. Population Biology (3)
Z 361. Invertebrate Biology (3) and Z 362. Invertebrate Biology Laboratory (2) or Z 461. Marine and Estuarine Invertebrate Zoology (4) (Hatfield Marine Science Center)
or BI 450. ${ }^{\wedge}$ Marine Biology and Ecology (15) (by application only - Hatfield Marine Science Center)
Z 371. Vertebrate Biology (3) and Z 372. Vertebrate Biology Laboratory (2)

## Z 423. Environmental Physiology (3)

Writing Intensive Course (WIC)
Chose one course from below:
BI/Z 319. ${ }^{\wedge}$ Critical Thinking and Communication in the Life Sciences (3)
BI 371. ^Ecological Methods (3)
BI 373. ^Field Methods in Marine Ecology (3)

BI 450. ^Marine Biology and Ecology (15)
(by application only - Hatfield Marine
Science Center)

## Zoology Elective Courses (24+ credits)

Organismal, Physiology and
Systematics Electives
Select two 3+ credit courses:
BI 358. Symbiosis and the Environment (3)
BOT 321. Plant Systematics (4)
or RNG 353. Wildland Plant Identification (4)

FW 311. Ornithology (3)
FW 315. Ichthyology (3)
or BI 450 . ^Marine Biology and Ecology
(15) (by application only - Hatfield Marine Science) Center)
FW 317. Mammalogy (3)
or BI/FW 302. Biology and Conservation of Marine Mammals (4) (Hatfield Marine Science Center)
MB 480. General Parasitology (3)
Z 315. Dinosaur Biology (3)
Z 350. Animal Behavior (3)
Z 365. Biology of Insects (4)
Z 431. Vertebrate Physiology I (3)
or Z 432. Vertebrate Physiology II (3)
Z 438. Behavioral Neurobiology (3)
Z 440. Insect Physiology (3)
Z 473. Herpetology (3)
or Z 474. Systematic Herpetology (3)
Z 477. Aquatic Entomology (4)

## Ecology, Evolution and

Conservation Electives
Select two 3+ credit courses:
BI 301. *Human Impacts on Ecosystems (3) or BI 348. *Human Ecology (3)
BI 351. Marine Ecology (3) or BI 450. ^Marine Biology and Ecology
(15) (by application only - Hatfield Marine Science Center)
BI 375. Field Methods in Ecological
Restoration (5) (OSU Cascades)
BI/FW 421. Aquatic Biological Invasions (4)
(Hatfield Marine Science Center)
BI 427. Paleobiology (3)
BI 481. Biogeography (3)
BI 495. Disease Ecology (3)
BOT 341. Plant Ecology (4)
ENT 420. Insect Ecology (3)
FES/FW 445. Ecological Restoration (4)
or RNG 421. Wildland Restoration Ecology (4)

FW 320. Introductory Population Dynamics (4)

FW 331. Ecology of Marine and Estuarine
Birds (4) (Hatfield Marine Science Center)
FW 427. Principles of Wildlife Diseases (4)
FW 479. Wetlands and Riparian Ecology (3)
FOR 446. Wildland Fire Ecology (3)
[Terminated winter 2017]
or RNG 446. Wildland Fire Ecology (3)
[Terminated summer 2017]

Z 349. *Biodiversity: Causes, Consequences and Conservation (3)
Z 475. Insect Biodiversity Survey (4)
Natural Resource, Management and Policy Electives
Select two 3+ credit courses:
AEC 250. *Introduction to Environmental Economics and Policy (3)
or AEC 253. *Environmental Law, Policy and Economics (4)
or AEC 351. *Natural Resource Economics and Policy (3)
or AEC/ECON 352. *Environmental
Economics and Policy (3)
ANS 435. Applied Animal Behavior (3)
or ANS 280. Companion Animal
Management (3)
BI 347. *Oceans in Peril (3)
BI 348. *Human Ecology (3)
or BI 301. *Human Impacts on Ecosystems
(3) (Additional course not used above)

FES 412. Forest Entomology (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FES 493. Environmental Interpretation (4)
FOR 436. Wildland Fire Science and Management (4)
FOR 462. Natural Resource Policy and Law (3)

FW 350. *Endangered Species, Society and Sustainability (3)
FW 458. Mammal Conservation and Management (4)
FW 462. Ecosystem Services (3)
GEOG 450. Land Use in the American West (3)

PS 475. Environmental Politics and Policy (4)
SOC 481. *Society and Natural Resources (4)

## Upper-Division Science Electives

Two additional 3+ credit science courses not used above or one course and 3 credits of approved experiential learning (BI 309, 410, 406, 409, 410) outlined below:
Any 300-400 level courses from the College of Science may be used to meet this requirement with the exception of the courses listed below as excluded. Other science courses outside of COS and courses taken internationally can be used by chief advisor approval. Courses from other majors, minors or baccalaureate core synthesis requirements not used to meet the requirements above may also be used. Approved BI 309 Teaching Practicum, BI 401 Research, BI 406 Projects: Curatorial Assistant, BI 409 Advanced Teaching Practicum or BI 410 Internship or IE3 Global Internship credits can be used to meet 3 credits (one course) of this requirement.
EXCLUDED COURSES: 401-410 credits (except as outlined above or by approval), BI 331-BI 333, BI 341-BI 343, BI 351 and BI 450 (unless specically approved and not used above), CH 334, 335, 336, ST 314, Z 361/362, Z 461 and any 399 or 499 courses not specifically approved.
BI 498. Senior Biology Major Field Test (0 credits)

Zoology majors are required to take a comprehensive, two-hour Biology Major Field Test their final OSU term (or spring term if they will graduate in summer) in order to graduate: BI 498. Senior Biology Major Field Test (0 credits). For further information, go to http://ib.oregonstate. edu/advising/MFT-info.

## Total Credits for BS in Zoology=180

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## SAMPLE FOUR-YEAR PLANS:

ZOOLOGY

## Zoology - TRACK I

## Year 1

## Fall (15)

BI 198. Biology and Zoology First-Year
Seminar (1)
CH 121. General Chemistry (5)
or CH 231. *General Chemistry (4) and
CH 261. Laboratory for Chemistry 231 (1)
MTH 111. *College Algebra (4)
or MTH 112. *Elementary Functions (4)
Bacc Core (3)
PAC Course (1-2)
or HHS 231. *Lifetime Fitness for Health (2)

## Winter (15)

CH 122. *General Chemistry (5)
or CH 232. *General Chemistry (4) and
CH 262. Laboratory for Chemistry 232 (1)
MTH 112. *Elementary Functions (4)
or MTH 251. *Differential Calculus (4)
Bacc Core (3)
Bacc Core (3)

## Spring (15)

CH 123. *General Chemistry (5) or CH 233. *General Chemistry (4) and
CH 263. Laboratory for Chemistry 233 (1)
MTH 251. *Differential Calculus (4)
or MTH 227. *Calculus and Probability for the Life Sciences I (4)
Bacc Core (3)
Bacc Core (3)

## Year 2

Fall (15)
BI 211. *Principles of Biology (4)
CH 331. Organic Chemistry (4)
MTH 252. *Integral Calculus (4)
or MTH 228. Calculus and Probability for the Life Sciences II (4)
Bacc Core (3)

## Winter (14)

BI 212. *Principles of Biology (4)
CH 332. Organic Chemistry (4)
Bacc Core (3)
Bacc Core (3)
Spring (14)
BI 213. *Principles of Biology (4)
ST 351. Introduction to Statistical Methods (4)

Bacc Core (3)
Bacc Core (3)
Year 3
Fall (13)
BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
ST 352. Introduction to Statistical Methods (4)

Z 423. Environmental Physiology (3)
Bacc Core (3)
Winter (9)
BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4) or BI 370. Ecology (3)
Writing Intensive Course (3)
or Organismal, Physiology and
Systematics Elective (3)
Ecology, Evolution and Conservation Elective (3)
or Natural Resource, Management and Policy Elective (3)

## Spring (14)

BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
or BI 445. Evolution (3)
Z 361. Invertebrate Biology (3)
Z 362. Invertebrate Biology Laboratory (2)
Writing Intensive Course (3)
or Organismal, Physiology and
Systematics Elective (3)
Ecology, Evolution and Conservation Elective (3)
or Natural Resource, Management and Policy Elective (3)

## Year 4

Fall (11)
BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
or BI 445. Evolution (3)
Z 371. Vertebrate Biology (3)
Z 372. Vertebrate Biology Laboratory (2)
Ecology, Evolution and Conservation Elective (3)
or Natural Resource, Management and Policy Elective (3)

## Winter (9)

BI 483. Population Biology (3)
Ecology, Evolution and Conservation Elective (3)
or Natural Resource, Management and Policy Elective (3)
Writing Intensive Course (3)
or Organismal, Physiology and
Systematics Elective (3)
Upper-Division Science Elective (3)

## Spring (3)

BI 498. Senior Biology Field Test (0)
Upper-Division Science Elective (3)
Add electives to reach 180 credits by graduation

## Zoology - TRACK II

Year 1
Fall (15)
BI 198. Biology and Zoology First-Year Seminar (1)
BI 211. *Principles of Biology (4)
CH 121. General Chemistry (5)
or CH 231. *General Chemistry (4) and
CH 261. Laboratory for Chemistry 231 (1)
Bacc Core (3)
PAC Course (1-2)
or HHS 231. *Lifetime Fitness for Health (2)

Winter (16)
BI 212. *Principles of Biology (4)
CH 122. *General Chemistry (5)
or CH 232. *General Chemistry (4) and
CH 262. Laboratory for Chemistry 232 (1)
Bacc Core (3)
Bacc Core (3)
Spring (16)
BI 213. *Principles of Biology (4)
CH 123. *General Chemistry (5)
or CH 233. *General Chemistry (4) and
CH 263. Laboratory for Chemistry 233 (1)
MTH 251. *Differential Calculus (4)
or MTH 227. *Calculus and Probability for the Life Sciences I (4)
Bacc Core (3)

## Year 2

Fall (14-15)
BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4) or BI 370. Ecology (3)
CH 331. Organic Chemistry (4)
MTH 252. *Integral Calculus (4)
or MTH 228. Calculus and Probability for the Life Sciences II (4)
Bacc Core (3)

## Winter (14-15)

BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4) or BI 370. Ecology (3)
CH 332. Organic Chemistry (4)
ST 351. Introduction to Statistical Methods (4)

Bacc Core (3)

## Spring (15-16)

BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4) or BI 370. Ecology (3)
or BI 445 . Evolution (3)
ST 352. Introduction to Statistical Methods (4)

Z 361. Invertebrate Biology (3)
Z 362. Invertebrate Biology Laboratory (2)
Bacc Core (3)
Year 3
Fall (14-15)
BI 311. Genetics (4)
or BB 314. Cell and Molecular Biology (4)
or BI 370. Ecology (3)
or BI 445. Evolution (3)
Z 371. Vertebrate Biology (3)
Z 372. Vertebrate Biology Laboratory (2)
Z 423. Environmental Physiology (3)
Bacc Core (3)

## Winter (9)

BI 483. Population Biology (3)
Ecology, Evolution and Conservation Elective (3)
or Natural Resource, Management and Policy Elective (3)
Writing Intensive Course (3)
or Organismal, Physiology and
Systematics Elective (3)
Bacc Core (3)

## Spring (9)

Ecology, Evolution and Conservation Electives (3)
or Natural Resource, Management and Policy Elective (3)

Writing Intensive Course (3)
or Organismal, Physiology and
Systematics Elective (3)

## Year 4

Fall (9)
Ecology, Evolution and Conservation Electives (6)
or Natural Resource, Management and Policy Elective (3)

## Winter (9)

Ecology, Evolution and Conservation Electives (3)
or Natural Resource, Management and Policy Elective (3)
Writing Intensive Course (3)
or Organismal, Physiology and
Systematics Elective (3)
Upper-Division Science Elective (3)

## Spring (3)

BI 498. Senior Biology Field Test (0)
Upper-Division Science Elective (3)
Add electives to reach 180 credits by graduation
Major Code: 620

## UNDERGRADUATE MINORS

## BIOLOGY MINOR

Administered by the Department of Integrative Biology under the School of Life Sciences.

Students majoring in Biochemistry and Biophysics, Biochemistry and Molecular Biology, Biohealth Sciences, Biology, Botany and Plant Pathology, Microbiology and Zoology cannot declare the Biology minor. The courses below may be shared with other majors outside of those listed above.

The Biology minor includes a required introductory biology sequence with a chemistry prerequisite or corequisite for the second term of each series. A term of organic chemistry, CH 331 or 334, is required to take BB 314 or BI 314, Cell and Molecular Biology, and some of the listed physiology courses. A C- or better in the BI 21x or 20x series is required to complete the minor.

## Required (16)

BI 211, BI 212, BI 213. *Principles of Biology ( $4,4,4$ )
or BI 204, BI 205, BI 206. *Introductory
Biology I,II,III (4,4,4)
BI 311. Genetics (4)
Electives: Choose one course in each of the following subject areas:
Cellular and Molecular Biology (3-4 credits):
BB 314. Cell and Molecular Biology (4)
BB 331. *Introduction to Molecular Biology (3)

## Ecology (3-4 credits):

BI 348. *Human Ecology (3)
BI 351. Marine Ecology (3)
BI 370. Ecology (3)
BOT 341. Plant Ecology (4)
MB 448. Microbial Ecology (3)

Z 349. *Biodiversity: Causes, Consequences, and Conservation (3)

## Evolution (3 credits):

BI 345. *Introduction to Evolution (3)
BI 445. Evolution (3)
Organismal and Physiology (3-4 credits):
BI 331. Advanced Human Anatomy and Physiology (3)
and BI 341 Advanced Human Anatomy
and Physiology Laboratory (2)
BOT 313. Plant Structure (4)
BOT 321. Plant Systematics (4)
BOT 331. Plant Physiology (4)
BOT 425. Flora of the Pacific Northwest (3)
BOT 488. Environmental Physiology of Plants (3)
MB 302. General Microbiology (3)
Z 315. Dinosaur Biology (3)
Z 350. Animal Behavior (3)
Z 361. Invertebrate Biology (3)
Z 365. Biology of Insects (4)
Z 371. Vertebrate Biology (3)
Z 423. Environmental Physiology (3)
Z 431. Vertebrate Physiology I (3)
Z 432. Vertebrate Physiology II (3)
Z 440. Insect Physiology (3)
Z 473. Herpetology (3)

## Total=28-32 credits

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 509

## MARINE BIOLOGY AND ECOLOGY MINOR

Administered by the Department of Integrative Biology under the School of Life Sciences.
Students must complete the core of the minor and either track outlined below. The minor requires one or more terms in residence at Hatfield Marine Science Center, typically during junior year spring or summer. The courses in the Marine Biology and Ecology minor may be shared with major requirements. Students cannot receive any combination of the Biology minor, Marine Biology and Ecology minor or the Marine Biology option. The minor requires the BI 211, 212 or 213 series and a term or more of chemistry for required course work. The BI 373 and BI 450 courses require ST 351 and have enrollment restrictions.

The BI 450 Marine Biology and Ecology course (see Track II) is taught each spring term at Hatfield Marine Science Center and is by application only. It covers marine invertebrates, algae and fishes, as well as sections on marine ecology, conservation and policy. Students apply to and are accepted the fall term before the spring they plan to attend. Applications are available fall term in the Integrative Biology office in Cordley 3029.

The BI 111, Introduction to Marine Life in the Sea (1), is an optional weekend experiential course at Hatfield Marine Science Center that compliments the minor, particularly for students with

## little or no previous marine experience.

## Complete Track I or II and Two <br> Electives

## Track I (24-25 credits)

BI 150. Introduction to Marine Biology (3)
BI 351. Marine Ecology (3)
BI 373. ^Field Methods in Marine Ecology (3)
or FW 493. Field Methods for Marine
Research (3)
BOT 416. Aquatic Botany (4)
FW 315. Ichthyology (3)
OC 201. *Oceanography (4)
Z 361. Invertebrate Biology (3) and Z 362. Invertebrate Biology Laboratory (2) or Z 461. Marine and Estuarine Invertebrate Zoology (4) (Taught at
Hatfield Marine Science Center)

## Track II (22 credits)

BI 150. Introduction to Marine Biology (3)
BI 450. ${ }^{\wedge}$ Marine Biology and Ecology (15) (admission by application only) (Taught at Hatfield Marine Science Center)
OC 201. *Oceanography (4)

## Electives (6-8 credits)

Select 2 courses from below (6-8 credits):
BI/FW 302. Biology and Conservation of Marine Mammals (4)
BI 347. *Oceans in Peril (3)
BI 358. Symbiosis and the Environment (3)
BI/FW 421. Aquatic Biological Invasions (4)
(Taught at Hatfield Marine Science Center)
BI/FW 464. Marine Conservation Biology (3)
FW 316. Systematics of Fishes (3)
FW 331. Ecology of Marine and Estuarine
Birds (4) (Taught at Hatfield Marine
Science Center)
FW/OC. 434 Estuarine Ecology (4)
MB 314. Aquatic Microbiology (3)
OC 332. Coastal Oceanography (3)
OC 333. Oceans, Coasts and People (3)
OC 440. Biological Oceanography (4)
Z 423. Environmental Physiology (3)

## Total=28-33

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 695

## INTEGRATIVE BIOLOGY (MS, PhD)

## Graduate Areas of Concentration

 Behavioral ecology, behavioral endocrinology, cell biology, chemical ecology, conservation biology, developmental biology, evolutionary biology, genetics, genomics, hostmicrobe interactions, marine ecology, paleontology, physiology, population biologyThe Department of Integrative Biology offers graduate work leading toward the Master of Arts, Master of Science, and Doctor of Philosophy degrees in all areas of biology ranging from molecular to community levels.

At present there are active research programs involving graduate students in the study of comparative immunobiology and pathology; cellular interactions and tissue differentiation; neuronal development; cytogenetics; behavioral
biology at the neurophysiological, endocrinological, and ecological levels; environmental physiology; vertebrate functional morphology; reproductive biology; natural products chemistry; marine biology; physiologic and biochemical adaptation; genetics and evolution of populations; experimental marine, terrestrial, and freshwater population and community ecology; biodiversity and conservation biology.

Research is conducted in laboratories on campus, at the Malheur Field Station in southeastern Oregon, at the Hatfield Marine Science Center in Newport, the H.J. Andrews Experimental Forest, and in natural areas of the Cascade Mountains and Willamette Valley. Students also have entered into cooperative research programs in other departments, with the Oregon Health and Science University in Portland, and with the Primate Research Center in Beaverton.

As part of their training, all students participate in the departmental seminar program, and doctoral students spend at least one year as teaching assistants. Most students are supported by graduate teaching or research assistantships. Students are expected to have broad competency in biology. The master's program leads to a thesis or research report (nonthesis option) on a specific problem; the PhD program emphasizes independent thesis research on a major topic at the forefront of the chosen field.

## Major Code: 6300

## INTEGRATIVE BIOLOGY <br> GRADUATE MINOR

For more details, see the departmental advisor.

## Minor Code: 6310 <br> ■ BIOLOGY COURSES

BI 101. *GENERAL BIOLOGY (4). Diversity of life, ecology, population biology, and human environmental impacts. An introductory course in the principles and methods of biology, intended for majors in fields other than the biological sciences. Lec/lab/rec. (Bacc Core Course)
BI 102. *GENERAL BIOLOGY (4). Mendelian genetics, molecular genetics, human genetics, genetic engineering, evolution, and behavior. An introductory course in the principles and methods of biology, intended for majors in fields other than the biological sciences. Lec/lab. (Bacc Core Course)
BI 103. *GENERAL BIOLOGY (4). Human anatomy and physiology, and human diseases. An introductory course in the principles and methods of biology, intended for majors in fields other than the biological sciences. Lec/lab. (Bacc Core Course)
BI 107. HEALTH PROFESSIONS: DENTAL (1).
Discussion of matters relating to a dental career. Includes application procedures, the importance of various requirements, admissions, professional school curricula, financing education and related matters. Speakers are included. Graded P/N.
BI 109. HEALTH PROFESSIONS: MEDICAL (1).
Discussion of matters relating to a medical career. Includes application procedures, the importance of various requirements, admissions, professional
school curricula, financing education, and related matters. Speakers are included. Graded P/N.

BI 111. INTRODUCTION TO MARINE LIFE IN THE SEA: MARINE HABITATS (1). A fieldfocused learning experience exploring the varied marine life and habitats on the Oregon coast, including rocky shores, sandy beaches, mud flats, bays and estuaries. Students will also be introduced to the breadth of marine science course offerings and research at Oregon State University's Hatfield Marine Science Center located in Newport, Oregon. Graded P/N.
BI 150. INTRODUCTION TO MARINE BIOLOGY
(3). Survey of marine organisms, the environments they inhabit, and their evolutionary adaptations for thriving in those environments. The course will also highlight current conservation challenges that threaten marine life, such as climate change overfishing, and pollution.
BI 197. BIOLOGY PRE-HEALTH FIRST-YEAR SEMINAR (1). Integrative Biology faculty and other professionals introduce a variety of human health professions including dentistry, medicine, pharmacy, physician assistant and others (veterinary medicine students take BI 198 instead). Pre-health experiential learning opportunities and paths to academic and professional success in the Biology major are explored. Graded P/N. PREREQS: Open to first-year students and sophomores in biology, undeclared science, and UESP.

BI 198. BIOLOGY AND ZOOLOGY FIRST-
YEAR SEMINAR (1). Biology professionals and Integrative Biology faculty introduce a variety of life science careers in ecology, education, genetics, marine biology, veterinary medicine, zoology and other non-health profession fields (health profession students take BI 197). Experientia learning opportunities and paths to academic and professional success in the Biology and Zoology majors are explored. Graded P/N. PREREQS: Open to first-year students and sophomores in biology, undeclared science, and UESP.

BI 199. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

BI 199H. SELECTED TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

BI 204. *INTRODUCTORY BIOLOGY I (4). Foundations of biological sciences including scientific inquiry, genetics, evolution, and ecology. Significant emphasis throughout on the application of core concepts to solve human and environmental problems. Laboratory emphasizes skills in critical thinking, scientific writing, and experimental design. Not intended for pre-health profession students. Lec/lab. (Bacc Core Course)
BI 205. *INTRODUCTORY BIOLOGY II (4). Fundamental concepts in molecular and cellular biology, beginning with biomolecules and the origin of life, and ending with genomics Significant emphasis throughout on applications of biotechnology to solve human problems Laboratory emphasizes skills in critical thinking, scientific writing, and experimental design. Not intended for pre-health profession students. Lec/ lab. (Bacc Core Course) PREREQS: CH 121* [D-] or CH 201* [D-] or ((CH 231* [D-] or CH 231H* D-] ) and (CH 261* [D-] or CH 261H* [D-] or CH 271* [D-] or CH 271H* [D-] ))

BI 206. *INTRODUCTORY BIOLOGY III (4). Basic plant and animal physiology from an evolutionary perspective. Significant emphasis on topics of mportance to human society, including human and plant disease. Laboratory emphasizes skills in critical thinking, scientific writing, and experimenta design. Not intended for pre-health professional students. Lec/lab. (Bacc Core Course) PREREQS: CH 121* [D-] or CH 201* [D-] or ((CH 231* [D-] or CH 231H* [D-] ) and (CH 261* [D-] or $\mathrm{CH} 261 \mathrm{H}^{*}$ [D-] or CH 271* [D-] or $\mathrm{CH} 271 \mathrm{H}^{*}$ [D-] ))
BI 211. *PRINCIPLES OF BIOLOGY (4). Origins of life, energy transformations, plant and animal
diversity. Lec/lab. (Bacc Core Course) PREREQS: For life science majors and pre-professional students.

BI 211H. *PRINCIPLES OF BIOLOGY (4).
Origins of life, energy transformations, plant and animal physiology. Lec/lab. (Bacc Core Course) PREREQS: For life science majors and preprofessional students. Honors College approval required.

BI 212. *PRINCIPLES OF BIOLOGY (4).
Cell biology, organ systems, plant and animal physiology. Lec/lab. (Bacc Core Course)
PREREQS: (CH 121* [D-] or CH 201* [D-] or CH 221* [D-] or CH 224H* [D-] or ((CH 231* [D-] or CH 231H* [D-] ) and (CH 261* [D-] or CH 261H* [D-] or $\mathrm{CH} 271^{*}$ [D-] ))) and for life science majors and pre-professional students.
BI 212H. *PRINCIPLES OF BIOLOGY (4). Cell biology, organ systems, plant and animal physiology. Lec/lab. (Bacc Core Course) PREREQS: (CH 121* [D-] or CH 201* [D-] or CH $221^{*}$ [D-] or CH 224H* [D-] or ((CH 231* [D-] or CH 231H* [D-] ) and (CH 261* [D-] or CH 261H* [D-] or CH $271^{*}$ [D-] ))) and for life science majors and pre-professional students. Honors College approval required.
BI 213. *PRINCIPLES OF BIOLOGY (4).
Genetics, evolution, natural selection, and ecology. Lec/lab. (Bacc Core Course) PREREQS: (CH 121 [D-] or CH 201 [D-] or CH 221 [D-] or CH 224H [D-] or ( $(\mathrm{CH} 231$ [D-] or CH 231 H [D-]) and (CH 261 [D-] or CH 261H [D-] or CH 271 [D-] ))) and for life science majors and pre-professional students.

BI 213H. *PRINCIPLES OF BIOLOGY (4)
Genetics, evolution, natural selection, and ecology. Lec/lab. (Bacc Core Course) PREREQS: (CH 121 [D-] or CH 201 [D-] or CH 221 [D-] or CH 224H [D-] or ( $(C H 231$ [D-] or CH 231 H [D-] ) and (CH 261 [D-] or CH 261H [D-] or CH 271 [D-] ))) and for life science majors and pre-professional students. Honors College approval required.

## Bl 231. INTRODUCTION TO HUMAN ANATOMY

AND PHYSIOLOGY (3). The first of a three-term introductory series. Using a strong gross anatomy focus, course topics address fundamental concepts of biology as they apply to human anatomy and physiology and then focus on understanding the structures, functions, and regulatory mechanisms involved in the human skeleton, muscular and integumentary systems. BI 231 is a required prerequisite to BI 232 and BI 233. The BI 241 Lab is optional but prerequisite for either of the subsequent BI 242 or BI 243 lab courses in the series. Lec.

BI 232. INTRODUCTION TO HUMAN ANATOMY
AND PHYSIOLOGY (3). The second of a
three-term introductory series. Using a strong gross anatomy focus, course topics address the structures, functions and regulatory mechanisms involved in the human nervous, endocrine and reproductive systems. Lec. PREREQS: BI 231* [D-] or (BI 103 [D-] or BI 103H [D-] ) or (BI 212 [D-] or BI 212H [D-] )

BI 233. INTRODUCTION TO HUMAN ANATOMY AND PHYSIOLOGY (3). The third of a three-term introductory series. Using a strong gross anatomy focus, course topics address the structures, functions, and regulatory mechanisms involved in the human cardiovascular, respiratory, urinary and digestive systems. Lec. PREREQS: BI 231* [D-] or (BI 103 [D-] or BI 103 H [D-] ) or (BI 212 [D-] or BI 212H [D-])
BI 241. INTRODUCTION TO HUMAN ANATOMY AND PHYSIOLOGY LABORATORY (2). The first of a three-term introductory series. Using the human cadaver (prosection), course topics address fundamental concepts of biology as they apply to human anatomy and physiology and then focus on understanding the structures, functions, and regulatory mechanisms involved in the human skeletal, muscular and integumentary systems. Physiology demonstrations illustrate functions of organ systems. Lab/rec. PREREQS: BI 231* [D-]

Bi 242. INTRODUCTION TO HUMAN ANATOMY AND PHYSIOLOGY LABORATORY (2). The
second of a three-term introductory series. Using the human cadaver (prosection) and dissection of preserved specimens with a strong gross anatomy focus, course topics address the structures, functions and regulatory mechanisms involved in the nervous, endocrine and reproductive systems. Physiology demonstrations illustrate functions of organ systems. Lab/rec. PREREQS: BI 231* [Cand BI 232* [D-] and $\mathrm{BI} 241^{*}$ [D-]

BI 243. INTRODUCTION TO HUMAN ANATOMY
AND PHYSIOLOGY LABORATORY (2). The third of a three-term introductory series. Using the human cadaver (prosection) and dissection of preserved specimens with a strong gross anatomy focus, course topics address the structures, unctions, and regulatory mechanisms involved in the human cardiovascular, respiratory, urinary and digestive systems. Physiology demonstrations illustrate functions of organ systems. Lab/rec. PREREQS: BI 231* [D-] and BI 233* [D-] and BI 241* [D-]

BI 298. INTEGRATED PROFESSIONAL
DEVELOPMENT: LIFE SCIENCES I (1).
ntroduces the process of integrated professional development through relevant social and cognitive concepts and student activities. Emphasis is placed on students being able to analyze career opportunities to determine their best mix of echnical and professional skills to be competitive as a biological science professional. Graded P/N.
3I 299. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

BI 301. *HUMAN IMPACTS ON ECOSYSTEMS 3). Selected human impacts on ecosystems are examined in depth, including air quality, global climate change, management of agricultural and forest resources, and threats to biological diversity The causes, approaches to investigating, and potential solutions for each issue are discussed from a scientific and social perspective. Adverse effects on ecosystems that result from each environmental problem are examined. (Bacc Core Course) PREREQS: One year of college biology or chemistry and junior standing required.
BI 302. BIOLOGY AND CONSERVATION OF MARINE MAMMALS (4). An examination of the biology of whales, pinnipeds, and other marine mammals, include general adaptations to a marine existence; systematics and biogeography; reproduction; diving physiology; communication and echolocation; feeding and migratory behavior; and marine mammal/human interactions, including conservation issues. CROSSLISTED as FW 302. Taught at Hatfield Marine Science Center, OR online through Ecampus. PREREQS: One year of introductory biology is mandatory.
BI 306. *^ENVIRONMENTAL ECOLOGY (3). Biological, physical, and chemical nature of both natural and human-disturbed ecosystems. Topics include population and conservation ecology, toxins in the food chain and in the environment forest decline and acid rain, eutrophication of terrestrial and aquatic ecosystems, and ecosystem restoration. Offered alternate years (Bacc Core Course) (Writing Intensive Course) PREREQS: One year of college biology and chemistry
BI 306H. *^ENVIRONMENTAL ECOLOGY (3). Biological, physical, and chemical nature of both natural and human-disturbed ecosystems. Topics include population and conservation ecology, oxins in the food chain and in the environment, forest decline and acid rain, eutrophication of terrestrial and aquatic ecosystems, and ecosystem restoration. Offered alternate years. Bacc Core Course) (Writing Intensive Course) PREREQS: One year of college biology and chemistry. Honors College approval required

BI 309. TEACHING PRACTICUM (1-6).
Introductory experience for students assisting with instruction in Biology or Zoology courses. Admission is by application. See Cordley 3029 for
details. This course is repeatable for a maximum of 6 credits.

BI 311. GENETICS (4). Fundamentals of Mendelian, quantitative, population, molecular, and developmental genetics. Lec/rec. PREREQS: ((BI 211 [C-] or BI 211 H [C-] ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213H [C-] )) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-] )

BI 311H. GENETICS (4). Fundamentals of Mendelian, quantitative, population, molecular and developmental genetics. Lec/rec. PREREQS: ((BI 211 [C-] or BI 211 H [C-] ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213 H [C-] )) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-] )
BI 314. CELL AND MOLECULAR BIOLOGY
(4). Fundamental concepts of prokaryotic and eukaryotic cell biology. Emphasizes cell structure and function at the molecular level. Lec/rec. CROSSLISTED as BB 314. PREREQS: (BI 211 C-] or BI 211 H [C-] ) and (BI 212 [C-] or BI 212H [C-] ) and (BI 213 [C-] or BI 213 H [C-] ) and (CH 331* [D-] or CH 334* [D-] )

BI 314H. CELL AND MOLECULAR BIOLOGY
(4). Fundamental concepts of prokaryotic and eukaryotic cell biology. Emphasizes cell structure and function at the molecular level. Lec/rec.
CROSSLISTED as BB 314H. PREREQS: (BI 211 [C-] or $\mathrm{BI} 211 \mathrm{H}[\mathrm{C}-]$ ) and (BI 212 [C-] or Bl 212H [C-] ) and (BI 213 [C-] or BI 213 H [C-] ) and (CH 331* [D-] or CH 334* [D-] ) and Honors College approval required.
BI 315. ^MOLECULAR BIOLOGY LABORATORY (3). Laboratory projects exploring the transmission of genetic information from storage to function will introduce students to fundamental molecular biology concepts and techniques, including isolation of DNA, construction of recombinant plasmids, quantification of gene expression in model organisms, polymerase chain reaction, and analysis of protein expression and subcellular ocalization. Lec/lab. (Writing Intensive Course) CROSSLISTED as BB 315. PREREQS: BI 314* [D-] or BI 314H* [D-] or BB 314* [D-] or BB 314H* [D-]

## BI 317. ^SCIENTIFIC THEORY AND

PRACTICE (3). Teaches students the practice of biological science. Topics cover scientific theory, communications, and critical evaluation CROSSLISTED as BB 317. (Writing Intensive Course) PREREQS: One year of college biology.

## BI 319. ^ ^RITICAL THINKING AND

COMMUNICATION IN THE LIFE SCIENCES
(3). Teaches students the practice of biological science. Topics cover scientific theory, written and spoken communications, ethics and critical evaluation. (Writing Intensive Course) CROSSLISTED as Z 319. PREREQS: (BI 211 [Cor BI 211 H [C-] ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213 H [C-] ) and (ST 351 [D-] or ST 351H [D-] ) and ST 352* [D-]
BI 331. ADVANCED HUMAN ANATOMY AND PHYSIOLOGY (3). The first of a three-term advanced series. With a strong focus on the physiological underpinnings of disease, course topics address the fundamental concepts of human anatomy and physiology and then focus on understanding the structures, functions, regulatory mechanisms and common pathologies involved in the skeletal, muscular and integumentary systems Lec. PREREQS: (BI 211 [C-] or $\mathrm{BI} 211 \mathrm{H}[\mathrm{C}-]$ ) and (BI 212 [C-] or BI 212H [C-] ) and (BI 213 [C-] or BI 213H [C-] ) and (CH 123 [D-] or ((CH 233 [D-] or CH 233 H [D-] ) and (CH 263 [D-] or CH 263H [D-] ))) and BI 341* [D-] and BI 331, BI 332, BI 333 must be taken in order.

BI 332. ADVANCED HUMAN ANATOMY AND PHYSIOLOGY (3). The second of a three-term advanced series. With a strong focus on the physiological underpinnings of disease, course topics address the structures, functions, and regulatory mechanisms involved in the nervous, endocrine and reproductive systems. Lec. PREREQS: BI 331 [D-] and $\mathrm{BI} 342^{*}$ [D-] and BI

331, $\mathrm{BI} 332, \mathrm{BI} 333$ must be taken in order.

## BI 333. ADVANCED HUMAN ANATOMY AND

 PHYSIOLOGY (3). The third part of a threeterm advanced series. With a strong focus on the physiological underpinnings of disease, course topics address the structures, functions, and regulatory mechanisms involved in the cardiovascular, respiratory, urinary and digestive systems. Lec. PREREQS: BI 332 [D-] and BI 343* [D-] and BI 331, BI 332, BI 333 must be taken in order.BI 341. ADVANCED HUMAN ANATOMY AND PHYSIOLOGY LABORATORY (2). The first of a three-term advanced series. Using the human cadaver (prosection) and physiological data acquisition equipment, course topics address the fundamental concepts of human anatomy and physiology and then focus on understanding the structures, functions, regulatory mechanisms and common pathologies involved in the human skeletal, muscular and integumentary systems. Lab. COREQS: BI 331

## Bl 342. ADVANCED HUMAN ANATOMY AND

 PHYSIOLOGY LABORATORY (2). The second of a three-term advanced series. Using the human cadaver (prosection), dissection of preserved specimens, and physiological data acquisition equipment, course topics address the structures, functions, regulatory mechanisms and common pathologies involved in the human nervous, endocrine and reproductive systems. Lab. COREQS: BI 332BI 343. ADVANCED HUMAN ANATOMY AND PHYSIOLOGY LABORATORY (2). The third of a three-term advanced series. Using the human cadaver (prosection), dissection of preserved specimens, and physiological data acquisition equipment, course topics address the structures, functions, regulatory mechanisms and common pathologies involved in the human cardiovascular, respiratory, urinary and digestive systems. Lab COREQS: BI 333

BI 345. *INTRODUCTION TO EVOLUTION (3). Elements of evolutionary theory; origin and history of life; evolutionary controversy; origins of species, sex, and humans. (Bacc Core Course)

BI 347. *OCEANS IN PERIL (3). The interactions of society and the marine environment, emphasizing the ecological, biogeochemical, economic, sociological, and political significance of the oceans. Topics of current critical importance will include marine pollution, protecting marine habitats, conserving marine biodiversity, fisheries and aquaculture, ocean energy, biogeochemical change, global warming, ocean acidification, and sea level rise. Lecture (Bacc Core Course). PREREQS: BI 101 [C-] or BI 101H [C-] or BI 102 [C-] or Bl 102H [C-] or Bl 211 [C-] or Bl 211H [C-] or BI 213 [C-] or BI 213H [C-] or BI 204 [C-] or BI 150 [C-]
BI 348. *HUMAN ECOLOGY (3). The impact of humans on the environment, emphasizing the political, sociological, and ecological consequences of human population growth. Topics of current critical importance will include global warming trends, destruction of the ozone layer, consequences of pollution, habitat destruction, the loss of biodiversity, and conservation biology. (Bacc Core Course)

BI 351. MARINE ECOLOGY (3). Ecological interactions and principles in different marine habitats. Topics include the organisms (plants, invertebrates, vertebrates) found in major habitats and interactions between organisms. Habitats discussed include coral reefs, rocky shores, kelp forests, near-shore waters, open-ocean waters, and the deep sea. Emphasis is placed on how organism-organism interactions produce varying patterns of distribution, abundance, body size, diversity, stability, and succession. PREREQS: ((BI 211 [C-] or BI 211H [C-] ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213H [C-] )) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-] )

BI 352. MARINE ECOLOGY LABORATORY (2). Laboratory and field exposure to many of the organisms and processes discussed in BI 351. Research projects provide students with the opportunity to experience the process by which information about marine ecology is obtained. Field trip fee. Lab fee. Lec/lab. PREREQS: BI 351* or Z $351^{*}$

Bl 358. SYMBIOSES AND THE ENVIRONMENT
(3). Overview of the diversity of mutualistic
symbioses and their roles in the natural environment. Integrative approach, from ecosystem to molecule, to the examination of certain key mutualisms. Lec. Offered alternate years. PREREQS: (( BI 211 [C-] or BI 211 H [C-] ) and (BI 212 [C-] or $\mathrm{BI} 212 \mathrm{H}[\mathrm{C}-]$ ) and (BI 213 [C-] or BI 213 H [C-] )) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-]) ) and (CH 123 [D-] or (CH 233 [D-] or CH 233H [D-] ) and (CH 263 [D-] or CH 263H [D-] ))
BI 370. ECOLOGY (3). The study of interactions between organisms and their biotic and abiotic environments at the population, community, ecosystem, and biosphere levels of organization. PREREQS: ((Bl 211 [C-] or BI 211H [C-] ) and (BI 212 [C-] or BI 212 H [C-]) and (BI 213 [C-] or BI $213 \mathrm{H}[\mathrm{C}-\mathrm{]}$ ) ) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-] )
BI 371. ^ECOLOGICAL METHODS (3). Experimental design, data collection, analysis and synthesis in ecological studies; local ecosystems emphasized. May have field trip fee. Lec/lab. (Writing Intensive Course) PREREQS: (BI 370 [D-] or BI 370H [D-] )

## BI 373. ^FIELD METHODS IN MARINE

ECOLOGY (3). Exposure to research methods used in field studies of the marine rocky intertidal ecosystem. Research projects and writing exercises provide students with hands-on experience of collecting, analyzing, and presenting marine ecological data. Field trip fee. Lab fee. Lec/lab. (Writing Intensive Course) PREREQS: (BI 351* [D-] or BI 370 [D-] or BI 370H [D-] ) and (ST 351 [D-] or ST 351H [D-] ) and ST 352 recommended

## BI 375. FIELD METHODS IN ECOLOGICAL

RESTORATION (4). Observation and application of theory and practice in ecological restoration. Using site visits and hands-on research, explores the roles in restoration of fire, local adaptation, disturbance history, natural history, beaver, and soils, including visits to several active and completed restoration projects and overnights in the field. Lab. PREREQS: ((BI 211 [C-] or BI 211 H [C-]) and (BI 212 [C-] or BI $212 \mathrm{H}[\mathrm{C}-]$ ) and (BI 213 [C-] or BI 213H [C-] )) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-] )
BI 385. ^EMERGING INFECTIOUS DISEASES
AND EPIDEMICS (3). Emerging and reemerging infectious disease is a contemporary global issue of great concern. To understand and evaluate the issue, the course covers germ theory, disease history and ecology, microbial pathogenesis and the immune response, historic plagues, and the biological, environmental, population and social changes that contribute to disease emergence. (Writing Intensive Course) CROSSLISTED as MB 385 PREREQS: (BI 211 [D-] or BI 211H [D-] ) and (BI 212 [D-] or BI 212H [D-] ) and (BI 213 [D-] or BI 213H [D-] )
BI 388. ^SPECIAL TOPICS IN BIOLOGY (3-5). Studies of contemporary subjects of interest and importance in biology. (Writing Intensive Course) This course is repeatable for a maximum of 5 credits. PREREQS: One year of college biology or departmental approval required.
BI 399. SPECIAL TOPICS (0-16). This course is repeatable for a maximum of 16 credits. PREREQS: Requirements vary. Consult with department.

BI 401. RESEARCH AND SCHOLARSHIP (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval

## required.

## BI 401H. RESEARCH AND SCHOLARSHIP

(1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
BI 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
BI 405H. READING AND CONFERENCE (1-16)
This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

BI 406. PROJECTS: CURATORIAL ASSISTANT
(1-6). Students assist with curatorial projects in OSU biological collections. Admission is by application. See Cordley 3029 for details. This course is repeatable for a maximum of 6 credits.

BI 407. SEMINAR (1). Departmental seminar. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
BI 407H. SEMINAR (1). Departmental seminar. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required. Honors College approval required.

BI 409. ADVANCED TEACHING PRACTICUM
(1-6). Advanced practicum experience for students assisting in Biology or Zoology courses. Includes advanced training in course content and development of instructional materials. Admission is by application. See Cordley 3029 for details. This course is repeatable for a maximum of 6 credits.

BI 410. INTERNSHIP (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
BI 414H. ^WRITING FOR THE BIOLOGICAL
SCIENCES (2). BI 414H/Z 414H and BI 415H/Z 415 H are writing intensive courses that use writing to learn the subject content. Students will develop their writing and critical thinking skills by writing and editing scientific and technical pieces as well as critically reviewing peer and published writing examples. CROSSLISTED as Z 414H. (Writing Intensive Course) PREREQS: HC 408 Thesis: Learn and HC 408 Thesis: Undertake (or independent completion of LEARN and UNDERTAKE steps). Honors College approval required.
BI 415H. ^BIOLOGICAL SCIENCES THESIS (1). BI $414 \mathrm{H} / \mathrm{Z} 414 \mathrm{H}$ and $\mathrm{BI} 415 \mathrm{H} / \mathrm{Z} 415 \mathrm{H}$ are writing intensive courses that use writing to learn the subject content. Students will hone critical thinking and technical writing skills necessary to create compelling and well-documented arguments in support of an original thesis. CROSSLISTED as Z 415H. (Writing Intensive Course) PREREQS: BI 414H [D-] or Z 414H [D-] and Honors College approval required.
BI 420. *VIRUSES IN MODERN SOCIETY (3). Impact of viruses on modern civilization. Molecular mechanisms of viral infectivity. Approaches to the prevention and cure of viral diseases. Role of viruses in agriculture and industry. Offered alternate years. (Bacc Core Course) PREREQS: (BI 311 [D-] or BI 314 [D-] or BI 314H [D-] )
BI 421. AQUATIC BIOLOGICAL INVASIONS (4). An overview of the background, theory, evolution, ecology, politics and conservation of invasions by introduced species in aquatic environments. Taught at Hatfield Marine Science Center. CROSSLISTED as FW 421. PREREQS: One year of university-level biology.
BI 427. PALEOBIOLOGY (4). Fossils provide a direct window into the evolution, extinction, and ecology of past life on Earth. A processbased study of the marine and terrestrial fossil record is taken to explore the topics of preservation, macroevolution, extinction of biotas,
biomechanics, paleoecology, and climate change. Required laboratory and weekend field trip. PREREQS: ((BI 211 [C-] or BI 211H [C-]) and (BI 212 [C-] or BI 212 H [C-] ] and (BI 213 [C-] or BI 213 H [C-] )) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-] ) or GEO 203 [D-]
BI 435. *GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK (3). A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. Lec/rec. CROSSLISTED as FES 435/FES 535, FES 435H, MCB 535, TOX 435/TOX 535, TOX 435H. (Bacc Core Course) PREREQS: One quarter each of biology and chemistry helpful but not essential.
BI 435H. *GENES AND CHEMICALS IN AGRICULTURE: VALUE AND RISK (3). A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. Lec/rec. CROSSLISTED as FES 435H, TOX 435H. (Bacc Core Course) PREREQS One quarter each of biology and chemistry helpful but not essential. Honors College approval required.
BI 445. EVOLUTION (3). Formal analysis of genetic and ecological mechanisms producing evolutionary change; special topics include speciation, ecological constraints, adaptive radiations, paleontology, biogeography, the origin of life, molecular evolution, and human evolution PREREQS: BI 311 [D-] or BI 311H [D-]
BI 450. ^MARINE BIOLOGY AND ECOLOGY (15). A comprehensive lecture and laboratory introduction to the flora and fauna of the marine environment approached from the level of the organism to ecosystem. Ecological patterns and processes characteristic of marine communities will be emphasized. Lec/lab. Taught at Hatfield Marine Science Center, Newport, OR. (Writing Intensive Course) PREREQS: (BI 370 [D-] or BI 370 H [D-] ) and (ST 351 [D-] or ST 351H [D-] ) and ST 352 is recommended. Departmental approval required. Admission to BI 450 is by application in fall of the academic year students plan to attend.
BI 451. FUNCTIONAL ANATOMY OF THE HUMAN MUSCULAR SYSTEM (4). In-depth dissection of the orientation, innervation, and functional significance of muscles and muscle groups. Topics include muscle identification, joint anatomy and variation of human form. BI 551 student expectations include vascularization and detailed joint anatomy. The laboratory component will consist of the dissection of the muscular anatomy of a human cadaver. Lab fee. Lec/lab. PREREQS: ((BI 231 [D-] and BI 241 [D-] ) or (BI 331 [D-] and BI 341 [D-] )) and ((Bl 232 [D-] and BI 242 [D-] ) or (BI 332 [D-] and BI 342 [D-] )) and (BI 233 [D-] and BI 243 [D-]) or (BI 333 [D-] and BI 343 [D-] )) and departmental approval required. Admission to $\mathrm{BI} 451 / \mathrm{BI} 551$ is by application in spring of the academic year students plan to attend.

BI 456. PHYLOGENETICS (4). Explores the theory and practice of modern phylogenetic analysis. Emphasis placed on tree reconstruction algorithms, assessment of statistical support, and contemporary issues in phylogenetics. Lab will focus on the use of phylogenetic software and the analysis of molecular data sets. Lec/lab. PREREQS: (ST 351 [D-] or ST 351H [D-]) and (ST 352* [D-] or ST 411* [D-]) and (BI 311 [D-] or BI 311H [D-] or BI 445 [D-] )
BI 481. BIOGEOGRAPHY (3). Biogeography is the study of the distribution of biodiversity. We focus on abiotic (geological, climatological) and biotic (ecological, evolutionary) factors that govern diversity across space and through time, emphasizing assembly of communities, global change, and conservation in today's rapidly changing world. The course format includes
ecture, computer-based activities, and discussion Offered winter term in odd years. PREREQS: BI 370 [D-] or BI 370H [D-]

BI 483. POPULATION BIOLOGY (3). Theoretical and empirical views of the structure and function of populations from across the tree of life, emphasizing the integration of ecological and evolutionary approaches. Lec. PREREQS: (MTH 241 [D-] or MTH 251 [D-] or MTH 251H [D-] ) and (ST 351 [D-] or ST 351H [D-] ) and (ST 352* [D-] or ST $411^{*}$ [D-] ) and (BI 311 [D-] or BI 311H [D-] or BI 370 [D-] or BI 370H [D-] )
BI 495. DISEASE ECOLOGY (3). An introduction to disease ecology--the study of disease processes in natural populations and communities. The course focuses on (I) the role parasites play in the ecology and evolution of animal populations including humans; and (II) the relevance of ecological and evolutionary considerations in managing infectious diseases. PREREQS: BI 370 [C-]

BI 498. SENIOR BIOLOGY FIELD TEST (0). A comprehensive, two-hour exam to assess the biological knowledge of Biology and Zoology seniors. Students must complete the exam in their final undergraduate term or during spring term if graduating during summer when it is not offered. A pass will be given to all students who complete the exam. More details at http://ib.oregonstate. edu/advising/MFT-info. PREREQS: Biology and Zoology majors with senior standing. Summer graduates register their final spring term. All other students register their final OSU term.
BI 499. SPECIAL TOPICS (0-16). Topics and credits vary.
BI 499H. SPECIAL TOPICS (1-16). Topics and credits vary. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
BI 501. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.

BI 503. THESIS/DISSERTATION (1-16). This course is repeatable for a maximum of 999 credits
BI 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
BI 506. PROJECTS: OUTREACH (1-16). Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
BI 507. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

BI 527. PALEOBIOLOGY (4). Fossils provide a direct window into the evolution, extinction, and ecology of past life on Earth. A processbased study of the marine and terrestrial fossil record is taken to explore the topics of preservation, macroevolution, extinction of biotas, biomechanics, paleoecology, and climate change. Required laboratory and weekend field trip.
PREREQS: ((BI 211 or BI 211 H$)$ and ( BI 212 or B 212 H ) and ( BI 213 or BI 213 H ) ) or (BI 204 and BI 205 and BI 206) or GEO 203. All BI courses with C-; GEO 203 with D-

## BI 535. GENES AND CHEMICALS IN

 AGRICULTURE: VALUE AND RISK (3). A multidisciplinary course that examines the scientific, social, political, economic, environmental, and ethical controversies surrounding agricultural and natural resource biotechnologies. Lec/rec. CROSSLISTED as FES 435/FES 535, FES 435H, MCB 535, TOX 435/TOX 535 , TOX 435H. PREREQS: One quarter each of biology and chemistry helpful but not essential.BI 545. EVOLUTION (3). Formal analysis of genetic and ecological mechanisms producing evolutionary change; special topics include speciation, ecological constraints, adaptive radiations, paleontology, biogeography, the origin
of life, molecular evolution, and human evolution. PREREQS: BI 311 or equivalent genetics course.

BI 551. FUNCTIONAL ANATOMY OF THE HUMAN MUSCULAR SYSTEM (4). In-depth dissection of the orientation, innervation, and functional significance of muscles and muscle groups. Topics include muscle identification, joint anatomy and variation of human form. BI 551 student expectations include vascularization and detailed joint anatomy. The laboratory component will consist of the dissection of the muscular anatomy of a human cadaver. Lab fee. Lec/lab. PREREQS: ((BI 231 and 241) or (BI 331 and 341)) and ((BI 232 and 242) or (BI 332 and 342)) and ((BI 233 and 243 ) or ( BI 333 and 343$)$ ) and departmental approval required. Admission to $\mathrm{BI} 451 / \mathrm{BI} 551$ is by application in spring of the academic year students plan to attend.

BI 556. PHYLOGENETICS (4). Explores the theory and practice of modern phylogenetic analysis. Emphasis placed on tree reconstruction algorithms, assessment of statistical support, and contemporary issues in phylogenetics. Lab will focus on the use of phylogenetic software and the analysis of molecular data sets. Lec/lab. CROSSLISTED as BOT 556. PREREQS: (ST 351 or ST 351H) and (ST 352* or ST $411^{*}$ ) and (BI 311 or BI 311 H or BI 445 )
BI 581. BIOGEOGRAPHY (3). Biogeography is the study of the distribution of biodiversity. We focus on abiotic (geological, climatological) and biotic (ecological, evolutionary) factors that govern diversity across space and through time, emphasizing assembly of communities, global change, and conservation in today's rapidly changing world. The course format includes lecture, computer-based activities, and discussion Offered winter term in odd years. PREREQS: BI 370 or BI 370 H
BI 583. POPULATION BIOLOGY (3). Theoretical and empirical views of the structure and function of populations from across the tree of life, emphasizing the integration of ecological and evolutionary approaches. Lec. PREREQS: (MTH 241 or MTH 251 or 251 H ) and (ST 351 or ST 351 H ) and (ST 352* or ST $411^{*}$ ) and (BI 311 or BI 311 H or BI 370 or BI 370H)
BI 592. THEORETICAL ECOLOGY (4). A treatment of the central concepts of theoretical ecology, with emphasis on the analysis and modeling of single populations and multispecies communities. Topics include discrete- and continuous-time models of population growth, stochastic and deterministic processes, and the response of populations and communities to pulse and press perturbations. PREREQS: Graduate standing.
BI 595. DISEASE ECOLOGY (3). An introduction to disease ecology--the study of disease processes in natural populations and communities. The course focuses on (I) the role parasites play in the ecology and evolution of animal populations, including humans; and (II) the relevance of ecological and evolutionary considerations in managing infectious diseases. PREREQS: BI 370
BI 599. SPECIAL TOPICS (1-16).
BI 601. RESEARCH AND SCHOLARSHIP (1-16). This course is repeatable for a maximum of 16 credits.
BI 603. THESIS/DISSERTATION (1-16). This course is repeatable for a maximum of 999 credits.
BI 808. WORKSHOP (1-16). This course is
repeatable for a maximum of 16 credits.

## - ZOOLOGY COURSES

Z 315. DINOSAUR BIOLOGY (3). In-depth examination of our current understanding of dinosaur systematics, physiology, and ecology. Possible factors associated with dinosaur extinction (i.e., natural catastrophes, global climate change, diseases, etc.) will also be covered. Lec. PREREQS: Sophomore standing.

Z 319. ^CRITICAL THINKING AND COMMUNICATIONS IN THE LIFE SCIENCES (3). Teaches students the practice of biological science. Topics cover scientific theory, written and spoken communications, ethics and critical evaluation. (Writing Intensive Course) CROSSLISTED as BI 319. PREREQS: ( BI 211 [C-] or BI 211 H [C-] ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213H [C-] ) and (ST 351 [D-] or ST 351H [D-] ) and ST 352* [D-]

## Z 349. *BIODIVERSITY: CAUSES,

## CONSEQUENCES, AND CONSERVATION (3).

The earth's biodiversity is a precious inheritance that is threatened by an unprecedented extinction crisis. This course examines the evolutionary and ecological processes that have created this unique diversity of life, the importance of biodiversity in maintaining the earth's ecosystems, and methods used to conserve biodiversity for future generations. (Bacc Core Course)
Z 350. ANIMAL BEHAVIOR (3). Concepts of behavior; sensory receptors, internal mechanisms governing responses; learning and habituation; social organization and communication. PREREQS: ((BI 211 [C-] or BI 211H [C-] ) and (BI 212 [C-] or Bl 212 H [C-]) and (BI 213 [C-] or BI $213 \mathrm{H}[\mathrm{C}-\mathrm{]})$ ) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-])
Z 361. INVERTEBRATE BIOLOGY (3).
Exploration of the diversity and evolutionary relationships among major invertebrate phyla with an emphasis on morphological features, functional aspects, and life history for each phylum.
PREREQS: ( BI 211 [C-] or BI 211 H [C-] ) and (BI 212 [C-] or BI 212H [C-]) and (BI 213 [C-] or BI 213 H [C-] ) ) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-])

## Z 362. INVERTEBRATE BIOLOGY

LABORATORY (2). Morphology and anatomy of representative invertebrates introduced in Z 361; diversity within phyla. Study is by dissections and both microscopic and macroscopic examination; field trip fee. Lab fee. Lec/lab. PREREQS: ((BI 211 D-] or BI 211H [D-] ) and (BI 212 [D-] or BI 212H [D-] ) and (BI 213 [D-] or BI 213H [D-] ) and Z 361* [D-] )
Z 365. BIOLOGY OF INSECTS (4). Introduction to the study of insects, focusing on the biological attributes responsible for the success and dominance of insects. Emphasis on taxonomy, morphology, behavior, ecology, and coevolutionary interrelationships. Required field trips. Lec/lab. PREREQS: ( BI 211 [C-] or BI 211 H [C-] ) and (BI 212 [C-] or Bl 212 H [C-]) and (BI 213 [C-] or BI 213 H [C-] ) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-])

Z 371. VERTEBRATE BIOLOGY (3). Overview of vertebrate origins and phylogeny integrating several disciplines (anatomy, ecology, genetics, developmental biology, physiology, behavior, and evolution) to explore the structural and functional adaptations and evolutionary history of vertebrates. Lec. PREREQS: ((BI 211 [C-] or BI $211 \mathrm{H}[\mathrm{C}-]$ ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213H [C-])) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-]) and may be taken alone or concurrently with Z 372.
Z 372. VERTEBRATE BIOLOGY LABORATORY
(2). Classification, identification, and natural history of vertebrates. Includes laboratory examination of specimens and frequent field trips (fee charged) emphasizing Oregon fauna. Lab fee PREREQS: ((BI 211 [C-] or BI 211H [C-]) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213 H [C-] )) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-] ) and Z 371* [D-]
Z 414H. ^WRITING FOR THE BIOLOGICAL
SCIENCES (2). BI 414H/Z 414H and BI 415H/Z 415 H are writing intensive courses that use writing to learn the subject content. Students will develop their writing and critical thinking skills by writing and editing scientific and technical pieces as well as critically reviewing peer and published writing samples. CROSSLISTED as BI 414 H . (Writing Intensive Course) PREREQS: HC 408

Thesis: Learn and HC 408 Thesis: Undertake (or independent completion of LEARN and UNDERTAKE steps). Honors College approval required.
Z 415H. ^BIOLOGICAL SCIENCES THESIS (1). BI 414H/Z 414H and BI 415H/Z 415H are writing intensive courses that use writing to learn the subject content. Students will hone critical thinking and technical writing skills necessary to create compelling and well-documented arguments in support of an original thesis. CROSSLISTED as BI 415H. (Writing Intensive Course) PREREQS: BI 414H [D-] or Z 414H [D-] and Honors College approval required.

## Z 422. COMPARATIVE/FUNCTIONAL

 VERTEBRATE ANATOMY (5). Phylogeneticallybased study of the form and function of vertebrate organ systems, including integumentary, musculoskeletal, cardiopulmonary, digestive, and sensory. Lab emphasizes comparative form through dissection, and function through noninvasive experimentation. Lec/lab. PREREQS: (BI 211 [C-] or BI 211 H [C-] ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213H [C-] ) and (CH 332* [D-] or CH 335* [D-] )
## Z 423. ENVIRONMENTAL PHYSIOLOGY (3).

Comparative environmental physiology of animals with emphasis on adaptations to such aspects of the physical environment as temperature, water, ions, and gases. Consideration given to interactions between physiology and environment that influence the local and geographic distribution of animals. PREREQS: ((BI 211 [C-] or BI 211H [C-] ) and (BI 212 [C-] or BI 212H [C-] ) and (BI 213 [C-] or BI 213H [C-] )) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-] )) and (CH 123 [D-] or (CH 233 [C-] or CH 233H [D-] ) and (CH 263 [D-] or CH 263H [D-] ))
Z 425. EMBRYOLOGY AND DEVELOPMENT (5). An integrated molecular, cellular and whole organism approach. Comparative embryonic development from gametogenesis, body axis specification, pattern formation and organogenesis. Experimental approaches uncovering cellular interactions, regulation of gene expression, and cellular differentiation Lab emphasizes experimental comparative developmental biology and embryology. Lab fee. Lec/lab. PREREQS: BI 311 [D-] and (BI 314 [D-] or BI 314H [D-] or BB 314 [D-] or BB 314H [D-] ) and junior standing.
Z 431. VERTEBRATE PHYSIOLOGY I (3). Systems/concepts covered include motor reflexes, autonomic nervous system, digestion/ metabolism, renal and osmoregulatory, endocrine and reproductive systems. First in Z43X series, although courses may be taken in any order. PREREQS: (BI 211 [C-] or $\mathrm{BI} 211 \mathrm{H}[\mathrm{C}-]$ ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213H [C-] ) and (CH 332* [D-] or CH 335* [D-] )
Z 432. VERTEBRATE PHYSIOLOGY II (3). Systems/concepts covered include blood, immune lymphatic, cardiovascular, and pulmonary. Second in the Z43X series, although courses may be taken in any order. PREREQS: (BI 211 [C-] or BI $211 \mathrm{H}[\mathrm{C}-]$ ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213H [C-]) and (CH 332* [D-] or CH 335* [D-] )

Z 437. VERTEBRATE ENDOCRINOLOGY (4). An exploration of vertebrate endocrinology that examines principles of hormone action, interand intracellular signaling mechanisms within endocrine axes, and comparative endocrine physiology, emphasizing concepts of homeostasis and methodologies for evaluating normal and physiological function. Students are provided multiple forums for class participation, in the form of scientific presentations and "mini-reports." PREREQS: BI 314 [D-] or BI 314H [D-] or BB 314 [D-] or BB 314H [D-]
Z 438. BEHAVIORAL NEUROBIOLOGY (3). An introduction to the neurobiological basis of animal behavior. Examines behavior in the context of sensory physiology, motor control, neural circuity,
and cellular processes. Lec. PREREQS: ((BI 211 [C-] or $\mathrm{BI} 211 \mathrm{H}[\mathrm{C}-]$ ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213H [C-]) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-] )) and (CH 123 [C-] or (CH 233 [C-] or CH 233 H [C-]) and (CH 263 [C-] or CH 263 H [C-] ))
Z 440. INSECT PHYSIOLOGY (3). Fundamentals
of insect physiology from the behavioral to the molecular level. Cellular physiology and hormonal control of molting, metamorphosis and reproduction. Overview of body functions: respiration, circulation, digestion, metabolism, and osmoregulation. Physiological basis of behavior: muscles and flight, structure and functions of the nervous system, sensory physiology and chemical communication. The contributions of insect physiology to general physiological principles and biorational methods of insect pest control are discussed. PREREQS: (( BI 211 [C-] or BI 211H [C-] ) and (BI 212 [C-] or BI 212H [C-]) and (BI 213 [C-] or BI 213 H [C-] )) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-] )) and CH 123 [D-] or ((CH 233 [D-] or CH 233H [D-] ) and (CH 263 [D-] or CH 263H [D-] ))

## Z 441.VERTEBRATE PHYSIOLOGY

LABORATORY (2). Experiments and exercises in vertebrate physiology. Systems studied: neuromuscular control, autonomic nervous system, digestive, endocrine, renal, and reproductive. Available to pre-vet and pre-med biology majors. Lab fee. Lab. PREREQS: Z 431* [D-]

## Z 442. VERTEBRATE PHYSIOLOGY

LABORATORY (2). Experiments and exercises in vertebrate physiology. Systems studied: blood, lymphatic, immune, cardiovascular, pulmonary Available to pre-vet and pre-med biology majors. Lab fee. Lab. PREREQS: Z 432* [D-]

## Z 461. MARINE AND ESTUARINE

INVERTEBRATE ZOOLOGY (4). Comparative survey of eight major invertebrate phyla and many lesser-known phyla. Areas of emphasis will be 1) invertebrate identification, 2) natural history (diversity, habitat, feeding, behavior), and 3) comparative anatomy (adaptive significance of morphological structures). Laboratories and field trips will strongly supplement lecture material. Lec/ lab. Taught at Hatfield Marine Science Center. PREREQS: ((BI 211 [C-] or BI 211H [C-] ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213 H [C-] )) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-])
Z 473. HERPETOLOGY (3). World families and distribution of amphibians and non-avian sauropods; evolution, population biology, life histories, current literature. PREREQS: ((BI 211 [C-] or BI 211 H [C-]) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213H [C-] )) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-])
Z 474. SYSTEMATIC HERPETOLOGY (2). A survey of the phylogenetic diversity of amphibians and reptiles of the United States. Identification through the use of keys will be stressed. Field trip fee. Lab fee. Lec/lab. PREREQS: One year of introductory biology and/or vertebrate biology.

## Z 475. INSECT BIODIVERSITY SURVEY (4).

Through lectures, laboratories and an intensive field survey, students learn about insect diversity, natural history and evolution as well as the important role of biological collections in modern biodiversity research. The survey takes place in the two weeks prior to fall term at a remote Pacific Northwest field station. Lec/lab. PREREQS: (BI 211 [C-] or Bl 211 H [C-] ) and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI 213 H [C-] )) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-] ) and departmental approval required. Admission to Z475/575 is by application (application preceding Spring term).

Z 477. AQUATIC ENTOMOLOGY (4). Biology, ecology, collection, and identification of aquatic insects. Two required Saturday field trips. Lec/lab. PREREQS: ( $(\mathrm{BI} 211$ [C-] or $\mathrm{BI} 211 \mathrm{H}[\mathrm{C}-\mathrm{]})$ and (BI 212 [C-] or BI 212 H [C-] ) and (BI 213 [C-] or BI

213 H [C-])) or (BI 204 [C-] and BI 205 [C-] and BI 206 [C-] )

Z 499. SPECIAL TOPICS (0-16). Topics and credits vary. This course is repeatable for a maximum of 16 credits.
Z 499H. SPECIAL TOPICS (1-16). Topics and credits vary. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
Z 501. RESEARCH (1-16). Graduate-level research completed under faculty supervision. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
Z 503. THESIS (1-16). Master's thesis, completed under faculty supervision. This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.

## Z 505. READING AND CONFERENCE (1-16).

For graduate students working toward a master's degree. After arrangements with individual faculty, readings and discussions on topics of mutual interest. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

Z 507. SEMINAR (1). Graded P/N. This course is repeatable for a maximum of 16 credits.

Z 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required

## 522. COMPARATIVE/FUNCTIONAL

VERTEBRATE ANATOMY (5). Phylogeneticallybased study of the form and function of vertebrate organ systems, including integumentary, musculoskeletal, cardiopulmonary, digestive, and sensory. Lab emphasizes comparative form through dissection, and function through noninvasive experimentation. Lec/lab. PREREQS: (BI 211 or BI 211 H ) and ( Bl 212 or BI 212 H ) and ( BI 213 or BI 213 H ) and (CH 332* or CH 335*)
Z 523. ENVIRONMENTAL PHYSIOLOGY (3).
Comparative environmental physiology of animals with emphasis on adaptations to such aspects of the physical environment as temperature, water, ions, and gases. Consideration given to interactions between physiology and environment that influence the local and geographic distribution of animals. PREREQS: (( BI 211 or Bl 211 H$)$ and (BI 212 or BI 212 H ) and ( BI 213 or BI 213 H )) OR (BI 204 and BI 205 and BI 206 )) and (CH 123 or ( CH 233 or CH 233 H ) and ( CH 263 or CH 263 H ))

## Z 525. EMBRYOLOGY AND DEVELOPMENT

(5). An integrated molecular, cellular and whole organism approach. Comparative embryonic development from gametogenesis, body axis specification, pattern formation and organogenesis. Experimental approaches uncovering cellular interactions, regulation of gene expression, and cellular differentiation. Lab emphasizes experimental comparative developmental biology and embryology. Lab fee. Lec/lab. PREREQS: BI 311 and (BI 314 or BI 314 H ) and graduate or postbac standing.

## Z 531. VERTEBRATE PHYSIOLOGY I (3)

Systems/concepts covered include motor reflexes, autonomic nervous system, digestion/ metabolism, renal and osmoregulatory, endocrine and reproductive systems. First in Z43X series, although courses may be taken in any order. Lec. PREREQS: ( Bl 211 or Bl 211 H ) and ( Bl 212 or BI 212 H ) and (BI 213 or BI 213 H ) and (CH 332* or CH 335*)
Z 532. VERTEBRATE PHYSIOLOGY II (3).
Systems/concepts covered include blood, immune lymphatic, cardiovascular, and pulmonary. Second in the Z43X series, although courses may be taken in any order. PREREQS: (BI 211 or BI 211 H ) and ( BI 212 or BI 212 H ) and (BI 213 or Bl 213 H ) and (CH 332* or CH 335*)
Z 537. VERTEBRATE ENDOCRINOLOGY (4). An exploration of vertebrate endocrinology that
examines principles of hormone action, inter and intracellular signaling mechanisms within endocrine axes, and comparative endocrine physiology, emphasizing concepts of homeostasis and methodologies for evaluating normal and pathophysiological function. Students are provided multiple forums for class participation, in the form of scientific presentations and PREREQS: (BI 314 or BI 314 H ) and graduate status or instructor approval required.

Z 538. BEHAVIORAL NEUROBIOLOGY (3). An introduction to the neurobiological basis of animal behavior. Examines behavior in the context of sensory physiology, motor control, neural circuity, and cellular processes. Lec. PREREQS: (((BI 211 [C-] or BI 211 H [C-] ) and (BI 212 [C-] or BI 212 H C-] ) and (BI 213 [C-] or BI 213H [C-] )) or BI 204 [C-] and BI 205 [C-] and BI 206 [C-] )) and CH 123 [C-] or ((CH 233 [C-] or CH 233H [C-] ) and (CH 263 [C-] or CH 263H [C-] ))
Z 540. INSECT PHYSIOLOGY (3). Fundamentals of insect physiology from the behavioral to the molecular level. Cellular physiology and hormonal control of molting, metamorphosis and reproduction. Overview of body functions: respiration, circulation, digestion, metabolism, and osmoregulation. Physiological basis of behavior: muscles and flight, structure and functions of the nervous system, sensory physiology and chemical communication. The contributions of insect physiology to general physiological principles and biorational methods of insect pest control are discussed. PREREQS: (((BI 211 or BI 211 H$)$ and ( BI 212 or BI 212 H ) and ( BI 213 or BI 213 )) or ( BI 204 and BI 205 and BI 206$)$ ) and CH 123 or ((CH 233 or CH 233 H ) and ( CH 263 or CH 263 H ))

## 2 561. MARINE AND ESTUARINE

INVERTEBRATE ZOOLOGY (4). Comparative survey of eight major invertebrate phyla and many lesser-known phyla. Areas of emphasis will be 1) invertebrate identification, 2) natural history (diversity, habitat, feeding, behavior), and 3) comparative anatomy (adaptive significance of morphological structures). Laboratories and field trips will strongly supplement lecture material. Lec/ lab. Taught at Hatfield Marine Science Center. PREREQS: ((BI 211 or BI 211 H$)$ and (BI 212 or B $212 \mathrm{H})$ and (BI 213 or BI 213 H$)$ ) or (BI 204 and BI 205 and BI 206) and students should have: (1) at east one year of undergraduate-level biology, and (2) basic familiarity with major invertebrate phyla. Graduate standing.

Z 565. MARINE CONSERVATION SCIENCE AND POLICY (3). Introduces the science-policy interface of ocean resource management. Through discussions, lectures, and independent projects, students will learn how policy is formulated at the state and federal levels, and the role of science in that process. Emphasizes current topics, such as ecosystem-based management. Graded P/N. Taught at Hatfield Marine Science Center. PREREQS: Graduate standing.
Z 573. HERPETOLOGY (3). World families and distribution of amphibians and non-avian sauropods; evolution, population biology, life histories, current literature. PREREQS: ((BI 211 or $\mathrm{Bl} 211 \mathrm{H})$ and $(\mathrm{BI} 212$ or BI 212 H$)$ and ( BI 213 or $\mathrm{BI} 213 \mathrm{H})$ ) or (BI 204 and BI 205 and BI 206 ) and graduate or postbac standing.
Z 574. SYSTEMATIC HERPETOLOGY (2). A
survey of the phylogenetic diversity of amphibians and reptiles of the United States. Identification through the use of keys will be stressed. Field trip fee. Lab fee. Lec/lab. PREREQS: Graduate or postbac standing.
Z 575. INSECT BIODIVERSITY SURVEY (4).
Through lectures, laboratories and an intensive field survey, students learn about insect diversity, natural history and evolution as well as the important role of biological collections in modern biodiversity research. The survey takes place in the two weeks prior to fall term at a remote Pacific Northwest field station. Lec/lab. PREREQS: ((BI 211 or BI 211 H$)$ and (BI 212 or BI 212 H$)$ and (BI

213 or BI 213 H$)$ ) or (BI 204 and 205 and 206) Departmental approval required. Admission to Z $475 / Z 575$ is by application (application preceding Spring term).
Z 577. AQUATIC ENTOMOLOGY (4). Biology, ecology, collection, and identification of aquatic insects. Two required Saturday field trips. Lec/lab. PREREQS: ((BI 211 or BI 211 H$)$ and (BI 212 or BI 212 H ) and (BI 213 or BI 213 H )) or (BI 204 and BI 205 and BI 206)
Z 585. GRANT WRITING AND ETHICS (3). Participants will write and submit a grant proposal by the end of the term. We discuss the main components of a typical grant proposal. Participants read and critique proposal drafts written by participants in the workshop. Ethical issues are discussed as they are encountered. Graded $P / N$. This course is repeatable for a maximum of 6 credits.
Z 587. SCIENTIFIC WRITING \& ETHICS (3).
Participants will write a scientific paper based on their own research and submit it for publication. Topics to be covered include writing skills (e.g., making a good argument, choice of a journal, reviewing the literature) and ethical issues (e.g., citation, plagiarism, disclosure, data archiving, and acknowledgment). This course is repeatable for a maximum of 6 credits. PREREQS: Graduate standing.
Z 593. BEHAVIORAL ECOLOGY (5). Behavioral ecology with emphasis on both theoretical and empirical approaches. Offered alternate years. PREREQS: Graduate or postbac standing.
Z 594. COMMUNITY ECOLOGY (5). Theory and analysis of multispecies associations. Emphasis on extent to which existing ecological theory is supported by natural phenomena. Course considers how biotic and abiotic mechanisms interact to regulate community organization and stability in marine, freshwater, and terrestria habitats. Offered alternate years. PREREQS: Graduate or postbac standing.
Z 599. SPECIAL TOPICS (1-16). Topics and credits vary. Grading mode TBA. Taught at Hatfield Marine Science Center and Corvallis campus. This course is repeatable for a maximum of 16 credits.
Z 601. RESEARCH (1-16). Doctoral-level research under faculty supervision. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval.

Z 603. THESIS (1-16). Doctoral thesis completed under faculty supervision. This course is repeatable for a maximum of 999 credits.
PREREQS: Departmental approval.
Z 605. READING AND CONFERENCE (1-16).
For graduate students working toward doctoral degree. After arrangements with individual faculty, readings and discussions on topics of mutual interest. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval.

## SCHOOL OF LIFE SCIENCES

DEPARTMENT OF
MICROBIOLOCY
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## FACULTY

Professors Bartholomew, Bermudez, Bottomley, Dreher, Field, Geller, Giovannoni, Kent, Ream, Sarker, Trempy
Associate Professors Schuster,
Thurber-Vega
Assistant Professors Halsey, Lowry, Mueller, Sharpton
Senior Instructor/Advisor Bruslind
Instructor/Advisor Anderson
Undergraduate Major
BioHealth Sciences (BS, CRED, HBS)
Pre-professional Options in Health Sciences
Pre-Clinical Laboratory Science
Pre-Dentistry
Pre-Medicine
Pre-Optometry
Pre-Pharmacy
Pre-Physical Therapy
Pre-Physician Assistant
Pre-Podiatry
Microbiology (BS, HBS)
Option
Aquatic Microbiology
Pre-Medicine/Microbiology
Minor
Microbiology

## Graduate Major

Microbiology (MA, MS, PhD)
Graduate Areas of Concentration
Environmental Microbiology
Food Microbiology
Genomics
Immunology
Microbial Ecology
Microbial Evolution
Parasitology
Pathogenic Microbiology
Virology

## Graduate Minor

Microbiology

Microbiology is concerned with the forms and activities of bacteria, archaea, fungi, protozoa, and viruses. It plays varied roles in the practical applications of technology and medicine, as well
as in the most theoretical problems of biology. Microbiologists are involved in activities as different as the study of gene structure, the control of disease, and the industrial processes based on the ability of microorganisms to decompose and synthesize complex organic molecules. Microbiology is one of the most rewarding of professions because it provides the opportunity to be in contact with all the other natural sciences and thus to contribute in many different ways to the betterment of life.

## UNDERGRADUATE STUDIES IN MICROBIOLOGY

Many fields of microbiology are available to students and research workers. These include fundamental areas such as the physiology, ecology, and genetics of microorganisms; and the applications of microbiology concerned with soil and water quality, food safety, immunology, and human, animal and plant diseases. Undergraduate studies prepare students for admission to professional schools, graduate programs in microbiology, and for positions in education and as health officers, sanitarians and biotechnicians in private industry, state and federal government.

High school students or community college transferees considering a career in microbiology will find it helpful to have a strong background in mathematics and chemistry. An excellent advising program is available to undergraduates, and prospective students are encouraged to consult with a departmental advisor or with faculty members working in an area of interest to them. Upper-division students are also encouraged to carry out a research project in the laboratory of a faculty member and/or to serve as an undergraduate teaching assistant. Several partial scholarships are available for microbiology majors. For more information, contact a microbiology advisor.

## UNDERGRADUATE STUDIES IN BIOHEALTH SCIENCES

Specialized programs are offered to students who wish to pursue careers in health-related fields. Such programs provide excellent academic preparation for students who plan to enter medical, pharmacy, or dental school, and for those choosing careers in physician assistant, physical therapy, optometry, clinical laboratory science, and podiatry. The curricula of the BioHealth Sciences major and accompanying options generally fulfills requirements at the respective professional schools. Because specific requirements vary from school to school, it is the student's responsibility to check requirements for any school to which the student plans to apply.

## GRADUATE STUDIES

The Department of Microbiology offers graduate programs leading to the Master of Science and Doctor of Philosophy degrees. Major fields of study in the program include molecular biology, microbial physiology, genetics, virology, soil and aquatic microbiology, immunology, pathogenic microbiology, and microbial genomes. The department also participates in the Master of Arts in Interdisciplinary Studies program. Students in both the master's and PhD programs are required to complete a research project leading to a thesis. Students pursuing the PhD degree must complete both written and oral qualifying examinations. Teaching and research assistantships are available.

For additional information, contact the department head or other faculty members conducting research in areas that are of interest.

## BIOHEALTH SCIENCES

## (BS, CRED, HBS)

## BioHealth Sciences Advisors:

## Beck, Kessel, Wolf

To earn a bachelor's degree in BioHealth Sciences, students must complete all University Baccalaureate Core requirements and choose one of the options listed below:

- Pre-Clinical Laboratory Science
- Pre-Dentistry
- Pre-Medicine
- Pre-Optometry
- Pre-Pharmacy
- Pre-Physical Therapy
- Pre-Physician Assistant
- Pre-Podiatry

The following is a BioHealth Sciences course plan. Specific degree requirements may be found under the option requirements.

All BioHealth Sciences majors must receive a $\mathbf{C}$ - or better in the following courses: (BI 211 or BI 211H), (BI 212 or BI 212H), (BI 213 or BI 213H), (CH 231 or CH 231 H ) and (CH 261 or CH 261 H )), ((CH 232 or CH 232 H ) and (CH 262 or CH 262H)).

## First Year

CH 231, CH 232, CH 233. *General
Chemistry ( $4,4,4$ )
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233 (1,1,1)
Approved mathematical science (12)
(See the mathematics requirements listed
for each option. Some may require more
than 12 credits of mathematics, computer science and statistics courses.)
Baccalaureate core courses and/or electives (9)

Fitness (3)
Speech (3)
WR 121. *English Composition (3)

## Sophomore Year

BI 211, 212, 213. *Principles of Biology
$(4,4,4)$
General physics or physical science (12-15)
Baccalaureate core courses and/or electives
(15-18)
Writing II (3)

## Junior and Senior Years

Select one WIC course from below (3-4):
MB 385. ^Emerging Infectious Diseases and Epidemics (3)
BHS 323. ^Microbial Influences on Human Health (3)
HSTS 417. ${ }^{\wedge *}$ History of Medicine (4)
Select two Cultural Competency
courses from below (6-8): (one
course may also count for a bacc
core requirement)
ANTH 240. Introduction to Biological Anthropology (3)
ANTH 345. *Biological and Cultural Constructions of Race (3)
ECON 383. *The Economics of Discrimination (4)
ES 351. *Ethnic Minorities in Oregon (4)

ES 353. *Environmental Racism (4)
FCSJ/ANTH 361. *Food Justice (4)
HDFS 201. *Contemporary Families in the U.S. (3)
MB 330. *Disease and Society (3)
PHL 280. *Ethics of Diversity (4)
PSY 426. *Psychology of Gender (4)
PSY 466. *Fat Studies (4)
SOC 426. *Social Inequality (4)
SPAN 211. Spanish for Medical Professions I (4)
SPAN 222. Spanish for Medical Professions II (4)
WGSS/QS 262. *Introduction to Queer Studies (3)
WGSS 414. *Systems of Oppression in Women's Lives (4)
Option, baccalaureate core, and electives courses (75) ${ }^{1}$
Synthesis (6)

## Footnotes:

${ }^{1}$ Students must take a minimum of 24 credits of upper-division science from departments in the College of Science.

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)
Major Code: 606


## OPTIONS

## PRE-CLINICAL LABORATORY SCIENCE OPTION

Clinical laboratory scientists (also known as medical laboratory scientists or medical technologists) perform routine and highly specialized diagnostic procedures in clinical laboratories. They must be certified by the American Society of Clinical Pathologists (ASCP) or the National Certification Agency (NCA). Certification requires 12 to 15 months of training at an accredited professional school of clinical laboratory science. Oregon currently has one such school jointly administered by the Oregon Health and Science University (OHSU) and Oregon Institute of Technology (OIT); Washington and

California have several. Most clinical laboratory science schools require a bachelor of science degree for admission to their educational program; however, some schools (notably OHSU/OIT) accept students who have had three years of appropriate college work.
The curriculum in the OSU PreClinical Laboratory science program was developed in cooperation with nearby clinical laboratory science schools, and OSU students have shown a high success rate in these schools. Most pre-clinical laboratory science students complete the BS degree in BioHealth Sciences and then attend clinical laboratory science school (4+1 program).

## First Year (45)

BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
CH 231, CH 232, CH 233. *General
Chemistry ( $4,4,4$ )
and CH 261 , CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
(1,1,1)
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness(1) or any PAC course (1-2)
MB 110. Orientation to Microbiology (1)
MTH 111. *College Algebra (4)
MTH 112. *Elementary Functions (4)
WR 121. *English Composition (3)
Speech (3)

## Sophomore Year (45)

BB 314. Cell and Molecular Biology (4)
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory
(2)

PHAR 210. Terminology of the Health
Sciences (2)

## Take 4 credits of Statistics:

ST 201. Principles of Statistics (4)
or ST 351. Introduction to Statistical
Methods (4)
Writing II (3)
Baccalaureate Core courses (12)
Electives (3)

## Junior Year (45)

BB 450, BB 451. General Biochemistry $(4,3)$
MB 310. Bacterial Molecular Genetics (3)
MB 311. ^Molecular Microbiology Lab: A Writing Intensive Course (3)
MB 416. Immunology (3)
PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
Contemporary Global Issues (3)
Science, Technology, and Society (3)
Electives (5)
Senior Year (45)
Completion of a one-year clinical laboratory science program
or BI 331, BI 332, BI 333. Advanced
Human Anatomy and Physiology (3,3,3)
and BI 341 , BI 342 , BI 343 . Advanced
Human Anatomy and Physiology
Laboratory ( $2,2,2$ )
Plus additional electives to total 60 upperdivision credits.
Electives (30)

## Total=180

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)


## Option Code: 576

## PRE-DENTISTRY OPTION

The BioHealth Sciences major offers a pre-dental curriculum leading to a Bachelor of Science degree that satisfies the requirements for admission to most dental schools.

Admission to dental school is competitive; students are selected on the basis of grades, DAT scores, dental experience, and apparent motivation for dentistry. A member of the pre-dental committee is assigned to each student as an advisor.

## First Year (45)

BI 107. Health Professions: Dental (1)
[Terminated summer 2017]
CH 231, CH 232, CH 233. *General Chemistry $(4,4,4)$
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233 $(1,1,1)$
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
or ST 201. Principles of Statistics (4)
or ST 351. Introduction to Statistical Methods (4)
Speech (3)
WR 121. *English Composition (3)
Baccalaureate core courses and electives (15)

## Sophomore Year (45-46)

BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
Baccalaureate Core courses and electives (14)

Additional math, computer science, or statistics courses (4)
Writing II (3)

## Junior Year (42-48)

BB 314. Cell and Molecular Biology (4) [ BB 450, BB 451. General Biochemistry $(4,3)$ or BB 350. Elementary Biochemistry (4)
BI 311. Genetics (4)
BI 331, BI 332, BI 333. Advanced Human Anatomy and Physiology $(3,3,3)$
and BI 341, BI 342, BI 343. Advanced
Human Anatomy and Physiology Laboratory $(2,2,2)$
Electives (12-14)
Select one WIC course from the following (3-4):
BHS 323. ${ }^{\wedge}$ Microbial Influences on Human Health (3)
BI/MB 385. ${ }^{\wedge}$ Emerging Infectious Diseases and Epidemics (3) [BI 385 terminated fall 2017]
HSTS 417. ${ }^{\wedge * H i s t o r y ~ o f ~ M e d i c i n e ~(4) ~}$

## Senior Year (45)

PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
Z 425. Embryology and Development (5)
Baccalaureate core courses and electives (25)
Graduation in BioHealth Sciences with the
Pre-Dentistry option requires a total of 40 credits of upper-division courses in

## science.

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 595


## PRE-MEDICINE OPTION

Physicians diagnose illness and injury, prescribe and administer treatment and advise patients about how to prevent and manage wellbeing.

There are two paths to becoming a doctor: allopathic medicine, which leads to an MD, or osteopathic medicine, which leads to a DO. Both provide the education and training necessary to practice medicine.

The BioHealth Sciences major offers all of the entrance requirements to medical school to include a year each of biology, general chemistry, organic chemistry, physics, genetics, biochemistry, and more. The BioHealth Sciences major is also suited for postbaccalaureate students who already have a bachelor's degree in another subject and need science course work to apply to medical school. The book, Medical School Admission Requirements, published by the Association of American Medical Colleges (https:// www.aamc.org/), lists specific entrance requirements for each MD school. The American Association of Colleges of Osteopathic Medicine (http://www. aacom.org/error/?aspxerrorpath=/about/ Pages/default.aspx) lists requirements for osteopathic (DO) schools.

Admission to medical schools is very competitive. Students are chosen according to grades, MCAT scores, medical experience, and apparent motivation for medicine. A member of the premedical committee is assigned to each student as an advisor.

## First Year (45)

BB 100. The Molecules of Life (2)
BI 109. Health Professions: Medical (1)
CH 231, CH 232, CH 233. *General
Chemistry $(4,4,4)$
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
$(1,1,1)$
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
WR 121. *English Composition (3)
Speech (3)
Baccalaureate core courses and electives (13)

## Sophomore Year (45-47)

BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
BI/BB 314. Cell and Molecular Biology (4)
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
Baccalaureate core courses and electives (14)
Writing II (3)

## Junior Year (44-46)

BB 450, BB 451. General Biochemistry $(4,3)$ BI 311. Genetics (4)
CH 324. Quantitative Analysis (4)

PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
ST 201. Principles of Statistics (4)
or ST 351. Introduction to Statistical Methods (4)
Baccalaureate core courses and electives (8-9)
Select one WIC course from the
following (3-4):
BHS 323. ${ }^{\wedge}$ Microbial Influences on Human Health (3)
BI/MB 385. ${ }^{\wedge}$ Emerging Infectious
Diseases and Epidemics (3)
HSTS 417. ${ }^{\wedge *}$ History of Medicine (4)

## Senior Year (45)

Z 425. Embryology and Development (5)
Baccalaureate core courses and electives, upper-division science courses (40)
Students should plan their senior year in consultation with a premedical advisor. Graduation in BioHealth Sciences/premedicine requires a total of 45 credits of upper-division courses in science.

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Option Code: 600


## PRE-OPTOMETRY OPTION

To prepare for a career as an optometrist, students need three or four years of undergraduate work in science, followed by four years at an accredited college of optometry. Completion of the professional program leads to the degree of Doctor of Optometry. The curriculum described below satisfies the entrance requirements to most optometry schools in the United States. Applicants to optometry schools are accepted on a competitive basis. Students are encouraged to carefully check the prerequisites at the optometry schools of their interest and to work closely with admissions officers to ensure that all requirements have been fulfilled.

## First Year (45)

CH 231, CH 232, CH 233. *General
Chemistry $(4,4,4)$
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
(1,1,1)
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC course (1-2)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
PSY 201, PSY 202. *General Psychology $(3,3)$
WR 121. *English Composition (3)
Speech (3)
Baccalaureate Core courses and Electives (7)

## Sophomore Year (45)

BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
ST 201, ST 202. Principles of Statistics $(4,4)$
Writing II (3)
Baccalaureate Core courses (10)
Junior Year (45)
BI 331, BI 332, BI 333. Advanced Human

Anatomy and Physiology (3,3,3)
and BI 341, BI 342, BI 343. Advanced
Human Anatomy and Physiology Lab
(2,2,2)
PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
or PH 211, PH 212, PH 213. *General
Physics with Calculus (4,4,4)
WR 327. *Technical Writing (3) (recommended)
Contemporary Global Issues (3)
Science Technology and Society (3)
Electives (6) (PHL 444 recommended)

## Senior Year (45)

BB 314. Cell and Molecular Biology (4)
BB 450, BB 451. General Biochemistry $(4,3)$
BI 311. Genetics (4)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

Electives (21) (PH 332 recommended)
Select one WIC course from the
following (3-4):
BHS 323. ^Microbial Influences on Human Health (3)
BI/MB 385. ^Emerging Infectious Diseases
and Epidemics (3) [BI 385 terminated

## fall 2017]

HSTS 417. ${ }^{\wedge *}$ History of Medicine (4)

## Recommended electives:

BB 331. *Introduction to Molecular Biology (3)

BI 370. Ecology (3)
CH 324. Quantitative Analysis (4)
CH 440, CH 441, CH 442. Physical Chemistry ( $3,3,3$ )
HSTS 411, HSTS 412, HSTS 413. *History of Science (4,4,4)
MB 416. Immunology (3)
MB 417. Immunology Laboratory (2)
MB 430. Bacterial Pathogenesis (3)
MB 434. Virology (3)
MB 435. Pathogenic Microbes Laboratory (2)
MTH 254. Vector Calculus I (4)
MTH 256. Applied Differential Equations (4)
PH 332. *Light, Vision, and Color (3)
PSY 330. Brain and Behavior (4)
PSY 432. Physiological Psychology (4)
PSY 442. Perception (4)
Z 425. Embryology and Development (5)
Z 431. Vertebrate Physiology I (3)
Z 432. Vertebrate Physiology II (4)

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Option Code: 603

## PRE-PHARMACY OPTION

The BioHealth Sciences major offers a preparatory program designed to meet most requirements for admission to pharmacy schools across the U.S., including OSU's Doctor of Pharmacy (PharmD) professional program. Students who complete the four-year pre-pharmacy program earn a BS degree in BioHealth Sciences with a Pre-Pharmacy option. Satisfactory completion of the prepharmacy course work facilitates, but does not guarantee, admission to phar-
macy school; applicants are selected on a competitive basis. Students are urged to carefully check admission requirements at their schools of interest and work closely with admission representatives in order to make sure they are meeting all requirements.

## First Year (40-45)

CH 231, CH 232, CH 233. *General
Chemistry ( $4,4,4$ )
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
(1,1,1)
MTH 111. *College Algebra (4)
and/or MTH 112. *Elementary
Functions (4)
MTH 251. *Differential Calculus (4)
or MTH 241. *Calculus for Management
and Social Science (4)
PHAR 201. Pharmacy Orientation (1)
Recommended
WR 121. *English Composition (3)
Fitness (3)
Speech (3)
Baccalaureate Core courses and/or electives
(7) Recommend Psychology course

## Second Year (45)

BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
ST 201. Principles of Statistics (4)
Writing II (3)
Baccalaureate Core courses and/or electives
(14) Recommend Economics course

## Third Year (45)

BB 314. Cell and Molecular Biology (4)
BI 331, BI 332, BI 333. Advanced Human Anatomy and Physiology ( $3,3,3$ )
BI 341, BI 342, BI 343. Advanced Human
Anatomy and Physiology Laboratory $(2,2,2)$
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

Contemporary Global Issues (3) Recommend
H 312. *HIV/Aids and STIS in Modern
Society (3)
PHAR 210. Terminology of the Health Sciences (2) Recommended
Baccalaureate Core courses and/or electives (16)

## Fourth Year (45)

PH 201, PH 202, PH 203. *General Physics (5,5,5)
Science, Technology, and Society (3)
Upper-division electives (23-24) Recommend
BB 450, 451. General Biochemistry $(4,3)$
Writing Intensive Course (3-4)
Select one WIC course from the following (3-4):
BHS 323. ^Microbial Influences on Human Health (3)
BI/MB 385. ^Emerging Infectious Diseases and Epidemics (3) [BI 385 terminated fall 2017]
HSTS 417. ${ }^{\wedge *}$ History of Medicine (4)
The College of Science requires the completion of a minimum of 12 credits in CS, MTH, ST.
Additional courses from upper-division
science courses to total 36 credits of upper-division science. A total of 180
credits with 60 upper-division credits (courses numbered 300 and above) are required to graduate.

## Total=180

Additional courses required for entry into OSU's PharmD program:
BB 450, BB 451. General Biochemistry $(4,3)$
ECON 201. *Introduction to
Microeconomics (4)
or ECON 202. *Introduction to
Macroeconomics (4)
or AEC 250 . *Introduction to
Environmental Economics and Policy (3)
One course in the social or behavioral sciences (3) Only required for students who will not complete a BS degree before entry into PharmD.

## Additional courses for other <br> PharmD programs:

Each of the 130+ pharmacy schools in the U.S. has its own list of prerequisites. Many schools also require applicants to take the Pharmacy College Admission Test (PCAT). Students must check with any school to which they wish to apply for up-to-date information.

## Option Code: 583

## PRE-PHYSICAL THERAPY

## OPTION

Students who complete the four-year pre-physical therapy program earn a BS degree in BioHealth Sciences with a Pre-Physical Therapy option. This program is designed to meet most general requirements for admission to physical therapy schools. Satisfactory completion of the OSU course work facilitates, but does not guarantee, admission to a school of physical therapy; applicants are selected on a competitive basis. Students are urged to carefully check admission requirements at their schools of interest and work closely with admission representatives in order to ensure that they are meeting all requirements.

## First Year (45)

CH 231, CH 232, CH 233. *General
Chemistry ( $4,4,4$ )
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
(1,1,1)
HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC
course (1-2)
KIN 132. Introduction to the Allied Health Professions (1)
PSY 201, PSY 202. *General Psychology (3,3)
WR 121. *English Composition (3)
Speech (3)
Mathematics at least through MTH 112.
*Elementary Functions (4)
Baccalaureate Core courses and/or electives (10)

## Sophomore Year (40-44)

BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
SOC 206. *Social Problems \& Issues (3)
or SOC 204. *Introduction to Sociology (3)
ST 201. Principles of Statistics (4)
ST 202. Principles of Statistics (4) (recommended)
WR 222. *English Composition (3)
Baccalaureate Core courses and/or electives (6)

## Junior Year (45)

BI 331, BI 332, BI 333. Advanced Human Anatomy and Physiology $(3,3,3)$
BI 341, BI 342, BI 343. Advanced Human
Anatomy and Physiology Laboratory ( $2,2,2$ )
KIN 311. Motor Behavior (4)
KIN 321. Biomechanics of Human Movement (4)
PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
WR 323. *English Composition (3) (recommended)
Baccalaureate Core courses and/or electives (4)

## Senior Year (45)

BB 314. Cell and Molecular Biology (4)
BI 311. Genetics (4)
H 312. *HIV/AIDS and STIS in Modern Society (3)
H 320. Introduction to Human Disease (3)
KIN 324. Exercise Physiology (4)
MB 302. General Microbiology (3)
PSY 350. Human Lifespan Development (4)
PSY 381. Abnormal Psychology (4)
Baccalaureate Core courses and/or electives (12-13)
Select one WIC course from the following (3-4):
BHS 323. ${ }^{\wedge}$ Microbial Influences on Human Health (3)
BI/MB 385. ^Emerging Infectious Diseases
and Epidemics (3) [BI $\mathbf{3 8 5}$ terminated
fall 2017]
HSTS 417. ${ }^{\wedge *}$ History of Medicine (4)
Total=180

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 585


## PRE-PHYSICIAN ASSISTANT <br> OPTION

The Pre-Physician Assistant option offers a preparatory program designed to meet most requirements for admission to physician assistant schools. Students who complete the four-year pre-physician assistant program earn a BS degree in BioHealth Sciences with a Pre-Physician Assistant option. Admission to physician assistant school is very competitive and student selection is based on grades, GRE scores, clinical experiences and more. Students are urged to carefully check admission requirements at their schools of interest and work closely with admission representatives in order to make sure they are meeting all requirements.

## First Year (45)

CH 231, CH 232, CH 233. *General Chemistry $(4,4,4)$
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
$(1,1,1)$

HHS 231. *Lifetime Fitness for Health (2)
HHS 241. *Lifetime Fitness (1) or any PAC
course (1-2)
KIN 132. Introduction to the Allied Health Professions (1)
MTH 111. *College Algebra (4)
MTH 112. *Elementary Functions (4)
PSY 201, PSY 202. *General Psychology $(3,3)$
WR 121. *English Composition (3)
Speech (3)
Baccalaureate Core courses and electives (6)

## Sophomore Year (45)

BI 211, BI 212, BI 213. *Principles of Biology ( $4,4,4$ )
CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
SOC 206. *Social Problems \& Issues (3)
or SOC 204. *Introduction to Sociology (3)
ST 201, ST 202. Principles of Statistics $(4,4)$
WR II. (3)
Baccalaureate Core courses and electives (9)

## Junior Year (45)

BI 331, BI 332, BI 333. Advanced Human Anatomy and Physiology $(3,3,3)$
and BI 341, BI 342, BI 343. Advanced
Human Anatomy and Physiology $(2,2,2)$
H 312. *HIV/AIDS and STIS in Modern Society (3)
H 320. Introduction to Human Disease (3)
PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
PSY 350. Human Lifespan Development (4)
PSY 381. Abnormal Psychology (4)
Elective (1)

## Senior Year (45)

Pre-approved upper-division science, psychology or health (9) excluding internship, practicum special/selected topics courses and courses with 399, 499, and 401-410 numbers.
BB 314. Cell and Molecular Biology (4)
BB 350. Elementary Biochemistry (4) or BB 450, BB 451. General Biochemistry $(4,3)$
BI 311. Genetics (4)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)

PHAR 210. Terminology of the Health Sciences (2)
Baccalaureate Core courses and electives (10-11)

## Select one WIC course from the

 following (3-4):BHS 323. ${ }^{\wedge}$ Microbial Influences on Human Health (3)
MB 385. ^Emerging Infectious Diseases and Epidemics (3)
HSTS 417. ${ }^{\wedge *}$ History of Medicine (4)

## Total=180

## Footnotes:

* Baccalaureate Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Option Code: 597

## PRE-PODIATRY OPTION

Podiatry is a growing and challenging health profession that focuses on the care of the human foot and leg. Podiatrists prevent, diagnose, and treat diseases and
disorders of the foot through both medical and surgical methods.

Students wishing to become podiatrists attend a four-year postbaccalaureate training program leading to a Doctor of Podiatric Medicine (DPM) at one of nine schools of podiatric medicine in the United States. These schools are located in Arizona, California, Florida, Illinois, Iowa, New York, Ohio, and Pennsylvania. To practice in Oregon, a DPM must also take the qualifying examination administered by the State Board of Podiatric Examiners.

Before entering a school of podiatric medicine, students must first complete four years of undergraduate study and fulfill entrance requirements to the school of their choice (note that most podiatry schools require 3 quarters of English/writing). Students who enroll in the Pre-Podiatry option will receive a BS degree in BioHealth Sciences upon completion of the curriculum shown below. The preparatory program at OSU will satisfy requirements for entrance to most podiatry schools.

## First Year

CH 231, CH 232, CH 233. *General
Chemistry $(4,4,4)$
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
$(1,1,1)$
MTH 111. *College Algebra (4)
MTH 112. *Elementary Functions (4)
Baccalaureate core courses and electives (16)
Speech (3)
WR 121. *English Composition (3)

## Sophomore Year

BI 211, BI 212, BI 213. *Principles of Biology $(4,4,4)$
CH 331, CH 332. Organic Chemistry $(4,4)$ and CH 337. Organic Chemistry Laboratory (4)
ST 201, ST 202. Principles of Statistics $(4,4)$
or ST 351, ST 352. Introduction to
Statistical Methods $(4,4)$
Writing II (3)
Baccalaureate core courses and electives (10-12)

## Junior Year

BB 314. Cell and Molecular Biology (4)
BB 450, BB 451. General Biochemistry $(4,3)$
or BB 350. Elementary Biochemistry (4)
BI 311. Genetics (4)
PH 201, PH 202, PH 203. *General Physics $(5,5,5)$
Baccalaureate core courses and electives (11-12)
Select one WIC course from the following (3-4):
BHS 323. ${ }^{\wedge}$ Microbial Influences on Human Health (3)
BI/MB 385. ^Emerging Infectious Diseases and Epidemics (3) [BI 385 terminated fall 2017]
HSTS 417. ${ }^{\wedge *}$ History of Medicine (4)

## Senior Year

Upper-division science elective courses (6-9)

Anatomy, physiology, or embryology are recommended.

## Footnotes:

* Baccalaureate Core Course (BCC)
$\wedge$ Writing Intensive Course (WIC)


## Option Code: 604

## MICROBIOLOGY (BS, HBS)

To receive the BS degree in Microbiology, a student must complete all university baccalaureate core requirements plus departmental requirements included in the list below.

- Majors must have 36 credits in microbiology with a minimum GPA of 2.00.
- Majors must receive a $\mathbf{C}$ - or better in the following courses: (BI 211 or BI 211 H ), (BI 212 or BI 212 H ), (BI 213 or BI 213 H$)$, ((CH 231 or CH 231 H$)$ and $(\mathrm{CH} 261$ or CH 261 H$))$, ((CH 232 or CH 232 H ) and ( CH 262 or CH $262 \mathrm{H}))$, ((CH 233 or CH 233 H$)$ and (CH 263 or CH 263 H$)$ ), (CH 331 or CH 331H), and MTH 251.
- Research (MB 401), Thesis (MB 403), and Reading and Conference (MB 405) cannot account for more than 3 of the required 36 microbiology credits.
- Special Projects (MB 406) can account for an additional 3 microbiology credits.
- Additional credits in these subjects will count toward elective credits.
- All required science courses must be taken for a grade.
- CH 324 may be taken with S/U grading; however, if taken $S / U$, the student will not receive a chemistry minor.
- 22 credits must come from the approved 400-level microbiology courses; to include MB 490 (2 credits) and 2 credits from 400-level laboratory courses.


## Freshman Year (45)

BI 211, 212, 213. *Principles of Biology $(4,4,4)$
CH 231, CH 232, CH 233. *General
Chemistry $(4,4,4)$
and CH 261, CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233 $(1,1,1)$
MB 110. Orientation to Microbiology (1)
MTH 251. *Differential Calculus (4)
MTH 252. Integral Calculus (4)
or MTH 268. Mathematical Ideas in
Biology (4)
Fitness (3)
Speech (3)
Writing I (3)

## Sophomore Year (46)

BI/BB 314. Cellular and Molecular Biology (4)

CH 331, CH 332. Organic Chemistry $(4,4)$
CH 337. Organic Chemistry Laboratory (4)
MB 302. General Microbiology (3)
MB 303. General Microbiology Laboratory (2)
PH 201, PH 202, PH 203. *General Physics
$(5,5,5)$

ST 351. Introduction to Statistical Methods (4)

Electives (3)
Writing II (3)

## Junior Year (44)

BB 450. General Biochemistry (4)
BB 451. General Biochemistry (3)
CH 324. Quantitative Analysis (4)
MB 310. Bacterial Molecular Genetics (3)
MB 311. ^Molecular Microbiology Lab: A
Writing Intensive Course (3)
MB 312. Bacterial Physiology and
Metabolism (3)
Perspectives (15)
Synthesis (6)
Electives (3)

## Senior Year (45)

MB 490. Microbiology Capstone Experience (2)

Select 20 credits from the approved 400-level microbiology courses below ( 2 credits of which must come from 400-level laboratory courses):
MB 401. Research (1-16)
MB 405. Reading and Conference (3)
MB 406. Special Projects (2-3)
MB 407. Seminar (1)
MB 410. Occupational Internship (3)
MB 416. Immunology (3)
MB 417. Immunology Laboratory (2)
MB 420. Microbial Genomes,
Biogeochemistry, and Diversity (3)
MB 430. Bacterial Pathogenesis (3)
MB 434. Virology (3)
MB 435. Pathogenic Microbes Laboratory (2)
MB 436. The Human Microbiome (3)
MB 440. Food Microbiology (3)
MB 441. Food Microbiology Laboratory (2)
MB 448. Microbial Ecology (3)
MB 456. Microbial Genetics and
Biotechnology (3)
MB/FST 479. Fermentation Microbiology (3)
MB 480. General Parasitology (3)
MB/FW 491. Fish Diseases in Conservation
Biology and Aquaculture (4)
MB 496. Fish Diseases in Conservation
Biology and Aquaculture Lab (2)

## MB 499. Special Topics (2)

## Total $=180$

Note: Microbiology majors planning advanced professional training in medicine, should consult a pre-medical, clinical lab science or other appropriate advisor.

## Footnotes:

* Baccalaureate Core Course (BCC)
^ Writing Intensive Course (WIC)
Major Code: 570


## OPTIONS

## AQUATIC MICROBIOLOGY <br> OPTION

The Aquatic Microbiology option encompasses a core of oceanography and microbiology courses heavy in coverage of aquatic systems, combined with a selection of elective courses offered by various departments. The option is designed to provide a microbiology major with a
detailed understanding of the role that microbes play in aquatic systems and for aquatic organisms, as well as an understanding of aquatic systems in general. The option complements the Marine Studies Initiative, which should stimulate interest in aquatic systems by students across campus.

Courses used to satisfy the Aquatic Microbiology option requirements may also satisfy the Upper-Division Microbiology Electives and Upper-Division Microbiology laboratory requirements in the Microbiology major.

## Required courses (13)

MB 314. Aquatic Microbiology (3)
MB 420. Microbial Genomes,
Biogeochemistry, and Diversity (3)
MB 448. Microbial Ecology (3)
OC 201. *Oceanography (4)
Must take at least 8 credits from the following:
BI 351. Marine Ecology (3)
BI 373. ^Field Methods in Marine Ecology (3)
BI 450. ${ }^{\wedge}$ Marine Biology and Ecology (15)
BI/FW 464. Marine Conservation Biology (3)
BI 495. Disease Ecology (3)
BOT 416. Aquatic Botany (4)
BOT 476. Introduction to Computing in the Life Sciences (3)
BOT 480. Photosynthesis and Photobiology (3)

FW/OC 434. Estuarine Ecology (4)
FW 456. Limnology (5)
MB/FW 491. Fish Diseases in Conservation Biology and Aquaculture (3)
MB/FW 496. Fish Diseases in Conservation Biology and Aquaculture Lab (2)

## Total=21 minimum credits

## Footnotes:

* Baccalaureate Core Course
$\wedge$ Writing Intensive Course


## Option Code: 736

## PRE-MEDICINE/MICROBIOLOGY OPTION

The Pre-Medicine/Microbiology option for the Microbiology major is designed to meet the current requirements for application to most medical schools in the U.S. (although students are advised to consult the requirements for specific schools before they apply, in the case of changes). Students pursuing a Microbiology degree receive a broad education in microbiological topics. The option focuses some of that education at the 400-level to ensure that students pursuing medicine take microbiology courses of interest to the medical field. In addition, the option adds important social science requirements and medical humanities electives that are not part of the general microbiology degree, but that are important for students pursuing a degree in medicine.

Courses used to satisfy the Pre-Medicine option requirements may also satisfy the Upper-Division Microbiology Electives and Upper-Division Microbiology
laboratory requirements in the Microbiology major. Courses may also be used to satisfy areas of the baccalaureate core.

## Required Courses (10 credits)

BI 109. Health Professions: Medical (1)
PSY 201. *General Psychology (3)
PSY 202. *General Psychology (3)
SOC 204. *Introduction to Sociology (3)

## Microbiology Courses

Select at least two 3-credit courses
below in addition to courses taken above:
MB 416. Immunology (3)
MB 430. Bacterial Pathogenesis (3)
MB 434. Virology (3)
MB 480. General Parasitology (3)
Microbiology Lab Course
Select at least one 2 -credit lab course below in addition to courses taken above:
MB 417. Immunology Laboratory (2)
MB 435. Pathogenic Microbes Laboratory (2)

## Other Electives

Select at least 7 credits from the courses listed below, in addition to courses taken above:
ANTH 383. *Introduction to Medical Anthropology (3)
BI 420. *Viruses in Modern Society (3)
H 312. *HIV/AIDS and STIS in Modern Society (3)
H 320. Introduction to Human Disease (3)
H 425. Foundations of Epidemiology (3)
HST 415. Selected Topics [Illness in
America: 1492-1850] (4)
HSTS 417. *^History of Medicine (4)
PHL 444. *Biomedical Ethics (4)
SOC 350. Health, Illness and Society (4)
ST 352. Introduction to Statistical Methods (4)

Z 431. Vertebrate Physiology I (3)
Z 432. Vertebrate Physiology II (3)
Total=25
Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)
Option Code: 607


## MICROBIOLOGY MINOR

The Microbiology minor is designed for students from other majors who have an additional interest in microbiology.

## Required Core

MB 302. General Microbiology (3)
MB 303. General Microbiology Lab (3)
MB 310. Bacterial Molecular Genetics (3)
MB 311. ^Molecular Microbiology Lab: A
Writing Intensive Course (3)
MB 312. Bacterial Physiology and Metabolism (3)
Plus 13 additional credits of upper-division microbiology courses selected after consultation with the head advisor in the Department of Microbiology.

Two of the 13 credits must come from $400-$ level laboratory courses. Not more than 3 of the 13 upper-division credits can consist of MB 401, Research. Other blanket courses cannot be used to satisfy the minor requirement. All of these
courses must be graded, not $\mathrm{S} / \mathrm{U}$.
Total=27
Footnote:
${ }^{\wedge}$ Writing Intensive Course (WIC)
Minor Code: 570

## MICROBIOLOGY (MA, MS, PhD)

Graduate Areas of Concentration Environmental microbiology, food microbiology, genomics, immunology, microbial ecology, microbial evolution, parasitology, pathogenic microbiology, virology
The Department of Microbiology offers graduate programs leading to the Master of Science, Master of Arts, and Doctor of Philosophy degrees. Major fields of study are diverse and include basic and applied aspects of virology and bacteriology; immunology and pathogenic microbiology; environmental and applied microbiology, and microbial evolution. Students may minor in a variety of related disciplines in the life sciences, such as molecular and cellular biology and biochemistry. Integrated minors are often selected in order to allow students to develop a program that best serves their needs.

The principal objectives of the graduate major in Microbiology are the completion of a comprehensive research project and preparation of a thesis. Student programs and research projects are developed with the major professor and are subject to approval by a committee of graduate faculty members. Microbiology research facilities are excellent and well-equipped.

For more information, write to Jerri Bartholomew, Professor, Department of Microbiology, 220 Nash Hall, OSU, Corvallis OR 97331-3804 or email: jerri. bartholomew@oregonstate.edu.

Students in the Microbiology Graduate Program are required to take the following core sequence of courses during their first year of enrollment in the program:
GRAD 520. Responsible Conduct of Research (1)
MB 511. Scientific Skills (1)
MB 512. Highlights of Microbiology (1)
MB 513. Microbial Systems (3)

## Major Code: 5700

## MICROBIOLOGY GRADUATE MINOR

For more details, see the departmental advisor.

## Minor Code: 5700 <br> ■ BIOHEALTH SCIENCES COURSES

BHS 107. HEALTH PROFESSIONS: DENTAL (1). Discussion of matters relating to a dental career. Includes application procedures, the importance of various requirements, admissions, professional school curricula, financing education and related matters. Speakers are included. Graded P/N.
BHS 199. SPECIAL TOPICS (1-16). Graded P/N. This course is repeatable for a maximum of 16
credits.
BHS 316. PRINCIPLES OF IMMUNOLOGY (3).
Interactions of the innate and adaptive immune responses in the context of infectious diseases, autoimmune diseases, immunodeficiencies and immunotherapies. This course is designed for nonmicrobiology majors. PREREQS: MB 230 [C-] or ((BI 212 [C-] or BI 212H [C-] ) and (BI 213 [C-] or BI 213H [C-] )) or (BI 204 [C-] and BI 205 [C-] )

## BHS 323. ^MICROBIAL INFLUENCES ON

 HUMAN HEALTH (3). How microorganisms contribute in beneficial and detrimental ways to human health. Emphasis on microbial contributions to cancer, gut health, chronic infection and autoimmune diseases. This course is part of the Writing Intensive Curriculum for the BioHealth Sciences major. (Writing Intensive Course) PREREQS: MB 302 [D-] or BI 314 [D-] or BB 450 [D-]BHS 329. MECHANISMS OF DISEASE:
INTRODUCTION TO GENERAL PATHOLOGY
(3). An introduction to basic principles of disease, focused on structural and functional changes of cells, tissues and organs, and their relationships to clinical disease. The emphasis of the course is at the cellular to organ level, but will cover some on molecular mechanisms as pertinent. PREREQS: (BI 211 [D-] or BI 211H [D-] ) and (BI 212 [D-] or BI 212 H [D-] )
BHS 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
BHS 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits.
BHS 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
BHS 406. PROJECTS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
BHS 407. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
BHS 410. SCIENCE INTERNSHIP (1-12).
Supervised scientific work experience at selected cooperating institutions, agencies, laboratories, or companies. Graded P/N. This course is repeatable for a maximum of 12 credits.
BHS 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## - GENERAL SCIENCE COURSES

GS 199. SPECIAL STUDIES (1-16). This course is repeatable for a maximum of 16 credits.

GS 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
GS 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
GS 405. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
GS 407. SEMINAR (1-16). One-credit sections. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits.

GS 410. SCIENCE INTERNSHIP (1-12).
Supervised scientific work experience at selected cooperating institutions, agencies, laboratories, or companies. Graded P/N. This course is repeatable for a maximum of 12 credits. PREREQS: Upperdivision standing in appropriate major.

## ■ MOLECULAR BIOLOGY COURSES

MB 110. ORIENTATION TO MICROBIOLOGY (1). Introduction of incoming microbiology students to college life with an emphasis on faculties, facilities, services, and curricula in microbiology. Exposure to career opportunities in microbiology. Graded P/N.

MB 201. LABORATORY SKILLS (1-16). These credits are designed for students who are doing experiential learning in a research laboratory on campus, performing basic laboratory tasks that are not elevated to the level of an independent research project. Graded P/N. This course is repeatable for a maximum of 16 credits.

MB 230. *INTRODUCTORY MICROBIOLOGY (4) Microbiology as it affects our everyday lives. The impact of microorganisms on health, food/water sanitation, environment, industry, and genetic engineering. Lec/lab. (Bacc Core Course)
MB 230H. *INTRODUCTORY MICROBIOLOGY
(4). Microbiology as it affects our everyday lives. The impact of microorganisms on health, food/ water sanitation, environment, industry, and genetic engineering. Lec/lab. (Bacc Core Course) PREREQS: Honors College approval required.
MB 299. SPECIAL TOPICS (1-16). May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits.
MB 299H. SPECIAL TOPICS (1-16). May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

## MB 302. GENERAL MICROBIOLOGY (3).

 Emphasis on cytology, physiology, virology, growth and control of growth with coverage of the role of microorganisms in nature, in disease, and as useful tools. PREREQS: (CH 332 [D-] or CH 335 [D-] ) and (BI 212 [D-] or BI 212H [D-] ) and (BI 213 [D-] or BI 213H [D-] )
## MB 303. GENERAL MICROBIOLOGY

LABORATORY (2). Development of laboratory techniques; exercises designed to reinforce concepts covered in MB 302. MB 302 is a prereq that may be taken prior to or concurrently with MB 303. Lec/lab. PREREQS: MB 302* [D-] and two terms organic chemistry.
MB 310. BACTERIAL MOLECULAR GENETICS
(3). Introductory concepts of bacterial molecular genetics. Topics include DNA replication, mutation, DNA repair, DNA recombination, transposons, bacteriophages, genetic manipulation, and gene regulation. PREREQS: MB 302 [D-] and (BI 314 [D-] or BI 314H [D-] or BB 314 [D-] ) and (BB 450 [D-] or BB 490 [D-]) and (BB 451* [D-] or BB 491* [D-] )
MB 311. ^MOLECULAR MICROBIOLOGY LAB: A WRITING INTENSIVE COURSE (3). Scientific writing, laboratory notebook composition, experimental design, and laboratory experiments in bacterial molecular biology. (Writing Intensive Course) PREREQS: ((MB 303 [D-] or MB 303H [D-] ) and MB 310* [D-] )

## MB 312. BACTERIAL PHYSIOLOGY AND

METABOLISM (3). Molecular structure and function, macromolecular assembly, energy production and use, and cellular growth. PREREQS: (MB 310 [D-] and BB 451 [D-] ) and BB 450
MB 314. AQUATIC MICROBIOLOGY (3). A survey of the diversity, ecology, and physiology of microbes in aquatic systems, with emphasis on their roles in food webs, chemical cycling, and human health. Provides the background knowledge and quantitative/analytical skills necessary to interpret and critique current and historical research in the fields of general aquatic microbiology. PREREQS: (CH 231 [D-] or CH 231 H [D-] or CH 121 [D-]) and (CH 232 [D-] or CH 232 H [D-] or CH 122 [D-]) and (CH 233 [D-] or CH 233 H [D-] or CH 123 [D-] )
MB 330. *DISEASE AND SOCIETY (3). Infectious disease has many effects on the development of society, and likewise, human interactions affect the development of disease. The course examines these interactions with a focus on the role of race, class, and economic status in the development of epidemics. (Bacc Core Course)

MB 385. ^EMERGING INFECTIOUS DISEASES AND EPIDEMICS (3). Emerging and reemerging infectious disease is a contemporary global issue of great concern. To understand and evaluate the issue, the course covers germ theory, disease history and ecology, microbial pathogenesis and the immune response, historic plagues, and the biological, environmental, population and social changes that contribute to disease emergence. (Writing Intensive Course) CROSSLISTED as BI 385 PREREQS: (BI 211 [D-] or BI 211H [D-]) and (BI 212 [D-] or BI 212 H [D-] ) and BI 213 [D-] or (BI 213H [D-])
MB 399. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
MB 399H. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
MB 401. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MB 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MB 405. READING AND CONFERENCE (1-16). Conference: Instruction in microbiology. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MB 406. SPECIAL PROJECTS (1-16). Reading and Conference/Instructor in Microbiology. This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MB 407. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

MB 410. OCCUPATIONAL INTERNSHIP (110). Supervised work experience at selected cooperating institutions, agencies, laboratories, clinics or companies. Maximum of 10 credits allowed but no more than 3 credits may be used to satisfy microbiology major requirement of 36 credits. Graded P/N. This course is repeatable for a maximum of 10 credits. PREREQS: Departmental approval required.
MB 416. IMMUNOLOGY (3). Basic theory and applications of immunochemistry, immunogenetics, and cellular immunology. Examination of immunologically related diseases. PREREQS: (BB 450 [D-] or BB 490 [D-] )

## MB 417. IMMUNOLOGY LABORATORY

(2). Laboratory on the applications of current immunological techniques. PREREQS: ((MB 303 [D-] or MB 303H [D-] ) and MB 416* [D-] )

## MB 420. MICROBIAL GENOMES,

BIOGEOCHEMISTRY, AND DIVERSITY (3).
A survey of microbial diversity from the earliest lifeforms to the modern role of bacteria and archaea in global biogeochemical cycles. Topics covered include molecular evolution, microbial genomics, biochemical diversity, and metabolic pathways that adapt cells to extreme environments. Particular emphasis is placed on marine systems, from photosynthesis in surface waters to life in the ocean crust. PREREQS: BB 451 [D-]
MB 430. BACTERIAL PATHOGENESIS (3). Bacteria pathogenic for humans, emphasizing the structural, physiological and genetic mechanisms of pathogenesis. Role of the immune system in pathogenesis and protection. PREREQS: MB 302 [D-] and MB 310 [D-] and (BB 451 [D-] or BB 491 [D-] )
MB 434. VIROLOGY (3). Properties of viruses, their biology and pathogenesis. Emphasis on viruses causing human disease. PREREQS: (BB 451 [D-] and MB 310* [D-] )

## MB 435. PATHOGENIC MICROBES

LABORATORY (2). Laboratory experiments to illustrate concepts presented in MB 430 and/or MB 434, focusing on pathogenic microorganisms. PREREQS: (MB 303 [D-] or MB 303H [D-] ) and MB 302 [D-] and (MB 430* [D-] or MB 434* [D-] )

MB 436. THE HUMAN MICROBIOME (3). Examines the biodiversity, function, and medical importance of the communities of microorganisms that inhabit the human body. A diverse array of topics will be discussed, including how the human microbiome is studied, case studies of specific aspects of the human microbiome, and emerging theories of how the microbiome influences human health. PREREQS: BI 314 [D-] or BI 314H [D-] or MB 302 [D-]
MB 440. FOOD MICROBIOLOGY (3). Role of microorganisms in food spoilage, infection, and intoxication; also basic principles in contamination control and germicidal treatment during processing, preparing, and distributing food for consumption. PREREQS: MB 302 [D-] and /or equivalent.
MB 441. FOOD MICROBIOLOGY LABORATORY
(2). Laboratory techniques to accompany MB 440/ MB 540. PREREQS: ((MB 303 [D-] or MB 303H D-] ) and MB 440* [D-] ) and MB 302

MB 448. MICROBIAL ECOLOGY (3). A comparison of soil sediments and freshwater as microbial habitats. Discussion of the role of microorganisms in nutrient cycles, effects of microbial activity on plant and animal life. PREREQS: MB 302 [D-]

MB 456. MICROBIAL GENETICS AND BIOTECHNOLOGY (3). General biology of natural, genetically engineered, and composite plasmids. Major topics include extrachromosomal DNA replication, plasmid transmission, insertion elements, transposons, gene expression, and recombinant DNA vectors. Biotechnological applications and molecular genetic tools are emphasized. PREREQS: MB 302 [D-] and (BB 450 [D-] or BB 490 [D-] ) and (BB 451 [D-] or BB 491 [D-] ) and (MB 310 [D-] or BB 492 [D-] )
MB 479. FERMENTATION MICROBIOLOGY (3). An introduction to industrial microbiology with a focus on the physiology of fermentation and use of microorganisms for the production of food ingredients, fermented foods, and beverages. FST students need to take BB 350 and MB students need to take BB 450 for their respective majors. CROSSLISTED as FST 479/FST 579. PREREQS (BI 212 [C-] or BI 212 H [C-]) and CH 331 [C-] and CH 332 [C-] and (BB 350 [D-] or BB 450 [D-]) and MB 302 [D-]
MB 480. GENERAL PARASITOLOGY (3).
Introduction to parasitology. The course emphasizes medical parasitology, but will cover a broad overview of parasitology, covering important groups and host/parasite relationships among all taxa from invertebrates to vertebrates, including mammals. PREREQS: BI 314 or BB 450 or equivalent or Z 361 or MB 302 or equivalent.

MB 490. MICROBIOLOGY CAPSTONE EXPERIENCE (2). Capstone experience for microbiology students to practice professional skills necessary to sustain a career in science. Students will work in teams to analyze research data and communicate this analysis, in addition to explore career opportunities and learn how to successfully compete for jobs. Graded P/N. PREREQS: MB 302 [D-] and junior or senior status.
MB 491. FISH DISEASES IN CONSERVATION BIOLOGY AND AQUACULTURE (3). Introduction to diseases of fish including pathogens important to aquaculture and ornamental industries as well as to wild fish populations and conservation programs. CROSSLISTED as FW 491/FW 591. PREREQS: 9 credits of upper-division fisheries or biology.
MB 496. FISH DISEASES IN CONSERVATION BIOLOGY AND AQUACULTURE LAB (2). This laboratory complements lectures in FW/MB 491/591, with students learning basic necropsy techniques; identification of bacterial, viral and metazoan pathogens; and molecular identification methods. CROSSLISTED as FW 496/FW 596. PREREQS: MB 303 or other upper-division laboratory course.

MB 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

MB 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.

MB 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS:
Departmental approval required.
MB 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MB 507. SEMINAR (1). Graded P/N. This course is repeatable for a maximum of 99 credits.
MB 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MB 511. SCIENTIFIC SKILLS (1). Foundational skills for success in graduate school. Students will also become familiar with ongoing research programs in three active programs in the Microbiology Program.
MB 512. HIGHLIGHTS OF MICROBIOLOGY (1).
Designed for students to gain familiarity with the history of microbiology through reading, reviewing and writing about great papers in the field. Students also meet the Microbiology Program faculty and students, and learn about some of the research in the Microbiology Program through attending colloquium.

MB 513. MICROBIAL SYSTEMS (3). Presentation of a modern view of microbiology through the lens of microbes' influences on our planet's habitats and inhabitants. Discusses current research and the use of advanced techniques to illustrate how microbiology is contributing to many crossdisciplinary problems that can involve engineering, public health, sociology, ecology, geology, etc.
MB 516. IMMUNOLOGY (3). Basic theory and applications of immunochemistry, immunogenetics, and cellular immunology Examination of immunologically related diseases. PREREQS: BB 450 or BB 490

## MB 517. IMMUNOLOGY LABORATORY

(2). Laboratory on the applications of current immunological techniques. PREREQS: (MB 303 or MB 303H) and MB 516*

## MB 520. MICROBIAL GENOMES,

BIOGEOCHEMISTRY, AND DIVERSITY (3).
A survey of microbial diversity from the earliest lifeforms to the modern role of bacteria and archaea in global biogeochemical cycles. Topics covered include molecular evolution, microbial genomics, biochemical diversity, and metabolic pathways that adapt cells to extreme environments. Particular emphasis is placed on marine systems, from photosynthesis in surface waters to life in the ocean crust. PREREQS: BB 451 or BB 551

## MB 530. BACTERIAL PATHOGENESIS (3).

Bacteria pathogenic for humans, emphasizing the structural, physiological and genetic mechanisms of pathogenesis. Role of the immune system in pathogenesis and protection. PREREQS: MB 302 and MB 310 and (BB 451 or BB 491)
MB 534. VIROLOGY (3). Properties of viruses, their biology and pathogenesis. Emphasis on viruses causing human disease. PREREQS: MB 310 and BB 451
MB 540. FOOD MICROBIOLOGY (3). Role of microorganisms in food spoilage, infection, and intoxication; also basic principles in contamination control and germicidal treatment during processing, preparing, and distributing food for consumption. PREREQS: MB 302 or equivalent.
MB 541. FOOD MICROBIOLOGY LABORATORY (2). Laboratory techniques to accompany MB 440/ MB 540. PREREQS: MB 540* [C] and MB 302 and MB 303

MB 548. MICROBIAL ECOLOGY (3). A comparison of soil sediments and freshwater as microbial habitats. Discussion of the role of microorganisms in nutrient cycles, effects of microbial activity on plant and animal life. PREREQS: MB 302
MB 555. BIOLOGY OF THE PROKARYOTES
(3). An integrative graduate course examining bacterial and archaeal life at different levels of biological organization, emphasizing current research and analysis of primary literature. The various life styles of prokaryotes are the common theme of the course. Topics include biofilms, cooperation and communication, development, stress responses, metabolic interactions involved in global nutrient cycling. Offered every even year in winter term. PREREQS: BB 450 and MB 310 and MB 312 or equivalent
MB 556. MICROBIAL GENETICS AND
BIOTECHNOLOGY (3). General biology of natural, genetically engineered, and composite plasmids. Major topics include extrachromosomal DNA replication, plasmid transmission, insertion elements, transposons, gene expression, and recombinant DNA vectors. Biotechnological applications and molecular genetic tools are emphasized. PREREQS: MB 302 and (BB 450 or BB 490) and (BB 451 or BB 491) and (MB 310 or BB 492)
MB 579. FERMENTATION MICROBIOLOGY (3).
An introduction to industrial microbiology with a focus on the physiology of fermentation and use of microorganisms for the production of food ingredients, fermented foods, and beverages. CROSSLISTED as FST 479/FST 579. PREREQS: (BI 212 or BI 212 H ) and CH 331 and CH 332 and (BB 350 or BB 450) and MB 302

MB 580. GENERAL PARASITOLOGY (3). Introduction to parasitology. The course emphasizes medical parasitology, but will cover a broad overview of parasitology, covering important groups and host/parasite relationships among all taxa from invertebrates to vertebrates, including mammals. PREREQS: BI 314 or BB 450 or equivalent or Z 361 or MB 302 or equivalent.

## MB 591. FISH DISEASES IN CONSERVATION

 BIOLOGY AND AQUACULTURE (3). Introduction to diseases of fish including pathogens important to aquaculture and ornamental industries as well as to wild fish populations and conservation programs. CROSSLISTED as FW 491/FW 591. PREREQS: 9 credits of upper-division fisheries or biology.MB 596. FISH DISEASES IN CONSERVATION BIOLOGY AND AQUACULTURE LAB (2). This laboratory complements lectures in FW/MB 491/591, with students learning basic necropsy techniques; identification of bacterial, viral and metazoan pathogens; and molecular identification methods. CROSSLISTED as MB 496/MB 596. PREREQS: MB 303 or other upper-division laboratory course.

MB 599. SELECTED TOPICS (0-6). This course is repeatable for a maximum of 24 credits.

MB 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MB 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
MB 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

MB 607. SEMINAR (1). Graded P/N. This course is repeatable for a maximum of 99 credits.

MB 610. INTERNSHIP (1-9). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
MB 668. MICROBIAL BIOINFORMATICS AND GENOME EVOLUTION (4). Theoretical and
practical issues in microbial genome sequencing and annotation, with an emphasis on evolutionary theory and comparative analysis of microbial genome sequences. Metabolic prediction from genomes, with a population genetics perspective on comparative microbial genomics. Exploration of applications of genomics and allied tools to microbial populations, including metagenomics, metaproteomics, and metatranscriptomics.
MB 699. SPECIAL TOPICS (0-16). Lec/lab. This course is repeatable for a maximum of 16 credits.
MB 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.
MB 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
MB 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.
MB 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MB 507. SEMINAR (1). Graded P/N. This course is repeatable for a maximum of 99 credits.
MB 510. INTERNSHIP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MB 511. SCIENTIFIC SKILLS (1). Foundational skills for success in graduate school. Students will also become familiar with ongoing research programs in three active programs in the Microbiology Program.
MB 512. HIGHLIGHTS OF MICROBIOLOGY (1).
Designed for students to gain familiarity with the history of microbiology through reading, reviewing and writing about great papers in the field. Students also meet the Microbiology Program faculty and students, and learn about some of the research in the Microbiology Program through attending colloquium.
MB 513. MICROBIAL SYSTEMS (3). Presentation of a modern view of microbiology through the lens of microbes' influences on our planet's habitats and inhabitants. Discusses current research and the use of advanced techniques to illustrate how microbiology is contributing to many crossdisciplinary problems that can involve engineering, public health, sociology, ecology, geology, etc.
MB 516. IMMUNOLOGY (3). Basic theory and applications of immunochemistry, immunogenetics, and cellular immunology. Examination of immunologically related diseases. PREREQS: BB 450 or BB 490
MB 517. IMMUNOLOGY LABORATORY
(2). Laboratory on the applications of current immunological techniques. PREREQS: (MB 303 or MB 303H) and MB 516*

## MB 520. MICROBIAL GENOMES,

BIOGEOCHEMISTRY, AND DIVERSITY (3).
A survey of microbial diversity from the earlies lifeforms to the modern role of bacteria and archaea in global biogeochemical cycles. Topics covered include molecular evolution, microbial genomics, biochemical diversity, and metabolic pathways that adapt cells to extreme environments. Particular emphasis is placed on marine systems, from photosynthesis in surface waters to life in the ocean crust. PREREQS: BB 451 or BB 551
MB 530. BACTERIAL PATHOGENESIS (3).
Bacteria pathogenic for humans, emphasizing the structural, physiological and genetic mechanisms of pathogenesis. Role of the immune system in pathogenesis and protection. PREREQS: MB 302 and MB 310 and (BB 451 or BB 491)
MB 534. VIROLOGY (3). Properties of viruses, their biology and pathogenesis. Emphasis on viruses causing human disease. PREREQS: MB 310 and BB 451

MB 540. FOOD MICROBIOLOGY (3). Role of microorganisms in food spoilage, infection, and intoxication; also basic principles in contamination control and germicidal treatment during processing, preparing, and distributing food for consumption. PREREQS: MB 302 or equivalent.
MB 541. FOOD MICROBIOLOGY LABORATORY
(2). Laboratory techniques to accompany MB 440/ MB 540. PREREQS: MB 540* [C] and MB 302 and MB 303

MB 548. MICROBIAL ECOLOGY (3). A
comparison of soil sediments and freshwater as microbial habitats. Discussion of the role of microorganisms in nutrient cycles, effects of microbial activity on plant and animal life. PREREQS: MB 302

MB 555. BIOLOGY OF THE PROKARYOTES (3).
An integrative graduate course examining bacterial and archaeal life at different levels of biological organization, emphasizing current research and analysis of primary literature. The various life styles of prokaryotes are the common theme of the course. Topics include biofilms, cooperation and communication, development, stress responses, metabolic interactions involved in global nutrient cycling. Offered every even year in winter term. PREREQS: BB 450 and MB 310 and MB 312 or equivalent

## MB 556. MICROBIAL GENETICS AND

BIOTECHNOLOGY (3). General biology of natural, genetically engineered, and composite plasmids. Major topics include extrachromosomal DNA replication, plasmid transmission, insertion elements, transposons, gene expression, and recombinant DNA vectors. Biotechnological applications and molecular genetic tools are emphasized. PREREQS: MB 302 and (BB 450 or BB 490) and (BB 451 or BB 491) and (MB 310 or BB 492)

MB 579. FERMENTATION MICROBIOLOGY (3). An introduction to industrial microbiology with a focus on the physiology of fermentation and use of microorganisms for the production of food ingredients, fermented foods, and beverages. CROSSLISTED as FST 479/FST 579. PREREQS: (BI 212 or BI 212 H ) and CH 331 and CH 332 and (BB 350 or BB 450) and MB 302
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Introduction to parasitology. The course emphasizes medical parasitology, but will cover a broad overview of parasitology, covering important groups and host/parasite relationships among all taxa from invertebrates to vertebrates, including mammals. PREREQS: BI 314 or BB 450 or equivalent or $Z 361$ or MB 302 or equivalent.
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PREREQS: 9 credits of upper-division fisheries or biology.
MB 596. FISH DISEASES IN CONSERVATION
BIOLOGY AND AQUACULTURE LAB (2). This
laboratory complements lectures in FW/MB 491/591, with students learning basic necropsy techniques; identification of bacterial, viral and metazoan pathogens; and molecular identification methods. CROSSLISTED as MB 496/MB 596. PREREQS: MB 303 or other upper-division laboratory course.
MB 599. SELECTED TOPICS (0-6). This course is repeatable for a maximum of 24 credits.
MB 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
MB 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required.

MB 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of

16 credits. PREREQS: Departmental approval required.
MB 607. SEMINAR (1). Graded P/N. This course is repeatable for a maximum of 99 credits.

MB 610. INTERNSHIP (1-9). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.
MB 668. MICROBIAL BIOINFORMATICS AND GENOME EVOLUTION (4). Theoretical and practical issues in microbial genome sequencing and annotation, with an emphasis on evolutionary theory and comparative analysis of microbial genome sequences. Metabolic prediction from genomes, with a population genetics perspective on comparative microbial genomics. Exploration of applications of genomics and allied tools to microbial populations, including metagenomics, metaproteomics, and metatranscriptomics.

MB 699. SPECIAL TOPICS (0-16). Lec/lab. This course is repeatable for a maximum of 16 credits.

## STATISTICS

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## FACULTY

Professors Gitelman, Lesser, Rojo Associate Professors Di, Emerson, Madsen, Xue
Assistant Professors Bhattacharyya, Fuentes, D. Jiang, Y. Jiang, McLaughlin, Mondal, Sharpton, Wickham
Senior Research Associate Newton
Research Associates Nawrocki, Sifneos
Senior Instructor II Kollath
Instructors Jager, Moore

## Undergraduate Minor

Statistics
Graduate Majors
Data Analytics (MS)
Statistics (MA, MAIS, MS, PhD)
Graduate Area of Concentration Statistics

## Graduate Minor

Statistics
Graduate Certificate
Data Analytics

The Department of Statistics offers undergraduate service courses and an undergraduate minor, as well as graduate courses and programs leading to the MA, MS, and PhD degrees or to a minor for an advanced degree in other fields. Students planning to major in statistics at the graduate level should have a minimum of mathematics through multivariable calculus, linear algebra, and an upperdivision sequence in mathematical statistics.

## SURVEY RESEARCH CENTER

Website: http://stat.oregonstate.edu/src/ survey-research-center

Established in 1973, the Oregon State University Survey Research Center (OSUSRC ) provides comprehensive survey services including proposal development, questionnaire design and layout, survey administration and data collection, survey analysis and professional report writing. Our staff offers customized options, working with our clients to determine the best approach to collect survey data based on the study objectives, population of interest, and budgetary concerns. Our past and current clients include federal, state, and local agencies, national nonprofit organizations, and OSU-affiliated entities. The OSU-SRC maintains several contracts with clients to provide our services on a recurrent basis, from monthly, annually, to ever few years.
Operating as a center for research in survey methodology, the OSU-SRC routinely conducts experiments using self-administered surveys with an aim to contribute to survey methodology research. The OSU-SRC subsequently publishes related material in scientific journals and presents experimental findings at professional meetings. The OSUSRC provides expertise using survey best practices to maximize response rates and reduce non-response bias. Various sampling plans are examined for each survey to minimize total survey error. The OSU-SRC also offers consulting for OSU community members on research-based survey design and analysis.

## STATISTICS MINOR

The undergraduate minor in Statistics requires a minimum of 27 credits in statistics, including:
ST 201. Principles of Statistics (4) ${ }^{1}$
or ST 314. Introduction to Statistics for Engineers (3)
or ST 351. Introduction to Statistical Methods (4)
ST 352. Introduction to Statistical Methods (4)

ST 407. Seminar: Sect. 1 Attendance at Consulting Practicum (1)
ST 421, ST 422. Introduction to Mathematical Statistics $(4,4)$ and at least 10 credits of additional approved courses.

## Approved courses include:

BOT 440. Field Methods in Plant Ecology (4)
ECE 461. Introduction to Analog and
Digital Communications (4)
ECON 424. Introduction to Econometrics (4)
FOR 321. Forest Mensuration (5)
H 425. Foundations of Epidemiology (3)
IE 355. Statistical Quality Control (4)
IE 356. Experimental Design for Industrial Processes (4)
MTH 464. Probability II (3)
MTH 465. Probability III (3)
MTH 467. Actuarial Mathematics (3)

PSY 301. Research Methods in Psychology (4)
SOC 315. ${ }^{\wedge}$ Methods I: Research Design (4)
ST 411, ST 412, ST 413. Methods of Data
Analysis $(4,4,4)$
ST 415. Design and Analysis of Planned Experiments (3)
ST 431. Sampling Methods (3)
ST 435. Quantitative Ecology (3)
ST 439. Survey Methods (3)
ST 441. Probability, Computing, and Simulation in Statistics (4)
ST 443. Applied Stochastic Models (3)
ST 473. Ecological Sampling (3)
ST 499. Special Topics (1-4)
Other statistics-related courses may be substituted, subject to departmental approval.

## Footnotes:

${ }^{1}$ ST 314 or ST 351 may be taken in place of ST 201.
$\wedge$ Writing Intensive Course (WIC)

## Minor Code: 615

## GRADUATE MAJORS

## DATA ANALYTICS (MS)

Offered via Ecampus only.
Prerequisites
ST 351. Introduction to Statistical Methods (4)

Mathematics to the level of calculus is recommended but not required.
Statistics Core ( 21 credits)
ST 516. Foundations of Data Analytics (4)
ST 517. Data Analytics I (4)
ST 518. Data Analytics II (4)
ST 558. Multivariate Analytics (3)
ST 566. Time Series Analytics (3) [Pending approval]
ST 595. Capstone Project (3) [Pending submission and approval of a proposal]

## Computer Science Core (12 credits)

CS 511. Programming Concepts for Nonmajors (4) [Pending submission and approval of a proposal]
CS 512. Big Data Management (4) [Pending submission and approval of a proposal]
CS 513. Applied Machine Learning (4) [Pending submission and approval of a proposal]

## Electives in Statistics (12 credits)

ST 515. Design and Analysis of Planned Experiments (3)
*ST 525. Applied Survival Analysis (3)
ST 537. Data Visualization (3)
ST 538. Modern Analytical Methods for Large and Complex Datasets (3)
ST 539. Survey Methods (3)
ST 588. Data Mining (3) [Pending submission and approval of a proposal]
ST 591. Introduction to Quantitative Genomics (3) [Pending submission and approval of a proposal]
ST 592. Statistical Methods for Genomic Research (3)
Total=45
Major Code: 6160

## STATISTICS (MA, MS, PhD, MAIS)

## Graduate Areas of Concentration Statistics

The Department of Statistics offers Master of Arts, Master of Science, and Doctor of Philosophy degrees in Statistics. Students can concentrate on theory or applications, and programs can be tailored to emphasize such areas of interest as ecology, engineering, forestry, finance, mathematics, or oceanography. The thesis is optional for MS and MA degrees. Statistical consulting is part of the program, enabling the student to gain a deeper appreciation of the need, power, and applicability of statistical tools through exposure to real problems.

## MS in Statistics

The MS program is designed to prepare a candidate for a career in industry or government or for further study at the PhD level. Recent MS graduates have found employment with the U.S. Environmental Protection Agency, U.S. Census Bureau, Abt Associates, state of Oregon, Fred Hutchinson Cancer Research Center, Kaiser Permanente, Mayo Clinic, Bureau of Labor Statistics, Department of Veteran's Affairs, NOAA, MRI Global, and Capital One.

## Prerequisites

- Single-variable and multivariable calculus (approximately 4 quarters).
- Linear algebra.
- An undergraduate sequence in mathematical statistics. Typical textbook: Mathematical Statistics with Applications by Mendenhall, et al.
- One or more applied statistics courses (recommended, but not required).
Students who meet all of the requirements except for one or two courses may be granted provisional admission so they can begin their graduate studies while completing the remaining required courses. When the remedial course work is completed the Graduate School will remove the provisional status.


## Required

ST 501. Research (3)
ST 506. Projects: (Sect 2) Teaching
Experience (1)
ST 507. Seminar: (Sect 1) Attendance at
Consulting Seminar (1)
ST 507. Seminar: (Sect 3) Attendance at Research Seminar $(1,1)$
ST 509. Consulting Practicum (2)
ST 541. Probability, Computing, and Simulation in Statistics (4)
ST 551, ST 552, ST 553. Statistical Methods $(4,4,4)$
ST 561, ST 562, ST 563. Theory of Statistics $(3,3,3)$
ST 623. Generalized Regression Models I (3)
Additional approved courses* (15)

## Total=52 credits

* Approved courses include all 500- and 600-level courses in the Statistics Department except:

ST 511, ST 512, ST 513. Methods of Data Analysis $(4,4,4)$
ST 515. Design and Analysis of Planned
Experiments (3)
ST 521, ST 522. Introduction to
Mathematical Statistics $(4,4)$
Courses with a zero middle digit and courses in other departments may be used only with the consent of the major professor (and minor professor if the course is listed in the minor).

A student intending to pursue the PhD in Statistics should review the mathematics prerequisites and requirements for that program and plan a course of study to satisfy them.

## Other Requirements

- Pass written comprehensive exams in statistical methods and in statistical theory. These exams are given each year in September.
- Pass a final oral exam.


## PhD in Statistics

The PhD program is designed to prepare a candidate for a career in teaching and research. Recent PhD graduates have found employment with US Geological Survey, Chase Bank, Bureau of Labor Statistics, USDA Forest Service, Weyerhauser, as well as with universities in the U.S. and abroad.

## Prerequisites

- Equivalent to the OSU Master's degree in Statistics.
- Pass the MS comprehensive exams in methods and theory.
- Apply for admission to PhD program. (Evaluation is by the entire faculty. The evaluation criteria for admission are: course work, grades, MS comprehensive exam results, and any information you provide in your application giving evidence of capability to do original research.)
- Course work equivalent to MTH 311, Advanced Calculus (4) and MTH 312, Advanced Calculus (4).


## Required Course Work

MTH 511. Real Analysis (3)
MTH 664. Probability Theory (3)
ST 509. Consulting (2 credits annually)
ST 541. Probability, Computing, and
Simulation in Statistics (4)
ST 551, ST 552, ST 553. Statistical Methods $(3,3,3)$
ST 561, ST 562, ST 563. Theory of Statistics $(3,3,3)$
ST 603. Thesis: PhD Research (36 credit minimum)
ST 623, ST 625. Generalized Regression Models I, II $(3,3)$
ST 651, ST 652. Linear Model Theory $(3,3)$
ST 661, ST 662, ST 663. Advanced Theory of Statistics $(3,3)$

## Total of about 120 credits of course

## work.

Credits completed for an MS degree as well as the 36 or more credits of ST 603 count toward this total. The specific
courses to be taken are decided at a meeting of the PhD committee.

## Other Requirements:

- Pass the preliminary exam over PhD course work.
- Write a thesis describing the results of original research.
- Pass the final examination over thesis and related material.


## Major Code: 6150

## STATISTICS GRADUATE MINOR

## MS Minor in Statistics

## Required

ST 521, ST 522. Introduction to
Mathematical Statistics $(4,4)$
ST 511, ST 512. Methods of Data Analysis $(4,4)$
The student and/or minor professor may wish to add one or two additional courses from below:

ST 513. Methods of Data Analysis (4)
ST 515. Design and Analysis of Planned
Experiments (3)
ST 531. Sampling Methods (3)
ST 535. Quantitative Ecology (3)
ST 557. Applied Multivariate Analysis (3)
ST 565. Time Series (3)
ST 573. Ecological Sampling (3)

## PhD Minor in Statistics

## A PhD minor program in statistics should

 include:ST 521, ST 522. Introduction to
Mathematical Statistics $(4,4)$
or ST 561, ST 562, ST 563. Theory of Statistics (3,3,3)
ST 551, ST 552, ST 553. Statistical Methods $(4,4,4)$
or ST 511, ST 512, ST 513. Methods of Data Analysis $(4,4,4)$
Additional statistics-related courses approved by the minor professor.

- If ST 551, ST 552, and ST 553 are taken, the additional courses should total at least 3 credits.
- If ST 511, ST 512, and ST 513 are taken, they should total at least 6 credits.
All programs must be approved by the student's minor professor.


## Minor Code: 6150

## DATA ANALYTICS GRADUATE CERTIFICATE

Offered via Ecampus only.
ST 516. Foundations of Data Analytics (4)
ST 517. Data Analytics I (4)
ST 518. Data Analytics II (4)
ST 558. Multivariate Analytics (3)
ST 566. Time Series Analytics (3) [Pending approval]

## Total=18 credits

Major Code: CG17
■ STATISTICS COURSES
ST 199. SPECIAL TOPICS (3). This course can only be taken once unless instructor permission is provided.

ST 201. PRINCIPLES OF STATISTICS (4). Study design, descriptive statistics, the use of probability in statistical arguments, sampling, hypothesis tests and confidence intervals for means and proportions. Lec/rec. PREREQS: High school algebra. ST 201 and ST 202 must be taken in order.

ST 202. PRINCIPLES OF STATISTICS (4). Comparisons of means and proportions between two populations (t-tests, chi-square tests, nonparametric tests), simple linear regression, correlation. Lec/rec. PREREQS: ST 201 [D-]
ST 314. INTRODUCTION TO STATISTICS FOR ENGINEERS (3). Probability, common probability distributions, sampling distributions, estimation, hypothesis testing, control charts, regression analysis, experimental design. PREREQS: (MTH 252 [D-] or MTH 252H [D-] )
ST 351. INTRODUCTION TO STATISTICAL METHODS (4). Study designs, descriptive statistics, collecting and recording data, probability distributions, sampling distributions for means and proportions, hypothesis testing and confidence intervals for means and proportions in one- and two-sample inference, and chi-square tests. Lec/lab. PREREQS: High school algebra with statistics. ST 351 and ST 352 must be taken in order.

ST 351H. INTRODUCTION TO STATISTICAL
METHODS (4). Study designs, descriptive statistics, collecting and recording data, probability distributions, sampling distributions for means and proportions, hypothesis testing and confidence intervals for means and proportions in one- and two-sample inference, and chi-square tests. Lec/lab. PREREQS: High school algebra with statistics. ST 351 and ST 352 must be taken in order. Honors College approval required
ST 352. INTRODUCTION TO STATISTICAL METHODS (4). Randomization tests and other nonparametric tests for one- and two-sample inference, simple and multiple linear regression, correlation, one- and two-way analysis of variance logistic regression. Lec/lab. PREREQS: (ST 351 D-] or ST 351H [D-] ) and ST 351 and ST 352 must be taken in order.

ST 406. PROJECTS (1-16). Section 1: Projects, graded P/N. Section 2: Teaching Experience, graded P/N. Section 3: Directed Work, graded $P / N$. This course is repeatable for a maximum of 16 credits.
ST 407. SEMINAR (1). Attendance at consulting practicum. Graded P/N.

ST 410. INTERNSHIP (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
ST 411. METHODS OF DATA ANALYSIS (4).
Graphical, parametric and nonparametric methods for comparing two samples; one-way and two-way analysis of variance; simple linear regression. Lec/ lab. PREREQS: ST 351 or the equivalent. ST 411, ST 412 and ST 413 must be taken in order
ST 412. METHODS OF DATA ANALYSIS (4).
Multiple linear regression, including model checking, dummy variables, using regression to fit analysis of variance models, analysis of covariance, variable selection methods. Lec/ ab. PREREQS: ST 411 [D-] and ST 351 or the equivalent.
ST 413. METHODS OF DATA ANALYSIS (4).
Principles of experimental design; randomized block and factorial designs; repeated measures; categorical data analysis, including comparison of proportions, tests of homogeneity and independence in cross-classified frequency tables, Mantel-Haenszel test, logistic regression, log-linear regression. Introduction to multivariate statistics. Lec/lab. PREREQS: ST 412 [D-] and ST 351 or the equivalent.
ST 415. DESIGN AND ANALYSIS OF PLANNED EXPERIMENTS (3). Principles of experimental
design; uses, construction and analysis of completely randomized, randomized block
and Latin square designs; covariates; factorial treatments, split plotting; random effects and variance components. PREREQS: (ST 352 [D-] or ST 411 [D-] or ST 511 [D-] )
ST 421. INTRODUCTION TO MATHEMATICAL STATISTICS (4). Probability, random variables, expectation, discrete and continuous distributions, multivariate distributions. PREREQS: MTH 253. ST 421 and ST 422 must be taken in order.

ST 422. INTRODUCTION TO MATHEMATICAL STATISTICS (4). Sampling distributions, Central Limit Theorem, estimation, confidence intervals, properties of estimators, and hypothesis testing. PREREQS: ST 421 [D-] and MTH 253
ST 431. SAMPLING METHODS (3). Estimation of means, totals and proportions; sampling designs including simple random, stratified, cluster, systematic, multistage and double sampling; ratio and regression estimators; sources of errors in surveys; capture-recapture methods. PREREQS: ST 411 or ST 511
ST 435. QUANTITATIVE ECOLOGY (3). Overview of statistical methods that are useful for analyzing ecological data, including spatial pattern analysis, multivariate techniques, logistic regression,
Bayesian statistics and computer-intensive methods. Consideration of special topics such as population dynamics, food webs and ecological indicators. Not offered every year. PREREQS: (ST 412 [D-] or ST 512 [D-] )
ST 439. SURVEY METHODS (3). Survey design data collection and analysis, general methodology. PREREQS: ST 201 [D-] or ST 351 [D-]
ST 441. PROBABILITY, COMPUTING, AND SIMULATION IN STATISTICS (4). Review of probability, including univariate distributions and limit theorems. Random-number generation and simulation of statistical distributions. Bootstrap estimates of standard error. Variance reduction techniques. Emphasis on the use of computation in statistics using the MATLAB programming language. Lec/lab. PREREQS: (ST 422 [D-] or ST 522 [D-])

ST 443. APPLIED STOCHASTIC MODELS (3).
Development of stochastic models commonly arising in statistics and operations research, such as Poisson processes, birth-and-death processes, discrete-time and continuous-time Markov chains, renewal and Markov renewal processes. Analysis of stochastic models by simulation and other computational techniques. PREREQS: (ST 421 [D-] or ST 521 [D-] ) and experience with a high-level programming language or mathematical computation package.

ST 499. SPECIAL TOPICS (1-4). This course is repeatable for a maximum of 8 credits.

ST 501. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required
ST 503. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Departmental approval required
ST 505. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Departmental approval required.

ST 506. PROJECTS (1-16). Section 1: Projects. Section 2: Teaching Experience. Section 3: Directed Work. This course is repeatable for a maximum of 16 credits.
ST 507. SEMINAR (1). Section 1: Attendance at consulting practicum, 1 credit. Section 3: Research Seminar, 1 credit. Section 4: Computing Facilities, 1 credit. All sections graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 99 credits.

ST 509. CONSULTING PRACTICUM (2). The student provides statistical advice, under faculty guidance, on university-related research projects. This course is repeatable for a maximum of 99 credits. PREREQS: ST 507, section 1 and ST 553, or instructor approval required.

ST 510. INTERNSHIP (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

## ST 511. METHODS OF DATA ANALYSIS (4).

Graphical, parametric and nonparametric methods for comparing two samples; one-way and two-way analysis of variance; simple linear regression. Lec/ lab. PREREQS: ST 351 or the equivalent. ST 511, ST 512, and ST 513 must be taken in order.

ST 512. METHODS OF DATA ANALYSIS (4).
Multiple linear regression, including model checking, dummy variables, using regression to fit analysis of variance models, analysis of covariance, variable selection methods. Lec/ lab. PREREQS: ST 511 [C] and ST 351 or the equivalent

ST 513. METHODS OF DATA ANALYSIS (4).
Principles of experimental design; randomized block and factorial designs; repeated measures; categorical data analysis, including comparison of proportions, tests of homogeneity and independence in cross-classified frequency tables, Mantel-Haenszel test, logistic regression, log-linear regression. Introduction to multivariate statistics. Lec/lab. PREREQS: ST 512 [C] and ST 351 or the equivalent.
ST 515. DESIGN AND ANALYSIS OF PLANNED EXPERIMENTS (3). Principles of experimental design; uses, construction and analysis of completely randomized, randomized block and Latin square designs; covariates; factorial treatments, split plotting; random effects and variance components. PREREQS: ST 352 or (ST 411 or ST 511)

ST 516. FOUNDATIONS OF DATA ANALYTICS
(4). Foundations of estimation and hypothesis testing; desirable properties of estimators; maximum likelihood; one- and two-sample problems; theoretical results are explored through simulations and analysis using R. Offered via Ecampus only. PREREQS: ST 351

ST 517. DATA ANALYTICS I (4). Methods for modeling quantitative data and statistical learning--simple and multiple linear regression; linear mixed effects models; data imputation; prediction and cross-validation; scaling up to large datasets. Simulations and data analysis using R. Offered via Ecampus only. PREREQS: ST 516 [C+]

ST 518. DATA ANALYTICS II (4). Statistical methods and data analysis techniques for count data. Topics include tests for tables of counts, logistic regression, log-linear regression, generalized linear mixed models, and issues for large datasets. Data analysis in R. PREREQS: ST 517 [C+]

ST 521. INTRODUCTION TO MATHEMATICAL STATISTICS (4). Probability, random variables, expectation, discrete and continuous distributions, multivariate distributions. PREREQS: MTH 253. ST 521 and ST 522 must be taken in order.
ST 522. INTRODUCTION TO MATHEMATICAL STATISTICS (4). Sampling distributions, Central Limit Theorem, estimation, confidence intervals, properties of estimators, and hypothesis testing. PREREQS: ST 521 [C] and MTH 253
ST 525. APPLIED SURVIVAL ANALYSIS (3). Statistical methods for analyzing survival data or time-to-event data, which may be censored and/ or truncated. Specific topics can vary term to term, and could include Kaplan-Meier estimator; K-sample hypothesis tests for survival data; Accelerated failure time model; Cox proportional hazard regression model. PREREQS: ST 516 [C] and ST 517 [C] and ST 518 [C] and /or equivalent.
ST 531. SAMPLING METHODS (3). Estimation of means, totals and proportions; sampling designs including simple random, stratified, cluster, systematic, multistage and double sampling; ratio and regression estimators; sources of errors in surveys; capture-recapture methods. PREREQS: ST 411 or ST 511

ST 535. QUANTITATIVE ECOLOGY (3). Overview of statistical methods that are useful for analyzing ecological data, including spatial pattern analysis, multivariate techniques, logistic regression,
Bayesian statistics and computer-intensive methods. Consideration of special topics such as population dynamics, food webs and ecological indicators. Not offered every year. PREREQS: ST 412 or ST 512
ST 537. DATA VISUALIZATION (3). Perceptual principles for displaying data; critique and improvement of data visualizations; use of color in visualization; principles of tidy data; strategies for data exploration; select special topics. PREREQS: ST 512 [C] or ST 517 [C] or ST 552 [C] and /or at discretion of instructor (students should be familiar with linear regression and using R)
ST 538. MODERN STATISTICAL METHODS
FOR LARGE AND COMPLEX DATA SETS (3).
Provides students with the tools and experience to analyze big and messy data and work effectively in a data science team. Covers the tools to handle big data and answer statistical questions based on the data. Includes three big data analysis projects that students work on in groups. Focuses on proper use of modern data analysis techniques related to regression, classification and clustering for data coming from a variety of application fields $R$ will be the lingua franca. PREREQS: ST 512 [C] or ST 517 [C] or ST 552 [C] or ST 412 [C]

ST 539. SURVEY METHODS (3). Survey design, data collection and analysis, general methodology PREREQS: ST 201 or ST 351

ST 541. PROBABILITY, COMPUTING, AND SIMULATION IN STATISTICS (4). Review of probability, including univariate distributions and limit theorems. Random-number generation and simulation of statistical distributions. Bootstrap estimates of standard error. Variance reduction techniques. Emphasis on the use of computation in statistics using the S-Plus or MATLAB programming language. Lec/lab. PREREQS: ST 422 or ST 522
ST 543. APPLIED STOCHASTIC MODELS (3).
Development of stochastic models commonly arising in statistics and operations research, such as Poisson processes, birth-and-death processes, discrete-time and continuous-time Markov chains, renewal and Markov renewal processes. Analysis of stochastic models by simulation and other computational techniques. PREREQS: (ST 421 or ST 521) and experience with a highlevel programming language or mathematical computation package.
ST 551. STATISTICAL METHODS (4). Properties of $t$, chi-square and $F$ tests; randomized experiments; sampling distributions and standard errors of estimators, delta method, comparison of several groups of measurements; two-way tables of measurements. PREREQS: ST 422 or ST 522. Should concurrently enroll in MTH 341. ST 551, ST 552 and ST 553 must be taken in order

ST 552. STATISTICAL METHODS (4). Simple and multiple linear regression including polynomial regression, indicator variables, weighted regression, and influence statistics, nonlineral regression and linear models for binary data. PREREQS: ST 551 [C] and ST 422 or ST 522.
ST 553. STATISTICAL METHODS (4). Principles and analysis of designed experiments, including factorial experiments, analysis of covariance, random and mixed effect models. Lec/lab. PREREQS: ST 552 [C]
ST 555. ADVANCED EXPERIMENTAL DESIGN (3). Designs leading to mixed models including split plots, repeated measures, crossovers and incomplete blocks. Introduction to experimental design in industry including confounding, fractional factorials and response surface methodology. Analysis of unbalanced data. PREREQS: ST 553 [C]

ST 557. APPLIED MULTIVARIATE ANALYSIS
(3). Multivariate data structures, linear
combinations; principal components, factor and latent structure analysis, canonical correlations, discriminant analysis; cluster analysis, multidimensional scaling. Not offered every year PREREQS: (ST 412 or ST 512) and (MTH 252 or MTH 245)
ST 558. MULTIVARIATE ANALYTICS (3). Basics of matrix algebra, principal components analysis, cluster analysis, factor analysis, multidimensiona scaling. PREREQS: ST 518 [C-] and courses equivalent to ST 518 may be substituted for ST 518 as a prerequisite with instructor consent.

ST 559. BAYESIAN STATISTICS (3). Bayesian statistics for data analysis. Characterizations of probability; comparative (Bayesian versus frequentist) inference; prior, posterior and predictive distributions; hierarchical modeling. Computational methods include Markov Chain Monte Carlo for posterior simulation. PREREQS: ST 562

ST 561. THEORY OF STATISTICS (3).
Distributions of functions of random variables, joint and conditional distributions, sampling distributions, convergence concepts, order statistics. PREREQS: (ST 422 or ST 522). ST 561 ST 562, and ST 563 must be taken in order.

ST 562. THEORY OF STATISTICS (3). Sufficiency, exponential families, location and scale families; point estimation: maximum likelihood, Bayes, and unbiased estimators; asymptotic distributions of maximum likelihood estimators; Taylor series approximations. PREREQS: ST 561 [C] and ST 422 or ST 522

ST 563. THEORY OF STATISTICS (3). Hypothesis testing: likelihood ratio, Bayesian, and uniformly most powerful tests; similar tests in exponential families; asymptotic distributions of likelihood ratio test statistics; confidence intervals. PREREQS: ST 562 [C] and ST 422 or ST 522

ST 565. TIME SERIES (3). Analysis of serially correlated data in both time and frequency domains. Autocorrelation and partial autocorrelation functions, autoregressive integrated moving average models, model building, forecasting; filtering, smoothing, spectral analysis, frequency response studies, Offered winter term in even years. PREREQS: (ST 412 or ST 512) and (ST 422 or ST 522)
ST 567. SPATIAL STATISTICS (3). The analysis of spatial data. Graphical tools for exploring spatia data, geostatistics, variogram estimation, kriging, areal models, hierarchical spatial models, and spatio-temporal modelling. Offered winter term in odd years. PREREQS: (ST 412 or ST 512) and (ST 422 or ST 522)
ST 573. ECOLOGICAL SAMPLING (3). Sampling of animal populations, frameless sampling, detectability, line transects, circular plots, mark-recapture, line intercept sampling; spatial sampling, quadrats, kriging; adaptive sampling designs. Not offered every year. PREREQS: (ST 412 or ST 512) and (ST 421 or ST 521)

## ST 592. STATISTICAL METHODS FOR

GENOMICS RESEARCH (3). Lectures include an overview of statistical methods commonly applied in genomics research. Specific methods can vary term to term, and could include cluster analysis, decision trees, dimension reduction tools, regression models, multiple testing adjustment, variable selection methods, etc. Journal clubs include team-based review and presentations of landmark papers in both statistical methodology and genomics research. Research experience includes whole-term collaboration between students from statistics and other disciplines on real projects. PREREQS: ST 411 or ST 511 or an equivalent/higher-level course such as ST 551. ST 411 or ST 511 is recommended.

ST 599. SPECIAL TOPICS (1-4). May be repeated for credit when topic varies. This course is repeatable for a maximum of 16 credits.

ST 601. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Instructor approval required.
ST 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits. PREREQS: Instructor approval required.
ST 606. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
ST 623. GENERALIZED REGRESSION MODELS
I (3). Maximum likelihood analysis for frequency data; regression-type models for binomial and Poisson data; iterative weighted least squares and maximum likelihood; analysis of deviance and residuals; overdispersion and quasi-likelihood models; log-linear models for multidimensional contingency tables. PREREQS: (ST 553 [C] and ST 563 [C] )
ST 625. GENERALIZED REGRESSION MODELS II (3). Parametric methods for the analysis of censored survival data, based mostly on large-sample likelihood theory. Specific topics include the Kaplan-Meier estimator, the log-rank test, partial likelihood, and regression models, including the Cox proportional-hazards model and its generalizations. PREREQS: (ST 553 [C] or ST 563 [C] )
ST 651. LINEAR MODEL THEORY (3). Least squares estimation, best linear unbiased estimation, parameterizations, multivariate normal distributions, distributions of quadratic forms, testing linear hypotheses, simultaneous confidence intervals. Offered alternate years. PREREQS: ST 553 and ST 563. ST 651 and ST 652 must be taken in order.

ST 652. LINEAR MODEL THEORY (3). Advanced topics including classification models, mixedeffects models and multivariate models. Offered alternate years. PREREQS: ST 651 [C] and ST 553 and ST 563
ST 661. ADVANCED THEORY OF STATISTICS
(3). Exponential families, sufficient statistics; unbiased, equivariant, Bayes, and admissible estimation. Offered alternate years. PREREQS: ST 563 and MTH 511. ST 661, ST 662, and ST 663 must be taken in order.
ST 662. ADVANCED THEORY OF STATISTICS
(3). Uniformly most powerful, unbiased, similar, and invariant tests. Offered alternate years. PREREQS: ST 661 [C] and ST 563 and MTH 511

ST 663. ADVANCED THEORY OF STATISTICS
(3). First-order and higher-order asymptotics; likelihood ratio, score, and Wald tests; Edgeworth and saddlepoint approximations. Offered alternate years. PREREQS: ST 662 [C] and ST 563 and MTH 511

## OTHER DECREES \& <br> PROGRAMS WHHIN THE COLLECE OF SCIENCE <br> UNDERGRADUATE MAJORS WITH OPTIONS

## INTERNATIONAL STUDIES (BA, HBA)

See International Programs for information on the International Studies Degree.
Major Code: 910

## SUSTAINABILITY (BS, HBS)

## Also available via Ecampus.

 OSU Main Campus Contact: Ann Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.
## OSU-Cascades Campus Contact:

Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@ osucascades.edu.

## Sustainability Core (17-20)

All Sustainability Majors and Minors must take the five courses that make up the Sustainability Core: SUS 304, SUS 350, an ecological sustainability course (SUS 102 recommended), a social sustainability course (choose one below), and an economic sustainability course (choose one below):

SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)

## Ecological Dimensions of

 Sustainability (3-4)
## Select 3 to 4 credits from the

 following:BI 301. *Human Impacts on Ecosystems (3)
SUS 102. *Introduction to Environmental Science and Sustainability (4)
Social Dimensions of Sustainability (3-4)
Select 3 to 4 credits from the following:
SOC 381. Social Dimensions of Sustainability (4)(Ecampus only)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/FES/ANS/FW 485. *Consensus and Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)(Ecampus, Cascades Campus)

## Economic Dimensions of

 Sustainability (3-4)Select 3 to 4 credits from the following:
AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 351. *Natural Resources Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and

Environmental Impacts (4)

## Practicum (3-12)

Sustainability majors are required to complete a minimum of 3 Practicum credits. Before registering for a practicum, students must get practicum approved by Sustainability Double Degree advisor. Email: Sus.advising@oregonstate.edu.
SUS 401. Research (3-12)
SUS 410. Internship (3-12)
SUS 499. Special Topics (3-12)
Note: SUS 410 credits may be achieved by participation in an $\mathrm{IE}_{3}$ Global Internship with advisor approval.

## Remaining Elective Credits (4-16)

In addition to the required credits specified above, students must work with the sustainability program advisor to select courses relevant to their discipline and career path interests.

## Credits total=36

Classes that can be used to fulfill remaining requirements are listed below. Students are NOT limited to taking courses within their primary major of study. The Sustainability advisor(s) will approve courses not listed here if they have an obvious link to sustainability and fulfill the intent of the double degree. See the OSU Sustainability Office list of sustain-ability-related courses.

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 465. *Systems Thinking and Practice (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. *Introduction to
Macroeconomics (4)
ECON 311. Intermediate Microeconomic Theory (4)
ECON 315. Intermediate Macroeconomic Theory (4)
MGMT 452. Leadership (4)

## Engineering

BEE 221. Fundamentals of Ecological Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative
Energy Systems (3)
CHE 451. Solar Energy Technologies (3)

ECE 438. Electric and Hybrid Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering Fundamentals (4)
ENVE 322. Fundamentals of Environmental Engineering (4)
HEST 310. *Introduction to Community
Engagement and Community-Based Design (3)

## Natural Sciences

ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ATS 320. *The Changing Climate (3)
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 348. *Human Ecology (3)
BI 370. Ecology (3)
BRR 325. *Energy Technology and Social Change (3)
BRR 350. Introduction to Regional Bioenergy (2)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
DHE/WSE 415. *Renewable Materials in the Modern Age (3)
FES 341. Forest Ecology (3)
FES 354. Communities, Natural Areas, and Sustainable Tourism (3)
FES 355. Management for Multiple Resource Values (3)
FES 360. Collaboration and Conflict Management (3)
FES 365. *Issues in Natural Resources Conservation (3) Ecampus or Cascades campus only
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FES/FW 445. Ecological Restoration (4)
FES/HORT 455. Urban Forest Planning,
Policy and Management (4) Ecampus only
FES/NR/RNG 477. *Agroforestry (3)
FES/SOC/ANS/FW 485. *Consensus and
Natural Resources (3)
FOR 462. Natural Resource Policy and Law (3)

FW 251. Principles of Fish and Wildlife Conservation (3)
FW 303. Survey of Geographic Information Systems in Natural Resource (3)
FW 321. Applied Community and Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society, and Sustainability (3)
FW 435. ^Wildlife in Agricultural Ecosystems (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water, and the Environment (3)
GEO 309. *Environmental Justice (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)

GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and Development (3)
GEOG 441. International Water Resources Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and
Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
SOIL 475. Soil Resource Potentials (4)
SOIL 499. Special Topics (1-16)
SUS 103. *Introduction to Climate Change (4)

WSE 111. Renewable Materials for a Green Planet (2)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 392. *Bamboolooza: The Fascinating World of Bamboo (3)
WSE 453. ^Global Trade in Renewable Materials (3)
WSE 455. Marketing and Innovation in
Renewable Materials (4)
WSE 473. Bioenergy and Environmental Impact (3)
WSE 475. Environmental Assessment of Building Materials (4)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy, and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
ANS/FES/FW/SOC 485. *Consensus and Natural Resources (3)
ANTH 481. *Natural Resources and
Community Values (3)
COMM 408. Workshop (3)
COMM 440. Theories of Conflict and Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature, Culture and the Environment (4)
FES/SOC/ANS/FW 485. *Consensus and Natural Resources (3)
HEST 310. *Introduction to Community
Engagement and Community-Based
Design (3)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL/REL 443. *World Views and
Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion, and Politics (4)
PS 374. *Sustainable Living: Practices and
Policies (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)

PS 475. Environmental Politics and Policy (4)
PS 477. International Environmental
Politics and Policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
WGSS 440. *Women and Natural Resources (3)

WGSS 450. Ecofeminism (3)

## Footnotes:

* Bacc Core Course (BCC)
${ }^{\wedge}$ Writing Intensive Course (WIC)
Major Code: $\mathbf{8 7 0}$


## SUSTAINABILITY MINOR

Available on the Corvallis and OSU-Cascades campuses, and via Ecampus.
OSU Main Campus Contact: Ann Scheerer, 3017B Agricultural and Life Sciences Building, Oregon State University, Corvallis, OR 97331; 541-737-5687; Ann. Scheerer@oregonstate.edu or the Sustainability Double Degree academic advisor, Sus.Advising@oregonstate.edu.

OSU-Cascades Campus Contact: Matt Shinderman, Forest Ecosystems and Society, Oregon State University Cascades; 541-322-3159; matt.shinderman@ osucascades.edu.
The Sustainability minor includes core sustainability courses (5) and tailored elective courses to expand students' knowledge and experience of their primary major in the context of sustainability principles and frameworks. Courses from a student's major course of study will not count towards minor requirements. Completion of the Sustainability minor requires 27 credits beyond the 180-credit minimum for graduation.

## Sustainability Core (17-20)

All Sustainability students must take (8):
SUS 304. *Sustainability Assessment (4)
SUS 350. *Sustainable Communities (4)

## Social Dimensions of

Sustainability:
Select 3 to 4 credits from the following:
SOC 381. Social Dimensions of
Sustainability (4)
SOC 480. *Environmental Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC 485/ANS 485/FES 485/FW 485.
*Consensus and Natural Resources (3)
SUS 420. Social Dimensions of Sustainability (3)
Ecological Dimensions of Sustainability:
Select 3 to 4 credits from the following:
BI 306. *^Environmental Ecology (3)
SUS 102. *Introduction to Environmental
Science and Sustainability (4)
Economic Dimensions of
Sustainability:

## Select 3 to 4 credits from the

following:
AEC 250. *Introduction to Environmental

Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)
Sustainability Individualized Study/

## Elective Credits (7-10)

Students will work with their primary academic advisor and the Sustainability academic advisor to select electives in the theme relevant to their interests for a total of 7-10 credits. Students should discuss with Sustainability advisor to apply elective courses that may not be
listed below.

## Total Credits=27

## Elective Courses:

## Business

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and
Environmental Impacts (4)
BA 302. Business Process Management (4)
BA 351. Managing Organizations (4)
BA 352. Managing Individual and Team Performance (4)
BA 362. Social Entrepreneurship and Social Initiatives (4)
BA 432. Environmental Law, Sustainability and Business (4)
BA 466. Integrative Strategic Experience (4)
ECON 202. Introduction to
Macroeconomics (4)
ECON 315. Intermediate Macroeconomic Theory (4)
Engineering
BEE 221. Fundamentals of Ecological
Engineering (3)
BEE 320. Biosystems Analysis and Modeling (4)

BEE 322. Ecological Engineering
Thermodynamics and Transfer Process (4)
CCE 422. Green Building Materials (3)
CHE 450. Conventional and Alternative
Energy Systems (3)
CHE 451. Solar Energy Technologies (3)
ECE 438. Electric and Hybrid Electric Vehicles (4)
ENGR 350. *Sustainable Engineering (3)
ENVE 321. Environmental Engineering
Fundamentals (4)
ME 312. Thermodynamics (4)

## Natural Sciences

ATS 320. *The Changing Climate (3)
[Terminated fall 2017]
BI 301. *Human Impacts on Ecosystems (3)
BI 306. *^Environmental Ecology (3)
BI 370. Ecology (3)
CH 374. *Technology, Energy, and Risk (3)
CH 390. Environmental Chemistry (3)
FES/TOX 435. *Genes and Chemicals in Agriculture: Value and Risk (3)
FOR 462. Natural Resource Policy and Law (3)

FW 251. Principles of Fish and Wildlife Conservation (3)

FW 303. Survey of Geographic Information Systems in Natural Resource (3)
FW 321. Applied Community and Ecosystem Ecology (3)
FW 325. *Global Crises in Resource Ecology (3)

FW 326. Integrated Watershed Management (3)

FW 340. *Multicultural Perspectives in Natural Resources (3)
FW 350. *Endangered Species, Society and Sustainability (3)
FW 435. ${ }^{\wedge}$ Wildlife in Agricultural
Ecosystems (3)
FW/ANS/FES/SOC 485. *Consensus and Natural Resources (3)
FW 488. Problem Solving in Fisheries and Wildlife Science (3)
FW 489. Effective Communications in Fisheries and Wildlife Science (3)
GEO 306. *Minerals, Energy, Water and the Environment (3)
GEO 309. *Environmental Justice (3)
GEO 453. Resource Evaluation Methods/ EIS (3)
GEOG 300. *Sustainability for the Common Good (3)
GEOG 324. Geography of Life: Species
Distributions and Conservation (4)
GEOG 330. *^Geography of International
Development and Globalization (3)
GEOG 331. *Population, Consumption, and Environment (3)
GEOG 340. *Introduction to Water Science and Policy (3)
GEOG 360. GIScience I: Geographic
Information Systems and Theory (4)
GEOG 430. Resilience-Based Natural
Resource Management (3)
GEOG 431. Global Resources and Development (3)
GEOG 441. International Water Resources
Management (3)
GEOG 450. Land Use in the American West (3)

GEOG 451. Planning Principles and Practices for Resilient Communities (4)
GEOG 452. Sustainable Site Planning (3)
PH 313. *Energy Alternatives (3)
WSE 210. *Renewable Materials Technology and Utilization (4)
WSE 266. *Industrial Hemp (3)
WSE 321. Chemistry of Renewable Materials (3)

WSE 322. Physical and Mechanical Properties of Renewable Materials (4)
SOIL 499. Special Topics [Organic Farming] (1-16)
Z 349. *Biodiversity: Causes, Consequences and Conservation (3)

## Social Sciences/Humanities

AEC 250. *Introduction to Environmental Economics and Policy (3)
AEC 253. *Environmental Law, Policy and Economics (4)
AEC 351. *Natural Resource Economics and Policy (3)
AEC/ECON 352. *Environmental
Economics and Policy (3)
AEC 434. ${ }^{\wedge}$ Measuring Resource and Environmental Impacts (4)
ANTH 481. *Natural Resources and
Community Values (3)
COMM 408. Workshop (3)

COMM 440. Theories of Conflict and
Conflict Management (3)
COMM 442. Bargaining and Negotiation Processes (3)
ENG 482. Studies in American Literature,
Culture and the Environment (4)
PHL 325. *Scientific Reasoning (4)
PHL 390. Moral Theories (3)
PHL 439. Philosophy of Nature (3)
PHL 440. Environmental Ethics (3)
PHL 443. *World Views and Environmental Values (3)
PS 331. *State and Local Politics (4)
PS 370. *Science, Religion and Politics (4)
PS 449. ${ }^{\wedge}$ Topics in Comparative Politics (4)
PS 461. Environmental Political Theory (4)
PS 475. Environmental Politics and Policy (4)
PS 477. International Environmental
Politics and policy (4)
SOC 360. *Population Trends and Policy (4)
SOC 381. Social Dimensions of
Sustainability (4)
SOC 480. *Environment Sociology (4)
SOC 481. *Society and Natural Resources (4)
SOC/ANS/FES/FW 485. *Consensus and Natural Resources (3)

## Footnotes:

* Baccalaureate Core Course
${ }^{\wedge}$ Writing Intensive Course (WIC)


## Minor Code: 871

## MANAGEMENT FOR SCIENCE PROFESSIONALS GRADUATE CERTIFICATE

To be terminated upon approval of proposal \#90741.

## Also available via Ecampus.

## PSM Director

2082 Cordley Hall
Corvallis OR 97331
541-737-5259
Email: kirstin.carroll@oregonstate.edu Website: http://psm.science.oregonstate. edu/
The Management for Science Professionals graduate certificate is designed for individuals in science or science-related fields seeking professional development. Formal training in business management, communication, and ethics allows graduates of this program to broadly communicate with diverse groups of people and move more rapidly into leadership positions within their organizations. This graduate certificate program is ideal for students of professional science tracks like veterinary medicine or pharmacy, current industry or agency employees who want to advance in their careers, or continuing students envisioning careers with future managerial responsibilities.
A graduate certificate is awarded to individuals who complete the professional series of courses ( 6 courses for 18 credits) offered as part of the Professional Science Master's degree program. If you are not a Professional Science Master's student or enrolled in the graduate certificate program, you can currently only register for these classes through Ecampus. Non-de-
gree seeking students who may later wish to apply to a graduate degree program should be aware that a maximum of 6 credits earned as a non-degree seeking student may be transferred to a graduate certificate or degree program.

Please go to http://psm.science.oregon-state.edu/graduate-certificate for additional information and details on how to apply.

## Required (18 credits)

COMM 550. Communication and the
Practice of Science (3)
PHL 547. Research Ethics (3)
PSM 513. Professional Skills (3)
PSM 565. Accounting and Finance for Scientists (3)
PSM 566. Project Management and
Marketing Scientific Technologies (3)
PSM 567. Innovation Management (3)

## Major Code: CG09

## - PROFESSIONAL SCIENCE

## MASTERS COURSES

PSM 506. PROJECTS (1 or 16). This course is repeatable for a maximum of 99 credits.
PSM 507. SEMINAR (1-16). This course is repeatable for a maximum of 99 credits.
PSM 513. PROFESSIONAL SKILLS (3). Students will work in teams with off-campus mentors to address a contemporary problem in a scientific field within the context of an existing business. This collaborative project will provide students with opportunities to integrate and apply their collective knowledge of business management, communication, and science to create innovative solutions. Project management and leadership styles will also be covered, and a final report and presentation are usually required. PREREQS: ( (COMM 550 [C] or COMM 512 [C] ) and PHL 547 [C] and PSM 565 [C] and PSM 566 [C] and PSM $567^{*}$ [C] )
PSM 565. ACCOUNTING AND FINANCE FOR SCIENTISTS (3). Students develop business management skills by learning principles of managerial and financial accounting and understanding profit and loss statements, cost analysis, and investment risks. Individuals utilize basic financial tools needed to develop business proposals and successfully manage scientific projects in public and private work sectors.

## PSM 566. PROJECT MANAGEMENT AND

MARKETING SCIENTIFIC TECHNOLOGIES (3).
Students gain an understanding of marketing principles and global markets with a focus on scientific technologies. Project management skills needed to effectively manage diversity, conflict and change in corporate, government and nonprofit environments as well as entrepreneurial ventures will be emphasized. PREREQS: PSM 565 [C]
PSM 567. INNOVATION MANAGEMENT (3).
Students learn about different types of innovation, development and implementation of new technologies, and intellectual property. Student teams develop and present business plans as term projects. Structuring small business enterprises, project planning and management, and commercialization of new products and services prepare individuals for leadership roles in the innovation process. PREREQS: (PSM 565 [C] and PSM 566 [C] )
PSM 599. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 99 credits.

Students who complete the requirements of the Oregon State University Honors College receive OSU's most prestigious academic recognition for undergraduates: an honors
baccalaureate degree (HBA, HBFA or HBS) in their major, jointly awarded by the Honors College and the colleges of their major.

The Honors College is about enrichment: How high can you dream? The Honors College provides challenging curricula, personal attention, and enhanced learning experiences in general education and in the student's primary academic interest. The Honors College offers courses consisting of small groups taught by OSU's finest faculty, specifically selected for their undergraduate teaching abilities. Through seminars, colloquia, and their own thesis research, students enjoy the benefits of a small college within a large, diverse, and comprehensive university.

Both a four-year and a two-year track are available. The two-year track is designed for transfer students or for students already enrolled at OSU. Interested students should contact the Honors College for information.

The Honors College, in cooperation with University Housing and Dining Services, maintains an honors living-learning community in West and Sackett Residence Halls.

## Undergraduate Degrees

Honors Bachelor of Arts (HBA)
Honors Bachelor of Fine Arts (HBFA)
Honors Bachelor of Science (HBS)

## MAJORS AND DEGREES

Students enrolled in the Honors College can pursue any one of OSU's wide range of undergraduate majors. Students who complete the requirements of the Honors College receive OSU's most prestigious undergraduate academic recognition: an honors baccalaureate degree in their major, jointly awarded by the Honors College and the colleges in which their major is located.

## ADMISSION

Admission is competitive and selectiveonly a small percentage of all entering students join the Honors College and space is limited. HC students are exceptionally able, highly motivated, and intellectually curious. They have a highly developed social consciousness and a sense of responsibility. Admission decisions are based on grade-point averages, SAT or ACT scores, and responses to an essay question that reveal the student's ability to think deeply and creatively. High school applicants must have a minimum of 3.75 GPA or a score of 1820 SAT, 27 ACT to be considered for admission.

Entering first-year students interested in beginning the HC fall term should submit an application by either November 1 or February 1. HC applicants must also apply for admission to OSU by that time. Admission decisions are made approximately 45 days after the submission deadlines. A response to the current year HC essay question is required.

Transfer or advanced-standing applicants should submit an application by March 15th and will be notified no later than April 30th. On-campus visits are encouraged.

## DEGREE REQUIREMENTS

The honors degree is jointly awarded by the Honors College ( HC ) and by the colleges of the student's major. Therefore, additional credit requirements beyond the total required by the colleges of the student's major must be completed. HC students must satisfy all university and major requirements, as well as honors requirements. A student who completes a 30 -credit track of Honors College courses will be designated an Honors Scholar. A student who completes a 15 -credit track will be designated as an Honors Associate. In either instance successful completion leads to receipt of an honors baccalaureate degree. Transcripts will also reflect Honors College completion and will denote HC course work.
Many honors classes satisfy dual requirements; please check details with an Honors College advisor. For students in majors that require a senior thesis project, the honors thesis requirements may complement those majors.

## RETENTION CRITERIA

All HC students must maintain a 3.25 cumulative OSU GPA and make satisfactory progress toward fulfilling the requirements of the HC and their major. Progress in three key areas-GPA, course work, and thesis-will be reviewed every fall, winter, and spring term. Students below, or at risk of falling below, the specified 3.25 cumulative OSU GPA will be notified to come in for advising. Students who do not meet retention expectations may be removed from the college. If removed, a student has the right to petition for reinstatement.
All students must maintain contact with Honors College advisors through regularly scheduled appointments.

## HONORS COURSES

See the Schedule of Classes each term under Honors College (HC) and under departmental listings for courses with an H suffix. The HC publishes its own schedule, which is available each term in the HC office and on the HC website. Honors courses change annually; many are offered under departmental designators.
See the HC website for additional information, http://honors.oregonstate.edu.

## HONORS ASSOCIATE

## (HBA, HBFA, HBS)

The honors degree is jointly awarded by the Honors College and by the college of the student's major. Therefore additional credit requirements beyond the total required by the colleges of the student's major must be completed. HC

Oregon State University 450 Learning Innovation Center (LInc)
Corvallis, OR
97331-2221
541-737-6400 FAX 541-737-6401
Email: Honors. College@ oregonstate.edu Website: http://honors. oregonstate.edu

## Administration

Toni Doolen
Dean, 541-737-
5974, toni.doolen@ oregonstate.edu

## Tara Williams

Associate Dean,
541-737-6412,
tara.williams@
oregonstate.edu
students must satisfy all university and major requirements, as well as honors requirements. A student who completes a 15 -credit track will be designated as an Honors Associate. Successful completion leads to receipt of an honors baccalaureate degree. Transcripts will also reflect Honors College completion and will denote HC course work. Interested students please contact the Honors College at 541-737-6400 or email honors.college@ oregonstate.edu.
The requirements for the Honors Associate track include:

- Honors colloquia (minimum 6 credits)
- Honors electives (minimum 6 credits)
- Thesis/Research/Projects (minimum 3 credits)
- At least 12 honors credits must be upper division.
- Bound thesis

Major Code: 012

## HONORS SCHOLAR

(HBA, HBFA, HBS)
The honors degree is jointly awarded by the Honors College and by the college of the student's major. Therefore additional credit requirements beyond the total required by the colleges of the student's major must be completed. HC students must satisfy all university and major requirements, as well as honors requirements. A student who completes a 30 -credit track of Honors College courses will be designated an Honors Scholar. Successful completion leads to receipt of an honors baccalaureate degree. Transcripts will also reflect Honors College completion and will denote HC course work. Interested students please contact the Honors College at 541-737-6400 or email honors.college@oregonstate.edu.
The requirements for the Honors Scholar track include:

- Honors baccalaureate core courses (minimum 6 credits)
- Honors colloquia (minimum 6 credits)
- Honors electives (minimum 12 credits)
- Thesis/Research/Projects (minimum 6 credits)
- At least 12 honors credits must be upper division.
- Bound thesis

Major Code: 011

## COURSES

HC 199. *HONORS WRITING (3). Through a range of assignments, texts, and guest speakers, Honors College students will develop critical thinking skills and a strategy for writing in their discipline. (Bacc Core Course) PREREQS: Honors College approval required.
HC 299. SELECTED TOPICS (1-16). Selected topics for Honors College students. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HC 399. SELECTED TOPICS (1-16). Upper-
division special topics for Honors College students. This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HC 401. RESEARCH AND SCHOLARSHIP (1-
16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HC 402. INDEPENDENT STUDY (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HC 403. THESIS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HC 404. WRITING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HC 405. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HC 406. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HC 407. SEMINAR (1-16). This course is repeatable for a maximum of 18 credits. PREREQS: Honors College approval required.
HC 408. WORKSHOP (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HC 409. PRACTICUM (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.
HC 499. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits. PREREQS: Honors College approval required.

The College of Veterinary Medicine at
Oregon State University was established in 1975 with three major areas of responsibilityteaching, research, and public service.
The college is fully accredited by the American Veterinary Medical Association's Council on Education.

Professional Program
Veterinary Medicine (DVM)
Graduate Majors
Comparative Health Sciences (MS, PhD) (Administered by the Graduate School)
Graduate Options
Biomedical Sciences
Clinical Sciences
Dual Degree (DVM and MPH)
Graduate Minor
Comparative Health Sciences
(Administered by the Graduate School)

## TEACHING

The college was established in 1975 and began its professional education program in 1979. Approximately 40 residents of Oregon and 16 nonresident students are selected to enter the OSU College of Veterinary Medicine. These students will complete all four years of their professional education in Corvallis. Completion of the professional program leads to the Doctor of Veterinary Medicine (DVM) degree.

There are two departments supporting the DVM doctoral program: Biomedical Sciences and Clinical Sciences.

Comprehensive research training is provided through graduate programs leading to the MS degree in Comparative Health Sciences.

Post-DVM residency training leading to board eligibility in several clinical disciplines and pathology is also available.

## RESEARCH

Biomedical research is conducted in the college, supported by federal agencies such as NIH, USDA, DOE, as well as by a number of foundations. Collaboration with the OSU Agricultural Experiment Station, colleges of Pharmacy, Public Health and Human Sciences, Engineering and many other colleges, is part of the program. The research is of economic and public health significance, aimed at improving the health of animals and people.

The college emphasizes research of infectious diseases, such as those caused by My cobacteria, Chlamydia, Clostridia, Vibrio, Mycoplasma, Cryptosporidium, herpesvirus, respiratory syncytial virus, influenza virus, and HIV-1 virus. Research is also conducted on immunity and nutrition, neuroscience, cancer, cardiovascular diseases, diabetes, reproductive diseases, and diseases of terrestrial and aquatic wildlife.

## PUBLIC SERVICE

The service programs focus on the diagnosis, prevention, treatment, and control and prevention of animal diseases. The college assists veterinary practitioners, animal owners, and the general public through the Veterinary Diagnostic Laboratory and the Veterinary Teaching Hospital.

The Veterinary Diagnostic Laboratory is a full-service facility providing a wide range of animal disease diagnostic testing services to veterinarians, animal owners, and public agencies. The laboratory offers testing and expertise in pathology, clinical pathology, bacteriology, and virology, and is accredited by the American Association of Veterinary Laboratory Diagnosticians.

The Veterinary Teaching Hospital is designed and equipped for diagnosis and medical and surgical treatment of canine, feline, equine, food animal, and camelid patients. Patients are admitted directly from animal owners and through referrals from practicing veterinarians in Oregon and the Pacific Northwest. Imaging (radiology, ultrasonography, fluoroscopy, CAT scan, MRI, and scintigraphy), anesthesiology, pharmacy, intensive care, and other services are available to support the hospital functions.

The Veterinary Diagnostic Laboratory and the Veterinary Teaching Hospital serve as learning centers where senior veterinary students and residents study animal disease, diagnosis, treatment, and prevention.

Providing continuing education for veterinarians is also considered a major responsibility of the college. One- to three-day intensive courses of instruction on specific topics are offered periodically.

## CAREER OPPORTUNITIES IN VETERINARY MEDICINE

Opportunities for employment in veterinary medicine are excellent. Nearly 70 percent of the professionally active veterinarians in the United States are engaged in private practice. Some practices are limited to types of animals, such as food animal, equine, or companion animal practices. Others involve specialties such as surgery, ophthalmology, cardiology, or radiology. In addition to private practice, there are numerous teaching and research opportunities in academic, government, and industrial settings. Expanding areas include laboratory animal medicine and public health.

## VETERINARY STUDENT EXPENSES

Oregon resident students registered in the College of Veterinary Medicine will pay tuition and fees of approximately $\$ 7,106$ per term. Students from the WICHE states will pay the same fees as Oregon resident students. Nonresident student fees currently are $\$ 13,733$ per term.

Veterinary students must provide required professional attire, as well as dissection, surgical, and diagnostic instruments, and notes and books.

Occasional field trips are scheduled in the veterinary curriculum. Transportation is provided by the university for required trips, but students must provide their

200 Magruder Hall Oregon State University Corvallis, OR 97331-4801 DVM Information: 541-737-2098 DVM Degree Email: cvmproginfo@ oregonstate.edu Website: http://vetmed. oregonstate.edu/

## Administration

Susan J.

## Tornquist,

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own food and lodging. For optional trips, the student is usually expected to provide transportation, lodging, and food. All other expenses, such as residence hall and living expenses, are the same as for students in other colleges of the university.
Students desiring additional information about veterinary medicine should write to the Office of the Dean, College of Veterinary Medicine, Oregon State University, 200 Magruder Hall, Corvallis, Oregon 97331-4801, or email cvmproginfo@oregonstate.edu or see our website at http://vetmed.oregonstate.edu/.

## POLICY ON LABORATORY AND DUTY HOURS

During the professional curriculum, several laboratory exercises in the preclinical years require the use of live animals. The exercises are designed to complement didactic lectures and demonstrations through hands-on experience with various species of animals. In all instances, the animals are humanely treated and anesthetized if the procedures are potentially painful.

During the clinical years, animals are used in laboratory exercises in the teaching of basic surgical skills and medical procedures. In most instances, the animals are anesthetized. Strict protocol is enforced regarding the animals' well-being in exercises requiring post-operative recovery. All use of animals in teaching is approved by the university's Institutional Animal Care and Use committee.

During the fourth year of the veterinary curriculum, students complete rotations in sections of the Veterinary Teaching Hospital and Veterinary Diagnostic Laboratory. Emergency services are offered to the public on a 24 -hour basis, seven days a week. Student assignments in the clinical blocks are demanding, and students are required to spend time at night, weekends, and holidays in the delivery of health care to patients. Hospital operations continue seven days per week, and students are responsible for their assigned tasks regardless of time and day of the week.

## DVM AND MPH DUAL DEGREE

Students enrolled in the Doctor of Veterinary Medicine (DVM) degree program wishing also to complete a Master's of Public Health Degree may do so if successfully admitted to the Graduate School and the College of Public Health and Human Sciences (CPHHS). Using pre-approved and cross-listed courses as electives, veterinary students may complete the MPH degree with an additional (5th) year of study.
The CPHHS offers an MPH degree in six tracks: Biostatistics; Epidemiology; Environment, Safety and Health; Health Management and Policy; Health Promo-
tion and Health Behavior; and International Health.

In order to maximize use of elective courses in the dual degree program, it is important that veterinary students enter the dual degree option as early in their studies as possible.

The five core MPH courses are offered through distance education. In consultation with the student's MPH adviser, internships, culminating activities and senior papers should be coordinated as well. The student's MPH adviser must approve all veterinary courses counted toward the graduate (MPH) degree.
For more information, see http:// health.oregonstate.edu/degrees/ graduate/public-health/mph/ dvm-mph-dual-degree.

## VETERINARY MEDICINE (DVM)

## Graduation Requirements

To be awarded the Doctor of Veterinary Medicine degree, candidates must have passed all required courses in the veterinary curriculum, have a minimum of a 2.00 grade-point average in the veterinary curriculum, satisfactorily complete a senior paper and a required veterinary procedures list.

## Preveterinary Curriculum

Typical preveterinary curriculum at Oregon State University follows. Oregon State University courses that will meet the preveterinary academic requirements:
ANS 314. Animal Physiology (4)
BI 211, BI 212, BI 213. *Principles of Biology (4,4,4)
BB 450, BB 451. General Biochemistry $(4,3)$
BI 311. Genetics (4)
or ANS 378. Animal Genetics (4)
CH 121, CH 122, CH 123. General
Chemistry $(5,5,5)$
or CH 231, CH 232, CH 233 . *General Chemistry ( $4,4,4$ )
and CH 261 , CH 262, CH 263.
*Laboratory for Chemistry 231, 232, 233
(1,1,1)
CH 331, CH 332. Organic Chemistry $(4,4)$
MTH 111. *College Algebra (4)
and MTH 112. *Elementary Functions (4)
PH 201, PH 202. *General Physics $(5,5)$
ST 351. Introduction to Statistical Methods (4)

English Writing (6)
Humanities/Social Sciences (12)
Public Speaking (3)
Upper-Division Biological Sciences with Lab (6)

## Footnote:

* Baccalaureate Core Course (BCC)

Professional Curriculum DVM
Degree
First Year

## Fall (18)

VMB 709. Veterinary Medicine Orientation (1)
VMB 711. Veterinary Gross Anatomy (4)
VMB 714. Veterinary Microscopic Anatomy (4)

VMB 717. Veterinary Physiology (5)
VMB 740. Veterinary Integrative Problem Solving (1)
VMC 738. Introduction to Animal Care (3)

## Winter (17)

VMB 712. Veterinary Gross Anatomy (4)
VMB 715. Veterinary Microscopic Anatomy (3)

VMB 716. Veterinary Neurosciences (4)
VMB 718. Veterinary Physiology (5)
VMB 741. Veterinary Integrative Problem
Solving (1)

## Spring (21)

VMB 713. Veterinary Gross Anatomy (4)
VMB 719. Veterinary Physiology (4)
VMB 720. Veterinary Immunology (5)
VMB 721. Veterinary Pathology (5)
VMB 742. Veterinary Integrative Problem Solving (1)
VMC 720. Veterinary Clinical Nutrition (2)

## Second Year

## Fall (20 credits)

VMB 750. Systemic Pathology I (4)
VMB 753. Veterinary Virology (4)
VMB 759. Veterinary Bacteriology and Mycology (5)
VMB 760. Veterinary Parasitology (5)
VMB 761. Veterinary Pharmacology (2)

## Winter (17 credits)

VMB 751. Systemic Pathology II (5)
VMB 762. Veterinary Pharmacology II (4)
VMB 763. Veterinary Clinical Pathology (4)
VMC 764. Diagnostic Imaging (4)

## Spring (21 credits)

VMB 765. Veterinary Toxicology (4)
VMB 766. Epidemiology and Public Health
(3)

VMB 767. Veterinary Epidemiology (3)
VMC 725. Principles of Surgery (4)
VMC 739. Veterinary Medical Ethics (1)
VMC 768. Principles of Anesthesia (4)
VMC 769. General Medicine (2)

## Third Year

## Fall (21-24)

VMC 770. Large Animal Medicine I (4)
VMC 773. Medicine Laboratory I (1)
VMC 776. Small Animal Medicine I (5)
VMC 783. Theriogenology I (4)
VMC 785. Small Animal Surgery (7)
Electives (0-3)
Winter (19-22)
VMB 775. Practice Management (2)
VMC 774. Medicine Laboratory II (1)
VMC 724. Large Animal Surgery (6)
VMC 771. Large Animal Medicine II (4)
VMC 777. Small Animal Medicine II (5)
VMC 786. Animal Behavior (1)
Electives (0-3)
Spring (15-24)
VMB 728. Special Animal Medicine (4)
VMB 745. Communications for
Veterinarians (1)
VMC 772. Large Animal Medicine III (4)
VMC 778. Small Animal Medicine III (5)
VMC 787. Third-Year Clinics (1)
Electives (0-9)

## Fourth Year

Required Blocks
VMB 736. Diagnostic Clinical Pathology (2)
VMB 795. Diagnostic Services (2)
VMC 711. Clinical Cardiology (2)
VMC 712. Clinical Oncology (2)
VMC 732. Clinical Medicine I (6)
VMC 734. Clinical Surgery I (6)
VMC 735. Rural Veterinary Practice I (6)
VMC 737. Veterinary Anesthesiology (4)
VMC 780. Veterinary Medical Preceptorship (4)

VMC 782. Emergency Care (1)
VMC 791. Clinical Small Animal Medicine (6)

VMC 793. Clinical Small Animal Surgery (6)
VMC 794. OHS Small Animal Primary Care (4)

VMC 796. Clinical Imaging (3)
VMC 797. Small Animal Critical Care and Hospital Service Rotation (1)
Additional electives required (3rd and 4th year) (5)
Total of all requirements and electives (65)
Elective Blocks (at least 5 credits required)
VMB 726. Pet Bird and Small Mammal
Medicine and Surgery (2)
VMB 727. Ornamental Fish Medicine (2)
VMB 729. Lab Animal/Primate Medicine and Surgery (2)
VMB 749. Wildlife Safari (2)
VMB 756. Advanced Clinical Pathology (1)
VMB 768. Basic Histopathology (1)
VMB 772. International Veterinary Medicine (2)
VMB 786. Advanced Histopathology (1)
VMC 714. Small Animal Dentistry (1)
VMC 715. Small Animal Case Studies I (1)
VMC 716. Small Animal Case Studies II (1)
VMC 717. Small Animal Case Studies III (1)
VMC 718. Small Animal Preventive
Medicine (2)
VMC 721. Small Animal Clinical Nutrition (1)

VMC 723. Advanced Feline Medicine (2)
VMC 726. Small Animal Theriogenology (1)
VMC 727. Advanced Small Animal Surgery (2)

VMC 731. Small Animal Emergency CareDove Lewis (3)
VMC 740. Sheep and Goat Medicine and Surgery (3)
VMC 741. Large Animal GI Surgery (2)
VMC 742. Camelid Medicine and Surgery (4)
VMC 743. Advanced Equine Reproduction (3)
VMC 744. Advanced Lameness in Equine (3)
VMC 747. Veterinary Anesthesiology II (3)
VMC 748. Equine Dentistry (2)
VMC 751. Ruminant Nutrition (2)
VMC 752. Clinical Large Animal Medicine II (3-6)
VMC 754. Clinical Large Animal Surgery II (3)
VMC 755. Rural Veterinary Practice II (3-6)
VMC 758. Cattle Production Medicine (3)
VMC 759. Large Animal Palpation (1)
VMC 763. Advanced Clinical Cardiology (1)
VMC 779. Equine Sports Medicine (1)
VMC 788. Business Applications in SA
Practice (1-2)
VMC 789. Pet Practice (3)

VMC 792. Clinical Small Animal Medicine II (3)
VMC 798. Clinical Small Animal Surgery II (3-6)

## STATE OF OREGON DVM LICENSING REGULATIONS <br> Oregon Veterinary Medical Examining Board <br> Requirements

1. Graduate of a veterinary medical school accredited by the AVMA, or if a foreign graduate, have a certificate from ECFVG, PAVE or other equivalency program approved by the board.
2. Passed the NBC/CCT or NAVLE and Juris Prudence exams.
3. If you have less than one year's U.S. experience, you must obtain an intern permit and practice under the supervision of an Oregon-licensed veterinarian for one year (or the balance of a year).
*If you meet the following conditions, you may include a letter requesting a waiver of the CCT. Your letter must cite compliance with each of these requirements:

- Graduate of an accredited veterinary school or earned ECFVG certificate prior to 1991;
- Engaged in five contiguous years of active veterinary clinic practice immediately preceding date of application;
- Have held license(s) in good standing in other US states or provinces since graduation; and
- Have continuing education of at least 10 hours per year during the five years immediately preceding the date of application.


## EXAMINATIONS

Scores must be reported directly to the board from VIVA. If you tested in Oregon, you do not need to request a score transfer.

North American Veterinary Licensing Examination (NAVLE): Administered via computer during two periods in spring and winter. Passing score as established by National Board Examination Committee.

NBE/CCT: Passing score before December 1992 is 75.00 based on 1.5 standard deviations. After December 1992, passing score is the criterion-referenced score of 425.

Jurisprudence Exam: An openbook 40-question test on veterinary laws and rules of Oregon. The exam and regulations will be sent to applicants upon receipt of the license application and $\$ 75$ fee. A passing score of 95 percent ( 38 correct answers) is required.

## LICENSING

Complete and submit the application and fee. The Jurisprudence Exam will be sent to you to complete and return. When you pass the JP exam, you will be sent an activation form. You may not practice in Oregon until you activate your license or intern permit. Complete and send in the activation form, along with the $\$ 100$ fee. Your permanent license or intern permit will be issued upon receipt of all necessary documentation.

Permanent Licenses: If you have at least one year's documented veterinary clinical experience, you may activate your permanent license.

Intern Permits: New graduates or veterinarians with less than one year's experience must obtain an intern permit. This permit expires one year after the date of issue or less if prior experience is documented. Renewal notices are sent approximately six weeks prior to expiration date, at which time interns may activate their permanent license or request another intern permit if one year's experience has not been acquired. Current veterinary school seniors may submit application materials prior to graduation; however an intern permit will not be issued until the board receives either a dean's letter confirming graduation or a diploma copy.
Continuing Education: Active licensees are required to report 30 credits of CE every odd year, i.e., '11, '13, '15, etc.

## Major Code: 9970

## BIOMEDICAL SCIENCES

## Luiz E. Bermudez, Head

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## FACULTY

Professors Bermudez, Bildfell, Craig, Hall, Häse, Heidel, Jin, Kent, Magnusson, Rockey, Sarker, Tornquist, Valentine
Associate Professors Jolles, Löhr, O'Reilly, Pastey
Assistant Professors Chappell, Danelishvili, Dolan, Gorman, D. Johns, J. Johns, Medlock, Miller-Morgan, Moulton, Nigussie, Ramsey, Russell, Shulzhenko
Instructors Alcantar, Mansouri, Sona Adjunct Fu
Emeriti Blythe, Engel, Hutton, Matsumoto, A. Smith, B. Smith, Snyder, Timm
Courtesy Allen, Burco, Cooper, Gillin, Harrenstien, Paredes-Sabja, Steinauer, Trevejo, Wolf

## ■ VETERINARY MEDICINE BIOMEDICAL COURSES

VMB 110. PREVETERINARY MEDICINE (1). Introduction to the profession's role in society. Graded P/N.
VMB 309. CAPTURE AND IMMOBILIZATION
TECHNIQUES (2). Manual and chemical restraint methods are covered with an emphasis on darting equipment, animal and human safety, drug pharmacology and species-specific recommendations. Lec/lab.
VMB 328. WILDLIFE CAPTURE AND
IMMOBILIZATION (2). Manual and chemical restraint methods are covered with an emphasis on darting equipment, animal and human safety, drug pharmacology and species specific recommendations. CROSSLISTED as FW 328. Lec/lab. This course is repeatable for a maximum of 4 credits.
VMB 501. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

VMB 503. THESIS (1-12). This course is repeatable for a maximum of 999 credits.
VMB 505. READING AND CONFERENCE (1-16). Graded $P / N$. This course is repeatable for a maximum of 16 credits.

VMB 507. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
VMB 517. VETERINARY PHYSIOLOGY (5). Physiology of body fluids, muscles, membranes, intermediary metabolism, cardiovascular system, and metabolism. PREREQS: One year of inorganic chemistry, including a lab; one upperdivision course in biochemistry; one term physics; one-year sequence in general biological sciences or equivalent; instructor approval required.
VMB 518. VETERINARY PHYSIOLOGY (5). Physiology of gastrointestinal, endocrine and reproductive systems. PREREQS: VMB 517 [C] and instructor approval required.
VMB 519. VETERINARY PHYSIOLOGY (4). Physiology of respiratory and renal systems and acid-base balance. PREREQS: VMB 518 [C] and instructor approval required.
VMB 521. ANIMAL MODELS (3). Selection/ use criteria for models describing animal or human diseases or processes with emphasis on experimental design, validation, transgenic technology, population dynamics, husbandry, and ethics. PREREQS: Graduate standing or advanced undergraduate in science or engineering, with permission of the instructor.
VMB 523. ZOONOSES (3). Interactive examination of the molecular basis of diseases that are transmissible between animals and humans. Emphasis on bacterial, viral and parasitic pathogens of animals and humans. PREREQS: Graduate standing or advanced undergraduate in science or engineering, with permission of instructor.

## VMB 524. BIOANALYTICAL CHEMISTRY (3).

Analytical methods employed in the study of biologically important molecules. Separations (chromatography, electrophoresis), spectroscopy, mass spectrometry, biosensors, and immunoassays. Lec/lab. Not offered every year. CROSSLISTED as CH 524. PREREQS: One year of organic chemistry and one term of organic chemistry laboratory.
VMB 601. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
VMB 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
VMB 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
VMB 606. PROJECTS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

VMB 607. SEMINAR (1-16). One-credit section; VMB 607 Sect. 1. Graded P/N. This course is repeatable for a maximum of 16 credits.

VMB 611. VETERINARY GROSS ANATOMY (4). Systematic and topographic study and dissection of the dog, cat, horse, ruminant, pig, and chicken. PREREQS: One year of inorganic chemistry, including a lab; one upper-division course in biochemistry; one term of physics; one year sequence in general biological sciences or equivalent. Instructor approval required. VMB 611, VMB 612, VMB 613 must be taken in sequence.
VMB 612. VETERINARY GROSS ANATOMY (4). Systematic and topographic study and dissection of the dog, cat, horse, ruminant, pig, and chicken. PREREQS: VMB 611; one year of inorganic chemistry, including a lab; one upper-division course in biochemistry; one term in physics; oneyear sequence in general biological sciences or equivalent; instructor approval required.
VMB 613. VETERINARY GROSS ANATOMY (4). Systematic and topographic study and dissection of the dog, cat, horse, ruminant, pig, and chicken. PREREQS: VMB 612; one year of inorganic chemistry, including a lab; one upper-division course in biochemistry; one term of physics; oneyear sequence in general biological sciences or equivalent; instructor approval required.
VMB 614. VETERINARY MICROSCOPIC ANATOMY (4). Structure and development of cells, tissues, organs, and organ systems of animals. PREREQS: One year of inorganic chemistry, including a lab; one upper-division course in biochemistry; one term of physics; oneyear sequence in general biological sciences or equivalent; instructor approval required. VMB 614 and VMB 615 must be taken in sequence.
VMB 615. VETERINARY MICROSCOPIC ANATOMY (3). Structure and development of cells, tissues, organs, and organ systems of animals. PREREQS: VMB 614; one year of inorganic chemistry, including a lab; one upperdivision course in biochemistry; one term of physics; one-year sequence in general biological sciences or equivalent; instructor approval required.
VMB 620. VETERINARY IMMUNOLOGY (5). Clinical and diagnostic aspects of immunological mechanisms, serological reactions;
hypersensitivity, allergy, and disorders of the immune system. PREREQS: One upper-division course in biochemistry; one year of physics; oneyear sequence in general biological sciences or equivalent; instructor approval required.
VMB 621. GENERAL PATHOLOGY (4). General principles of pathology, cell injury and death, inflammation and tissue repair, abnormalities of cell growth, and structures and mechanisms of disease. PREREQS: One year of inorganic chemistry, including a lab; one upper-division course in biochemistry; one term of physics; oneyear sequence in general biological sciences or equivalent; must be taken in sequence. Instructor approval required.

VMB 622. PATHOLOGY LABORATORY (1). Laboratory instruction to complement VMB 621. PREREQS: VMB 611* [C] and one course in histology and instructor approval required.
VMB 627. ORNAMENTAL FISH MEDICINE (2). An introduction to the basic principles of ornamental fish medicine including basic husbandry, handling and clinical procedures. This is a 1 -week intensive course held at the Hatfield Marine Science Center in Newport, Oregon. Graded P/N. PREREQS: Graduate standing and instructor's permission.
VMB 630. MECHANISMS OF DISEASE (3). Cellular and molecular events that contribute to the pathogenesis of disease in animals, including humans. Host interactions with infectious agents and the environment. PREREQS: Graduate status in a biomedical discipline. Prior courses in biochemistry, immunology, microbiology, and
physiology are recommended. Instructor approval required.
VMB 631. MATHEMATICAL MODELING OF BIOLOGICAL SYSTEMS (3). The use of mathematical modeling in biological sciences is studied. A variety of modeling techniques are covered including implementing the methods computationally. PREREQS: Graduate standing or permission of instructor.

VMB 640. SEMINARS IN LABORATORY
ANIMAL MEDICINE (2). Prepares students for careers in laboratory animal medicine. Provides a review of medical conditions, diagnosis and treatment of research animals. PREREQS: DVM degree or equivalent or permission of instructor.
VMB 641. SEMINARS IN LABORATORY ANIMAL MEDICINE (2). Prepares students for careers in laboratory animal medicine. Provides a review of medical conditions, diagnosis and treatment for research animals. PREREQS: DVM or equivalent required or permission of instructor.
VMB 642. SEMINARS IN LABORATORY ANIMAL MEDICINE (2). Prepares students for careers in laboratory animal medicine. Provides a review of medical conditions, diagnosis and treatment for research animals. PREREQS: DVM or equivalent required or permission of instructor.
VMB 651. SELECTED TOPICS IN VETERINARY MEDICINE (3). Topics vary; check Schedule of Classes for particular topics. PREREQS: Graduate standing and instructor approval required.
VMB 653. VETERINARY VIROLOGY (4). Virology for the professional and graduate student. PREREQS: Graduate standing or advanced undergraduate in science or engineering, with permission of instructor.
VMB 659. VETERINARY BACTERIOLOGY AND MYCOLOGY (5). Veterinary bacteriology and mycology for the veterinary graduate student. PREREQS: Graduate standing or advanced undergraduate in science or engineering, with permission of instructor.
VMB 660. VETERINARY PARASITOLOGY (5).
A study of the parasitic diseases of domestic animals with an emphasis on diagnosis and treatment. Fundamentals in host-parasite interactions, taxonomy and life cycle strategies are covered. PREREQS: Graduate standing or advanced undergraduate in science or engineering, with permission of instructor.
VMB 663. VETERINARY DIAGNOSTIC
PATHOLOGY (6). Practical hands-on course training students in the diagnostic pathology utilizing case material received at the OSU Veterinary Diagnostic Lab. Graded P/N. PREREQS: DVM degree or equivalent required.
VMB 664. COMPARATIVE MICROSCOPIC
PATHOLOGY (1). Case-based discussion course to train participants in the recognition, description, and pathogenesis of a wide variety of disease processes with an emphasis on microscopic features. Graded P/N. This course is repeatable for a maximum of 4 credits. PREREQS: DVM degree or equivalent.

VMB 665. READINGS IN VETERINARY
PATHOLOGY (1). Group discussions of assigned readings central to understanding of veterinary pathology, including recent advances. Graded $P / N$. This course is repeatable for a maximum of 6 credits. PREREQS: DVM degree or equivalent.

## VMB 666. VETERINARY MEDICINE AND

PUBLIC HEALTH (3). Covers aspects of
veterinary medicine that affect human health. An understanding of the contribution of the veterinary profession to human (public) health will enable students to play an effective role in this area, regardless of career direction. PREREQS: Instructor permission or admission to MPH degree program.
VMB 667. VETERINARY EPIDEMIOLOGY (3). A course for veterinary students describing the
factors determining the frequency and distribution of diseases, in a defined population of animals for the purpose of establishing programs to prevent and control their development and spread in this population. PREREQS: Graduate standing and instructor approval required.
VMB 669. INTRODUCTION TO GRANT
PROPOSAL WRITING (1). To introduce students to the fundamentals of writing grant proposals to the National Institute of Health (NIH), different funding mechanisms, as well as the grant reviewing process. CROSSLISTED as PHAR 669. PREREQS: Status as a student in a graduate or professional program.
VMB 670. INTRODUCTION TO SYSTEMS BIOLOGY (2). Students will gain a high-level overview of systems biology and bioinformatics, with an emphasis on biomedical applications, integration of "-omics" approaches, and biological networks.

VMB 671. MOLECULAR TOOLS (3). Intended for personnel with some scientific background who are seeking basic- and advanced-level molecular biology knowledge and who wish to become involved with molecular biology-related and biotechnological research. CROSSLISTED as MCB 671. PREREQS: Graduate standing or advanced undergraduate in science or engineering, with permission of instructor.

## VMB 672. MOLECULAR APPROACH TO

CANCER (1). Overview of cancer pathogenesis and current molecular techniques to diagnose and treat various neoplasms is provided. Content will include both veterinary and human data and concepts. Discussion/Lab. Graded P/N.

VMB 673. COMPARATIVE IMMUNOLOGY (3). Examines immune system function in animals other than mice and men with a focus on adapting cutting-edge technologies. PREREQS: Baccalaureate degree or instructor permission

VMB 674. VACCINES AND NEW THERAPIES (3).
Provides students with a cohesive understanding of the basic research behind the discovery of new therapeutic targets and scientific advancements used in development of vaccines and new therapies. PREREQS: Baccalaureate degree or permission of instructor.

VMB 699. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 99 credits. PREREQS: Graduate standing.

VMB 701. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
VMB 705. READING AND CONFERENCE (1-16).
This course is repeatable for a maximum of 16 credits.
VMB 706. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.
VMB 709. VETERINARY MEDICINE
ORIENTATION (1). An overview of veterinary medicine with emphasis on historical development, current veterinary medical issues, employment opportunities, and professionalism. Graded P/N. PREREQS: First-year standing in veterinary medicine.
VMB 711. VETERINARY GROSS ANATOMY (4). Systematic and topographic study and dissection of the dog, cat, horse, ruminant, pig, and chicken. PREREQS: First-year standing in veterinary medicine. VMB 711, VMB 712, VMB 713 must be taken in sequence.
VMB 712. VETERINARY GROSS ANATOMY (4). Systematic and topographic study and dissection of the dog, cat, horse, ruminant, pig, and chicken. PREREQS: VMB 711 and first-year standing in veterinary medicine. VMB 711, VMB 712, VMB 713 must be taken in sequence.
VMB 713. VETERINARY GROSS ANATOMY (4). Systematic and topographic study and dissection of the dog, cat, horse, ruminant, pig, and chicken. Lec/lab. PREREQS: VMB 712 and first-year
standing in veterinary medicine. VMB 711, VMB 712, VMB 713 must be taken in sequence.
VMB 714. VETERINARY MICROSCOPIC ANATOMY (4). Structure and development of cells, tissues, organs, and organ systems of animals. PREREQS: First-year standing in veterinary medicine.
VMB 715. VETERINARY MICROSCOPIC
ANATOMY (3). Structure and development of cells, tissues, organs, and organ systems of animals. PREREQS: VMB 714 and first-year standing in veterinary medicine.
VMB 716. VETERINARY NEUROSCIENCES (4). Structural and functional relationships of the nervous system and organs of special sense with emphasis on general clinical application. PREREQS: First-year standing in veterinary medicine.

VMB 717. VETERINARY PHYSIOLOGY (5), Physiology of body fluids, excretion, respiration, acid-base balance, blood, muscle, bone, cardiovascular system, digestion, metabolism, endocrine system, reproduction, and lactation. PREREQS: First-year standing in veterinary medicine. VMB 717, VMB 718, VMB 719 must be taken in sequence.
VMB 718. VETERINARY PHYSIOLOGY (5). Physiology of body fluids, excretion, respiration, acid-base balance, blood, muscle, bone, cardiovascular system, digestion, metabolism, endocrine system, reproduction, and lactation. PREREQS: VMB 717 and first-year standing in veterinary medicine.
VMB 719. VETERINARY PHYSIOLOGY (4). Physiology of body fluids, excretion, respiration, acid-base balance, blood, muscle, bone, cardiovascular system, digestion, metabolism, endocrine system, reproduction, and lactation. Lec/lab. PREREQS: VMB 718 and first-year standing in veterinary medicine.
VMB 720. VETERINARY IMMUNOLOGY (5). Clinical and diagnostic aspects of immunological mechanisms, serological reactions,
hypersensitivity, allergy, and disorders of the immune system. Lec/lab. PREREQS: First-year standing in veterinary medicine.
VMB 721. VETERINARY PATHOLOGY (5). Basic mechanisms and concepts relating to reaction of cells and tissues to disease, with emphasis on cellular and tissue degeneration, inflammatory reaction, circulatory disturbance and neoplasia. Lec/lab. PREREQS: First-year standing in veterinary medicine.
VMB 726. PET BIRD AND SMALL MAMMAL MEDICINE AND SURGERY (2). Medicine and surgery of pet birds and small animals. Graded P/N. PREREQS: Third-year standing in veterinary medicine.

VMB 727. ORNAMENTAL FISH MEDICINE (2).
An introduction to the basic principles of ornamental fish medicine including basic husbandry, handling and clinical procedures. Graded P/N. PREREQS: Fourth-year standing in veterinary medicine.

VMB 728. SPECIAL ANIMAL MEDICINE (4).
Diagnosis, treatment, and management of special animals, including the common laboratory animals. This course is repeatable for a maximum of 8 credits. PREREQS: Third-year standing in veterinary medicine.
VMB 729. LAB ANIMAL/PRIMATE MEDICINE AND SURGERY (3-12). Designed to provide hands-on experience with a variety of laboratory animal species including primates, rodents, ungulates, fish, and reptiles. May be repeated up to 4 times for 3, 6, 9 or 12 credits per term. 12 credits maximum apply toward graduation. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 12 credits. PREREQS: Completion of first year of veterinary medicine.

VMB 736. DIAGNOSTIC CLINICAL PATHOLOGY
(2). One week clinical experience in clinical pathology, cytology, urinalysis, clinical chemistry interpretation and hematology. Lec/lab.

## VMB 740. VETERINARY INTEGRATED

## PROBLEM SOLVING (1). The first of three

1 -credit courses in problem solving and integration of clinical cases and basic sciences in the veterinary curriculum. PREREQS: First-year professional standing.

## VMB 741. VETERINARY INTEGRATED

PROBLEM SOLVING (1). The second of three
1 -credit courses in problem solving and integration of clinical cases and basic sciences in the veterinary curriculum. PREREQS: First-year professional standing.

## VMB 742. VETERINARY INTEGRATED

PROBLEM SOLVING (1). The third of three
1 -credit courses in problem solving and integration of clinical cases and basic sciences in the veterinary curriculum. Graded P/N. PREREQS: First-year professional standing.

VMB 743. VETERINARY INTEGRATED
PROBLEM SOLVING (1). A course in problem solving and integration of clinical cases and basic sciences in the veterinary curriculum. Students learn through interaction with their peers and with independent study outside of class. Graded P/N. This course is repeatable for a maximum of 4 credits.

## VMB 744. VETERINARY INTEGRATED

PROBLEM SOLVING (1). A course in problem solving and integration of clinical cases and basic sciences in the veterinary curriculum. Students learn through interaction with their peers and with independent study outside of class. Graded P/N. PREREQS: Second-year professional standing.

## VMB 745. COMMUNICATIONS FOR

VETERINARIANS (1). Communications and problem solving for the third-year veterinary student. Graded P/N. PREREQS: Third-year standing in veterinary medicine.

VMB 749. WILDLIFE SAFARI (2). Clinical training in the care of exotic and zoo animal species. Graded P/N. PREREQS: Fourth-year standing in veterinary medicine.
VMB 750. SYSTEMIC PATHOLOGY I (4).
Examines the principles of system and organ responses to injury and the consequent effects of these changes on the host. PREREQS: Secondyear professional standing.

VMB 751. SYSTEMIC PATHOLOGY II (5). Examines the principles of system and organ responses to injury and the consequent effects of these changes on the host. PREREQS: Secondyear professional standing.
VMB 753. VETERINARY VIROLOGY (4). Virology for the professional DVM student. PREREQS: Second-year professional standing.

VMB 756. ADVANCED CLINICAL PATHOLOGY (1). One-week rotation in advanced clinical pathology: cytology, hematology and clinical chemistry interpretation. Graded P/N. PREREQS: VMB 736 [C] and Fourth-year standing in veterinary medicine.
VMB 759. VETERINARY BACTERIOLOGY AND MYCOLOGY (5). Bacteriology and mycology for the professional DVM student. PREREQS: Second-year professional standing.
VMB 760. VETERINARY PARASITOLOGY (5). A study of the parasitic diseases of domestic animals with an emphasis on diagnosis and treatment. Fundamentals in host-parasite interactions, taxonomy and life cycle strategies are covered. PREREQS: Second-year professional standing.
VMB 761. VETERINARY PHARMACOLOGY (2).
Fundamentals of pharmacology as related to veterinary medicine presented in a systemsoriented approach with drug therapy in domestic
animals. PREREQS: Second-year professiona standing.
VMB 762. VETERINARY PHARMACOLOGY II
(4). Fundamentals of pharmacology as related to veterinary medicine presented in a systemsoriented approach with drug therapy in domestic animals. PREREQS: Second-year professional standing.
VMB 763. VETERINARY CLINICAL PATHOLOGY
(4). Clinical pathology for the professional DVM student. PREREQS: Second-year professional standing.
VMB 765. VETERINARY TOXICOLOGY (4). A study of toxic agents, mechanisms of action, toxicosis and treatments, especially as related to domestic and wild animals, with principles of toxicity testing, clinical diagnosis, and identification of poisonous plants. Lec/lab. PREREQS: Secondyear professional standing.

## VMB 766. EPIDEMIOLOGY AND PUBLIC

 HEALTH (3). Examination of the application of epidemiology to the field of veterinary medicine and the study of important veterinary public health issues. PREREQS: Second-year professional standing.VMB 767. VETERINARY EPIDEMIOLOGY (3). Examines factors determining the frequency and distribution of diseases in a defined population of animals for the purpose of establishing programs to prevent and control their development and spread in this population.

## VMB 768. BASIC HISTOPATHOLOGY (1).

 A rotation in histopathology at the Veterinary Diagnostic Laboratory. Emphasis is placed on case evaluation, diagnosis and report writing of biopsies of all species. Graded P/N. PREREQS: VMB 751 [C] and third-year standing in veterinary medicine.VMB 769. ANIMAL GENOMICS (1). Discussion about the dog and cow genomes, susceptibility to diseases, and the possibilities and techniques for treatment of medical conditions by gene transfer and modification. PREREQS: Mandatory graduate standing in science or third- or fourth-year student in the College of Veterinary Medicine.
VMB 772. INTERNATIONAL VETERINARY MEDICINE (2). Veterinary students work with veterinarians and domestic animals in international settings. Graded P/N. This course is repeatable for a maximum of 4 credits.
VMB 774. LABORATORY ANIMAL MEDICINE
(6). Clinical experience related to diagnosis, treatment, and management of laboratory animals. Graded P/N. PREREQS: Fourth-year professional standing.
VMB 775. PRACTICE MANAGEMENT (2).
Examines the world of work and career development theories using career assessment, literature, media and computer resources. Graded P/N. PREREQS: Third-year professional standing.
VMB 786. ADVANCED HISTOPATHOLOGY (2). A rotation in histopathology at the Veterinary Diagnostic Laboratory. Emphasis is placed on case evaluation, diagnosis and report writing of biopsies of all species. PREREQS: Fourth-year standing in veterinary medicine, VMB 751 is mandatory.
VMB 795. DIAGNOSTIC SERVICES (2). Students will perform service duty in the necropsy area of the Veterinary Diagnostic Laboratory and will perform necropsies on delivered specimens. Other activities.

## CLINCAL SCIENCES

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## FACULTY

Professors Cebra, Riebold, Semevolos Associate Professors Baltzer, deMorais, Estill, Huber, Mandsager, McKenzie, Parker, Ruaux, StiegerVanegas, Warnock, Zellmer
Assistant Professors Bracha, Cooley, Curran, Gordon, Klopfenstein, LeBlanc, Mecham, Milovancev, Montilla, Nemanic, Palmer, Schlipf, Scollan, Townsend, Vanegas
Instructor Miller
Emeriti Crisman, Pearson, Sisson, Watrous
Adjunct Campbell
Courtesy Brown, Otteman

## - VETERINARY MEDICINE CLINICAL COURSES

VMC 501. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
VMC 503. THESIS (1-12). This course is repeatable for a maximum of 999 credits.
VMC 505. READING AND CONFERENCE (1-16).
Graded P/N. This course is repeatable for a maximum of 16 credits.

VMC 507. SEMINAR (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

VMC 601. RESEARCH (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.

VMC 603. THESIS (1-16). This course is repeatable for a maximum of 999 credits.
VMC 605. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
VMC 606. PROJECTS (1-16). Graded P/N. This course is repeatable for a maximum of 16 credits.
VMC 607. SEMINAR (1-16). One-credit section; VMC 607 Sect. 1. Graded P/N. This course is repeatable for a maximum of 16 credits.
VMC 632. POSTGRADUATE MEDICINE (3-7).
An interactive, practical course on the role of scholarship in clinical medicine, including techniques to develop and conduct research in a clinical setting. This course is repeatable for a maximum of 16 credits. PREREQS: Enrollment in a clinical residency and DVM degree or equivalent and graduate standing.

VMC 634. POSTGRADUATE SURGERY (3-7).
An interactive, practical course on the role of scholarship in clinical surgery, including techniques to develop and conduct research in a clinical setting. This course is repeatable for a maximum of 16 credits. PREREQS: Enrolled in CVM residency program and graduate standing.
VMC 637. POSTGRADUATE CARDIOLOGY (3-7). An interactive, practical course on the role of scholarship in clinical cardiology, including techniques to develop and conduct research in a clinical setting. This course is repeatable for a maximum of 16 credits. PREREQS: Enrollment in
a clinical residency and DVM degree or equivalent and graduate standing.
VMC 651. SELECTED TOPICS IN VETERINARY MEDICINE (3). Topics vary; check Schedule of Classes for particular topics. PREREQS: Graduate standing and instructor approval required.
VMC 680. VETERINARY MEDICAL
PRECEPTORSHIP (1-16). Clinical experience in veterinary medicine for students in the combined DVM-MPH program. Graded P/N. This course is repeatable for a maximum of 16 credits.

VMC 682. TOPICS IN INTERNAL MEDICINE
(2-4). In-depth investigation of important topics in physiology, pathophysiology, treatment, diagnosis, and other aspects of internal medicine through investigation of primary literature and recent reviews. This course is repeatable for a maximum of 16 credits. PREREQS: Enrollment in a clinical residency and DVM degree or equivalent.
VMC 684. TOPICS IN SURGERY (2-4). In-depth investigation of important topics in physiology, pathophysiology, treatment, diagnosis, and other aspects of surgery through investigation of primary literature and recent reviews. This course is repeatable for a maximum of 16 credits. PREREQS: Enrollment in a clinical residency and DVM degree or equivalent.
VMC 701. RESEARCH (1-16). This course is repeatable for a maximum of 16 credits.
VMC 705. READING AND CONFERENCE (1-16). This course is repeatable for a maximum of 16 credits.
VMC 706. PROJECTS (1-16). This course is repeatable for a maximum of 16 credits.

VMC 711. CLINICAL CARDIOLOGY (1-4). A oneweek clinical elective rotation in cardiology at the Veterinary Teaching Hospital. May be repeated up to 4 times, two weeks or more is encouraged. This course is repeatable for a maximum of 4 credits. PREREQS: Fourth-year standing in veterinary medicine required.

VMC 712. CLINICAL ONCOLOGY (1-4). A
one-week clinical elective rotation in clinical oncology at the Veterinary Teaching Hospital. May be repeated up to 4 times, two weeks or more is encouraged. This course is repeatable for a maximum of 4 credits. PREREQS: VMC 778 [C] and fourth-year standing in veterinary medicine.

## VMC 714. SMALL ANIMAL DENTISTRY (1).

 A clinical course designed to provide students with hands-on training in diagnosis, treatment and prophylaxis of dental diseases of dogs and cats. PREREQS: Fourth-year standing in the professional veterinary curriculum.VMC 715. CASE STUDIES IN SMALL ANIMAL MEDICINE I (1). A case-based course involving diseases and conditions of the endocrine, gastrointestinal and hepatobiliary systems as well as neoplastic and infectious diseases of small animals. PREREQS: Third-year professional standing in veterinary medicine.

VMC 716. CASE STUDIES IN SMALL ANIMAL MEDICINE II (1). A case-based course involving diseases and conditions of the cardiovascular, respiratory and urogenital systems as well as emergent diseases and conditions. PREREQS: Third-year professional standing in veterinary school.

VMC 717. CASE STUDIES IN SMALL ANIMAL MEDICINE III (1). A case-based course involving diseases and conditions of the dermatologic, neurologic, ophthalmalogic, and hemolymphatic systems. PREREQS: Third-year professional standing in veterinary school.
VMC 718. SMALL ANIMAL PREVENTIVE
MEDICINE (2). Introductory course to basic concepts in small animal preventive medicine including vaccine immunology, vaccine strategies, internal/external parasite control, nutrition in disease prevention, and wellness programs for
dogs and cats. PREREQS: Third-year standing in veterinary school.

VMC 720. VETERINARY CLINICAL NUTRITION
(2). To examine the nutritional needs of many species of veterinary importance. Emphasis is placed on designing feeding programs to optimize health and animal performance. PREREQS: First-year standing in the professional veterinary curriculum.

VMC 721. SMALL ANIMAL CLINICAL
NUTRITION (1). Introduction to the concepts of small animal clinical nutrition and is designed for the third-year veterinary student. PREREQS: Third-year standing in veterinary medicine recommended.

VMC 723. ADVANCED FELINE MEDICINE (2).
A one-week elective for senior students in the DVM curriculum. The course emphasizes aspects of internal medicine specific to the domestic cat. Graded P/N.
VMC 724. LARGE ANIMAL SURGERY (6).
Selected surgical techniques and procedures related to equine and food animal species. PREREQS: Third-year standing in veterinary medicine.

VMC 725. PRINCIPLES OF SURGERY (4). A basic course in the principles and techniques of surgery for the professional veterinary student. Lec/lab. PREREQS: Second-year standing in veterinary medicine.

VMC 726. SMALL ANIMAL THERIOGENOLOGY (1). Advanced clinical experience in small animal (canine) reproduction. Graded P/N. PREREQS: VMC 783 [C]
VMC 727. ADVANCED SMALL ANIMAL
SURGERY (2). One-week of additional lectures and laboratories to improve surgical skills and acquire more advanced knowledge of specific surgical conditions. Lec/lab. Graded P/N. PREREQS: Fourth-year standing in veterinary medicine is mandatory.
VMC 729. CLINICAL THERIOGENOLOGY (1). Practical and theoretical training in reproductive management and disorders in all species; routine diagnostic and treatment procedures; clinic rounds. This course is repeatable for a maximum of 3 credits. PREREQS: 4th year standing in veterinary medicine.
VMC 731. SMALL ANIMAL EMERGENCY
CARE-DOVE LEWIS (3). A two-week clinical rotation at the Dove Lewis Memorial Emergency Clinic in Portland, OR. PREREQS: Fourth-year standing in veterinary medicine.

## VMC 732. CLINICAL LARGE ANIMAL

MEDICINE I (3 or 6). Clinical medicine training in diseases of food animals and horses; clinic rounds and diagnostic procedures. This course is repeatable for a maximum of 24 credits. PREREQS: Fourth-year standing in veterinary medicine.

VMC 734. CLINICAL LARGE ANIMAL SURGERY I (3 or 6). Clinical surgery, treatment, and care of food animals and horses; clinical rounds; training in surgery, lameness, and diagnostic procedures. Lec/lab. This course is repeatable for a maximum of 24 credits. PREREQS: Fourth-year standing in veterinary medicine.
VMC 735. RURAL VETERINARY PRACTICE I (3 or 6). Rural practice training in diseases of food animals and horses. Lec/lab. This course is repeatable for a maximum of 6 credits. PREREQS: Fourth-year standing in veterinary medicine.
VMC 737. VETERINARY ANESTHESIOLOGY (4). A three-week rotation in veterinary anesthesiology utilizing patients presented to the veterinary teaching hospital. PREREQS: Fourth-year standing in veterinary medicine.
VMC 738. INTRODUCTION TO ANIMAL CARE
(3). Feeding, housing, breeding and marketing systems related to animal care. This course is
epeatable for a maximum of 6 credits. PREREQS: First-year standing in veterinary medicine.

VMC 739. VETERINARY MEDICAL ETHICS (1). Introduction of ethics in veterinary medicine, with specific attention to ethical theories, ethical decision making, moral status of animals, professional ethics, and practice issues.
VMC 740. SHEEP AND GOAT MEDICINE AND SURGERY (3). Discussions of economically important sheep and goat diseases, practical surgeries, and a review of nutrition and husbandry Graded P/N. PREREQS: Fourth-year standing in veterinary medicine.
VMC 741. LARGE ANIMAL GI SURGERY (2). A one-week course for 4th year veterinary students, with particular interest in gastrointestinal surgery. Graded P/N. PREREQS: Fourth-year standing in veterinary medicine.

VMC 742. CAMELID MEDICINE AND SURGERY
(4). Designed to give students an in-depth introduction to camelid health care via handson work, lectures, and discussion sections. Graded P/N. PREREQS: Fourth-year standing in veterinary medicine.

## VMC 743. ADVANCED EQUINE

REPRODUCTION (3). A two-week course
in advanced clinical experience in equine reproduction. Graded P/N. PREREQS: Third-year standing in veterinary medicine recommended.

## VMC 744. ADVANCED LAMENESS IN

 EQUINE (3). Application of anatomy, lameness examination, nerve and joint anesthesia diagnostic radiology, ultrasound and nuclear scintigraphy to diagnosis of lameness in horses. Graded P/N. PREREQS: Fourth-year standing in veterinary medicine.VMC 747. VETERINARY ANESTHESIOLOGY II (3). An additional two-week clinical rotation in veterinary anesthesiology utilizing patients presented to the Veterinary Teaching Hospital. Graded P/N. PREREQS: Fourth-year standing in veterinary medicine.
VMC 748. EQUINE DENTISTRY (2). Utilizing modern, motorized equipment, cadaver specimens, and live hospital and client horses, students will learn and perform modern methods of equine dental prophylaxis and treatment. Graded P/N. PREREQS: Third-year standing in veterinary medicine.
VMC 749. CLINICAL IMAGING II (3). Advanced clinical course for 4th-year veterinary students in which they will assume additional responsibility for performing common radiographic procedures. Graded P/N. PREREQS: VMC 796 [C] and fourthyear standing in veterinary medicine.
VMC 750. EQUINE CLINICAL NUTRITION (1). A one-week course for veterinary students focusing on equine nutrition that can be used in veterinary practice. Graded P/N. PREREQS: Third-year standing in veterinary medicine.

VMC 751. RUMINANT NUTRITION (2). An advanced course in clinical ruminant nutrition dealing with nutritional problems of ruminants that might be encountered by a practicing veterinarian. Graded P/N. PREREQS: Third-year standing in veterinary medicine and basic nutrition recommended.

## VMC 752. CLINICAL LARGE ANIMAL

MEDICINE II (3-6). Additional clinical medicine training. Graded P/N. This course is repeatable for a maximum of 6 credits. PREREQS: VMC 732 [C]

## VMC 754. CLINICAL LARGE ANIMAL

SURGERY II (3 or 6). Additional clinical surgery training. Graded P/N. This course is repeatable for a maximum of 6 credits. PREREQS: VMC 734 [C]

VMC 755. RURAL VETERINARY PRACTICE II
(3-6). One additional rural practice training. Graded P/N. This course is repeatable for a maximum of 6 credits. PREREQS: VMC 735 [C]

VMC 757. SMALL ANIMAL SURGERY (6). Small animal medicine and surgical techniques and procedures. Graded P/N. PREREQS: Fourth-year professional standing.

## VMC 758. CATTLE PRODUCTION MEDICINE

(3). Clinical application of production medicine practices to dairy and beef cattle practice. Graded P/N. PREREQS: VMC 735 [C] and fourth-year professional standing or instructor approval required.
VMC 759. LARGE ANIMAL PALPATION (1). A laboratory for additional experience in rectal palpation of large animals, for third-year veterinary students. Graded P/N. PREREQS: Third-year standing in veterinary medicine recommended.

VMC 763. ADVANCED CLINICAL CARDIOLOGY (1). An elective course for junior veterinary students detailing diagnosis and management of the common congenital and acquired cardiac diseases of domestic animals. PREREQS: Thirdyear standing in veterinary medicine.
VMC 764. DIAGNOSTIC IMAGING (4). A lecture and laboratory course in diagnostic imaging covering physics or radiography and ultrasonography, radiation safety and image interpretation for small and large animals, presented by body systems. PREREQS: Secondyear professional standing.
VMC 765. ADVANCED CLINICAL RADIOLOGY (1). An elective advanced radiology case-based course for Year 3 veterinary medicine students that focuses on radiographic findings of commonly encountered clinical disease. PREREQS: VMC 764 or equivalent course.
VMC 768. PRINCIPLES OF ANESTHESIA (4). A basic course in the principles and techniques of surgery and anesthesia for the professional veterinary student. Lec/lab. PREREQS: Secondyear professional standing.
VMC 769. GENERAL MEDICINE (2). An introduction to medicine with a discussion of the principles of medicine that would be applicable to all species. Physical examination, clinical diagnosis, pathophysiology of signs of disease in domestic animals, therapeutic principles and diagnostic procedures. PREREQS: Second-year professional standing.
VMC 770. LARGE ANIMAL MEDICINE I (4). The first of three courses in large animal medicine for third-year professional veterinary students covering diagnosis and treatment of domestic large animals.
VMC 771. LARGE ANIMAL MEDICINE II (4). Diagnosis, treatment and control of diseases of large domestic animals, specifically gastrointestinal, hepatobiliary diseases, weight loss, and introduction to production medicine, and some swine diseases. PREREQS: VMC 770

VMC 772. LARGE ANIMAL MEDICINE III (4). Diagnosis, treatment and control of diseases of large domestic animals, specifically central nervous system, mastitis, musculoskeletal, sudden death, skin, and some swine diseases. PREREQS: VMC 770 and VMC 771

VMC 773. MEDICINE LABORATORY I (1). Laboratory experience for third-year veterinary students concurrent with the large and small animal medicine courses. PREREQS: Third-year standing in veterinary medicine.
VMC 774. MEDICINE LABORATORY II (1). Laboratory experience for third-year veterinary students concurrent with the large and small animal medicine courses. PREREQS: Third-year standing in veterinary medicine.
VMC 775. CLINICAL SMALL SPORTS MEDICINE AND REHABILITATION (3). Clinical training in small animal rehabilitation in the Veterinary Teaching Hospital. PREREQS: VMC 725 and VMC 785 and 4th-year professional veterinary standing.

VMC 776. SMALL ANIMAL MEDICINE I (5). A course for veterinary students describing major topics of small animal internal medicine, using both a systems-based approach and a problembased approach.
VMC 777. SMALL ANIMAL MEDICINE II (5). A course for veterinary students describing major topics of small animal internal medicine, using both a systems-based approach and a problembased approach. PREREQS: VMC 776
VMC 778. SMALL ANIMAL MEDICINE III (5). A course for veterinary students describing major topics of small animal internal medicine, using both a systems-based approach and a problembased approach. PREREQS: VMC 776 and VMC 777

VMC 779. EQUINE SPORTS MEDICINE (1).
One-week elective encompassing basic exercise physiology, sports-related injuries, injury rehabilitation, training and nutrition of equine athletes. Graded P/N. PREREQS: Fourth-year standing in the DVM program.

## VMC 780. VETERINARY MEDICAL

PRECEPTORSHIP (1-16). Theory of practice of veterinary medicine in a non-university situation. Graded P/N. This course is repeatable for a maximum of 16 credits. PREREQS: Fourth-year professional standing.
VMC 781. SEMINAR IN VETERINARY MEDICINE
(1-16). Seminars and case discussions on selected topics by students, staff, and others. Graded $\mathrm{P} / \mathrm{N}$. This course is repeatable for a maximum of 16 credits.
VMC 782. EMERGENCY CARE (1). One-week rotation in the Veterinary Teaching Hospital during non-regular hours. Practice and instruction in caring for critically ill patients. PREREQS: Fourthyear professional standing.
VMC 783. THERIOGENOLOGY I (4). To present the clinical applications of reproductive physiology, anatomy, embryology, pathology and microbiology in domesticated animals.
VMC 785. SMALL ANIMAL SURGERY (7).
A lecture and laboratory course covering the diagnosis, operative methods, and aftercare of common small animal surgical conditions.

VMC 786. ANIMAL BEHAVIOR (1). Diagnosis and treatment of feline, canine and equine problem behaviors including aggression, anxiety, house-soiling and compulsive behaviors.

## VMC 787. 3RD YEAR CLINICS (1). An

 introductory clinical experience for third-year veterinary students.VMC 788. BUSINESS APPLICATIONS IN PRIVATE SMALL ANIMAL PRACTICE (1). A hands-on elective course exploring the business of small animal general practice in a casebased approach. This course is repeatable for a maximum of 2 credits. PREREQS: 4th year standing in veterinary school.
VMC 789. PET PRACTICE (3). Additional clinical training in primary care pet practice at a Banfield Pet Hospital. Graded P/N. This course is repeatable for a maximum of 6 credits. PREREQS: Fourth-year standing in veterinary medicine.

VMC 790. CLINICAL EXPERIENCE (1-16). One-
to four-week periods. Section 1: Large Animal
Clinical Experience/Topics (1-16). Section 2: Small Animal Clinical Experience/Topics (1-16). Section 3: Mixed Animal Clinical Experience/Topics (1-16).
Section 4: Small Animal Private Practice (1-16).
Section 5: Special Studies (1-16). Some sections graded P/N. Lec/lab. This course is repeatable for a maximum of 48 credits. PREREQS: Fourth-year professional standing.
VMC 791. CLINICAL SMALL ANIMAL MEDICINE
(3 or 6). A clinical rotation in small animal internal medicine at the Veterinary Teaching Hospital. Emphasis will be placed on patient evaluation, diagnosis and treatment of diseases of dogs and cats. This course is repeatable for a maximum of 6 credits. PREREQS: Fourth-year standing in veterinary medicine.
VMC 792. CLINICAL SMALL ANIMAL MEDICINE
II (3-6). A two-week, three-credit clinical elective rotation in small animal internal medicine at the Veterinary Teaching Hospital. Emphasis will be placed on patient evaluation, diagnosis and treatment of diseases of dogs and cats. This course is repeatable for a maximum of 6 credits. PREREQS: VMC 791 is recommended.

VMC 793. CLINICAL SMALL ANIMAL SURGERY (3 or 6). Clinical training in small animal surgery in the Veterinary Teaching Hospital. This course is repeatable for a maximum of 6 credits. PREREQS: VMC 725 [C] and VMC 785 [C] and fourth-year standing in veterinary medicine.

VMC 794. OHS SMALL ANIMAL PRIMARY
CARE (4). Three-week rotation at OHS to gain experience with an emphasis on surgery, medical case workup, exam room protocol and behavior basics. PREREQS: Fourth-year standing in veterinary medicine.
VMC 796. CLINICAL IMAGING (3). A clinical course for 4th-year veterinary students in which they will assume primary responsibility for performing common radiographic procedures. PREREQS: Fourth-year standing in veterinary medicine.
VMC 797. SMALL ANIMAL CRITICAL CARE
AND HOSPITAL SERVICE ROTATION (1). A one-week clinical rotation in small animal critical care managing small animal cases in the intensive care unit at the Veterinary Teaching Hospital. PREREQS: Fourth-year standing in veterinary medicine.
VMC 798. CLINICAL SMALL ANIMAL
SURGERY II (3-6). Clinical training in small animal surgery in the College of Veterinary Medicine, Lois B. Acheson Veterinary Teaching Hospital. This course is repeatable for a maximum of 6 credits. PREREQS: VMC 725 and VMC 785 and VMC 793 recommended.
VMC 799. SPECIAL TOPICS (1-16). This course is repeatable for a maximum of 16 credits.

## THE RESEARCH OFFICE

Oregon's State University is one of only two land, sea, space and sun grant institutions in the U.S., holds top tier research designation from the Carnegie Foundation, and is the state's largest public research university. Oregon State research exceeded \$308 million dollars in fiscal year 2015, with private sector funding totaling approximately $\$ 40$ million.

The OSU Research Agenda, integrated with the university's strategic plan, guides faculty inquiry in OSU's three signature areas of distinction: Advancing the Science of Sustainable Earth Ecosystems; Improving Human Health and Wellness; and Promoting Economic Growth and Social Progress.

Headed by the vice president for research, the Research Office serves faculty involved in research, innovation, scholarship, and creativity in all OSU colleges and in a variety of multidisciplinary centers, institutes and programs. The office provides support to secure funding, comply with regulations, partner with industry, establish collaborations across the university and raise the profile of OSU.

## INCENTIVE PROGRAMS

Website: http://research.oregonstate.edu/ incentive/

The Research Office provides funding for faculty success. The General Research Fund is for projects not otherwise supported by organized or directed programs. Faculty Release Time provides funding for developing external grant proposals or furthering scholarly activities. Research Equipment Reserve Funds help acquire, repair, renovate, or improve equipment. The Undergraduate Research, Innovation, Scholarship and Creativity Fund enable students to initiate scholarly relationships with faculty early in their academic careers.

## OSU ADVANTAGE

Website: http://advantage.oregonstate.edu/ home
The Oregon State University Advantage connects business with faculty expertise, student talent and world-class facilities to research solutions, bring ideas to market and launch companies. The OSU Advantage helps faculty take their research and projects into the marketplace where they can have real-world impacts, and provides opportunities to new sources of funding to carry on important and impactful work. Three aligned organizations offer this opportunity: Advantage Accelerator, Advantage Partnerships, and Advantage Impact.

OFFICE OF RESEARCH INTEGRITY
Website: http://research.oregonstate.edu/ ori/

The Office of Research Integrity (ORI) works with OSU faculty, staff, and students
to help assure proper conduct of research in areas pertaining to the use of human subjects, and non-human vertebrate animals. The office also works with faculty and Academic Affairs to identify and appropriately manage issues that could be perceived to present financial conflicts of interest. The university's Small Boat and Diving Safety programs are overseen by the office, as are issues related to technology export controls. The ORI's purpose is to facilitate the research efforts of OSU faculty, staff and students by helping them to remain compliant with the many federal and state research regulations that assure the integrity of research, the safety of all, and the ethical treatment of human and animal subjects.

## OFFICE OF SPONSORED RESEARCH AND AWARD ADMINISTRATION

Website: http://research.oregonstate.edu/ osraa
The Office of Sponsored Research and Award Administration (OSRAA) has central responsibility for proposal submission for sponsored research, scholarship, instructional and other activities at Oregon State and contractual compliance as it relates to sponsored activities. OSRAA balances service to OSU faculty and staff, university administration, and the numerous organizations that sponsor Oregon State University activities. Functions include proposal review, monitoring institutional compliance with terms and conditions, official institutional signatory, policy and procedure development, training, compliance activities related to research administration, and general funding opportunity assistance.

## OFFICE FOR <br> COMMERCIALIZATION AND CORPORATE DEVELOPMENT (OCCD)

Website: http://advantage.oregonstate. edu/advantage-impact
The OCCD leads OSU's industrysponsored research efforts and the commercialization of OSU innovations by evaluating markets, developing an intellectual property protection strategy and executing research, confidentiality, materials transfer, licensing and other industry agreements. The OCCD is the bridge to commercial entities-from Oregon-based startups to large international companies, the OCCD facilitates OSU research to impact the world.

## OFFICE FOR RESEARCH

 DEVELOPMENT (ORD)Website: http://research.oregonstate.edu/ ord
The ORD provides leadership in strategic planning, implementation, coordination, and review of large research proposals

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across campus, and manages the University Limited Submission process. The primary responsibilities of the ORD are to identify and develop new external funding sources, increase funding support for the university, facilitate the development of research partnerships, research future grant opportunities, and provide education for faculty and administrators to encourage applications for grant funding.

## MULTIDISCIPLINARY <br> CENTERS AND INSTITUTES

Website: http://research.oregonstate.edu/ research-centers-and-institutes-osu Addressing many of the world's most pressing challenges requires collaborative efforts of scientists, engineers, social scientists, and humanists to attain longlasting, high impact results. OSU fosters these dynamic transdisciplinary collaborations through a variety of centers, institutes and programs. With particular strengths in material sciences, ocean and earth sciences, enterprise innovation and economic development, health sciences, and natural resources, OSU investigators, representing virtually every college on campus, team to conduct cutting-edge research, provide undergraduate and graduate education, and proactively engage communities throughout Oregon and the world in helping them address their greatest needs.

The following centers and institutes are administered by the OSU Research Office.

1. Center for Genome Research and Biocomputing
2. Center for Latin@ Studies and Engagement (CL@SE)
3. Center for Research on Lifelong STEM Learning
4. Center for the Humanities
5. Cooperative Institute for Marine Resources Studies (CIMRS)
6. Environmental Health Sciences Center
7. Hatfield Marine Science Center
8. Institute for Natural Resources (INR)
9. Institute for Water and Watersheds (IWW)
10. Laboratory Animal Resources Center (LARC)
11. Linus Pauling Institute
12. Native American Collaborative Institute (NACI)
13. Northwest National Marine Renewable Energy Center (NNMREC)
14. Oregon NASA Space Grant Consortium
15. Oregon Sea Grant
16. Radiation Center
17. Superfund Research Center

## OSU RESEARCH OFFICE CENTERS AND INSTITUTES

## CENTER FOR CENOME <br> RESEARCH AND <br> BIOCOMPUTING

## Brett Tyler, Director

Website: http://cgrb.oregonstate.edu/

## Mission Statement

The Center for Genome Research and Biocomputing facilitates the development, application and training in computationally intensive, genome-enabled research at OSU and across the state. Research in the CGRB and faculty affiliate laboratories seeks to improve health, better utilize natural and agricultural resources, understand our global environment, and develop new bio-based products and energy sources. The center offers leadership and services to faculty, staff and students through core laboratories, computational facilities, seminars and technology workshops, and conferences. It also provides a focal point for researchers to establish contacts, initiate collaborations, and apply new technologies in their own laboratories.

## Functions of the CGRB

Over 100 OSU faculty, all holding primary appointments in academic departments of the colleges of Agricultural Sciences; Engineering; Forestry; Pharmacy; Science; Veterinary Medicine; or Earth, Ocean, and Atmospheric Sciences; are affiliate members of the center. The center was established in 1983 as a university resource to develop cell and molecular biology research. Today, the CGRB facilitates development, application and training in computationally intensive, genome-enabled research at OSU and across the state. The CGRB functions and facilities include:

1. Staffed Core Laboratory facilities that provide a variety of services in genomics, functional genomics, imaging and genotyping;
2. Staffed biocomputing facilities with an extensive hardware infrastructure, which includes a managed cluster and shared resources;
3. Computational scientists and staff to facilitate implementation of a computationally intensive research program;
4. Seminar Series that features leading scientists in molecular and genomic biosciences, and frequent technology training workshops that feature cutting-edge technologies;
5. Annual Fall Conference that brings together faculty, staff and students from across OSU;
6. Coordination of the OSU Computational and Genome Biology Initiative.

## CGRB Core Laboratories

A key part of the center is the CGRB Core Laboratories that provide services, technical expertise, collaborative functions and share-use equipment for molecular bioscience research at OSU. The core labs are a fully staffed facility that serves as a focal point for acquisition and development of new instrumentation and technologies. A professional staff of five provides service in four areas:

- Genomics-DNA sequencing, high throughput sequencing (Illumina), genotyping and fragment analysis;
- Functional genomics-NimbleGen and Affymetrix GeneChip microarray services for analysis of global gene expression patterns in all types of organisms;
- Biocomputing and bioinformaticsadvanced computational resources for data mining, data analysis and database development;
- Imaging and image analysis-a confocal laser scanning microscope facility for high-resolution analysis of a wide variety of specimens. In addition, the center maintains a set of common-use instruments and computers for research and data presentation.
In addition, the CGRB provides shared instrumentation, including real-time PCR, scanners, robotics, and computational facilities for use by walk-in users.
- Seminars, conferences, training-Bi-weekly CGRB seminar, annual conference, Gene D. Knudson Lectures in Molecular Genetics, technology training (e.g., high-throughput sequencing, bioinformatics training, etc.). The center coordinates a seminar program in which faculty, staff and students can interact with outstanding scientists from other institutions and organizations. The center also sponsors a yearly conference for scientific exchange, building collaborations, strengthening ties across departmental and college boundaries, and social interaction.
- Consolidation and coordination of bioscience faculty-over 100 faculty members are affiliated with the CGRB. The CGRB provides a consolidating function to organize large equipment grant proposals and other activities that require participation by several faculty. In addition, the CGRB is perceived by the administration to represent the interests of these faculty, who are spread across eight colleges.
- Research-In the past, the CGRB has not had an in-house research program. This is changing as the focus of the center shifts away from simple service to more of a
collaborative, enabling technology entity. In particular, the CGRB has developed significant capacity for genomic and computational biology.
The CGRB director reports to the vice president for research. Scientific and administrative oversight and guidance are provided by a scientific advisory board, which has two external members, and an administrative advisory board.


## CENTER FOR LATINO/A <br> STUDIES AND ENGACEMENT (CL@Sヨ)

Ana Gómez-Diazgranados, Associate Director of Outreach and Engagement Ana.Gomez@oregonstate.edu
Daniel López-Cevallos, Associate Director of Research Daniel.Lopez-Cevallos@oregonstate.edu
Website: http://liberalarts.or-egonstate.edu/centers-and-initiatives/ center-latino-studies-and-engagement

## Mission Statement

The mission of the Center for Latino/a Studies and Engagement is to promote engaged research and outreach devoted to advancing knowledge and understanding of Latinx life chances and the issues shaping their lived experiences in our state, region and beyond.

## Overarching Goals

- To promote excellence in engaged research, teaching, and outreach in Latinx Studies.
- To establish an action-based agenda which will promote the economic, political, physical, and educational well-being and development of the Latinx community in rural and urban Oregon.
- To serve as a model for enhancing the university's capabilities in similarly targeted research and engagement efforts.
- To foster engaged research that is collaborative, trans-disciplinary, and community oriented; furthering both theoretical and applied knowledge to solve real-world problems.


## Established Areas of Expertise

- Youth and Community Empowerment
- Socio-Economic Well-Being
- Health and Wellness
- Education
- Cultural and Historical Awareness


## CENTER FOR RESEARCH ON LIFELONG STEM LEARNING

Martin Storksdieck, Director Storksdieck@oregonstate.edu
Julie Risien, Associate Director Julie.Risien@oregonstate.edu Website: http://stem.oregonstate.edu/
The Center for Research on Lifelong STEM Learning at Oregon State University works to improve understanding of how all people learn STEM throughout the lifespan and across formal and informal settings. The center works across campus to enhance OSU's capacity to conduct applied research on learning and education in STEM disciplines (Science, Technology, Engineering and Mathematics), and to provide OSU with the insights from past and current research on STEM learning. It serves a diverse and decentralized community of those who engage in STEM, or use learning research at OSU, by functioning as a central hub and institutional support structure. The center represents OSU STEM learning research at state, national and international levels.

## THE CENTER FOR THE HUMANTTIES

Christopher McKnight Nichols, Director

## Joy Jensen, Coordinator

Website: http://oregonstate.edu/dept/ humanities/
The Center for the Humanities, established in 1984 through a grant from the National Endowment for the Humanities, is primarily concerned with the advancement of interdisciplinary humanities research. The Humanities Center provides fellowships to visiting scholars and OSU faculty members engaged in research and writing projects in literature, history, philosophy, foreign languages, and related humanities fields. Its programs are supported by the OSU Office of Research and the Oregon State University Foundation. Fellowship applications are screened by an advisory board made up of former fellows and OSU faculty from the College of Liberal Arts. The Humanities Center also hosts or co-sponsors research conferences, seminars, films, lectures, and other public programs in the humanities. The Humanities Center's fundamental concern is the advancement of humanities research, teaching, and public presence at OSU. It is located in Autzen House, a gracious and historic building on the east edge of campus, 811 SW Jefferson Avenue. Contact: Center for the Humanities, 541-737-2450.

## COOPERATIVE INSTITUTE FOR MARINE RESOURCES STUDIES

Michael A. Banks, Director
Website: http://hmsc.oregonstate.edu/ cimrs/

The Cooperative Institute for Marine Resources Studies was established in 1982 to foster collaborative research between the National Oceanic and Atmospheric Administration (NOAA) and Oregon State University in fisheries, aquaculture, oceanography, and related fields. It also encourages education and training of scientists in disciplines related to marine resources.

Administered through the Vice President for Research, the institute is the academic home for a staff of 25 to 45 (total) research assistants, associate and full professors, research associates, and faculty research assistants and students. Headquartered at the Hatfield Marine Science Center in Newport, the institute hosts collaborative research with various NOAA investigators within OAR, NOS and NMFS, specifically, the Pacific Marine Environmental Laboratory, the Northwest Fisheries Science Center and the Alaska Fisheries Science Center, the West Coast Regional Office, as well as researchers from a broad range of colleges and departments within the entire OUS system.

Currently, the broad goal of the Cooperative Institute for Marine Resources Studies is to coordinate research focused on living and nonliving marine resources, under four primary themes:

1. Marine Ecosystems and Habitat
2. Protection and Restoration of Marine Resources
3. Seafloor Processes
4. Marine Bioacoustics

The institute works with projects that emphasize basic science and environmental impacts, including human dimensions. The geographic area of interest extends over the eastern Pacific Ocean from northern California to the Bering Sea. The institute promotes cooperative projects between government and the university. Its cooperative agreements with NOAA laboratories provide a mechanism for OSU faculty, staff and students to work with federal scientists on research that leads to improved understanding of global ocean processes and fisheries resource issues.

## ENVIRONMENTAL HEALTH SCIENCES CENTER

Joseph Beckman, Director
Website: http://ehsc.oregonstate.edu/
The Environmental Health Sciences Center was established in 1967 with funding by the National Institute of Environmental Health Sciences (NIEHS). As an organizational unit under the vice president for research, it provides resources for coordination and stimulation of interdisciplinary basic research and training related to the effects of environmental factors on human health.

Environmental quality problems and their resultant effects continue to challenge people's health and their ability to understand and manage the evolving impact of environmental agents. Solutions to environmental problems require the interdisciplinary scientific efforts of professionals in many fields, both to generate new knowledge and to develop a qualified cadre of scientists who can provide an improved basis for risk assessment.
The EHS Center currently brings together and uses a variety of professional capabilities of research and teaching faculty, staff, and students from numerous OSU departments, schools, and colleges within OSU. Academic areas include chemistry, biochemistry and biophysics, environmental and molecular toxicology, microbiology, molecular and cell biology, food science and technology, fisheries and wildlife, veterinary medicine, pharmacology, zoology, and statistics. The center's visiting scientists program complements research expertise in these areas.
The broad mission of the EHS Center encompasses coordinated ongoing research of its faculty and encourages research by the training and support of qualified graduate students, predoctoral candidates, and postdoctoral research associates. As one of 26 national research centers designated by NIEHS, the EHS Center at OSU enhances the collaborative scientific research of its investigators with specialized core facilities. The center serves as an interdisciplinary resource on human health as related to the environment; it periodically awards funding for pilot projects submitted by OSU faculty to encourage new approaches in environmental health research. Selected proposals receive funding for preliminary studies, many of which have led to agency funding as major projects. It sponsors conferences, symposia, seminars, and meetings for student training, faculty consultations, and public communication. The EHS Center, through the OSU Cooperative Extension Service and other existing mechanisms, has developed a Community Outreach and Education

Program to communicate and heighten public awareness about environmental issues and the related recognition of risk to human health.
Examples of specific research areas include toxicology of environmental chemicals, cellular and biochemical toxicology, immunotoxicology, naturally occurring toxins, carcinogenesis of environmental chemicals, genetic toxicology, mass spectrometric ionization processes and methodologies, heteronuclear NMR studies, the chemical basis for solid waste and chemical waste disposal, and statistical studies, e.g., temporal aspects of cancer risks.
Federal environmental health legislation, particularly the Toxic Substances Control Act, has created a greater need for qualified toxicologists. To help meet this need, many EHS Center investigators serve as faculty within the OSU MS/ PhD interdisciplinary graduate Toxicology Program, as well as being faculty for the ongoing predoctoral and postdoctoral training program supported by the NIEHS and administered by the center. The focus of the training and research in environmental toxicology emphasizes determination of the mode of action of environmental chemicals; the curricula encourage use of biochemical, pathological, and pharmacological approaches to acquire a mastery in aquatic, biochemical, comparative, environmental, food, as well as general toxicology.

The administrative office of the EHS Center is in the Agricultural and Life Sciences (ALS) building; the research and teaching facilities are in the cooperating departments on campus. The EHS Center office has information available upon request.

## HATFIELD MARINE SCIENCE CENTER

## Robert Cowen, Director

2030 SE Marine Science Drive, Newport, OR 97365
541-867-0212, Director's Office
Email: HMSCmainoffice@oregonstate.edu Website: http://hmsc.oregonstate.edu/
The Hatfield Marine Science Center has over 50 years of accomplishment in research, education, and outreach. Originally established as a marine laboratory for Oregon State University, it has grown to encompass a large group of partners on its 49 -acre site on Yaquina Bay in Newport, Oregon. Within OSU, HMSC includes researchers, students, and faculty from six colleges. It serves as home to several university programs, including the Coastal Oregon Marine Experiment Station, the Cooperative Institute for Marine Resources Studies, and the Marine Mammal Institute. It also includes important components of the Oregon

Sea Grant program and the Northwest National Marine Renewable Energy Center. Our onsite partners include six state and federal agencies involved in research and management of the marine environment, and our cooperation includes faculty appointments for agency staff, as well as opportunities for students to work with agency scientists. We work closely with local coastal communities, including the fishing industry. HMSC's Visitor Center, with 150,000 visitors and 40,000 $\mathrm{K}-12$ students each year, is a key asset for OSU in public education.
The dynamic nature of HMSC's programs is reflected in our mission statement:
The Hatfield Marine Science Center is Oregon State University's campus for research, education, and outreach in marine and coastal sciences. Through its partnerships, HMSC improves scientific understanding of marine systems, coastal processes and resources, and applies this knowledge to social, economic, and environmental issues.

HMSC is integral to OSU's Marine Studies Initiative, which brings OSU's diverse marine studies programs together for interdisciplinary collaboration in research and teaching. HMSC conducts diverse research and instruction in oceanic, coastal and estuarine habitats, and serves a unique laboratory facility serving resident scientists and students, and as a base for oceanographic research. With a combined budget in excess of $\$ 40 \mathrm{M}$, HMSC also plays an important economic role on the Oregon Coast.
Research facilities on the HMSC campus serve students and staff of OSU, partnering state and federal agencies, and visiting scientists from other institutions. Main buildings provide 200,000 square feet of office, library, classroom, wet and dry laboratory space and a Visitor Center. Ship support facilities and dock areas of the College of Earth, Ocean, and Atmospheric Sciences serve the $R / V$ Oceanus, R/V Elakha, R/V Pacific Storm and other research vessels. There are also housing and kitchen facilities for up to 82 students and visiting scientists on the HMSC campus.
The university encourages all marine science research, instruction, or extension activities to take advantage of the center's unique facilities.

## INSTITUTE FOR NATURAL RESOURCES

## Lisa Gaines, Interim Director

Main Office: 541-737-9918
Website: http://inr.oregonstate.edu/
Created by the Oregon Legislature with the Oregon Sustainability Act of 2001, the Institute for Natural Resources (INR) is a cooperative enterprise bringing the scientific knowledge and expertise of the Oregon University System and other Oregon higher education institutions to bear on natural resource management.
Designated as the lead university to administer INR, Oregon State University (OSU) established INR as a research institute within OSU to help decision-makers identify and use relevant science in making policy choices. At INR's foundation is the land grant mission - building bridges between theory and practice and effectively communicating knowledge to decision-makers. As such, INR seeks to:

- provide Oregonians with ready access to current, science-based information and methods for better understanding and making informed decisions about our natural resource management challenges;
- increase the utility of integrated, science-based information in the development and understanding of natural resource and environmental policy by bridging science and decision-making efforts;
- focus on interdisciplinary natural resource and environmental problems and develop new collaborative relationships to solve them;
- identify and investigate controversial natural resource issues that challenge resource management and/or governance; and,
- identify opportunities for applied policy-related research that benefits Oregon's natural resources and environment.
INR's success depends on a clear sense of our values and principles: ensuring integrity and objectivity, building partnerships, maintaining relevance, providing service, and creating excellence.

INR's focus areas, programs, and projects address Oregon natural resource issues in the local, regional, national, and international context.

## INSTHUTE FOR WATER AND WATERSHEDS

## Todd Jarvis, Director

Kathryn Motter, Laboratory Manager 541-737-9918
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Oregonians are beginning to witness the difficulties caused by water quantity and quality constraints and face critical choices about fresh water. Earlier melting of the Cascades snowpack is changing "free water storage," which has implications for snowmelt out of phase with existing water resource systems and ecosystems. Sustainable water supplies for development, ecosystem maintenance, and hydroelectric power generation may be adversely affected by increased population, climate change, and renegotiation of the Columbia River Treaty. Since water is "virtually" embedded in all Oregon products, whether natural or manufactured, the state's economic vitality is tied directly to water. Water quantity and quality issues in the Willamette and Klamath Basins are two of the state's top environmental priorities.
The aforementioned challenges are on an unprecedented scale and require solutions obtained by integrating several or more disciplines. The Institute for Water and Watersheds (IWW), Oregon's feder-ally-designated water resources research institute, has over 125 affiliated faculty and pursues solutions to Oregon's water problems by assembling research teams from a broad spectrum of disciplines. The institute utilizes educational and outreach models to communicate the latest water science and policy options to stakeholders so that they can make informed intelligent decisions. The IWW's Water Collaboratory, an open analytical chemistry laboratory, provides faculty, staff, and students with a variety of analytical capabilities.

## LABORATORY ANIMAL RESOURCES CENTER

Helen E. Diggs, MEd, DVM, DACLAM Director and Campus Attending Veterinarian
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Website: http://oregonstate.edu/dept/larc/
The Laboratory Animal Resources Center (LARC) supports and manages the care and veterinary oversight of vertebrate animals used in instruction, research, production, and testing on the Oregon State University campus and property throughout the state.

As the leading public research university in Oregon, the campus community is held to the highest standards of responsible animal care. The LARC is managed and operated in compliance with the U.S. Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals and the United States Department of Agriculture (USDA) Animal Welfare Act Regulations. The university is fully accredited by the Association for Assessment and Accreditation of Laboratory Animal Care (AAALAC International). All LARC policies and procedures adhere to the recommendations of the Guide for the Care and Use of Laboratory Animals (NRC 2011) and the Guide for the Care and Use of Agricultural Animals in Research and Teaching (FASS 2010).

The LARC staff is composed of veterinarians, animal technicians, and veterinary technicians all with specialty training and certifications specific to laboratory animal medicine. LARC employees are committed to providing an exemplary animal oversight program. This includes assuring humane care and use of animals through quality veterinary oversight, husbandry, social housing and environmental enrichment. The LARC staff facilitates campus research and instructional collaborations, through consultation, training, and provision of professional technical and clinical services, and by maintaining compliance with applicable federal and state regulations. The LARC upholds the university's academic mission and commitment to public service.

## LINUS PAULING INSTITUTE

## Balz Frei, Director

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Email: lpi@oregonstate.edu Website: http://lpi.oregonstate.edu/
The Linus Pauling Institute was cofounded in 1973 by Linus Pauling, the only individual to win two unshared Nobel Prizes (Chemistry, 1954; Peace, 1962). The institute moved to the campus of Oregon State University (Dr. Pauling's undergraduate alma mater) in 1996 and now operates as one of the university's research centers and institutes. The program is principally supported by gifts from individuals, private corporations, and foundations; grants from federal and private agencies; and Oregon State University.

Researchers at the Linus Pauling Institute investigate the role that vitamins and essential minerals (micronutrients) and chemicals from plants (phytochemicals) play in human aging, immune function, and chronic diseases, especially heart disease, cancer, and neurodegenerative diseases. A major emphasis is to un-
derstand the role of oxidative stress and inflammation in disease etiology, and the preventive effects of dietary constituents with antioxidant or anti-inflammatory properties.

The goal of these studies is to understand the mechanisms by which diet, micronutrients, and dietary supplements affect disease initiation and progression and can be used in the prevention or treatment of human diseases, thereby enhancing lifespan and healthspan.
LPI's research is organized into three major areas: Cardiometabolic Disease Prevention, the Healthy Aging Program, and the Cancer Prevention and Intervention Program. Specific research projects address:

- Dietary antioxidants, vascular inflammation, and heart disease
- Vitamin E in human health
- Metabolism of dietary and endogenous fats
- Vitamin C, lipid peroxidation, and oxidative stress
- Role of lipoic acid in vascular inflammation and atherosclerosis
- Aging, stress response, and mitochondrial decay
- Lou Gehrig's disease (ALS), peroxynitrite, and superoxide dismutase
- Vitamin D and immune function
- Aging and memory
- Rapamycin, protein homeostasis, and aging
- Cancer chemoprotection for the fetus and infant
- Zinc and antioxidants in cancer chemoprevention
- Dietary interventions for cancer prevention
- Role of drug-metabolizing enzymes in health and disease
- Vitamin E metabolism and mechanisms for chemoprotection and chemotherapy
The goals of these studies are to understand the mechanisms by which nutrition affects disease initiation and progression and how nutritional factors can be used in the prevention and treatment of diseases. Such an understanding will allow an increase in the human healths-pan-the period in which people enjoy a healthy and productive life, full of vitality, with minimal suffering, and free of cancer and other debilitating diseases.
LPI maintains three core laboratories that provide analytical services to intramural and extramural researchers:


## Cancer Prevention and Intervention Program Core Laboratory

The Cancer Prevention and Intervention Program (CPI) Core Laboratory provides genetic toxicology testing services. Its mission is to help investigators identify dietary compounds with chemoprotective properties and to elucidate their
inhibitory mechanism(s). Several techniques, including the Salmonella mutagenicity assay (Ames test), single-cell gel electrophoresis assay (Comet assay), and micronucleus assay, enable investigators to assess the mutagenic, DNA-damaging, and clastogenic effects of chemicals. Using known mutagens or clastogens as positive controls, we study the potential beneficial activities of dietary compounds or other chemicals against those DNA-damaging agents. We also recently implemented a Histone Deacetylase (HDAC) assay to identify dietary HDAC inhibitors, which are of interest in cancer chemoprotection.

## Oxidative/Nitrative Stress Core Laboratory

Oxidative and nitrative stress can be produced by inflammation, disease, or environmental exposure, including tobacco smoke. The resulting reactive oxygen and nitrogen species can react with lipids, proteins, and nucleic acids in the body to form molecules measurable by sensitive chemical analytical methods. These molecules can serve as "biomarkers" to reveal an individualss state of health or the effectiveness of dietary or pharmaceutical interventions. For example, F2-isoprostanes and their metabolites are considered good biomarkers of free radical-induced lipid peroxidation. The Oxidative/Nitrative Stress Core Laboratory (ONSL) has several high-performance liquid chromatographs (HPLCs) coupled to UV, fluorescence, electrochemical, and single- and triple-quadrupole mass spectrometer detectors. ONSL also has several solid-phase extraction robots for sample preparation. These facilities provide LPI investigators with state-of-the-art chemical analysis of biomarkers, antioxidants, and drug metabolites.

## Food Composition Laboratory

The Food Composition Laboratory provides chemical analyses of food composition and nutritional factors. We provide analyses of food, feed, or dietary supplement samples for vitamins, phytochemicals, and other compositional factors.
In addition to our research, we publish a free, semiannual research newsletter; maintain a website; provide peerreviewed information about nutritional factors on our online Micronutrient Information Center, http://lpi.oregonstate. edu/mic; organize and sponsor scientific meetings, including the biennial Diet and Optimum Health Conference; and respond to inquiries from the public and the media as our means of building on Dr. Pauling's legacy. The Healthy Youth Program (http://lpi.oregonstate.edu/ healthyyouth) is designed to provide education and activities on diet and exercise to school children and their teachers and families to promote optimum health.

## NOBTHWEST MATIONAL MARINE BENEWABLE ENERGY CENTER

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The Northwest National Marine Renewable Energy Center (NNMREC) is a U.S. Department of Energy-sponsored partnership between Oregon State University (OSU), the University of Washington (UW), and the University of Alaska Fairbanks (UAF). The three universities collaborate together with national laboratories on research, education, outreach, and engagement.

NNMREC's mission is to facilitate commercialization of marine energy technology, inform regulatory and policy decisions, and close key gaps in scientific understanding with a focus on student growth and development. We work closely with a variety of stakeholders, including device developers, community members, ocean users, federal and state regulators, and government officials, to conduct research about wave energy, provide test sites for prototype devices, and assist developers with planning and permitting activities.

## NNMREC's objectives are to:

- Develop facilities to serve as an integrated, standardized test center for U.S. and international developers of wave and tidal energy;
- Evaluate potential environmental, ecosystem, and human dimension impacts, focusing on the compatibility of marine energy technologies in areas with sensitive environments and existing users;
- Facilitate and conduct research to inform adaptive management of marine energy technologies;
- Study and consult on device and array optimization for effective deployment of wave and tidal energy technologies;
- Improve forecasting of the wave energy resource; and
- Increase reliability and survivability of marine energy systems.


## OREGON NASA SPACE <br> GRANT CONSORTIUM

Jack Higginbotham, Director
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The National Aeronautics and Space Administration (NASA) established Oregon Space Grant in 1991 as a part of the National Space Grant College and Fellowship Program. The objectives of the program are to establish a national network of universities with interest and capabilities in aeronautics, space, and related fields; encourage cooperative programs among universities, aerospace industry, and federal, state, and local governments; encourage interdisciplinary training, research, and public service programs related to aeronautics, space science, and technology; recruit and train professionals, especially women, underrepresented minorities, and persons with disabilities, for careers in aerospace-related science and engineering; and develop a strong science mathematics, and technology education base from elementary through university levels.

Oregon NASA Space Grant maintains a diverse array of programs to support space science and engineering education. Connecting educators with professional development opportunities, Oregon Space Grant aims to help develop a strong science, mathematics, and technology education base at all levels while fostering communication and continuity between the K-12 community and higher education. Through various research award programs available to students and faculty, Oregon Space Grant supports STEM education and development within the higher education community. Undergraduate scholarships are available for students at affiliate campuses statewide. Participation in a wide array of internship programs administered by the Oregon Space Grant offers undergraduate and graduate level students opportunities to develop research skills while conducting hands-on projects at NASA centers nationwide. Additionally, graduate fellowships attract excellent students to aerospace-related research programs at affiliate institutions across Oregon.

OREGON SEA GRANT
Shelby Walker, Director
Website: http://seagrant.oregonstate.edu/
Oregon Sea Grant's mission is to be a catalyst that promotes discovery, understanding and resilience for Oregon coastal communities and ecosystems.

Funding for Sea Grant comes from federal and state appropriations, as well as contributions from local governments and industry. The major support is a grant from the National Oceanic and Atmospheric Administration.

Program activities are conducted in four thematic areas; ecological, social and economic aspects of coastal development, adaptation to acute or chronic coastal hazards, human and natural dimensions of coastal and marine fisheries, and cultural beliefs, learning and valuation of coastal and marine issues.

Oregon Sea Grant's competitive research grants program addresses coastal and marine issues of high importance and of potential benefit to society. The program prioritizes socioeconomic and biophysical research that is predictive (rather than explanatory) and meaningful collaboration with industry, agencies, communities, and other stakeholders. In addition, Sea Grant partners with state natural resource agencies, not-for-profit organizations, field labs and others to support undergraduate and graduate students as Sea Grant Scholars and to provide scholars with hands-on experience with important marine and coastal problems.
The program is driven by an ethic of public service and uses various approaches to engage our constituents. Interactions with a wide range of coastal stakeholders are continuous. An advisory council of coastal community leaders provides external review and counsel to the program. The Sea Grant outreach and engagement program offers professional, technical, and public education to the general public, to professionals seeking training, and to school-age children through hands-on programs and print, digital and electronic media. Oregon Sea Grant manages the Visitor Center of the Hatfield Marine Science Center as a public science learning facility; our Free Choice learning program uses the Visitor Center as a laboratory for studying how people learn in such settings.

Multidisciplinary and interdisciplinary in operation, the program involves faculty and students in several Oregon institutions of higher education. Recent participants in the program include the University of Oregon, Oregon Health and Science University, Portland State University, Linfield College, and Western Oregon University. In addition, Oregon Sea Grant maintains close relationships
with several research facilities on the Oregon coast, including the Hatfield Marine Science Center in Newport and the Oregon Institute of Marine Biology in Charleston.

## RADIATION CENTER

## Steve Reese, Director

Website: http://radiationcenter.oregonstate.edu/
The Radiation Center is a campus-wide instructional and research facility specially designed to accommodate programs involving the use of radiation and radioactive materials. Located in the center are major items of specialized equipment and unique teaching and research facilities, including a TRIGA Mark II nuclear research reactor (licensed to operate at 1,100 kilowatts when running at a steady power level and at 2,500 megawatts in the pulsing mode); a cobalt-60 gamma irradiator; a number of gamma radiation spectrometers and associated germanium detectors; and a variety of instruments for radiation measurements and monitoring. Facilities for radiation work include teaching and research laboratories with up-to-date instrumentation and related equipment for performing neutron activation analysis and radiotracer studies; laboratories for plant experiments involving radioactivity; an instrument calibration facility for radiation protection instrumentation; and facilities for packaging radioactive materials for shipment to national and international destinations.
The Radiation Center staff is available to provide a wide variety of services including instruction and/or consultation associated with the feasibility, design, and execution of experiments using radiation and radioactive materials, and with safety evaluations relating to experiments or devices involving the use of radioisotopes or other radiation sources. In addition, the center provides direct support and assistance to teaching and research programs involving nuclear engineering, nuclear and radiation chemistry, radiation health physics, neutron activation analysis, neutron radiography, radiation effects on biological systems, radiation dosimetry, production of shortlived radioisotopes, radiation shielding, nuclear instrumentation, emergency response, transportation of radioactive materials, instrument calibration, and radioactive waste disposal.

The center's laboratories and instruments are available to all campus instructional and research programs requiring such support. The center also accommodates instructional and nuclear research and development programs requested by other universities, by federal and state agencies, and by industrial organizations.

In addition, a special neutron activation analysis service for forensic studies is available to law enforcement agencies.

## SUPERFUND RESEARCH CENTER

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Website: http://superfund.oregonstate.edu/
The Superfund Research Center oversees the NIEHS-funded Superfund Research Program grant at Oregon State University. This grant supports a multidisciplinary research effort to address the re-emerging health threat of polycyclic aromatic hydrocarbons (PAHs) in the environment. PAHs are considered a re-emerging threat to environmental health due to the increased burning of fossil fuels (e.g., coal and petroleum products) for energy production. The SRP grant supports five research projects and six support cores at Oregon State University and Pacific Northwest National Laboratory in Richland, WA, in a range of efforts involving human exposure to PAHs. In addition, research partners are located at San Diego State University, the Confederated Tribes of the Umatilla Indian Reservation and Pennsylvania State University. These research projects focus on determining the effect of PAHs on a variety of adverse human health outcomes employing animal models such as zebrafish to detect developmental toxicities. An additional collaboration with Lawrence Livermore National Laboratories allows for following the fate of PAHs in humans as well as animals. Research efforts are also aimed at developing passive sampling devices to identify, measure and track PAHs in the atmosphere and foods to assess exposure of Native American populations to PAHs through wood smoke used in food preservation. Following the Deep Water Horizon oil spill, we were one of the first research groups to determine the levels of PAHs in the Gulf of Mexico at multiple sites over time. We partner with the U.S. EPA through the Partners in Technical Assistance Program to assist communities in dealing with concerns of environmental pollutants at Brownfields, Superfund sites or Conservation and Recovery Act sites. Support cores provide expertise in analytical chemistry, and in biostatistics and bioinformatics. The SRP grant also has programs aimed at translating research results to stakeholders and outreach to the public and in training the next generation of environmental health scientists.

## SIGNATURE RESEARCH CENTERS

Nanoscience. Drug discovery. Sustainable "green" technologies. These are the focus of OSU's increasing collaboration with other Oregon research universities, the private sector, and state and federal agencies.

## OREGON NANOSCIENCE AND MICROTECHNOLOCIES INSTITUTE (ONAMI)

Skip Rung, President and Executive Director
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ONAMI is Oregon's first "signature research center" for the purpose of sustaining and growing Oregon's innovation economy. As is true of only three other states, technology is Oregon's largest employer, with an average wage twice the statewide average. Growth of these kinds of job opportunities is the single most effective thing we can do for state financial health, schools, public safety and human services.

Our strategy has been 10 years in the making, and the selection of "nanoscience and microtechnologies" was based on a careful analysis intended to discover the largest possible intersection among:

- nationally competitive research in our universities,
- future commercial opportunities/ growing sectors of the national economy,
- the existing skills of Oregon industry and its surrounding value chain ecosystem.
ONAMI is now a nationally recognized model for state innovation initiatives, and is frequently featured at events and in publications by the National Science Foundation, National Governors Association, and other organizations concerned with keeping the United States competitive in the global innovation economy.

The state of Oregon so far has invested $\$ 47$ million in ONAMI, including $\$ 5.2$ million from the Oregon Innovation Council (OECDD) for fiscal year 20122013. These funds are invested in OSU research and commercialization capacity in the form of matching funds for competitive extramural proposals, facility operations, and "gap" grants to assist in the formation of successful new products and startup companies.

## ONAMI Staff and Leadership

ONAMI's leadership (executive director, research co-directors, 501 c 3 board) combines senior-level executive experience in both industry and academia.
President and Executive Direc-
tor Robert D. "Skip" Rung worked for Hewlett-Packard for 25 years, most recently as director of Advanced Research and Development for HP's Corvallis, OR, facility, which is both the headquarters for HP's world-leading inkjet technology, as well as HP's most advanced and capable facility.
Working with Mr. Rung are Vice President of Operations Cindy L. Dahl (formerly area director for CH2M Hill), High-Tech Extension Director Janet M. Teshima (formerly Semiconductor Business VP for FEI Company), and Gap Fund Manager Jay M. Lindquist (formerly Corporate Development VP for FEI Company) and Office Manager/Webmaster Danielle Z. Clair (shared with the Microproducts Breakthrough Institute).

## ONAMI Leadership Team Core

## Members:

Prof. Brian Paul, OSU/PNNL Microproducts Breakthrough Institute codirector. Dr. Paul is a professor of mechanical, industrial and manufacturing engineering at OSU, and a specialist in microfabrication technologies for MECS (Microtechnology-based Energy and Chemical Systems).

Prof. Goran Jovanovic, OSU/ PNNL Microproducts Breakthrough Institute co-director. Dr. Jovanovic is a professor of chemical, biological and environmental engineering at OSU, and a specialist in chemical processes for fuel production, medical devices (e.g., hemodialysis filters) and many other applications.

Dr. Ward TeGrotenhuis, OSU/ PNNL Microproducts Breakthrough Institute co-director. Dr. TeGrotenhuis is a senior scientist and team leader for hydrocarbon processing at the Pacific Northwest National Laboratory.

Prof. Douglas Keszler, OSU Distinguished Professor of Chemistry and Principle Investigator for the NSF Center for Sustainable Materials Chemistry (CSMC), is a pioneer in the preparation and characterization of new solid-state inorganic materials. Current efforts are directed to the development and study of laser hosts, nonlinear optical materials, phosphors, transparent conductors, wide band-gap semiconductors, and low-temperature deposition and crystallization of thin films. Professor Keszler's pioneering work is the basis for Brilliant Technologies, Deep Photonics, Inpria and Amorphyx all local start-up companies.

Prof. David Johnson, University of Oregon professor of chemistry and CSMC co-PI, is a solid-state chemist who has pioneered new method of synthesizing valuable new materials which cannot occur naturally. He is equally a pioneer in developing graduate student programs geared to the real career needs of stu-
dents (most of whom will not become academics) and shared user facilities, which maximize the public value realized from investments in sophisticated equipment.

Dr. John Carruthers, Portland State University distinguished professor of physics, has worked at Bell Laboratories, NASA, Hewlett-Packard Laboratories, and most recently Intel Corporation, where he was director of components research and development at Intel's Hillsboro, OR, facility-the world's most advanced semiconductor facility, e.g., the first to achieve 32 nm production on 300 mm substrates, now poised to take the lead on sub-20nm technology in its recently announced D1X facility.
Prof. Jim Hutchison, University of Oregon professor of chemistry and UO Associate VP for Research, is a pioneer of green chemistry and leading innovator in nanofabrication and assembly processes that maximize material yields and minimize use and release of harmful reagents. Professor Hutchison is the leader of ONAMI's Safer Nanomaterials and Nanomanufacturing Initiative (SNNI), and also a founder of Dune Sciences, LLC.

ONAMI Inc. (501c3) board of directors members are senior executives from CH2MHill, Intel Corporation, HewlettPackard Company, FEI Company, Life Technologies Corporation, PNNL/Battelle, Sharp Laboratories, and all four of Oregon's major research universities. Ron Adams, former dean of the College of Engineering at OSU, was formerly director of research and development at Tektronix' color printing operation (now Xerox), which is the world leader in solid inkjet printing, and Xerox's most successful division.

## Four Major Research and Commercialization Thrusts

 Microtechnology-based energy and chemical systems. ONAMI researchers are developing and fabricating unique bulk fluidic microsystems that accelerate, miniaturize and distribute energy, chemical and biomedical processes. Applications include:- Compact, highest-performance heat exchangers
- Novel miniaturized HVAC cycles
- Medical devices, e.g., dialysis filters
- Fuel processing, e.g., hydrogen reforming
- Fuel atomization for small engines using greener fuels
- Continuous production and direct deposition of nanomaterials
- Water sterilization

This work is based on the principle that mass and heat transfer are best accomplished in microchannels which, when fabricated (typically via micro-lamination) into massively parallel structures, enable "bulk" throughputs without
pressure drop penalties. Revolutionary results-in terms of component size, weight and energy efficiency-can be applied to military energy, medical devices and other specialty chemical products.
A dedicated facility, the Microproducts Breakthrough Institute (http://mbionline.org/), supports project activity for research and development by both institutional researchers and numerous companies. A good overview of several applications and fabrication capabilities may be found at http://mbi-online.org/ our-research.
Professors Goran Jovanovic, Brian Paul, and Kendra Sharp of Oregon State University and Dr. Ward TeGrotenhuis of the Pacific Northwest National Laboratory, jointly lead this team.
Nanoelectronics, Nanobiotechnology, and Nanometrology. ONAMI and Oregon's strong industrial and academic experience in semiconductor electronics, microscopy and microanalysis, analytical tools, and test and measurement, remains engaged on key semiconductor industry challenges (new devices, more demanding measurement challenges). They are also being leveraged to enable large opportunities and confront serious measurement challenges in the emerging field of nanomedicine (the application of engineered nanomaterials and nanoscale electronic, magnetic, and optical devices for medical diagnostics and therapeutics). The long history of equipment and instrumentation advances in the engineering and physical sciences, enabling great breakthroughs in the medical and life sciences, suggest that this is a very opportune time for the physical, engineering and medical sciences to collaborate closely on developments in nanobiotechnology. Applications are emerging in single cell analysis at the point-of-use in real time for cancer and other disease diagnosis.
N3I research projects span the following areas:

## Nanoelectronics

1. Carbon-based nanoelectronics
2. Analog memory applications of nanoscale devices
3. Nanoscale energy conversion and storage

## Nanobiotechnology

1. Imaging/sensing/diagnostics at the nanoscale
2. Drug delivery/cell membrane behavior
3. Intracellular behavior and regenerative medicine

## Nanometrology

1. Nanoscale optical near-field nanoscopy and photo-electron emission
2. Spatio-temporal-compositional imaging at the nanometer and femtosecond scales
3. Nanoscale electron crystallography
4. Nanoparticle characterization

Dr. John Carruthers, Distinguished Professor of Physics at Portland State University and former director of Components Research at Intel Corporation, heads up this research collaboration.

Safer Nanomaterials and Nanomanufacturing Initiative. The goals of ONAMI's Safer Nanomaterials and Nanomanufacturing Initiative (SNNI) are to develop new nanomaterials and nanomanufacturing approaches that offer a high level of performance, yet pose minimal harm to human health or the environment. Research under the initiative merges the principles of green chemistry and nanomaterials design and synthesis strategies to produce safer nanomaterials and more efficient nanomanufacturing (including critical purification steps) processes in the context of producing nanoparticles and nanostructured materials for applications in fields such as photovoltaics, nanoelectronics, and sensors.
In addition to greening the production of nanomaterials, SNNI seeks to understand the biological and environmental impacts of nanoparticles. As part of an international research community, it is [i] working with organizations to develop reference materials and standard practices, [ii] creating well-characterized nanomaterial libraries and [iii] developing effective methods protocols for both physico-chemical characterization and biological effects assays for many different types of engineered nanomaterials. Distinctive features of our research portfolio are the critical importance of using only well-characterized nanomaterials and acquiring rich information sets from biological impacts studies. This approach establishes a foundation of fundamental knowledge and advances predictive strategies based upon structure-activity relationships. A long-term commitment to this strategy is required because it is simply not practical to test all significant permutations of nanoparticles (composition, size, shape, surface functionalization, etc.) in bioassays to assess safety.
Professor Jim Hutchison of the University of Oregon leads this initiative that is bringing together key scientists in the life sciences, materials sciences and engineering. Visit the Safer Nanomaterials and Nanomanufacturing website at http:// greennano.org/.
Since 2005, SNNI has spearheaded the highly regarded Greener Nano series of annual conferences, with "GN11" coming in the late spring of 2011: http:// greennano.org/GN11.

Center for Sustainable Materials Chemistry. ONAMI member researchers and collaborators in both academia and industry are leading a
growing collaboration in the study and design of environmentally benign chemistry platforms for the fabrication of high-performance inorganic electronic devices. Beginning from groundbreaking work on transparent electronics and atomic-precision synthesis using both low-temperature solution chemistry and gas-phase assembly techniques, the range of applications for these greener (i.e., benign and earth-abundant elements, lower cost fabrication methods) materials platforms includes many aspects of electronics manufacturing, optics, sensors, thermoelectrics, magnetics, coatings and metrology standards.
ONAMI researchers have recently demonstrated atomically dense and atomically smooth solution processed inorganic films, functionally graded materials from modulated elemental reactants, and a growing range of composite electronic materials.

This work has direct implications for:

- Nanoscale patterning for
semiconductors and other applications
- High-performance thin film electronic elements, e.g., MIM electronics
- Printed electronics on nontraditional substrates
- Large area and lower cost display backplanes
- High-performance thermoelectric cooling
- Low cost thin-film photovoltaics Learn more about the NSF Phase I Center for Sustainable Materials Chemistry at http://sustainablematerialschemistry. org/.
Professors Douglas Keszler at Oregon State University and David Johnson at the University of Oregon lead this collaborative research initiative.


## Facilities (NWNanoNet ${ }^{\text {™ }}$ )

Twenty million dollars of Oregon's initial investment in ONAMI and several million dollars in matching funds have been applied to three user facilities, which are open to all Oregon academic users on equal terms, and to industrial collaborators at commercially competitive rates. The open/shared facility model not only supports diverse research projects with advanced and well-maintained fabrication and characterization tools, it provides an essential resource to Oregon companies, the vast majority of which cannot afford to buy such capabilities for dedicated in-house usage.
Among the many users of the ONAMIaffiliated facilities are the ONAMI gap fund portfolio companies, which, led by Home Dialysis Plus, have raised over \$70 million in leveraged investment since late 2006.
The NWNanoNet ${ }^{\mathrm{TM}}$ facilities are:

- The Microproducts

Breakthrough Institute (http:// mbi-online.org) in Corvallis enables research and product development for microchannel devices and other microfluidics-related fields. Laser micromachining, nano-imprinting/ hot embossing, microlamination, diffusion bonding, nanoparticle injection micromolding, electroplating, atomic layer deposition, and high temperature sintering under precision loads are among the staple processes.

- The Center for Advanced Materials Characterization (http://camcor.uoregon.edu/) in Eugene is the most capable university-based materials analysis and microscopy facility in the Pacific Northwest, offering user access and/ or expert operator service for SEM (with e-beam lithography), HR-TEM, dual-beam FIB, Electron Microprobe, XRD, XPS, AFM, TOF-SIMS, UPS, FTIR, NMR, Mass Spec, and basic semiconductor device fabrication. CAMCOR serves clients all over the U.S.
- The Center for Electron Microscopy and Nanofabrication (http://www.pdx. edu/cemn/) in downtown Portland has been home to one of the most advanced TEMs (200Kev) dual-beam FIBs in the Pacific Northwest. CEMN regularly serves over 40 companies in the silicon forest high-tech region centered around Portland, and also holds regular user training workshops.
- The OSU Electron Microscopy Facility (http://emfacility.science. oregonstate.edu/) at Oregon State University. The Electron Microscopy Facility(EMF) provides service to the research community of both life sciences and materials science related studies. The facility was first established in the Department of Botany and Plant Pathology in 1967, and has been in continuous operation. In addition to supporting faculty and students, the facility welcomes external academic and government institutions and industry. The facility maintains and operates the following instruments:
- FEI Quanta 3D Field Emission

Dual Beam Scanning Electron Microscope (SEM/FIB)

- FEI Quanta 600F Field Emission Environmental SEM
- FEI Nova NanoSEM 230 High Resolution SEM
- FEI Titan 80-200/ChemiSTEM Transmission Electron Microscope (TEM)
- All microscopes are equipped with X-ray Energy Dispersive

Spectrometers (EDS) to conduct chemical analysis. The OSU EMF is located in the Linus Pauling Science Center, room 145, 2900 SW Campus Way, Oregon State University, Corvallis, OR 97331.

## Corporate Partners

ONAMI is uniquely situated in the midst of the world's most advanced collection of "small tech" research and development assets: Intel, Hewlett-Packard, FEI Company, CH2M Hill, ON Semiconductor Corp., Electro Scientific Industries, Xerox, Maxim, IDT, Sharp Labs, Microchip, Life Technologies/Invitrogen, Planar Systems, Wafertech, Flir, Mentor Graphics, Synopsys, Novellus, TriQuint, Siltronic, SEH America, Solarworld, Sanyo, Solaicx, Peak Sun Silicon and many exciting startup companies.
We have many opportunities to do joint research with nearby industries only a few minutes' drive away for research faculty and graduate students, and it is quite possible that highly capable corporate partners can be found to participate in new ONAMI federal projects.

## ORFGON TRANSLATIOTAL RESEARCH AND DEVELOPMENT INSTHUTE (OTRADI)

Jennifer E. Fox, Executive Director
503-227-1814
Email: jfox@otradi.org
Website: http://www.otradi.org

## About OTRADI

OTRADI is a nonprofit research and development organization, supported in part by the state of Oregon that strives to promote bioscience industry growth and job creation in Oregon. OTRADI achieves this goal via collaboration with private and public sector entities in the bioscience community to discover, develop, and commercialize therapeutics, vaccines, diagnostics and other life sciences products important for human health. OTRADI's specialized high-throughput drug discovery robotic equipment is unique in the Northwest, offering previously out-of-reach drug screening capabilities as well as the expertise necessary to analyze results and quickly identify the best products to commercialize. OTRADI uses its equipment and expertise to rapidly screen thousands of chemical compounds developed by Oregon research laboratories and companies to identify new potential drugs, speeding progress on global health concerns, and bringing more economic development and scientific talent to Oregon.

## A Unique Opportunity for Oregon

## Researchers

OTRADI brings the lab to the market via partnerships with Oregon universities,
private bioscience companies, the life science industry, and public and private funders. Collaborating with OTRADI offers many advantages:

## Collaboration

- OTRADI partners with university researchers and small biotech companies to help produce preliminary data in new areas and helps develop strategies and helps write grants.
- When grants are funded, OTRADI continues working with the investigator as a subcontractor on the grant.
- Investigators have access to opportunities for licensing and commercialization of novel chemicals and drug targets.


## Training

- Researchers, faculty, postdocs and students
- Internships and fellowships


## Expertise

- Experience and knowledge in assay development for cell biology, pharmacology, infectious diseases, cancer, inflammatory diseases, etc.


## Specialized Equipment and

## Resources

- State-of-the-art drug discovery robotic equipment for highthroughput screening and highcontent analysis
- Novel and commercially available chemical compound libraries comprised of more than 90,000 compounds for screening


## Grant Partnering

- Actively involved in grant writing and attracting follow-on and new federal and private funding to Oregon universities and small businesses
- Supplied with the new experimental data that OTRADI produces, university researchers can provide federal granting agencies and/or pharmaceutical companies with the crucial evidence and support necessary (e.g., preliminary data) to prove that their discoveries have increased value and worth as possible drugs, drug targets or diagnostic agents. OTRADI's activities have and will continue to increase federal grant funding success, spark small-business development in Oregon, foster student involvement in applicable research, accelerate connections between Oregon university researchers and biopharmaceutical companies and lead to the creation of high-paying jobs in Oregon.


## How OTRADI Works

Every day, Oregon researchers make progress in the fields of biology, medicine, agriculture, marine biology and chemistry that may lead to promising new therapeutics or drug targets. While university researchers are experts within their own fields of science, they often lack the specialized scientific equipment and/or expertise necessary to translate their discoveries into potential new therapeutics. OTRADI brings the lab to the market by providing its partners with access to scientific expertise and equipment. It works to accelerate a product's development and commercialization through strategic partnerships and access to its wealth of resources. OTRADI forms the integral connection or "glue" that links the scientific with the commercial, energizing and simplifying the connection to move medical advances forward, and helping to translate scientific research into tomorrow's discoveries.

## The OTRADI Bioscience Incubator

 Operated by Oregon Translational Research and Development Institute (OTRADI), the OTRADI Bioscience Incubator (OBI) is the state's first and only bioscience-specific incubator. Located in Portland, Oregon, the multi-client company bioscience complex provides startups and scientists with access to entrepreneurial mentoring and state-of-the-art bioscience facilities, meeting space and shared equipment.The OBI serves emerging companies and scientists who have outgrown existing space, but who want to dedicate resources to commercializing their research rather than investing in build-out and equipment. The OBI provides scientists with access to a state-of-the-art facility while their companies reach the next phase of expansion and growth.

## How to Partner with OTRADI

Oregon university researchers and small businesses are encouraged to join OTRADI as OTRADI-Affiliated Researchers and Companies. As such, Affiliated Researchers are pre-qualified to collaborate with OTRADI and utilize our resources. Partnering with OTRADI provides researchers and Oregon companies access to unique expertise and drug-discovery equipment as well as assistance with assay development, grant writing, business development, biomentoring and incubation. To learn more about OTRADI or the OTRADI Bioscience Incubator, see our website at http://www.otradi.org or contact OTRADI's Executive Director, Jennifer E. Fox, PhD, at jfox@otradi.org or 503-227-1814.

## ORECON BEST

David Kenney, President and Executive
Director
503-928-7902
Email: david.kenney@oregonbest.org Website: http://oregonbest.org/

## Global Impact, One Startup at a Time

Oregon BEST funds and supports innovative cleantech startups across Oregon. As an economic development catalyst, Oregon BEST connects startups with state and federal resources while preparing them for follow-on investment through a series of focused programs.
We invest strategically in public-private partnerships that rapidly transform university research into new clean technologies, companies, and jobs. The research, projects, and startups we support serve as a proving ground for leadingedge clean technologies while powering a vibrant innovation ecosystem.

Oregon BEST's work not only adds value and enhances competitiveness for Oregon businesses, it also grows the state's research revenue, expands research programs, enhances workforce development, and positions Oregon to recruit new cleantech companies.
Since its establishment as an independent, nonprofit organization by the Oregon Legislature in 2007, Oregon BEST's 270+ Member Researchers have attracted more than $\$ 135$ million in research revenue to Oregon from federal, industry, and foundation sources. Building on Oregon's international reputation as a sustainability innovator, Oregon BEST offers a range of programs, expertise, and research facilities described below.

## Oregon BEST Labs

Cutting-edge research requires cuttingedge equipment and the expertise to operate it. Oregon BEST supports a network of nine shared-user research facilities at Oregon State University, Portland State University, and the University of Oregon. These multi-million dollar labs offer our industry partners access to research tools, faculty expertise, and workforce development opportunities. The labs help Oregon businesses compete while helping universities grow research and educate graduates. By providing both financial and leadership support, Oregon BEST works to ensure that our community has access to advanced research facilities.

To date, Oregon BEST Labs includes the following facilities:

- Energy Studies in Buildings Laboratory at the University of Oregon in Eugene and in Portland
- Green Building Research Laboratory at Portland State University
- Green Building Materials

Laboratory at Oregon State
University

- High Performance

Environments (HiPE)
Laboratory at the University of Oregon

- infraStructure Testing \& Applied Research (iSTAR) Laboratory at Portland State University
- Multipurpose River Hydraulics Research Facility at Oregon State University
- Oregon Process Innovation Center (OPIC) for Sustainable Solar Cell Manufacturing at Oregon State University
- OSU-Benton County Green Stormwater Infrastructure Research Facility at Oregon State University
- SuNRISE Photovoltaics Lab at the University of Oregon


## Oregon BEST Member Researchers

A statewide network of 270+ Oregon BEST Member Researchers across four universities offer expertise to help Oregon companies - ranging from startups to existing firms - compete in the cleantech economy. The research expertise of Oregon BEST Member Researchers covers clean technologies of all kinds, as well as cleantech business expertise.

## Oregon BEST Commercialization Program

This program accelerates the commercialization of technologies developed by universities and small businesses in Oregon. The program focuses on creating commercialization partnerships between industry and Oregon universities, leveraging existing collaborations between Oregon companies and Oregon BEST's Member Researchers, and moving clean technologies from Oregon universities into the marketplace.
The commercialization collaborations that are catalyzed by Oregon BEST create much-needed jobs for Oregonians in the cleantech sector, which is expected to experience significant growth for decades to come. Simultaneously, the technologies commercialized help address the challenges of climate change, our nation's dependence on fossil fuels, the environmental impacts of energy generation and building materials production, and the quality of our indoor environments.
The Commercialization Program has three main elements:

- Oregon BEST University

Research Grants are designed to move clean technologies out of Oregon universities and into startups and Oregon businesses. The grants fund technology development projects with a high potential for
commercialization. Successful funded projects have the potential to receive additional Oregon BEST funding and assistance in startup creation.

- Oregon BEST Early-Stage Investments help bridge the gap between traditional R\&D funding sources and the availability of private investment - a gap commonly known as the "valley of death." By working with Oregon BEST Member Researchers at partner universities, university tech-transfer offices, and small businesses, we identify opportunities for small investments to make a big impact. These investments assist new companies in moving products and services to market, securing follow-on financing, and gaining initial customer traction.
- Commercialization acceleration support services connect experienced Entrepreneurs-inResidence on the Oregon BEST team with researchers and startups that need assistance in making the transition from "technology readiness" to "investment readiness" and "commercial viability." Oregon BEST provides consultation and mentorship to assist in the areas of business strategy, product strategy, acquisition of private capital, strategic business development, management team formation, and federal funding opportunities (see the Oregon BEST SBIR/STTR Support Center). Oregon BEST also leverages a wide range of entrepreneurial support services available from other entities and provides a focal point for the development of cleantech products and cleantech companies.


## Investment Opportunities: Oregon BEST Companies

Oregon BEST has awarded commercialization funding to more than 40 Oregon companies. Through a competitive process, Oregon BEST selects high-potential companies with strong technologies, viable business strategies, and passionate entrepreneurs. Many of these companies are strong investment candidates for angel investors, venture capitalists, and corporate strategic investors. To make them investor-ready, Oregon BEST companies typically have had the benefit of collaboration with a university researcher, a funded project to develop or demonstrate their technology, and mentoring from one of our Entrepreneurs-in-Residence or another ecosystem affiliate. By engaging with Oregon BEST, the companies we support offer greater potential and lower risk than typical cleantech startups.

## Visionary Leadership

As an independent nonprofit established by the Oregon Legislature, Oregon BEST builds on Oregon's reputation as an
international leader in cleantech innovation. We provide leadership to map opportunities for high-impact clean technology development and establish priorities that result in jobs, greater sustainability, and economic prosperity for the region. Oregon BEST brings together representatives from industry, universities, government, and other organizations to identify targeted clean technology commercialization and industry development opportunities across many areas. We focus on areas of opportunity where existing organizations are not already addressing needs or are not positioned to lead and develop strategies. Working with a wide range of partners, Oregon BEST takes a leadership role in coordinating clean technology initiatives across Oregon. This work includes identifying strategic research focus areas that align with market opportunities and national policy priorities and that have the potential to create future economic activity in Oregon. We also reach beyond Oregon's borders, collaborating with organizations in other states to increase regional impact and benefit Oregon.
Oregon BEST's leadership includes executives from Portland General Electric, National Energy Technology Lab, and The Baker Group. These executives join research leadership from Oregon BEST's founding partner universities (see below), venture capital and corporate investors, and members of the Oregon Legislature to make up a visionary Board of Directors, a Commercialization Advisory Board, and staff - all committed to advancing Oregon's cleantech economy.
History and Founding Universities Oregon BEST was established as an independent, nonprofit organization in 2007 as part of the Oregon Innovation Council's legislative recommendations. Initial funding came from the Oregon Legislature, with additional support from the Oregon University System and the Meyer Memorial Trust. Founding partner universities include the Oregon Institute of Technology, Oregon State University, Portland State University, and the University of Oregon.

## ADDITIONAL RESEARCH UNITS AND CONSORTIA AT OSU

These additional research units are organized under OSU's colleges.

## ACRICULTURAL <br> EXPERIMENT STATION

Daniel J. Arp, Director
William G. Boggess, Executive Associate Director
W. Daniel Edge, Associate Director

Joyce Loper, Associate Director
John R. Talbott, Assistant Director
Jack Breen, Agricultural Sciences and Marine Sciences Business Center Manager
Email: AESsupport@oregonstate.edu Website: http://agsci.oregonstate.edu/ research/research
The Oregon Agricultural Experiment Station is a statewide research network of Oregon State University scientists working on the Corvallis campus and at 11 branch stations in the major crop, climate, and marketing areas of Oregon. These diverse locations ensure that the station's research program is close to the people and the needs of Oregon's agricultural and natural resources. Founded July 1,1888 , in accordance with the federal Hatch Act of 1887, the mission of the Oregon Agricultural Experiment Station is to conduct research and demonstrations in the agricultural, biological, social, and environmental sciences that contribute to the economic, environmental, and social welfare of Oregon. We are committed to:

- Helping build a sustainable economy by fostering economic growth and sustainability;
- Addressing ecological concerns by generating knowledge and information to improve and protect Oregon's natural resources; and
- Expanding fundamental knowledge by advancing fundamental science relating to the environment, agriculture, and natural resources;
- Partnering with and enabling people and their communities to address a variety of issues including urbanrural economic dependencies, community food systems, land use, food security, poverty, and others Current research emphases in the station are in five signature program areas that sustain and build on the College of Agricultural Sciences' traditional strengths and link to stakeholder needs, but also look to key future opportunities. These signature areas also address contemporary and emerging forces or drivers facing Oregon's people and landscape. Overarching contemporary drivers comprise water, energy, climate change,
health, and demographics. The signature program areas are:
- Sustainable food and agricultural systems;
- Environmental and human wellbeing;
- Plant sciences and systems biology;
- Natural resources stewardship;
- Bioproducts, biomaterials, and bioenergy for a sustainable bioeconomy.
The station conducts research in 12 academic departments (Applied Economics (formerly Agricultural and Resource Economics), Animal and Rangeland Sciences, Biological and Ecological Engineering, Botany and Plant Pathology, Chemistry, Crop and Soil Science, Environmental and Molecular Toxicology, Fisheries and Wildlife, Food Science and Technology, Horticulture, Microbiology, and Statistics), and colleges of Forestry, Public Health and Human Sciences, Science, and Veterinary Medicine. Research is supported in other units such as the Center for Genome Research and Biocomputing, Linus Pauling Institute, the Environmental Health Sciences Center, Agricultural Education and Agricultural Sciences, and Extension and Experiment Station Communications.
Branch stations provide opportunities for basic and applied field research programs at the following locations:
- Central Oregon Agricultural Research Center (Madras and Powell Butte)
- Columbia Basin Agricultural Research Center (Pendleton and Moro)
- Eastern Oregon Agricultural Research Center (Burns and Union)
- Food Innovation Center Experiment Station (Portland)
- Hermiston Agricultural Research and Extension Center (Hermiston)
- Klamath Basin Research and Extension Center (Klamath Falls)
- Malheur Experiment Station (Ontario)
- Mid-Columbia Agricultural Research and Extension Center (Hood River)
- North Willamette Research and Extension Center (Aurora)
- Southern Oregon Research and Extension Center (Medford)
- Coastal Oregon Marine Experiment Station (Newport and the Seafood Laboratory at Astoria)
The station collaborates with the OSU Extension Service, instructional programs within Oregon State University, Oregon state agencies, federal departments of Agriculture, Commerce, Energy, Interior, and Transportation, and other federal and state agencies on research programs of interest to the state, the Pacific Northwest, the nation, and other countries.


## COLLEGE OF ENCINEEBING RESEARCH AND ECONOMIC DEVELOPMENT OFFICE

Irem Y. Tumer, Associate Dean for Research and Economic Development Websites: http://red.engr.oregonstate.edu/
The Office of Research and Economic Development (RED) at the College of Engineering was established to promote and support research programs and faculty. The overall mission of the RED office is to build new bridges between faculty, external stakeholders and collaborators, help faculty find and apply for funding opportunities, boost the college's reputation for research, and grow industry funding. We specifically aim to foster high-impact research initiatives among our faculty, and develop strong relationships with our academic, industry, and government partners. This includes not only connecting faculty teams with funding opportunities and matching industry needs with Oregon State expertise, but also assembling teams that can build new programs in emerging areas that are responsive to global challenges.
Research is conducted by faculty and students from the following schools and departments:

- School of Chemical, Biological and Environmental Engineering
- School of Civil and Construction Engineering
- School of Electrical Engineering and Computer Science
- School of Mechanical, Industrial and Manufacturing Engineering
- School of Nuclear Science and Engineering
- Department of Biological and Ecological Engineering
Graduate students can complete their degrees in one of 14 graduate programs are offered through the CoE schools:
- Biological and Ecological Engineering
- Chemical Engineering
- Civil Engineering
- Computer Science
- Electrical and Computer Engineering
- Engineering Management Graduate Option
- Environmental Engineering
- Industrial Engineering
- Materials Science
- Mechanical Engineering
- Medical Physics (in partnership with OHSU)
- Nuclear Engineering
- Radiation Health Physics
- Robotics

The schools under the OSU College of Engineering collaborate with signature research centers, institutes, and facilities that bring together industry, academia, the investment community, and other key partners. These platforms of coopera-
tion serve as a catalyst for new research and revenue streams that transform ideas into solutions.

- Center for Applied Systems and Software
- Center for Design of Analog-digital Integrated Circuits
- Center for e-Design
- Center for Sustainable Materials Chemistry
- Eco-Informatics Summer Institute
- End Users Shaping Effective Software
- Energy Efficiency Center
- Kiewit Center for Infrastructure \& Transportation
- MaSC: Materials Synthesis and Characterization Facility
- Microproducts Breakthrough Institute
- Northwest Alliance for Computational Science and Engineering
- Northwest National Marine Renewable Energy Center
- O.H. Hinsdale Wave Research Laboratory
- Radiation Center
- Wallace Energy Systems \& Renewables Facility


## FEED THE FUTURE <br> INNOVATION LAB FOR <br> COLLABORATIVE RESEARCH <br> ON AQUACULTURE \& <br> FISHERIES (AQUAFISH <br> INNOVATION LAB)

Hillary S. Egna, Director
Website: http://aquafishcrsp.oregonstate. edu/
The AquaFish Innovation Lab (formerly AquaFish CRSP) is one of six Feed the Future Innovation Labs for Collaborative Research funded by the U.S. Agency for International Development (USAID) and participating U.S. and host country institutions. The mission of the AquaFish Innovation Lab is to enrich livelihoods and promote health by cultivating international multidisciplinary partnerships that advance science, research, education, and outreach in aquaculture and fisheries. Oregon State University leads this flagship program designed to reduce poverty in developing countries by improving access by the poor to fish and water resources. AquaFish research and outreach work focuses on developing comprehensive, sustainable, and economically viable aquaculture and fisheries management systems in developing countries that contribute to food safety and food security. Challenges poorer countries face include pressures from global trade, environmental degradation, climate change, water use conflicts, and the distribution of benefits. The AquaFish Innovation Lab concentrates its efforts on reducing the
number of constraints its host countries face in order to promote local economies. OSU partners with U.S. and host country universities, government, private companies, and non-governmental organizations to support research, development, and outreach activities in over 20 countries. AquaFish participating countries have included Bangladesh, Brazil, Cambodia, China, Ghana, Guyana, Honduras, Indonesia, Kenya, Mali, Mexico, Nicaragua, Nepal, Philippines, South Africa, Thailand, Tanzania, Uganda, Vietnam, and the U.S.

## FOREST RESEARCH <br> LABORATORY-INSTITUTE FOR WORKING FOREST LANDSCAPES

Thomas Maness, Director
Anthony S. Davis, Associate Director
Roger D. Admiral, Associate Director Website: http://www.forestry.oregonstate. edu/research/forest-research-laboratory
Research in the College of Forestry (CoF) is conducted under the broad umbrella of the Forest Research Laboratory (FRL), which was established by the Oregon Legislature in 1941. The FRL is partially funded by the Legislature as one of three Statewide Public Service Units (see Oregon Revised Statute 526.225). Faculty, staff, and students from the College of Forestry's Departments of Forest Engineering, Resources, and Management; Forest Ecosystems and Society; and Wood Science and Engineering contribute to a diverse portfolio of fundamental and applied research and outreach activities.

In November 2013, the college launched the Institute for Working Forest Landscapes (IWFL) to focus FRL research programs on innovative approaches for managing landscapes that will enhance people's lives and improve the health of communities, businesses and vital ecosystems. The IWFL's program is organized under four broad thematic areas: Healthy People and Communities, Resilient Ecosystems, Intensively Managed Forests, and Competitive and Innovative Products. Initial efforts focus on the following opportunities:

- Improving the Health of Rural

Communities and Citizens

- Increasing the Competitiveness of Oregon's Private Landowners and Businesses
- Enhancing Ecosystem Health with a Landscape Approach
- Increasing Public Trust in Active Management of Public and Private Lands
In addressing these themes and opportunities, faculty are providing leadership in addressing many of society's challeng-
es at scales ranging from molecules to the globe, including topics such as:
- Determining the impacts of climate change on forests and how forests can lessen the severity of change
- Protecting the sustainability of forests and the ecosystem services they provide, including water, wildlife habitat, recreation, and wood
- Facilitating development and use of renewable "green" materials and energy
- Fostering operations and manufacturing processes that are environmentally and socially acceptable, and economically feasible
- Expanding the understanding and value of forests to society, especially in urban environments
Research provides information that supports scientifically informed decisions about the management, conservation, and use of Oregon's public and private forest resources, and that enhances the competitiveness of Oregon's forest-resource-based industries and businesses. Communication of results to science peers, land managers, policy makers, and the public is a high priority.
Activities benefit from collaboration with many other departments and colleges at Oregon State and elsewhere. The FRL, the Corvallis Forestry Sciences Laboratory of the U.S. Forest Service, the Corvallis-based Forest and Rangelands Ecosystem Science Center of the U.S. Geological Service, and related research conducted elsewhere on campus combine to form one of the largest concentrations of forest sciences research capacity in North America.


## INTEGRATED PLANT PBOTECTION CENTER

## Paul Jepson, Director

Website: http://www.ipmnet.org/
The Integrated Plant Protection Center (IPPC) was established in 1991, to expand upon the range of activities of the International Plant Protection Center, that was chartered by Oregon State University in 1969 (see http://www.ipmnet. org/). The IPPC is partially supported by the Agricultural Experiment Station, and the Cooperative Extension Service. The IPPC focuses upon research, education and outreach activities associated with the adoption of sustainable integrated pest management (IPM) practices in agriculture. It is the home for a number United States Department of Agriculture (USDA)-funded programs associated with pest control and pesticide management, including the state IPM program, the Regional Pest Management Center program, the Pesticide and Environmental Stewardship program, and the Farm Safety program.

The IPPC provides leadership, coordination and support for scientists at OSU, in the Pacific Northwest region, and internationally, in the field of IPM. Its activities encompass pest, disease and weed management, and the rational management and use of pesticides. It also provides news and facilitates communications between university, state, and federal agencies through a number of media, including an electronic news alert system, and a newsletter (see http:// oregonipm.ippc.orst.edu/).

IPPC activities include the provision of electronic tools that assist growers and their advisors in making pest management decisions within their crops. This includes online weather data and degree-day models, which forecast the developmental stages and epidemiology of a number of important crops pests and diseases (see http://pnwpest.org/wea/). In addition, the IPPC works collaboratively with scientists throughout the state, to manage online pest alerts to growers. These can be accessed via the IPPC home page (see http://www.ipmnet.org/).

The IPPC maintains a large and important collection of documents, monographs and books on IPM, much of which is searchable via the OSU Valley library online database. It also supports a unique service in international outreach, IPMnet, which includes, among a number of other resources, IPMnet NEWS, a monthly electronic newsletter that is distributed to scientists in 127 countries (see http://www.ipmnet.org/). IPMnet NEWS is supported by the Consortium for International Crop Protection (CICP) and a grant from the USDA.

The IPPC is expanding its activities in four areas at present, (1) biological con-trol/biologically-based pest management, (2) enhanced diagnostic and forecasting tools, (3) pesticide management, rational use, risk mitigation and (4) information delivery, decision support and outreach. For further details please contact the director.

## INTER-UNVERSTY CONSORTIUM FOR <br> POLITICAL AND SOCIAL BESEARCH (ICPSR)

Valery King, Official Representative (OSU Libraries)
Website: http://www.icpsr.umich.edu/ icpsrweb/
Through funding provided by OSU Libraries, Oregon State University is a member of ICPSR, the Inter-University Consortium for Political and Social Research. A unit within the Institute for Social Research at the University of Michigan, ICPSR was established in 1962 and maintains and provides access to
a vast archive of social science data for research and instruction. OSU students, faculty and staff may access these data at no charge and may also deposit their own data into the collection.

ICPSR offers members reduced fees to attend the Summer Training Program in Quantitative Methods of Social Research, a comprehensive curriculum of intensive courses in research design, statistics, data analysis, and social methodology. Additionally ICPSR leads several initiatives that encourage use of data in teaching, particularly for undergraduate instruction, and offers user support to assist researchers in identifying relevant data for analysis and in conducting their research projects.

## KIEWIT CENTER FOR INFRASTRUCTURE AND TRANSPORTATION

## Jason Weiss, Director

Email: kiewit.center@oregonstate.edu Website: http://cce.oregonstate.edu/ research/

## Background

The Kiewit Center for Infrastructure and Transportation was initially established in 1962 as the Transportation Research Institute. The Kiewit Center serves as the umbrella organization for all research within the School of Civil and Construction Engineering. The center is a key component in the College of Engineering's drive to become a top 25 engineering program, coordinating multi- and interdisciplinary research projects.

For the last 150 years, civil engineers have built the infrastructure upon which American prosperity rests. Roads, bridges, airfields, dams, schools, and safe drinking water form the foundation for our quality of life. Today that foundation is crumbling. Americans experience this deterioration every day. A recent report by the American Society of Civil Engineers confirms what most Americans already know-the ASCE report gave the U.S. infrastructure an overall grade of D+.

The center is an interdisciplinary unit that provides research, education and public service related to the built environment and the systems that operate in that environment.

## Facilities

## Geotechnical Testing Laboratory

- Testing in support of both practiceoriented investigations and state-of-the-art research
- Advanced geo-mechanical modeling of soil-structure interaction
- Full scale, well-instrumented testing of field geo-systems
Highway Materials Laboratory
- Investigation of innovative highway construction materials
- Service life modeling and long term durability assessment
- Evaluation of recycled materials for use in construction
O.H. Hinsdale Wave Research Laboratory
- Impact of tsunamis and storm waves on coastal infrastructure
- Nearshore processes related to coastal erosion
- Tsunami and coastal hazard mitigation
Large Scale Structural Strong-Floor Facility
- Structural evaluation of full-size beams and columns
- Development of earthquake-resistant structural systems
National Center for Accessible
Transportation
- Investigation of advanced technologies for accessible transportation systems


## MARINE MAMMAL

INSTITUTE
Bruce Mate, Director
Website: http://mmi.oregonstate.edu/
The OSU Marine Mammal Institute is a multi-disciplinary faculty incorporating the work of academics from engineering, genetics, fisheries and wildlife (agriculture), aquatics, ecology, veterinary medicine, biology, and communications.

## Whale Telemetry Group (WTG)

Using satellite-monitored radio tags to determine the distribution and critical habitats of endangered whales.

## Cetacean Conservation and

 Genomics Laboratory (CCGL)Exploring the genomes of whales and dolphins to understand the past, assess the present, and conserve the future.
Pinniped Ecology Applied Research Laboratory (PEARL)
Ecology, behavioral physiology, and conservation biology of pinnipeds.
Geospatial Ecology of Marine Megafauna (GEMM) Laboratory Spatial and behavioral studies of marine megafauna to generate an improved understanding of species ecology and distribution patterns.

## Bio-Telemetry and Behavioral

 Ecology LaboratoryUsing telemetry and bio-logging tools to study the behavioral ecology of marine mammals.
Oregon Marine Mammal Stranding Network (OMMSN)
Documenting occurrences and investigating the causes of marine mammal strandings in Oregon.

## MICROPRODUCTS <br> BREAKTHROUGH INSTITUTE

Goran Jovanovic, OSU Co-Director
541-713-1348 (office-MBI)
Email: goran.jovanovic@oregonstate.edu Website: http://mbi-online.org/
The MBI is a 45,000 square foot facility located on the Hewlett-Packard Corvallis campus containing offices, laboratories, fabrication facilities and laydown space for the research, development and commercialization of arrayed microfluidic systems and related nanomanufacturing technology. This facility is focused on accelerating the discovery, development and commercial deployment of new nano- and micro-scale phenomena and their technology embodiments.

The MBI is collaboration between the Pacific Northwest National Laboratory (PNNL) and Oregon State University (OSU). The MBI is one of three shareduser facilities within the Oregon Nanoscience and Microtechnologies Institute (ONAMI, http://onami.us/).

PNNL and OSU are leaders in the science, engineering, and technology development of nano- and micro-scale processes and systems. Collaboratively they conduct research and development projects ranging from fundamental science and technology investigations to assistance with commercial development and production. Areas of current research and development include photovoltaic manufacturing, hydrogen storage, nanomaterials synthesis, biofuel processing, miniature heat pumps and artificial kidneys among others.

Both PNNL and OSU are well established in arrayed microfluidic systems development. PNNL's thrust is Micro Chemical and Thermal Systems (MICROCATS) while OSU concentrates on Micro Energy and Chemical Systems (MECS). Together, OSU and PNNL seek to model, through the MBI, the way in which technology can be developed and commercialized through the collaboration of federal laboratories and universities.

The MBI is performing research and development in arrayed microfluidics and nanomanufacturing for:

- U.S. Department of Energy (DOE)
- National Institute of Health (NIH)
- Defense Advanced Research Projects Agency (DARPA)
- U.S. Army
- National Aeronautics and Space Administration (NASA)
- National Science Foundation (NSF)
- Private companies and corporations


## O.H. HINSDALE WAVE BESEARCH LABORATORY

## Pedro Lomonaco, Director

541-737-2875
Email: pedro.lomonaco@oregonstate.edu Website: http://wave.oregonstate.edu/
The O.H. Hinsdale Wave Research Laboratory provides outstanding research and testing at the largest nearshore experimental facility at an academic institution in the US. The 6,100 $\mathrm{ft}^{2}\left(570 \mathrm{~m}^{2}\right)$ building is situated on the main campus and houses the Large Wave Flume (LWF), Directional Wave Basin (DWB), and $3,000 \mathrm{ft}^{2}\left(300 \mathrm{~m}^{2}\right)$ of office space for staff, graduate students, visiting researchers, and clients.
The laboratory conducts research on coastal and nearshore processes involving:

- Wave-structure interaction
- Nearshore hydrodynamics and sediment transport
- Marine renewable energy
- Tsunami and coastal hazards
- Fixed and floating structures

Through our work we deliver research, testing, and education and outreach opportunities to improve the resilience and sustainability of coastal areas, and to develop innovative solutions to the design of coastal infrastructure.
From January 2016, the HWRL is partially supported by the Natural Hazards Engineering Research Infrastructure (NHERI) program of the National Science Foundation.

## ORECON CLMMATE CHANCE RESEARCH INSTHUTE (OCCRI)

Philip W. Mote, Director
Kathie Dello, Associate Director Websites: http://occri.weebly.com/
The Oregon State Legislature established the Oregon Climate Change Research Institute (OCCRI) within the Department of Higher Education in 2007. OCCRI is a network of over 150 researchers at Oregon State University (OSU), the University of Oregon, Portland State University, Southern Oregon University, and affiliated federal and state labs. OCCRI is administered by OSU and has a staff of about 15 .

## OCCRI is tasked with:

- facilitating research by faculty at Oregon's public universities on climate change and its effects on natural and human systems in Oregon
- serving as a clearinghouse for climate change information
- providing climate change information to the public in
integrated and accessible formats
- supporting the Oregon Global Warming Commission in developing strategies to prepare for and to mitigate the effects of climate change on natural and human systems, and
- providing technical assistance to local governments to assist them in developing climate change policies, practices, and programs.
At least every two years, the institute will also develop an assessment of climate change science as it relates to Oregon and the likely effects of climate change on the state. OCCRI helps Oregonians, government agencies, and the private sector understand the potential impacts of climate variability and change on the state. The institute also helps individuals, agencies, and companies develop new strategies to prepare for climate change.

In September of 2010, OCCRI was named as the anchor institution for two federally funded regional climate science centers. The Department of the Interior's (DOI) Pacific Northwest Climate Science Center (CSC) is one of eight CSC's. The CSC serves as a resource for DOI agencies and other partners in providing necessary science in advising policy decisions. The National Oceanic and Atmospheric Administration's (NOAA) Pacific Northwest Climate Impacts Research Consortium (CIRC) is one of 11 Regional Integrated Sciences and Assessments (RISA) projects. The CIRC is engaging a broad number of stakeholders, including municipalities, utilities, emergency management organizations, irrigators, agricultural and Sea Grant extension, and state and federal agencies. In support of these stakeholders, CIRC is working on developing regional downscaled climate scenarios using integrated climate, hydrological, and vegetation models; PNW region and basin scale climate impacts assessments; social science and network analysis; coastal climate hazard, risk and vulnerability assessments; decision scenario visualization and planning tools; climate extension; public health risk management guidance; and community level adaptation approaches.

Other major 5-year OCCRI projects include Regional Approaches to Climate Change for PNW Agriculture (https:// www.reacchpna.org/), Forest Mortality and Climate (http://terraweb.forestry. oregonstate.edu/FMEC.htm), and Willamette Water 2100 (http://water.oregonstate.edu/ww2100/).

## OBECON WOOD <br> INNOVATION CENTER

## Scott Leavengood, Director

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Chris Knowles, Assistant Director
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Email: owic@oregonstate.edu
Website: http://owic.oregonstate.edu/
The Oregon Wood Innovation Center (OWIC) is a joint initiative of Oregon State University's College of Forestry and Extension Service. OWIC's mission is to improve the competitiveness of Oregon's wood products industry by fostering innovation in products, processes, and business systems. A key function of the center is to serve as the primary link between university research and needs and opportunities in the forest industry.

## Why an Innovation Center?

The forest products industry has undergone dramatic changes in recent years. The industry responded to reductions in raw material supply and the forces of globalization by consolidating, retooling production systems, and by focusing on improving efficiencies in manufacturing processes. However, it is clear that focusing solely on process innovation will be insufficient to maintain future competitive advantage. Firms must also focus on product and business systems innovation. OWIC helps foster such innovation by serving as a 'clearinghouse' to connect manufacturers to the research community, to other organizations that provide assistance to businesses, and to facilitate networking within the industry.

## Facilities and Services

OWIC is housed within OSU's Department of Wood Science and Engineering, a department with established capabilities in research, outreach, and technology transfer in a broad array of disciplines. Disciplines and accompanying laboratories and services include:

## - Anatomy and Quality of

## Renewable Materials-

laboratories for wood fiber characterization and wood identification; equipment including microscopes and an X-ray densitometer.

- Biodeterioration, Protection and Durability of Renewable Materials-pressure cylinder for impregnating materials with preservatives; equipment for assessing insect and decay resistance.
- Biomass and Biofuelsequipment for analyzing the physical characteristics and energy value (e.g., particle size distribution, ash content and composition, and calorimetric heating values) of biomass feed
stocks; a $1 / 2$-meter diameter dryer for biomass.
- Chemistry-adhesives development, testing, and troubleshooting; research and testing of plant materials for value-added chemical products.
- Nanotechnology-research in nanocomposites for advanced textiles, barrier films, membranes, coatings and sensors
- Composite Materialsdevelopment and testing of wood and wood/non-wood composites; equipment including presses (hot and cold), glue spreader, refiner, digester, blender, former, and woodplastic extruder.
- Wood Drying-a 100 BF kiln for measuring volatile organic compound (VOC) emissions and $2,000 \mathrm{BF}$ dry kiln for research in lumber drying.
- Timber Engineering and Structural Design-equipment for assessing strength properties of wood-based materials; scale varies from small specimens up to large members such as beams and full-scale wall systems.
- Green Building Materials Laboratory-a 5,000 sq. ft. shared resource laboratory of Oregon Built Environment and Sustainable Technologies Center (Oregon BEST). Equipment for characterizing, developing and testing high performance sustainable materials for a wide variety of applications including buildings and transportation infrastructure. A multi-chamber modular environment conditioning (MCMEC) system was added in 2014. The MCMEC is designed for durability testing of full-scale building assemblies. One test configuration allows exterior and interior conditions (temperature range - 30 degrees to 40 degrees C, humidity range $10 \%$ to $95 \%$ ) to be imposed simultaneously, including sunlight simulation and water spray.
- Forest Products Business and Marketing-research and outreach on innovation in the forest industry and assessment of market potential for new products.
- Environmental Impacts of Renewable Materials-research on the environmental impacts of renewable materials from 'cradle to grave' (life cycle inventory and analysis).
- Other facilities include environmental conditioning chambers (hot-dry, hot-wet, cold room, standards room), accelerated weathering chambers (Q-Lab QUV and an automatic boil test device for

ASTM D3434 test of exterior wet use adhesives), as well as state-of-the-art classrooms for onsite or distance education programs.

## SUN GBANT WESTEBN BEGIONAL CENTER

John R. Talbott, Director
541-737-2194
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Email: sungrant@oregonstate.edu
Website: http://sungrant.oregonstate.edu/

## The mission of the Sun Grant

Initiative is to:

1. Enhance national energy security through development, distribution and implementation of biobased energy technologies;
2. Promote diversification in and the environmental sustainability of, agricultural production in the United States through biobased energy and products technologies;
3. Promote economic diversification in rural areas of the United States through biobased energy and product technologies; and
4. Enhance the efficiency of bioenergy and biomass research and development programs through improved coordination and collaboration among the Department of Agriculture, the Department of Energy, and the land grant colleges and universities.
A network of five land grant universities serve as regional Sun Grant Centers. These universities include Oregon State University (Western Region), South Dakota State University (North-Central), Oklahoma State University (South-Central), the University of Tennessee-Knoxville (Southeastern), and Pennsylvania State University (Northeastern). The centers facilitate federally funded research, extension, and education programs in their respective regions.

The Sun Grant Western Regional Center, located at Oregon State University in Corvallis, is the administrative unit for the region composed of the states of Alaska, Arizona, California, Hawaii, Idaho, Nevada, Oregon, Utah, and Washington, and the Pacific Territories and associated Pacific island nations, including American Samoa, Commonwealth of the Northern Marianas Islands, Guam, Federated States of Micronesia, the Republic of Palau, and the Republic of the Marshall Islands.

The current program area priorities for the Western region include biomass production, conversion and processing technologies, the development and enhancement of bio-based products, and evaluation of the bioproduct supply chain and life cycle analyses.

Important aims for the center include distributed energy production, diversity of feedstocks and processing approaches, crop suitability assessment, co-product and local human capital development, and system approaches.

## SURVEY RESEARCH CENTER

Virginia Lesser, Director
Website: http://stat.oregonstate.edu/src/ survey-research-center
Established in 1973, the Oregon State University Survey Research Center (OSUSRC) provides comprehensive survey services including proposal development, questionnaire design and layout, survey administration and data collection, survey analysis and professional report writing. Our staff offers customized options, working with our clients to determine the best approach to collect survey data based on the study objectives, population of interest, and budgetary concerns. Our past and current clients include federal, state, and local agencies, national nonprofit organizations, and OSU-affiliated entities. The OSU-SRC maintains several contracts with clients to provide our services on a recurrent basis, from monthly, annually, to ever few years.

Operating as a center for research in survey methodology, the OSU-SRC routinely conducts experiments using self-administered surveys with an aim to contribute to survey methodology research. The OSU-SRC subsequently publishes related material in scientific journals and presents experimental findings at professional meetings. The OSUSRC provides expertise using survey best practices to maximize response rates and reduce non-response bias. Various sampling plans are examined for each survey to minimize total survey error. The OSU-SRC also offers consulting for OSU community members on research-based survey design and analysis.

## UNIVERSTY CORPORATION FOR ATMOSPHERIC <br> RESEARCH (UCAR)

Jeffrey R. Barnes, OSU Member
Representatives
Website: https://www2.ucar.edu/
Through its membership in this national research consortium, Oregon State University has access to extensive facilities and services in support of its research in atmospheric, oceanic, and related sciences. Chief among these is the National Center for Atmospheric Research (NCAR) in Boulder, Colorado. Under the support of the National Science Foundation, this national laboratory conducts significant programs of atmospheric, oceanographic, and solar research in cooperation with member universities, and operates a state-of-the-art super computer facility, which is accessible to member institutions. UCAR also operates facilities for scientific ballooning, and through NCAR, maintains instrumented research aircraft and an extensive research and data library.

In addition to using these facilities, OSU faculty and graduate students participate in numerous seminars, workshops, and scientific meetings and conferences that are held at NCAR throughout the year. Through the corporation, Oregon State also cooperates in various national and international initiatives for research, service, and training in the atmospheric and related sciences.

EMERITUS FACULTY
Emeritus status is given to eligible tenured Oregon State University faculty members upon their retirement, in recognition for their years of effective service. As leaders in their fields, many emeritus faculty members continue to serve the university throughout their retirement. The year listed after each name is the year the faculty member began service at Oregon State.


Abrassart, Arthur E 1966 Emeritus Associate Professor College of Business.
Acock, Alan C 1990 Emeritus Professor Sch of Soc/Bhav Hlth Sci.
Adair, John 1953 Emeritus Senior Instructor I Animal \& Rnglnd Sciences
Adams, Darius M 1995 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Adams, David G 1972 Emeritus Professor Horticulture Extension.
Adams, Frank W 1953 Emeritus Assistant Professor Enviro/Molecular Toxic.
Adams, Paul W 1980 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Adams, Richard M 1983 Emeritus Professor Applied Economics.
Adams, Ronald L 1998 Dean Emeritus College of Engineering.
Adams, Ronald L 1998 Emeritus Professor Sch of Mech/Ind/Mfg Engr.
Adams, Wesley 1978 Emeritus Professor Forest Ecosyst \& Society.
Ahearn, Kerry D 1976 Emeritus Associate Professor Sch of Wrtg Lit \& Film.
Aldrich-Markham, Susan 1983 Emeritus Professor Crop and Soil Science.
Ali Niazee, Mohammed T 1972 Emeritus Professor Horticulture.
Allen Jr, John S 1973 Emeritus Professor Earth, Ocean \& Atmo Sci.
Allen Jr, Thomas C 1962 Emeritus Professor Ag Botany/Plant Path.
Amano, Matthew M 1967 Emeritus Professor College of Business.
Amort, Donald L 1958 Emeritus Associate Professor Sch Elect Engr/Comp Sci.
Andersen, Wilbert L 1969 Emeritus Professor Extension Service Prgram.
Anderson, Norman H 1962 Emeritus Professor Integrative Biology.
Anderson, Sonia R 1968 Emeritus Professor Biochem/Biophysics.
Anselone, Philip M 1964 Emeritus Professor Mathematics.
Appleby, Arnold P 1959 Emeritus Professor Crop and Soil Science.
Armstrong, Donald J 1974 Emeritus Professor Ag Botany/Plant Path.
Arnold, Roy G 1987 Provost Emeritus Provost/ Exec Vice Pres.
Arnold, Roy G 1987 Emeritus Professor Food Science and Techno.
Arscott, George H 1953 Emeritus Professor Animal \& Rnglnd Sciences.
Arthur, Jeffrey L 1977 Emeritus Professor Statistics (Science).
Arthur Jr, John R 1983 Emeritus Professor Sch Elect Engr/Comp Sci.

Atkinson, William A 1987 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Ayres, James W 1970 Emeritus Professor Pharmacy.

## B

Baham, John E 1979 Emeritus Associate Professor Crop and Soil Science.
Bailes, Jack C 1972 Emeritus Professor College of Business.
Baisted, Derek J 1963 Emeritus Professor Biochem/Biophysics.
Ball, Daniel A 1991 Emeritus Professor Crop and Soil Science.
Barofsky, Douglas F 1984 Emeritus Professor Chemistry.
Barte, Georgene V 1961 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Bayne, Christopher J 1970 Emeritus Professor Integrative Biology.
Beatty, Joseph J 1974 Emeritus Senior Instructor I Integrative Biology.
Becker, Boris W 1970 Emeritus Professor College of Business.
Becker, Gerald L 1968 Emeritus Associate Professor College of Education.
Becker, Robert R 1962 Emeritus Professor Biochem/Biophysics.
Bell, Christopher A 1981 Emeritus Professor Sch of Civil/Constr Engr.
Bell, J R 1962 Emeritus Professor Sch of Civil/ Constr Engr.
Bell, John F 1959 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Bella, David A 1967 Emeritus Professor Sch of Civil/Constr Engr.
Bengtson, George W 1979 Emeritus Professor College of Forestry Adm.
Bennett, Andrew F 1987 Emeritus Professor Earth, Ocean \& Atmo Sci.
Bennett Jr, Cleon V 1959 Emeritus Professor Speech Communication.
Beran, Kurt 1975 Emeritus Assistant Professor College of Business.
Bergeron, D J 1974 Emeritus Associate Professor Fisheries and Wildlife.
Berry, Ralph E 1968 Emeritus Professor Ag Botany/Plant Path.
Beschta, Robert L 1974 Emeritus Professor Forest Ecosyst \& Society.
Besse Jr, Ralph S 1963 Emeritus Professor College of Ag Admin.
Binney, Stephen E 1973 Emeritus Professor Nuclear Engineering.
Birkes, David 1972 Emeritus Associate Professor Statistics (Science).
Bishop, Norman I 1963 Emeritus Professor Ag Botany/Plant Path.
Black, Harold M 1949 Emeritus Professor Extension Service Prgram.
Bliss, John C 1998 Emeritus Professor Forest Ecosyst \& Society.
Block, John H 1966 Emeritus Professor Pharmacy.
Bloome, Peter D 1997 Emeritus Professor Biol \& Ecol Engineering.
Bluhm, Wilbur L 1957 Emeritus Professor Extension Service Prgram.
Blythe, Linda L 1978 Emeritus Professor Vet Biomedical Science.
Bodyfelt, Floyd W 1964 Emeritus Professor Food Sci/Tech Extension.

Boedtker, Olaf A 1961 Emeritus Associate Professor Physics.
Boehlert, George W 2002 Emeritus Professor Fisheries and Wildlife.
Boersma, Larry L 1960 Emeritus Professor Crop and Soil Science.
Bond, Barbara J 1992 Emeritus Professor Forest Ecosyst \& Society.
Bonham, Earl E 1955 Emeritus Associate Professor Extension Service Prgram.
Boots, Donald S 1977 Emeritus Professor Student Health Services.
Borello, Daniel J 2014 Courtesy Appointment Assistant Professor Sch of Civil/Constr Engr.
Borgir, Tharald 1967 Emeritus Professor Music.
Borman, Michael M 1992 Emeritus Professor Animal \& Rnglnd Sciences.
Bottomley, Peter J 1979 Emeritus Professor Microbiology (Science).
Boucot, Arthur J 1969 Emeritus Professor Integrative Biology.
Bowker, Judith K 1991 Emeritus Associate Professor Speech Communication.
Boyle, James R 1981 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Braker, Marjorie J 1979 Emeritus Associate Professor EXT Fam/CommHlth OnCmps.
Branch, Harrison 1972 Emeritus Professor Art.
Brandt, Jeanette 1973 Emeritus Associate Professor College of Business.
Brandt, Patricia E 1962 Emeritus Professor Information Services.
Brandt, William H 1956 Emeritus Associate Professor Ag Botany/Plant Path.
Bray, Tammy M 2002 Dean Emeritus Public Hlth/HumanSci Adm.
Breen, Patrick J 1974 Emeritus Professor Horticulture.
Brennan, William J 1966 Emeritus Associate Professor Dean of Students.
Brewer, Donald H 1957 Emeritus Professor Crop and Soil Science.
Brewster, Bill D 1975 Emeritus Senior Instructor I Crop and Soil Science.
Britton, Gwyneth E 1965 Emeritus Professor College of Education.
Broderick, William P 1986 Emeritus Associate Professor College of Education.
Brodie, J Douglas 1975 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Brookhyser, Evelyn 1966 Emeritus Professor EXT Fam/CommHlth OnCmps.
Brooks, Raymond M 1997 Emeritus Professor College of Business.
Brooks, Royal H 1967 Emeritus Professor Biol \& Ecol Engineering.
Brown, Carol E 1978 Emeritus Associate Professor College of Business.
Brown, Clinton A 1970 Emeritus Professor Art.
Brown, Daniel J 1974 Emeritus Associate Professor College of Business.
Brown, Dorothy F 1955 Emeritus Professor Extension Service Prgram.
Brown, Joy B 1962 Emeritus Professor Extension Service Prgram.
Brown, Kenneth N 1963 Emeritus Professor Extension Service Prgram.
Brown, Lyle R 1970 Emeritus Professor Microbiology (Science).
Brown, Terence D 1975 Emeritus Professor Wood Science/Engr.
Brown III, George W 1966 Emeritus Professor Forest Eng/Resourcs/Mgmt.

Brown III, George W 1966 Dean Emeritus Professor College of Forestry Adm.
Browne, William G 1970 Emeritus Professor College of Business.
Brownell, Philip 1979 Emeritus Professor Integrative Biology.
Brumley, Richard L 1993 Emeritus Associate Professor Library.
Brunner, Charles C 1984 Emeritus Associate Professor Wood Science/Engr.
Bryan, M E 1972 Emeritus Associate Professor Univ Housing and Dining.
Bryant, Nancy O 1974 Emeritus Professor College of Business.
Buccola, Steven T 1980 Emeritus Professor Applied Economics.
Buckhouse, John C 1975 Emeritus Professor Animal \& Rnglnd Sciences.
Bucy, David A 1956 Emeritus Professor Facilities O\&M Admin.
Budd, Timothy A 1986 Emeritus Associate Professor Sch Elect Engr/Comp Sci.
Bull, Tina 1996 Emeritus Associate Professor Music.
Burgett, D M 1974 Emeritus Professor Horticulture.
Burke, Mary E 1985 Emeritus Senior Instructor I Microbiology (Science).
Burke, Michael J 1984 Emeritus Professor Horticulture.
Burns, Leslie D 1985 Emeritus Professor College of Business.
Burridge, Judith A 1968 Emeritus Professor Extension Service Prgram.
Burris, Nedry V 1968 Emeritus Assistant Professor Business Affairs.
Burt, John G 1973 Emeritus Professor General Agriculture.
Burt, Lawrence A 1979 Emeritus Associate Professor Applied Econ Extension.
Butcher, Karyle S 1981 Emeritus Professor Library.
Butler, David A 1975 Emeritus Professor Statistics (Science).
Butler, Marvin D 1991 Emeritus Professor Crop and Soil Science.
Byrne, John V 1964 Emeritus Professor Earth, Ocean \& Atmo Sci.
Byrne, John V 1964 President Emeritus Office of the President.

## c

Cadart-Ricard, Odette 1965 Emeritus Professor World Languag \& Cultures.
Caldwell, Douglas R 1968 Emeritus Professor Earth, Ocean \& Atmo Sci.
Caldwell, George R 2003 Emeritus Associate Professor Speech Communication.
Calvert, Janet K 1982 Emeritus Associate Professor Extension Service Prgram.
Calvert, Leonard J 1961 Emeritus Associate Professor Ext/Exp S Communications.
Cameron, H R 1955 Emeritus Professor Ag Botany/Plant Path.
Campbell, Elizabeth A 1984 Emeritus Professor Sch of Wrtg Lit \& Film.
Campbell, Kay 1987 Emeritus Professor Art.
Campbell III, Allan 1976 Emeritus Associate Professor Forest Ecosyst \& Society.
Cannon, Lynn E 1963 Emeritus Professor Extension Service Prgram.

Carey Jr, Andrew G 1961 Emeritus Professor Earth, Ocean \& Atmo Sci.
Carlson, Roy W 1958 Emeritus Associate Professor Sch of Wrtg Lit \& Film.
Carlson, Theodore H 1961 Emeritus Associate Professor Liberal Arts Admin.
Carr, Jay B 1979 Emeritus Professor Animal \& Rnglnd Sci Extn.
Carroll, Carleton W 1974 Emeritus Professor World Languag \& Cultures.
Carter, David S 1961 Emeritus Professor Mathematics.
Carter, W G 1980 Emeritus Associate Professor Extension Service Prgram.
Cassady, John M 2005 Emeritus Professor Pharmacy.
Castle, Emery N 1954 Emeritus Professor Applied Economics.
Caughey, Carol C 1990 Emeritus Associate Professor College of Business.
Chamberlain, David J 1980 Emeritus Professor Animal \& Rnglnd Sciences.
Chambers, Kenton L 1968 Emeritus Professor Ag Botany/Plant Path.
Champeau, Donna A 1995 Emeritus Associate Professor Sch of Soc/Bhav Hlth Sci.
Chau, May Y 1994 Emeritus Associate Professor Library.
Cheeke, Peter R 1965 Emeritus Professor Animal \& Rnglnd Sciences.
Chelton, Dudley B 1983 Emeritus Professor Earth, Ocean \& Atmo Sci.
Chen, Paul M 1978 Emeritus Professor Horticulture.
Chen, Tony H 1986 Emeritus Professor Horticulture.
Chesley, Marie M 1986 Emeritus Associate Professor Speech Communication.
Chilcote, David 1961 Emeritus Professor Crop and Soil Science.
Ching, Te M 1956 Emeritus Professor Crop and Soil Science.
Chona, Harbans S 1966 Emeritus Assistant Professor Library.
Christensen, Neil W 1978 Emeritus Professor Crop and Soil Science.
Church, D C 1956 Emeritus Professor Animal \& Rnglnd Sciences.
Clark, Glenn E 1968 Emeritus Professor College of Education.
Claypool, Donald W 1964 Emeritus Assistant Professor Animal \& Rnglnd Sciences.
Clinton, Richard L 1976 Emeritus Professor Political Science.
Clough, George H 1987 Emeritus Associate Professor Horticulture.
Coakley, Stella M 1988 Emeritus Professor Ag Botany/Plant Path.
Coakley Jr, James A 1988 Emeritus Professor Earth, Ocean \& Atmo Sci.
Coblentz, Bruce E 1975 Emeritus Professor Fisheries and Wildlife.
Cohen, LeoNora M 1985 Emeritus Associate Professor College of Education.
Cole, Richard L 1977 Emeritus Professor General Agriculture.
Collier, Robert W 1981 Emeritus Professor Earth, Ocean \& Atmo Sci.
Collison, Brooke B 1989 Emeritus Professor College of Education.
Conkey, Harlan D 1969 Emeritus Professor Speech Communication.

Conklin, Frank S 1968 Emeritus Professor Applied Economics.
Conner, Helen D 1963 Emeritus Professor Extension Service Prgram.
Constantine Jr, G H 1966 Emeritus Professor Pharmacy.
Conte, Frank P 1962 Emeritus Professor Integrative Biology.
Cook, Gordon H 1965 Emeritus Professor Crop and Soil Science.
Cook, Thomas W 1977 Emeritus Associate Professor Horticulture.
Coolen, Michael T 1978 Emeritus Professor Music.
Coolican, Patricia M 1978 Emeritus Professor Extension Service Prgram.
Copa, George H 1998 Emeritus Professor College of Education.
Corden, Malcolm E 1958 Emeritus Professor Ag Botany/Plant Path.
Cordray, Sheila M 1982 Emeritus Associate Professor Sociology.
Cowles, Timothy J 1984 Emeritus Professor Earth, Ocean \& Atmo Sci.
Crabtree, Garvin 1957 Emeritus Professor Horticulture.
Craig, Richard P 1974 Emeritus Associate Professor Extension Service Admin.
Crawford, David L 1958 Emeritus Professor COMES - Newport Exp Sta.
Crisman, Russell O 1979 Emeritus Associate Professor Vet Clinical Sciences.
Croft, Brian A 1982 Emeritus Professor Horticulture.
Cromack Jr, Kermit 1974 Emeritus Professor Forest Ecosyst \& Society.
Cross, Frank R 1969 Emeritus Professor College of Education.
Crowe, Frederick J 1984 Emeritus Associate Professor Ag Botany/Plant Path.
Crozier Jr, William 1961 Emeritus Professor Art.
Cruse, Donna F 1970 Emeritus Associate Professor Sch of Psychological Sci.
Cuenca, Richard H 1978 Emeritus Professor Biol \& Ecol Engineering.
Cull, Paul 1970 Emeritus Professor Sch Elect Engr/Comp Sci.
Curtis, Lawrence R 1999 Emeritus Professor Enviro/Molecular Toxic.
Cusimano, Barbara E 1988 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.

## D

D Ambrosio, Bruce D 1986 Emeritus Associate Professor Sch Elect Engr/Comp Sci.
Daeschel, Mark A 1988 Emeritus Professor
Food Science and Techno.
Dale, Robert D 1965 Emeritus Associate Professor Philosophy.
Daley, Laurence S 1983 Emeritus Professor Horticulture.
Dalrymple, G B 1994 Emeritus Professor Earth, Ocean \& Atmo Sci.
Dane, Charles W 1957 Emeritus Professor College of Business.
Daniels, Richard J 1970 Emeritus Associate Professor Sch of Wrtg Lit \& Film.
Danielson, Harold R 1968 Emeritus Senior Instructor I Crop and Soil Science.
Darnell, Thomas J 1978 Emeritus Professor Horticulture Extension.

Daugherty, Tracy D 1986 Emeritus Professor Sch of Wrtg Lit \& Film.
Davis, Lorin R 1969 Emeritus Professor Sch of Mech/Ind/Mfg Engr.
Davis, Steven L 1983 Emeritus Professor Animal \& Rnglnd Sciences.
Dawson, Peter S 1969 Emeritus Professor Integrative Biology.
Day, Paul E 1972 Emeritus Associate Professor Extension Service Prgram.
De Angelis, Jack D 1988 Emeritus Associate Professor College of Ag Admin.
De Kock, Carroll W 1967 Emeritus Professor Chemistry.
De Szoeke, Roland A 1977 Emeritus Professor Earth, Ocean \& Atmo Sci.
DeYoung, Bruce R 1988 Emeritus Professor College of Business.
Dealy, Glen D 1967 Emeritus Professor Political Science.
Deardorff, James W 1978 Emeritus Professor Earth, Ocean \& Atmo Sci.
Dedeurwaerder, Charles 1968 Emeritus Professor Liberal Arts Admin.
Dickinson, Ralph V 1968 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Dietterich, Thomas G 1985 Emeritus Professor Sch Elect Engr/Comp Sci.
Dillon, Thomas M 1976 Emeritus Professor Earth, Ocean \& Atmo Sci.
Dilson, Wolfgang O 1970 Emeritus Associate Professor World Languag \& Cultures.
Dix, Russell G 1964 Emeritus Associate Professor Office of the Registrar.
Doescher, Paul S 1980 Emeritus Professor Forest Ecosyst \& Society.
Doler, Thurston E 1949 Emeritus Professor Speech Communication.
Donatelle, Rebecca J 1984 Emeritus Associate Professor Sch of Soc/Bhav Hlth Sci.
Dost, Frank N 1962 Emeritus Professor Enviro/ Molecular Toxic.
Doudoroff, Eve-Mary 1962 Emeritus Assistant Professor World Languag \& Cultures.
Douglass, James M 1968 Emeritus Professor Music.
Drexler Jr, John A 1983 Emeritus Associate Professor College of Business.
Duddles, Ralph E 1988 Emeritus Associate Professor Forestry \& Natrl Res Ext.
Duncan, James A 1976 Emeritus Professor Ag Communications.
Duncan, Robert A 1977 Emeritus Professor Earth, Ocean \& Atmo Sci.
Dunn, James W 1963 Emeritus Professor Office of Development.
Dunn, John M 1975 Emeritus Professor Sch of Bio/Pop Hlth Sci.
Dunnington, Leslie G 1969 Emeritus Associate Professor Counseling Center.
Dutson, Thayne R 1987 Emeritus Professor Food Science and Techno.
Dutson, Thayne R 1987 Dean Emeritus College of Ag Admin.
Duvall, Betty 1995 Emeritus Professor College of Education.

## E

Easterday, Harry T 1955 Emeritus Professor Physics.
Easton, Edison E 1951 Emeritus Professor College of Business.

Eddleman, Lee E 1981 Emeritus Professor Animal \& Rnglnd Sciences.
Ede, Lisa S 1980 Emeritus Professor Sch of Wrtg Lit \& Film.
Edwards, Barbara E 1997 Emeritus Associate Professor Mathematics.
Eiseman, David 1968 Emeritus Professor Music.
Elwood, Norman E 1979 Emeritus Associate Professor Forest Eng/Resourcs/Mgmt.
Emmingham, William H 1980 Emeritus Professor Forest Ecosyst \& Society.
Engel, Evelyn A 1975 Emeritus Professor Ext/ Exp S Communications.
Engel Jr, Harold N 1979 Emeritus Professor Veterinary Medicine.
English, Marshall J 1978 Emeritus Professor Biol \& Ecol Engineering.
Erickson, Dianne K 1987 Emeritus Associate Professor College of Education.
Erickson, Linda P 1979 Emeritus Professor Ext Clackamas Co Office.
Esbensen, Steven K 1977 Emeritus Professor Earth, Ocean \& Atmo Sci.
Evans, Glenn T 1977 Emeritus Professor Chemistry.
Evans, Gwil 1966 Emeritus Professor Ag Communications.
Evans, Thomas P 1968 Emeritus Professor College of Education.

## F

Fairchild, Clifford 1962 Emeritus Professor Physics.
Falk, John H 2003 Emeritus Professor College of Education.
Farber, Paul L 1970 Emeritus Professor History.
Farber, Vreneli R 1979 Emeritus Professor World Languag \& Cultures.
Farkas, Daniel F 1990 Emeritus Professor Food Science and Techno.
Farness, Donald H 1964 Emeritus Associate Professor Economics.
Faudskar, John D 1972 Emeritus Assistant Professor Fisheries and Wildlife.
Faulkenberry, G D 1991 Emeritus Professor Statistics (Science).
Fein, Burton I 1970 Emeritus Professor Mathematics.
Fendall, Roger K 1968 Emeritus Professor Crop and Soil Science.
Fielder, William R 1971 Emeritus Professor College of Education.
Fink, Gregory B 1964 Emeritus Professor Pharmacy.
Firth, James L 1973 Emeritus Associate Professor College of Education.
Fischer, C M 1947 Emeritus Professor Animal \& Rnglnd Sci Extn.
Fisher, Glenn C 1976 Emeritus Professor Crop and Soil Science.
Fisk, Martin R 1983 Emeritus Professor Earth, Ocean \& Atmo Sci.
Flaherty, Francis J 1967 Emeritus Professor Mathematics.
Fletcher, Richard A 1979 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Fletcher, Roger L 1967 Emeritus Professor Extension Service Admin.
Folts, James A 1971 Emeritus Professor Art.
Fontana, Peter R 1967 Emeritus Professor Physics.

Foster, James C 1985 Emeritus Professor Political Science.
Frakes, Rodney V 1960 Emeritus Professor VP for Research.
France, Thomas T 1969 Emeritus Assistant Professor Library.
Francis, Sally K 1982 Dean Emeritus Professor Graduate School Admin.
Francis, Sally K 1982 Emeritus Professor Sch of Soc/Bhav Hlth Sci.
Frank, Robert J 1970 Emeritus Professor Liberal Arts Admin.
Fraundorf, Martha N 1975 Emeritus Associate Professor Economics.
Freeman, Peter K 1968 Emeritus Professor Chemistry.
Frei, Balz B 1997 Emeritus Professor Biochem/ Biophysics.
Frenkel, Robert E 1965 Emeritus Professor Earth, Ocean \& Atmo Sci.
Friedemann, Dale H 1966 Emeritus Professor Extension Service Prgram.
Frischknecht, W D 1956 Emeritus Professor Extension Service Prgram.
Frishkoff, Patricia A 1978 Emeritus Professor College of Business.
Fritzell, Erik K 1994 Emeritus Professor Fisheries and Wildlife.
Froman, David P 1984 Emeritus Animal \& Rnglnd Sciences.
Fuchigami, Leslie H 1970 Emeritus Professor Horticulture.

## G

Gamble, Wilbert 1962 Emeritus Professor Biochem/Biophysics.
Gamroth, Michael J 1974 Emeritus Professor Animal \& Rnglnd Sci Extn.
Garcia, Kay S 1988 Emeritus Professor World Languag \& Cultures.
Gardner Jr, John A 1973 Emeritus Professor Physics.
Garity, Dennis J 1981 Emeritus Professor Mathematics.
Garland, John J 1973 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Gates, Dillard H 1980 Emeritus Professor Animal \& Rnglnd Sciences.
Gates, W L 1998 Emeritus Professor Earth, Ocean \& Atmo Sci.
Gelberg, Howard B 2001 Emeritus Professor Vet Biomedical Science.
Geller, Bruce L 1987 Emeritus Professor Microbiology (Science).
Gentle, Thomas H 1976 Emeritus Professor Ext/Exp S Communications.
George, Melvin R 1984 Emeritus Professor Information Services.
George, Richard A 1969 Emeritus Associate Professor Speech Communication.
Georgiou, Constance 1987 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Gibbs, Wallace E 1958 Emeritus Professor Office of the Registrar.
Gillis, John S 1976 Emeritus Professor Sch of Psychological Sci.
Gingrich, Gale A 1973 Emeritus Professor Crop and Soil Science.
Glass, William R 1956 Emeritus Professor College of Business.
Gleicher, Gerald J 1966 Emeritus Professor Chemistry.

Gobeli, David H 1982 Emeritus Professor College of Business.
Goering, Lois A 1988 Emeritus Assistant Professor EXT Fam/CommHlth OnCmps.
Gonor, Jefferson J 1964 Emeritus Professor Earth, Ocean \& Atmo Sci.
Gonzales-Berry, Erlinda V 1997 Emeritus Professor Ethnic Studies.
Good, James W 1980 Emeritus Professor Earth, Ocean \& Atmo Sci.
Gordon, Louis I 1966 Emeritus Associate Professor Earth, Ocean \& Atmo Sci.
Gravatt, Margaret 1973 Emeritus Professor Student Health Services.
Gray, Clifford F 1961 Emeritus Professor College of Business-Adm.
Greer, Arthur 1981 Emeritus Associate Professor Applied Economics.
Gregerson, Donna M 1974 Emeritus Professor EXT Fam/CommHlth OnCmps.
Gregory, Stanley V 1981 Emeritus Professor Fisheries and Wildlife.
Griggs, Lawrence F 1972 Emeritus Associate Professor Educ Opportunities Prgm.
Grigsby, Tom E 1973 Emeritus Associate Professor College of Education.
Grosskopf, Shawna P 1998 Emeritus Professor Economics.
Grunder, Anita L 1986 Emeritus Professor Earth, Ocean \& Atmo Sci.
Guenther, Ronald B 1967 Emeritus Professor Mathematics.
Gutbrod, Oscar A 1966 Emeritus Assistant Professor Crop and Soil Science.
H
Hackleman, Debra B 1978 Emeritus Associate Professor Library.
Hagelstein, Fred 1958 Emeritus Professor Extension Service Prgram.
Hall, James D 1963 Emeritus Professor Fisheries and Wildlife.
Hall, Roberta L 1975 Emeritus Professor Anthropology.
Halse, Richard R 1990 Emeritus Senior Instructor I Ag Botany/Plant Path.
Hamilton, Margaret E 1957 Emeritus Professor Extension Service Prgram.
Hamilton, Robert R 1968 Emeritus Professor Extension Service Prgram.
Hamm, Philip B 1975 Emeritus Professor Ag Botany/Plant Path.
Hancock, Astrid F 1963 Emeritus Assistant Professor Sch of Bio/Pop Hlth Sci.
Hanna, Susan S 1977 Emeritus Professor Applied Economics.
Hansen, Everett M 1972 Emeritus Professor Ag Botany/Plant Path.
Hansen, Herbert E 1974 Emeritus Associate Professor College of Ag Admin.
Hansen, N J 1998 Emeritus Professor College of Ag Extension.
Hardesty, David P 1970 Emeritus Professor Art.
Harding, Anna K 1987 Emeritus Professor Sch of Bio/Pop Hlth Sci.
Harmon, Mark E 1981 Emeritus Professor Forest Ecosyst \& Society.
Harper, James A 1942 Emeritus Professor Animal \& Rnglnd Sciences.
Harris, Irwin C 1947 Emeritus Professor Memorial Union.

Harrison, William L 1974 Emeritus Professor College of Business-Adm.
Hart, Dianne W 1981 Emeritus Senior Instructor I World Languag \& Cultures.
Hart, John M 1984 Emeritus Professor Crop and Soil Science.
Hart, Ralph D 1969 Emeritus Professor Crop/ Soil Sci Extension.
Harward, Moyle E 1956 Emeritus Professor Crop and Soil Science.
Hashimoto, Andrew G 1986 Emeritus Professor Biol \& Ecol Engineering.
Hathaway, Ronald L 1972 Emeritus Animal \& Rnglnd Sci Extn.
Haun, James F 1964 Emeritus Professor Office of the Registrar.
Haverson, Wayne W 1978 Emeritus Professor College of Education.
Hawkes, Stephen J 1968 Emeritus Professor Chemistry.
Hay, James W 1977 Emeritus Senior Instructor I Horticulture.
Hayes, Wilson C 1998 Emeritus Professor Sch of Bio/Pop Hlth Sci.
Headrick, Charlotte J 1982 Emeritus Professor Speech Communication.
Heath, Kathleen F 1967 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Hedberg, Kenneth W 1955 Emeritus Professor Chemistry.
Heidel, Jerry R 1988 Emeritus Professor Vet Biomedical Science.
Heikkila, Paul A 1969 Emeritus Associate Professor Fisheries and Wildlife.
Hellickson, Martin L 1975 Emeritus Associate Professor Biol \& Ecol Engineering.
Helmick, Sandra A 1991 Emeritus Professor Sch of Soc/Bhav Hlth Sci.
Hemphill, Delbert D 1976 Emeritus Professor Horticulture.
Hendricks, Jerry D 1975 Emeritus Professor Enviro/Molecular Toxic.
Hendricks, Jon A 1988 Emeritus Professor Sociology.
Hendricks, Jon A 1988 Emeritus Professor Univ Honors College.
Hermann, Richard K 1961 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Herzog, James H 1967 Emeritus Associate Professor Sch Elect Engr/Comp Sci.
Hetherington, William M 1987 Emeritus Associate Professor Physics.
Hibbs, David E 1983 Emeritus Professor Forest Ecosyst \& Society.
Hicks, Russell G 1975 Emeritus Professor College of Engineering.
Higgins, Karen 1986 Emeritus Associate Professor College of Education.
Hildebrandt, Emery V 1954 Emeritus Professor Speech Communication.
Hilderbrand, Kenneth S 1969 Emeritus Associate Professor Food Science and Techno. Hisaw, Frederick L 1958 Emeritus Associate Professor Integrative Biology.
Hixon, Mark A 1984 Emeritus Professor Integrative Biology.
Hobbs, Beverly B 1989 Emeritus Professor EXT 4-H YouthDev OnCmps.
Hobbs, Stephen D 1978 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Holdren, Rich 1987 Vice Provost Emeritus Professor VP for Research.

Holman, Robert A 1979 Emeritus Professor Earth, Ocean \& Atmo Sci.
Holmes, Zoe A 1974 Emeritus Professor Sch of Bio/Pop Hlth Sci.
Holtan, Donald W 1975 Emeritus Associate Professor Animal \& Rnglnd Sciences.
Holyoak, Arlene 1981 Emeritus Associate Professor Sch of Soc/Bhav Hlth Sci.
Horne, Frederick H 1986 Emeritus Professor Chemistry.
Horowitz, Irwin A 1994 Emeritus Professor Sch of Psychological Sci.
Horton, Howard F 1957 Emeritus Professor Fisheries and Wildlife.
Hosoi, Yasuharu T 1969 Emeritus Associate Professor Philosophy.
Houck, Lynne D 1997 Emeritus Professor Integrative Biology.
Houglum, Lyla E 1985 Emeritus Professor Liberal Arts Admin.
Hovland, Clarence W 1949 Emeritus Professor Liberal Arts Admin.
Howell, Michael E 1973 Emeritus Professor Animal \& Rnglnd Sciences.
Huber, Wayne C 1991 Emeritus Professor Sch of Civil/Constr Engr.
Huddleston, J H 1975 Emeritus Professor Crop and Soil Science.
Hudspeth, Robert T 1974 Emeritus Professor Sch of Civil/Constr Engr.
Hutton, Norman E 1977 Emeritus Professor Veterinary Medicine.
Huyer, Adriana 1972 Emeritus Professor Earth, Ocean \& Atmo Sci.


Ingle Jr, James D 1971 Emeritus Professor Chemistry.
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Jacobson, Robert W 1967 Emeritus Professor Extension Service Prgram.
Jarvis, Robert L 1971 Emeritus Professor Fisheries and Wildlife.
Jeffers, Ronald H 1974 Emeritus Associate Professor Music.
Jeffrey Jr, Hugh F 1950 Emeritus Professor Business Affairs.
Jensen, Edward C 1976 Emeritus Professor Forest Ecosyst \& Society.
Johnson, Arthur G 1966 Emeritus Professor Radiation Center.
Johnson, Arthur G 1966 Emeritus Professor Nuclear Engineering.
Johnson, Douglas E 1982 Emeritus Professor Animal \& Rnglnd Sciences.
Johnson, Duane P 1959 Emeritus Professor College of Education.

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Johnson, Sharon D 2000 Emeritus Associate Professor Sch of Soc/Bhav Hlth Sci.
Johnson, Simon S 1971 Emeritus Associate Professor Sch of Wrtg Lit \& Film.
Johnson Jr, W C 1968 Emeritus Professor Biochem/Biophysics.
Johnston, Alberta B 1963 Emeritus Professor Extension Service Admin.
Johnston, LaRea D 1960 Emeritus Senior Instructor I Ag Botany/Plant Path.
Johnston, Richard S 1966 Emeritus Professor Applied Economics.
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Keller, George H 1975 Emeritus Professor Earth, Ocean \& Atmo Sci.
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Kemp, Patrick S 1974 Emeritus Professor College of Business.
Kennedy, Timothy C 1976 Emeritus Professor Sch of Mech/Ind/Mfg Engr.
Kenneke, Larry J 1970 Emeritus Professor College of Education.
Kerkvliet, Joe R 1988 Emeritus Professor Economics.
Kerkvliet, Nancy I 1977 Emeritus Professor Enviro/Molecular Toxic.
Ketchum, Lynn G 1988 Emeritus Professor Ext/ Exp S Communications.
Kiekel, Robert D 1966 Emeritus Associate Professor World Languag \& Cultures.
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Kiigemagi, Ulo 1954 Emeritus Senior Instructor I Enviro/Molecular Toxic.
Kimerling, A J 1976 Emeritus Professor Earth, Ocean \& Atmo Sci.
Kimura, Shoichi 1989 Emeritus Professor Sch of Chem/Bio/Envr Eng.
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King, Charles E 1977 Emeritus Professor Integrative Biology.
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King, Jonathan B 1980 Emeritus Associate Professor College of Business.
King, Keith I 1969 Emeritus Senior Instructor I Integrative Biology.
King, Lynda J 1986 Emeritus Professor World Languag \& Cultures.

King, Nancy J 2000 Emeritus Professor College of Business.
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Kirk, Dale E 1954 Emeritus Professor Biol \& Ecol Engineering.
Klein, Andrew C 1985 Emeritus Professor Nuclear Engineering.
Kleinsorge, Ilene K 1987 Dean Emeritus Associate Professor College of Business.
Klemke, Lloyd W 1970 Emeritus Professor Sociology.
Kling, Gerald F 1974 Emeritus Associate Professor Crop and Soil Science.
Klingeman, Peter C 1966 Emeritus Professor Sch of Civil/Constr Engr.
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Knothe, Carol A 1972 Emeritus Associate Professor Ext Malheur Co Office.
Knutson, Devon D 1994 Emeritus Associate Professor Animal \& Rnglnd Sciences.
Kocher, Carl A 1973 Emeritus Professor Physics.
Koepsell, Paul A 1969 Emeritus Professor Ag Botany/Plant Path.
Koester, Ardis W 1974 Emeritus Professor EXT Fam/CommHlth OnCmps.
Kogan, Marcos 1991 Emeritus Professor Horticulture.
Kolbe, Edward R 1974 Emeritus Professor Biol \& Ecol Engineering.
Kolding, Mathias F 1967 Emeritus Senior Instructor I Hermiston Exp Sta.
Komar, Paul D 1970 Emeritus Professor Earth, Ocean \& Atmo Sci.
Koong, Ling-Jung 1987 Emeritus Professor Animal \& Rnglnd Sciences.
Kozlik, Charles J 1961 Emeritus Associate Professor Wood Science/Engr.
Kradjan, Wayne A 1998 Dean Emeritus Professor College of Pharmacy-Adm.
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Krantz, Gerald W 1955 Emeritus Professor Integrative Biology.
Krueger, James H 1961 Emeritus Professor Chemistry.
Krueger, Judith C 1966 Emeritus Senior Instructor I Music.
Krueger, William C 1971 Emeritus Professor Animal \& Rnglnd Sciences.
Kulm, Laverne D 1964 Emeritus Professor Earth, Ocean \& Atmo Sci.

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Landau, Rubin H 1974 Emeritus Professor Physics.
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Larson, Erik W 1980 Emeritus Professor College of Business.
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Larwood, Lillian L 1988 Emeritus Professor EXT 4-H YouthDev OnCmps.
Laursen, Harold I 1963 Emeritus Professor Sch of Civil/Constr Engr.
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Laver, Murray L 1969 Emeritus Associate Professor Wood Science/Engr.
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Lawrence, Robert D 1970 Emeritus Associate Professor Earth, Ocean \& Atmo Sci.
Lawrence, Robert E 1974 Emeritus Associate Professor Information Services.
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Lawton, Stephen J 1976 Emeritus Associate Professor College of Business.
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Leeson, Theodore A 1984 Emeritus Senior Instructor I Sch of Wrtg Lit \& Film.
Leffel, John A 1962 Emeritus Professor Extension Service Prgram.
Leklem, James E 1975 Emeritus Professor Sch of Bio/Pop Hlth Sci.
Leman, Nancy F 1971 Emeritus Instructor Sch of Wrtg Lit \& Film.
Leno, Janice R 1988 Emeritus Associate Professor EXT Fam/CommHlth OnCmps.
Leong, Joann C 1975 Emeritus Professor Microbiology (Science).
Levenspiel, Octave 1969 Emeritus Professor Sch of Chem/Bio/Envr Eng.
Levi, Shaul 1977 Emeritus Professor Earth, Ocean \& Atmo Sci.
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Lillie, Robert J 1984 Emeritus Professor Earth, Ocean \& Atmo Sci.
Liss, William J 1977 Emeritus Professor Fisheries and Wildlife.
List, Peter C 1967 Emeritus Professor Philosophy.
Locke, Kerry A 1985 Emeritus Professor Crop and Soil Science.
Loeb, Barbara E 1985 Emeritus Associate Professor Art.
Lombard, Porter B 1963 Emeritus Professor Horticulture.
Lomonte, Rosemarie 1959 Emeritus Associate Professor Information Services.
Lovell, Ronald P 1972 Emeritus Professor Sch of Wrtg Lit \& Film.
Lowrie, Miriam E 1971 Emeritus Professor Ext Polk County Office.
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Lundy, James R 1990 Emeritus Associate Professor College of Engineering.
Lunner, Marilyn J 1968 Emeritus Associate Professor Extension Service Prgram.

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Maksud, Michael G 1980 Dean Emeritus Professor Sch of Bio/Pop Hlth Sci.
Males, James R 1998 Emeritus Professor Animal \& Rnglnd Sciences.
Mallory-Smith, Carol A 1994 Emeritus Professor Crop and Soil Science.
Malouf, Robert E 1991 Emeritus Professor Fisheries and Wildlife.
Malueg, Sara E 1966 Emeritus Professor World Languag \& Cultures.
Malueg, Sara E 1966 Emeritus Liberal Arts Admin.
Manlove, Anne K 1982 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Manore, Melinda M 1998 Emeritus Professor Sch of Bio/Pop Hlth Sci.
Mansour, N S (Bill) 1970 Emeritus Professor Horticulture Extension.
Maresh, Thomas J 1967 Dean Emeritus Graduate School Admin.
Maresh, Thomas J 1967 Emeritus Professor Earth, Ocean \& Atmo Sci.
Markle, Douglas F 1985 Emeritus Professor Fisheries and Wildlife.
Martin, Lloyd W 1967 Emeritus Professor North Willamette Exp Sta.
Marvell, Elliot N 1948 Emeritus Professor Chemistry.
Mason, Barbara J 2000 Emeritus Associate Professor Speech Communication.
Massie, John W 1956 Emeritus Professor Extension Service Prgram.
Mast, M JoAnn 1990 Emeritus Professor College of Education.
Mathany, Allan R 1975 Emeritus Associate Professor Budget/Fiscal Planning.
Mathews, Christopher K 1978 Emeritus Professor Biochem/Biophysics.
Matsumoto, Masakazu 1975 Emeritus Professor Veterinary Medicine.
Matzke, Gordon E 1977 Emeritus Professor Earth, Ocean \& Atmo Sci.
Maughan, Laurel S 1972 Emeritus Associate Professor Library.
Mc Caughan, William T 2000 Emeritus Extended Campus.
Mc Clellan, Thomas J 1945 Emeritus Professor Sch of Civil/Constr Engr.
Mc Clintock, Thomas C 1959 Emeritus Professor History.
Mc Clintock, Thomas C 1959 Emeritus Liberal Arts Admin.
Mc Comb, Brenda C 1987 Emeritus Professor Forest Ecosyst \& Society.
Mc Comb, Brenda C 1987 Dean Emeritus Professor Graduate School Admin.
Mc Creight, Keith R 1971 Emeritus Assistant Professor Financial Aid/Scholarshp.
Mc Cubbin, Jeffrey A 1988 Emeritus Professor Sch of Bio/Pop Hlth Sci.

Mc Daniel, Mina R 1983 Emeritus Professor Food Science and Techno.
Mc Farland, Floyd B 1963 Emeritus Associate Professor Economics.
Mc Farlane, Dale D 1965 Emeritus Professor College of Business.
Mc Grath, Edward G 1965 Emeritus Professor Political Science.
Mc Innis, Mike L 1985 Emeritus Professor Animal \& Rnglnd Sciences.
Mc Intire, Charles D 1961 Emeritus Professor Ag Botany/Plant Path.
Mc Lain, Thomas E 1993 Emeritus Professor Wood Science/Engr.
Mc Mahan, Linda R 2000 Emeritus Associate Professor Horticulture.
Mc Mullen, B Starr 1980 Emeritus Professor Economics.
Mc Murray, David A 1994 Emeritus Associate Professor Anthropology.
Mc Neilan, Ray A 1964 Emeritus Professor Horticulture Extension.
Mc Reynolds, Robert B 1982 Emeritus
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McGrath, Daniel M 1983 Emeritus Professor Horticulture.
Mead, Clifford S 1986 Emeritus Professor Library.
Megale, Donald M 1958 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
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Menino Jr, Alfred R 1984 Emeritus Professor Animal \& Rnglnd Sciences.
Messersmith, Ann M 1978 Emeritus Professor Public Hlth/HumanSci Adm.
Meyer, Howard H 1983 Emeritus Professor Animal \& Rnglnd Sciences.
Michael, Carol L 1989 Emeritus Associate Professor EXT Fam/CommHlth OnCmps.
Michael, Robert E 1968 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Miles, Stanley D 1966 Emeritus Associate Professor Applied Economics.
Miller, Charles B 1970 Emeritus Professor Earth, Ocean \& Atmo Sci.
Miller, Donald J 1960 Emeritus Associate Professor Wood Science/Engr.
Miller, Jeffrey C 1979 Emeritus Professor Horticulture.
Miller, Richard F 1977 Emeritus Professor Animal \& Rnglnd Sciences.
Miller, Robert N 1987 Emeritus Professor Earth, Ocean \& Atmo Sci.
Miller, Ronald L 1987 Emeritus Professor College of Business.
Miller, Terry L 1970 Emeritus Professor Enviro/ Molecular Toxic.
Mills, Dallice I 1976 Emeritus Professor Ag Botany/Plant Path.
Mills, Randall R 1984 Emeritus Associate Professor Animal \& Rnglnd Sci Extn.
Milota, Michael R 1988 Emeritus Professor Wood Science/Engr.
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Minnick, Miriam S 1957 Emeritus Professor Information Services.
Minoura, Toshimi 1982 Emeritus Associate Professor Sch Elect Engr/Comp Sci.

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Mitchell Jr, Richard G 1979 Emeritus Professor Sociology.
Mix, Michael C 1970 Emeritus Professor Integrative Biology.
Mobley, Ronald T 1968 Emeritus Professor Horticulture.
Mohler, Ronald 1972 Emeritus Assistant Professor Sch Elect Engr/Comp Sci.
Mok, David W 1975 Emeritus Professor Horticulture.
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Moore, Frank L 1975 Emeritus Professor Integrative Biology.
Moore, James A 1979 Emeritus Professor Biol \& Ecol Engineering.
Moore, Mark P 1990 Emeritus Professor Speech Communication.
Moore, Sylvia L 1966 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Moran, Patricia 1989 Emeritus Associate Professor Sch of Soc/Bhav Hlth Sci.
Morita, Richard Y 1962 Emeritus Professor Microbiology (Science).
Morris, John E 1968 Emeritus Professor Integrative Biology.
Morris Jr, Robert J 1965 Emeritus Associate Professor Earth, Ocean \& Atmo Sci.
Morrison, Betty J 1973 Emeritus Associate Professor Extension Service Prgram.
Morrissey, Michael T 1990 Emeritus Professor Food Science and Techno.
Morrow, Alice M 1980 Emeritus Professor EXT Fam/CommHlth OnCmps.
Mosher, Wayne D 1948 Emeritus Professor Extension Service Admin.
Mosley, Alvin R 1977 Emeritus Associate Professor Crop and Soil Science.
Moule, Jean G 1997 Emeritus Associate Professor College of Education.
Muckleston, Keith W 1965 Emeritus Professor Earth, Ocean \& Atmo Sci.
Muir, Patricia S 1987 Emeritus Ag Botany/Plant Path.
Mukatis, W Alfred 1980 Emeritus Associate Professor College of Business.
Mumaw, Catherine R 1987 Emeritus Associate Professor Sch of Soc/Bhav Hlth Sci.
Murphy, Glen E 2001 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Murphy, Lea F 1980 Emeritus Associate Professor Mathematics.
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Musser, Gary L 1972 Emeritus Professor Mathematics.

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Newburgh, R W 1958 Emeritus Professor Biochem/Biophysics.
Newton, Michael 1960 Emeritus Professor Forest Eng/Resourcs/Mgmt.
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Niem, Alan R 1970 Emeritus Professor Earth, Ocean \& Atmo Sci.
Niess, Margaret L 1978 Emeritus Professor College of Education.
Nolan, Mary L 1973 Emeritus Professor Earth, Ocean \& Atmo Sci.
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Northcraft, Martin E 1955 Emeritus Associate Professor Sch of Civil/Constr Engr.
Nye, Mary J 1994 Emeritus Professor History.
Nye, Robert A 1994 Emeritus Professor History.

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Oldfield, James E 1951 Emeritus Professor Animal \& Rnglnd Sciences.
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Olson, Geraldine I 1975 Emeritus Professor Sch of Soc/Bhav Hlth Sci.
Olson, Robert E 1968 Emeritus Professor Fisheries and Wildlife.
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Patterson, Kenneth D 1959 Emeritus Professor Economics.
Patton, Nephi M 1972 Emeritus Professor Lab Animal Resources.
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Pearcy, William G 1960 Emeritus Professor Earth, Ocean \& Atmo Sci.
Pearson, Erwin G 1982 Emeritus Professor Veterinary Medicine.
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Pease, James R 1972 Emeritus Professor Earth, Ocean \& Atmo Sci.
Peckham, Charles W 1965 Emeritus Assistant Professor Printing and Mailing Svc.
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Penn, John R 1972 Emeritus Professor Vice Prov/Student Aff.
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Peters, Amy 1992 Emeritus Professor Animal \& Rnglnd Sciences.
Peters, Jean H 1958 Emeritus Associate Professor Public Hlth/HumanSci Adm.
Peters, Kurt M 1996 Emeritus Professor Ethnic Studies.
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Petzel, Florence E 1960 Emeritus Professor College of Business.
Phelps, David W 1965 Emeritus Professor Sch of Soc/Bhav Hlth Sci.
Philbrick, David A 1983 Emeritus Associate Professor Public Hlth/HumanSci Adm.
Philipp, Kurt D 1963 Emeritus Associate Professor History.
Phillips, Robert L 1957 Emeritus Professor Liberal Arts Admin.
Phipps, Wanda L 1968 Emeritus Associate Professor Extension Service Prgram.
Pierce, Donald A 1966 Emeritus Professor Statistics (Science).
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Reistad, Gordon M 1970 Emeritus Professor Sch of Mech/Ind/Mfg Engr.
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Roberts, Lani 1989 Emeritus Associate Professor Philosophy.
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Robinson, David M 1977 Emeritus Professor Sch of Wrtg Lit \& Film.
Robinson, Kay C 1970 Emeritus Associate Professor Admissions.
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Rubert, Steven C 1991 Emeritus Professor History.
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Saugen, John L 1964 Emeritus Associate Professor Sch Elect Engr/Comp Sci.
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Sawer, Barbara J 1974 Emeritus Professor Extension 4-H Youth.
Sayre, Henry M 1983 Emeritus Professor Art.
Scanlan, Michael J 1981 Emeritus Associate Professor Philosophy.
Scanlan, Richard A 1964 Emeritus VP for Research.
Scanlan, Richard A 1964 Emeritus Professor Food Science and Techno.
Schafer, Daniel W 1982 Emeritus Professor Statistics (Science).
Schaffer, Kay F 1994 Emeritus Professor Sch of Psychological Sci.
Schaffer, Kay F 1994 Emeritus Liberal Arts Admin.
Schauber, Ann C 1978 Emeritus Professor Liberal Arts Admin.
Schaup, Henry W 1973 Emeritus Professor Biochem/Biophysics.
Schimerlik, Michael I 1978 Emeritus Professor Biochem/Biophysics.

Schmall, Vicki L 1972 Emeritus Professor Extension Service Prgram.
Schmisseur, Wilson E 1971 Emeritus Associate Professor Applied Economics.
Schmitt, Roman A 1966 Emeritus Professor Chemistry.
Schneider, Gary L 1964 Emeritus Professor Extension Service Prgram.
Schori, Richard M 1978 Emeritus Professor Mathematics.
Schroeder, Jane F 1960 Emeritus Professor Extension Service Prgram.
Schroeder, W Lee 1967 Emeritus Professor College of Engineering.
Schroeder, Walter G 1949 Emeritus Professor Extension Service Prgram.
Schuyler, Michael W 1980 Emeritus Professor Chemistry.
Schwartz, Robert B 1978 Emeritus Professor Sch of Wrtg Lit \& Film.
Scott, Nan H 1972 Emeritus Senior Instructor I Crop and Soil Science.
Scott, Shirley R 1988 Emeritus Assistant Professor Library.
Seim, Wayne K 1968 Emeritus Senior
Instructor I Fisheries and Wildlife.
Selivonchick, Daniel P 1976 Emeritus Professor Food Science and Techno.
Sessions, John 1983 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Seville, Mary A 1983 Emeritus Associate Professor College of Business.
Shangmao, AI 2016 Emeritus Associate Professor Sch of Civil/Constr Engr.
Sharrow, Steven H 1976 Emeritus Professor Animal \& Rnglnd Sciences.
Sheets, Willis A 1959 Emeritus Professor Extension Service Prgram.
Shelby, Bo 1976 Emeritus Professor Forest Ecosyst \& Society.
Sherr, Barry F 1990 Emeritus Professor Earth, Ocean \& Atmo Sci.
Sherr, Evelyn B 1990 Emeritus Professor Earth, Ocean \& Atmo Sci.
Shibley, Gloria O 1965 Emeritus Professor Extension Service Prgram.
Shindler, Bruce A 1988 Emeritus Professor Forest Ecosyst \& Society.
Shirley, Robert E 1967 Emeritus Associate Professor College of Business-Adm.
Shively, Stanley E 1970 Emeritus Associate Professor Sociology.
Shock, Clinton C 1984 Emeritus Professor Malheur Exp Sta.
Shumway, Sallyann M 1963 Emeritus Associate Professor EXT Fam/CommHlth OnCmps.
Siemens, Philip J 1988 Emeritus Professor Physics.
Sillars, David 2002 Emeritus Associate Professor Sch of Civil/Constr Engr.
Simko, Benedict C 1978 Emeritus Professor Crop and Soil Science.
Simmons, Dale D 1963 Emeritus Professor Sch of Psychological Sci.
Simon-Brown, Viviane M 1994 Emeritus Professor Forest Ecosyst \& Society.
Simoneit, Bernd R 1981 Emeritus Professor Earth, Ocean \& Atmo Sci.
Simonson, Gerald H 1961 Emeritus Professor Crop and Soil Science.
Sisson, Carol F 1975 Emeritus Associate Professor College of Education.

Sisson, David 2005 Emeritus Professor Vet Clinical Sciences.
Sjogren, Christine O 1960 Emeritus Professor World Languag \& Cultures.
Skaugset, Arne E 1986 Emeritus Associate Professor Forest Eng/Resourcs/Mgmt.
Skubinna, Tammy K 1983 Emeritus Professor Sch of Soc/Bhav Hlth Sci.
Sleight, Arthur W 1989 Emeritus Professor Chemistry.
Slocombe, Edmond N 1986 Emeritus Associate Professor Extension Service Prgram.
Slotta, Larry S 1962 Emeritus Professor Sch of Civil/Constr Engr.
Small, Lawrence F 1961 Emeritus Professor Earth, Ocean \& Atmo Sci.
Smiley, Janice M 1978 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Smiley, Richard W 1985 Emeritus Professor Ag Botany/Plant Path.
Smiley, William E 1987 Emeritus Associate Professor College of Education.
Smith, Alvin W 1980 Emeritus Professor Veterinary Medicine.
Smith, Bradford B 1983 Emeritus Professor Veterinary Medicine.
Smith, Charles E 1961 Emeritus Professor Sch of Mech/Ind/Mfg Engr.
Smith, Courtland L 1969 Emeritus Professor Anthropology.
Smith, Frederick J 1964 Emeritus Professor Sea Grant.
Smith, J W 1965 Emeritus Professor Mathematics.
Smith, Margaret M 1977 Emeritus Associate Professor Sch of Soc/Bhav Hlth Sci.
Smith, Robert L 1979 Emeritus Professor Extension Service Prgram.
Smith, Robert L 1964 Emeritus Professor Earth, Ocean \& Atmo Sci.
Smythe, Robert T 1998 Emeritus Professor Statistics (Science).
Snow, Christine M 1990 Emeritus Professor Sch of Bio/Pop Hlth Sci.
Snyder, Stanley P 1985 Emeritus Professor Veterinary Medicine.
Soeldner, Alfred H 1966 Emeritus Senior Instructor I Ag Botany/Plant Path.
Soleau, Carol J 1977 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Sollins, Phillip 1976 Emeritus Professor Forest Ecosyst \& Society.
Sollitt, Charles K 1972 Emeritus Professor Sch of Civil/Constr Engr.
Solmon, Donald C 1977 Emeritus Professor Mathematics.
Sorenson, Gary W 1968 Emeritus Associate Professor Economics.
Soule, B L 1967 Emeritus Associate Professor College of Business.
Spencer, James B 1963 Emeritus Associate Professor History.
Spotts, Robert A 1978 Emeritus Professor Ag Botany/Plant Path.
Sredl, Henry J 1983 Emeritus Professor College of Education.
Stadsvold, Cyril V 1963 Emeritus Associate Professor Art.
Stang, Jack R 1976 Emeritus Associate Professor Horticulture.
Stanger Jr, Charles E 1973 Emeritus Professor Malheur Exp Sta.

Staton, Maryanne K 1964 Emeritus Professor Sch of Soc/Bhav Hlth Sci.
Stebbins, Robert L 1962 Emeritus Professor Horticulture.
Steggell, Carmen D 1998 Emeritus Associate Professor College of Business.
Stennett, Douglass J 1974 Emeritus Professor Pharmacy.
Stern, Sam 1981 Emeritus Professor College of Education.
Stetz, Albert W 1976 Emeritus Professor Physics.
Stevens, Joe B 1966 Emeritus Professor Applied Economics.
Stiehl, Ruth E 1972 Emeritus Professor College of Education.
Stoltz, Michael A 1979 Emeritus Professor Crop and Soil Science.
Stone, Solon A 1957 Emeritus College of Engineering.
Stone, Solon A 1957 Emeritus Professor Sch Elect Engr/Comp Sci.
Stonehill, Arthur I 1966 Emeritus Professor College of Business.
Storm, Robert M 1946 Emeritus Professor Integrative Biology.
Stormshak, Fredrick 1968 Emeritus Professor Animal \& Rnglnd Sciences.
Strandberg, Lee R 1975 Emeritus Professor Pharmacy.
Strub, Paul T 1984 Emeritus Professor Earth, Ocean \& Atmo Sci.
Sugar, David 1978 Emeritus Professor Ag Botany/Plant Path.
Sullivan, David R 1981 Emeritus Associate Professor College of Business.
Sunderland, Paul L 1986 Emeritus Associate Professor General Agriculture.
Suttie, Sandra J 1969 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Swan, Patricia L 1978 Emeritus Associate Professor EXT Fam/CommHlth OnCmps.
Swanson, Lloyd V 1970 Emeritus Professor Animal \& Rnglnd Sciences.
Swenson, L W 1968 Emeritus Professor Physics.
T
Tappeiner, John C 1980 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Taylor, Edward M 1966 Emeritus Professor Earth, Ocean \& Atmo Sci.
Taysom, Wayne P 1951 Emeritus Professor Art.
Tesch, Steven D 1981 Emeritus Professor College of Forestry Adm.
Thienes, John R 1952 Emeritus Professor Extension Service Prgram.
Thies, Richard W 1968 Emeritus Professor Chemistry.
Thomas, Darrah 1971 Emeritus Professor Chemistry.
Thomas, David R 1967 Emeritus Professor Statistics (Science).
Thompson, Gregory W 1996 Emeritus Professor General Agriculture.
Thompson, James M 1989 Emeritus Associate Professor Animal \& Rnglnd Sci Extn.
Thompson, Maxine M 1964 Emeritus Professor Horticulture.
Tillson, Gregory D 1970 Emeritus Professor Extension Service Admin.
Timm, Karen I 1983 Emeritus Associate Professor Veterinary Medicine.

Tinsley, Ian J 1957 Emeritus Professor Enviro/ Molecular Toxic.
Todd, Rodney M 1974 Emeritus Professor Crop and Soil Science.
Torbeck, Frances M 1958 Emeritus Associate Professor Extension Service Prgram.
Torpey, James E 1971 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Towey, Richard E 1962 Emeritus Professor Economics.
Tricker, Raymond 1989 Emeritus Associate Professor Sch of Soc/Bhav Hlth Sci.
Trow, Clifford W 1970 Emeritus Professor History.
Trow, Jo Anne 1965 Emeritus Professor College of Education.
Trow, Jo Anne 1965 Vice Provost Emeritus Professor Vice Prov/Student Aff.
Tubb, Richard A 1975 Emeritus Professor Fisheries and Wildlife.
Tucker, Sylvia B 1975 Emeritus Professor College of Education.
Turner, Harley A 1974 Emeritus Associate Professor EOARC - Burns Exp Sta.
Tynon, Joanne F 1997 Emeritus Associate Professor Forest Ecosyst \& Society.


Ullman, David G 1984 Emeritus Professor Sch of Mech/Ind/Mfg Engr.
Unsworth, Michael H 1992 Emeritus Professor Earth, Ocean \& Atmo Sci.
Uzgalis, William L 1981 Emeritus Professor Philosophy.

## v

VanDehey, Norbert J 1998 Emeritus Professor College of Ag Extension.
VanDyke, Henry 1960 Emeritus Professor Integrative Biology.
VanHolde, Ken E 1967 Emeritus Professor Biochem/Biophysics.
VanVliet, Antone C 1959 Emeritus Professor Career Development Ctr.
VandeWater, John G 1976 Emeritus Professor OSU Global Opportunities.
Vanvechten, James A 1985 Emeritus Professor Sch Elect Engr/Comp Sci.
Vars Jr, R C 1966 Emeritus Professor Economics.
Vavra, Martin 1971 Emeritus Professor Animal \& Rnglnd Sciences.
Verzasconi, Ray A 1967 Emeritus Professor World Languag \& Cultures.
Vinson, Ted S 1976 Emeritus Professor Sch of Civil/Constr Engr.
Volk, Veril V 1966 Emeritus Professor Crop and Soil Science.
Vomocil, James A 1967 Emeritus Professor Crop and Soil Science.
Vonborstel Jr, Frank 1948 Emeritus Professor Extension Service Prgram.
Vondracek, Ruth A 2001 Emeritus Associate Professor Library.
Vong, Richard J 1989 Emeritus Associate Professor Earth, Ocean \& Atmo Sci.
Vuchinich, Samuel 1988 Emeritus Associate Professor Sch of Soc/Bhav Hlth Sci.

## W

Wagener, Joseph M 1969 Emeritus Professor Counseling Center.
Walstad, John D 1980 Emeritus Professor Forest Eng/Resourcs/Mgmt.
Ward, Chris L 1986 Emeritus Associate Professor College of Education.
Waring, Richard H 1963 Emeritus Professor Forest Ecosyst \& Society.
Warnes, William H 1986 Emeritus Associate Professor Sch of Mech/Ind/Mfg Engr.
Warren Jr, William W 1991 Emeritus Professor Physics.
Wasserman, Allen L 1965 Emeritus Professor Physics.
Watrous, Barbara J 1981 Emeritus Professor Vet Clinical Sciences.
Watson, Philip R 1984 Emeritus Professor Chemistry.
Wax, Darold D 1963 Emeritus Professor History.
Weaver, Roger K 1962 Emeritus Professor Sch of Wrtg Lit \& Film.
Weber, Bruce A 1974 Emeritus Professor Applied Economics.
Weber, Dale W 1976 Emeritus Professor Animal \& Rnglnd Sciences.
Weber, Leonard J 1957 Emeritus Professor College of Engineering.
Webster, Janet G 1989 Emeritus Professor Library.
Weinman, Richard J 1967 Emeritus Professor Speech Communication.
Weiser, Conrad J 1971 Emeritus Professor Horticulture.
Weiser, Conrad J 1971 Dean Emeritus College of Ag Admin.
Welty, James R 1958 Emeritus Professor Sch of Mech/Ind/Mfg Engr.
Wess, Robert V 1977 Emeritus Associate Professor Sch of Wrtg Lit \& Film.
West, Thomas M 1976 Emeritus Professor Sch of Mech/Ind/Mfg Engr.
Westall, John C 1980 Emeritus Professor Chemistry.
Westwood, Melvin N 1960 Emeritus Professor Horticulture.
Whanger, Philip D 1966 Emeritus Professor Enviro/Molecular Toxic.
Wheeler, Patricia A 1982 Emeritus Professor Earth, Ocean \& Atmo Sci.
Wheeler, William P 1956 Emeritus Professor Forest Ecosyst \& Society.
White, James D 1971 Emeritus Professor Chemistry.
Widicus, Wilbur W 1964 Emeritus Professor College of Business.
Wilcox, Anthony R 1987 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Wilcox, Bert G 1962 Emeritus Professor Extension Service Admin.
Wilkins, Bill 1961 Emeritus Professor Economics.
Wilkins, Bill 1961 Emeritus Liberal Arts Admin.
William, Ray D 1979 Emeritus Professor Horticulture Extension.
Williamson, Kenneth J 1972 Emeritus Professor Sch of Civil/Constr Engr.
Willis, David L 1962 Emeritus Professor Integrative Biology.
Wilson, Howard L 1973 Emeritus Professor Mathematics.

Wilson, James B 1973 Emeritus Professor Wood Science/Engr.
Wilson, Mark V 1983 Emeritus Associate Professor Ag Botany/Plant Path.
Winograd, Kenneth J 1990 Emeritus Associate Professor College of Education.
Winters, Eugene P 1963 Emeritus Professor Extension Service Prgram.
Wiprud, Theodore F 1964 Emeritus Professor Art.
Wirth, Donald S 1971 Emeritus Associate Professor Alumni Relations.
Witt, James M 1966 Emeritus Professor Enviro/ Molecular Toxic.
Witters, Robert E 1977 Emeritus Professor College of Ag Admin.
Wogaman, Mariol R 1968 Emeritus Associate Professor Library.
Wong, Sally 1973 Emeritus Assistant Professor Counseling Center.
Wood, Terence M 1985 Emeritus Associate Professor Sch of Bio/Pop Hlth Sci.
Woodard, Ernest S 1974 Emeritus Associate Professor Extension Service Prgram.
Woodburn, Margy J 1969 Emeritus Professor Sch of Bio/Pop Hlth Sci.
Wrolstad, Ronald E 1965 Emeritus Professor Food Science and Techno.

## Y

Yates, Tom 1963 Emeritus Professor Information Services.
Yeats, Robert 1977 Emeritus Professor Earth, Ocean \& Atmo Sci.
Yonker, Nicholas J 1962 Emeritus Professor Philosophy.
Yost, Melvin L 1962 Emeritus Assistant Professor Information Services.
Youmans, Russell C 1966 Emeritus Professor Applied Economics.
Young, John A 1972 Emeritus Professor Anthropology.
Young, William C 1977 Emeritus Professor Crop and Soil Science.
Youngberg, Harold W 1960 Emeritus Professor Crop and Soil Science.
Yungen, John A 1950 Emeritus Professor Southern Oregon Exp Sta.

## z

Zaerr, Joe B 1965 Emeritus Professor Forest Ecosyst \& Society.
Zaneveld, J Ronald V 1971 Emeritus Professor Earth, Ocean \& Atmo Sci.
Zimmerman, Martin J 1960 Emeritus Professor Crop/Soil Sci Extension.
Zinn, Thomas G 1962 Emeritus Professor Extension Service Admin.
Zobel, Donald B 1968 Emeritus Professor Ag Botany/Plant Path.
Zollinger, William A 1985 Emeritus Associate Professor Animal \& Rnglnd Sciences.

## FACULTY

This faculty roster includes the Oregon State University faculty who serve the university, its students, and constituents through one or more of the following activities: instruction, research, extension, and administration. Also listed are a few on-campus staff members with faculty appointments in other state system agencies. The names of courtesy faculty members, individuals who provide voluntary services to the instructional and research programs of the university, appear in the faculty listings of individual departments or colleges.

The following abbreviations are used: Prof-Professor; Assoc Prof-Associate Professor; Asst Prof-Assistant Professor; InstInstructor; Res Assoc-Research Associate; Sr Inst-Senior Instructor; Sr Faculty Res Asst-Senior Faculty Research Assistant; Faculty Res Asst-Faculty Research Assistant; Extn-Oregon State University Extension Service.

## A

Aaron, Wendy R 2012 Assistant Professor College of Education. BA Univ of CaliforniaSanta Cruz 2001; MA Univ of California-Los Angeles 2004; PHD Univ of Michigan-Ann Arbor 2011
Abbott, Mark R 1988 Professor Earth, Ocean \& Atmo Sci. BS Univ of California-Berkeley 1974; PHD Univ of California-Davis 1978
Abney, Landon D 2015 Faculty Research Assistant Sch Elect Engr/Comp Sci. BS Oregon State University 2015
Ackers, Steven H 2000 Senior Faculty Research Asst I Fisheries and Wildlife. PHD Northern Arizona University 1997
Adam, LeAnn J 2011 Advisor-Prestigious Scholars Univ Honors College. BA San Francisco State University 1996
Adams, Dennis B 2016 Instructor College of Business. BS Brigham Young University Main 1999; MBA University of Oregon 2006
Adams, Julie A 2016 Professor Sch Elect Engr/
Comp Sci. BS Siena College 1989; MENG
University of Pennsylvania 1993; PHD University of Pennsylvania 1995
Adams, Ronald L 1998 Sr. Advis-Pres for Strat Init Office of the President. BS Oregon State University 1970; MS Massachusetts Inst of Technolo 1971; PHD Oregon State University 1977
Adams, Terry 1986 Senior Instructor I College of Education. BA University of Oklahoma 1978; BA Oregon State University 1989; JD University of Oklahoma 1981
Adrean, Lindsay 2005 Faculty Research Assistant Forest Ecosyst \& Society. BS James Madison University 2004
Aduviri, Amas 2005 Dir-CAMP Coll Assist Migrant Prgm. BA Foreign Institution 1989; MBA Andrews University 2000
Aduviri, Cheridy L 2006 Instructor College of Education. BA Eastern Washington University 1996; MA Andrews University 2000

Aguilar, Sunddip K 2017 Instructor College of Education. BS Simon Fraser University 2002; MED University of Phoenix 2006; EDD University of Phoenix 2009
Aguilera, Mary 2006 Instructor College of Education. BS Multnomah University 2000; MA Western Conservative Baptist S 2004; PHD Oregon State University 2009
Aguirre Rodriguez, Apolo G 2008 ConsultantAcademic Advisor Acad Prog/Student Aff. BBA Oregon State University 2012
Ahern, Katherine 2011 Instructor Ext Deschutes Co Office. BS University of Puget Sound 1987; MA Oklahoma State Univ-Main 1993
Ahern, Kevin G 1989 Professor Biochem/ Biophysics University Honors College Faculty. BS Oklahoma State Univ-Main 1976; MS Oklahoma State Univ-Main 1981; PHD Oregon State University 1986
Ahrens, Glenn R 2001 Assistant Professor (Practice) Ext Clackamas Co Office. BS Humboldt State University 1982; MS Oregon State University 1990
Akins, Scott M 2004 Associate Professor Sociology University Honors College Faculty. BA Northern Arizona University 1994; MA Washington State University 1999; PHD Washington State University 2002
Akroyd, Christopher L 2012 Assistant Professor College of Business. MS University of Sydney 1995; MBA Kobe University 2000; PHD Univ of Auckland 2007
Alam, Mahabub 2012 Research Associate Sch of Mech/Ind/Mfg Engr. BS Bangladesh Univ of Engr \& Tech 2008; MS Univ of Missouri-Columbia 2013; PHD Oregon State University 2016
Alani, Adam W 2010 Associate Professor Pharmacy. BS University of Baghdad 1989; MS University of Baghdad 1995; PHD Univ of Wisconsin-Madison 2007
Albert, Dennis A 2004 Assistant Professor (Sr Res) Horticulture. BS Univ of Michigan-Ann Arbor 1981; MS Univ of Michigan-Ann Arbor 1983; PHD Univ of Michigan-Ann Arbor 1990
Albertani, Roberto 2010 Associate Professor Sch of Mech/Ind/Mfg Engr University Honors College Faculty. MS Foreign Institution 1980; PHD University of Florida 2005
Alcantar, Benjamin E 2011 Instructor Vet Biomedical Science. DVM Autonomous Univ St of Mexico 2005
Alcon, Tim 2014 Instructor Sch Elect Engr/ Comp Sci. BA Western Washington University 1992; MS Western Washington University 1998; MS Iowa State University 2010
Alcorn, Kay A 2013 Instructor (ESL) INTO OSU Program. BS San Diego State University 1986; MS School for Internatl Training 1997
Aldwin, Carolyn M 2004 Professor Sch of Soc/ Bhav Hlth Sci University Honors College Faculty. BA Clark University 1974; PHD Univ of Cal-San Francisco 1982
Alexander, Charlene M 2017 Executive 3-Diversity Officer Institutional Diversity. BA Creighton University 1983; MS Creighton University 1985; PHD Univ of NebraskaLincoln 1992
Alexander, Jennifer L 2010 Director-Ext/Exp Station Comm Ext/Exp S Communications. BS Iowa State University 2004; MS Iowa State University 2006

Alexander, Julie D 2010 Research Associate Microbiology (Ag). BS Univ of Mary Washington 1999; MS James Cook University 2002; PHD Montana State Univ-Bozeman 2010
Allan, Andrea M 2005 Instructor Earth, Ocean \& Atmo Sci. BS Penn State Univ-Main Campus 2005; MS Oregon State University 2007; PHD Oregon State University 2012
Allan, Robert S 2004 Dir-Student Services
Earth, Ocean \& Atmo Sci. BA Wittenberg
University 1995; MA Minnesota State UnivMankato 2000
Alleau, Yvan 1999 Senior Faculty Research Asst I Earth, Ocean \& Atmo Sci. BS Universite of Poitiers 1997; MOCE Oregon State University 2002
Alleau, Yvan 1999 Senior Faculty Research Asst I Forest Eng/Resourcs/Mgmt. BS Universite of Poitiers 1997; MOCE Oregon State University 2002
Allen, Anna T 2008 Instructor Speech Communication. BA Oregon State University 2010; MA Oregon State University 2012
Allen, Jennifer M 2015 Faculty Research Assistant Fisheries and Wildlife. BS San Diego State University 2006
Allen, Nancy L 1999 Head Advisor Fisheries and Wildlife. BS Oregon State University 1985; MS Oregon State University 2001
Almabruk, Khaled H 2010 Research Associate (Post Doc) Pharmacy. PHD Oregon State University 2016
Almuaybid, Ameer J 2012 Instructor Sch of Psychological Sci. BS Oregon State University 2013; MAIS Oregon State University 2016
Altishin, Andrew M 2013 Instructor Crop/Soil Sci Extension. BS Oregon State University 2006
Ambrowiak, Gloria 2013 Faculty Research Assistant Crop and Soil Science. BS Univ of Wisconsin-Madison 2012
Ameele, Melinda R 1999 Instructor (PAC)
Physical ActivityCourses. BS Oregon State University 1980; MS Portland State University 1988
Ameele, Melinda R 1999 Instructor Sch of Bio/ Pop Hlth Sci. BS Oregon State University 1980; MS Portland State University 1988
Anand, Tejasvi 2015 Assistant Professor Sch Elect Engr/Comp Sci. PHD Univ of Illinois at Urbana-Cha 2015
Andersen, Daniel 2012 Instructor Political Science. BS Western Washington University 2005; MS University of Oregon 2008; PHD University of Oregon 2012
Andersen, Jayne 2006 Advisor-Academic College of Business. BS Purdue University Main Campus 1983; MBA Oregon State University 1992
Anderson, Ashleigh N 2007 Advisor-Head Academic Sch of Psychological Sci. BA Univ of California-Riverside 2007; MED Oregon State University 2013
Anderson, Jeff 2014 Assistant Professor Ag Botany/Plant Path. BA Whitman College 1997; PHD Cornell University-Ithaca 2006
Anderson, Jeneva K 2015 Instructor Microbiology (Science). BS Linfield College 2009; PHD University of Oregon 2015
Anderson, Kim A 1999 Professor Enviro/ Molecular Toxic. BS University of Oregon 1981; BS Boise State University 1985; PHD Washington State University 1989

Anderson, Lorinda W 2011 Assistant Professor (Clinical) Pharmacy. D PHAR University of Utah 2010
Anderson, Nicole 2009 Assistant Professor Associate Professor Ext Yamhill Co Office. BS Xavier University 2003; MS Washington State University 2006
Anderson, T Anne 2010 Instructor Speech Communication. BS Portland State
University 1997; MA Oregon State University 2013
Anderson, Wayne C 1986 Professor Sch of Wrtg Lit \& Film University Honors College Faculty. BA Gonzaga University 1977; MA University of Washington 1979; MA Mount Angel Seminary 1997; PHD University of Washington 1983
Andrew, Isaac D 2010 Instructor Music. BMUS Azusa Pacific University 2005; MM Cal State Univ-Long Beach 2010
Andrews, Heather E 2007 Faculty Research
Assistant North Willamette Exp Sta. BS
Southern Oregon University ; BSEE Southern Oregon University
Andrews, Lawrence S 1993 Senior Faculty
Research Asst I Fisheries and Wildlife. BS University of New Mexico 1988
Andrews, Matthew T 2016 Professor Biochem/ Biophysics. BS Univ of Michigan-Ann Arbor 1979; MS Central Michigan University 1981; PHD Wayne State University 1984
Andrews, Nicholas 2005 Associate Professor (Practice) Ext No Willamette Co Off. BS Oregon State University 1991; MS Univ of Reading 1995
Angima, Sam 2005 Assistant Dean College of Ag Extension. BS Andrews University 1991; MS Kenyatta Univ 1996; PHD Purdue University Main Campus 2000
Angima, Sam 2005 Associate Professor Crop and Soil Science. BS Andrews University
1991; MS Kenyatta Univ 1996; PHD Purdue
University Main Campus 2000
Annalora, Andrew J 2013 Assistant Professor
(Sr Res) Enviro/Molecular Toxic. BS
University of New Mexico 2001; PHD
University of New Mexico 2005
Antle, John 2008 Professor Applied Economics
BA Albion College 1976; MA University of
Chicago 1979; PHD University of Chicago 1980
Anzinger, Dawn L 1998 Senior Instructor I
Forest Ecosyst \& Society. BS Oregon State
University 1999; MS Oregon State University 2002
Ao, Wallice 2017 Instructor Economics. PHD
Univ of Wisconsin-Madison 2014
Apte, Sourabh V 2005 Professor Sch of Mech/ Ind/Mfg Engr University Honors College Faculty. BS University of Pune 1994; MS Indian Institute of Science 1996; PHD Penn State Univ-Main Campus 2000
Arbuckle, Heather J 2001 Advisor-Head Academic College of Science Admin. BS Oregon State University 2015
Arbuckle, Nancy 2013 Instructor Fisheries and Wildlife. BS Long Island Univ-Southampton 2003; PHD Texas A\&M Univ-College Station 2012
Arellano, Lucy 2013 Assistant Professor College of Education. BA Univ of Michigan-Ann Arbor 2000; MA Univ of Michigan-Ann Arbor 2005; PHD Univ of California-Los Angeles 2011

Argerich, Alba 2009 Assistant Professor (Sr Res) Forest Eng/Resourcs/Mgmt. BS Foreign Institution 1998; MS Foreign Institution 2002; PHD Univ of Barcelona 2009
Arismendi, Ivan D 2010 Assistant Professor Fisheries and Wildlife. PHD Universidad Austral De Chile 2010
Arispe, Sergio A 2014 Assistant Professor Ext Malheur Co Office. PHD Univ of CaliforniaDavis 2012
Armstrong, Jonathan B 2016 Assistant
Professor Fisheries and Wildlife. BS Lewis \& Clark College 2005; PHD University of Washington 2013
Arnadottir, Liney 2009 Assistant Professor Sch of Chem/Bio/Envr Eng University Honors College Faculty. BS University of Iceland 2001; MS University of Washington 2003; PHD University of Washington 2007
Arnesen, Erik 2011 Faculty Research Assistant
Senior Faculty Research Asst I Earth, Ocean \& Atmo Sci. BS Sonoma State University 2010
Arnold, David S 2002 Senior Instructor I
Philosophy. BS Oregon State University 1972;
MA University of Oregon 1977; PHD Emory
University 1983
Arnold, Mary E 2000 Professor EXT 4-H
YouthDev OnCmps. BA Western Washington University 1984; MS Oregon State University 1992; PHD Oregon State University 1994
Arnold, Stevan J 1997 Professor Integrative Biology. BA Univ of California-Berkeley
1966; PHD Univ of Michigan-Ann Arbor 1972
Arocho, Ingrid 2014 Assistant Professor Sch of Civil/Constr Engr. BS University of Puerto Rico 2007; MS North Carolina State Univ
2008; PHD North Carolina State Univ 2014
Arora, Vipin 2014 Instructor College of
Business. BS Foreign Institution 2003; MS
Foreign Institution 2006
Arp, Daniel J 1990 Dean/Director-CAS College of Ag Admin University Honors College Faculty. BS Univ of Nebraska-Lincoln 1976; PHD Univ of Wisconsin-Madison 1980
Arp, Daniel J 1990 Distinguished Professor Ag Botany/Plant Path University Honors College Faculty. BS Univ of Nebraska-Lincoln 1976; PHD Univ of Wisconsin-Madison 1980
Arras, Tracy L 2000 Senior Instructor I Sch of Civil/Constr Engr. BS Cal State Polytechnic - Pomona 1986; MS Cal State Univ-Fresno 1996
Arredondo, Felipe D 2012 Faculty Research Assistant Ag Botany/Plant Path. BS Univ of California-Davis 1987
Arthurs, Jonathan D 2013 Assoc Dean - Res and Fac College of Business. BBA Texas A\&M Univ-College Station 1991; MBA Texas A\&M Univ-College Station 1998; PHD University of Oklahoma 2004
Arthurs, Jonathan D 2013 Associate Professor College of Business. BBA Texas A\&M UnivCollege Station 1991; MBA Texas A\&M Univ-College Station 1998; PHD University of Oklahoma 2004
Asadinia, Marjan 2016 Research Associate Sch Elect Engr/Comp Sci. BS Sharif University of Tech 2009; MS Sharif University of Tech 2011; PHD Sharif University of Tech 2016
Ashford, Scott A 2007 Dean College of
Engineering. BS Oregon State University 1983; MS Univ of California-Berkeley 1986; PHD Univ of California-Berkeley 1994

Ashford, Scott A 2007 Professor Sch of Civil/ Constr Engr. BS Oregon State University 1983; MS Univ of California-Berkeley 1986; PHD Univ of California-Berkeley 1994
Ashton, Carolyn 2005 Associate Professor Ext Benton County Office. BA University of Arizona 1989; MA Michigan State University 1994
Atchley, Elizabeth E 2005 Instructor Music.
Ates, Serkan 2016 Assistant Professor Animal \& Rnglnd Sciences. BS Selcuk University 1996; MS Suleyman Demirel University 2002; PHD Lincoln University 2010
Atkinson, Stephen D 2010 Research Associate Microbiology (Ag) University Honors College Faculty. BS Foreign Institution 2004; PHD Foreign Institution 2011
AuYeung, Nicholas J 2006 Assistant Professor Sch of Chem/Bio/Envr Eng. BS University of Connecticut 2006; PHD Oregon State University 2011
Auerbach, Marisha 2011 Lecturer Horticulture. BA Evergreen State College 1998
Auld, Heather L 2016 Research Associate (Post Doc) COMES - Newport Exp Sta. BS University of Ottawa 2008; PHD Carleton University 2016
Austin Haney, Angela R 1999 Head Advisor Pharmacy. BS University of Idaho 1997; EDM Oregon State University 2001
Averett, Joshua P 2012 Faculty Research Assistant Eastern Ore Univ Ag Prg. BS Eastern Oregon University 2012; MS Oregon State University 2014
Azarenko, Anita N 1986 Assoc VP/Cap Plan \& Fac Ops Capital Planning \& Devlp. BS Univ of Maryland System 1981; MS Univ of Maryland System 1983; PHD Univ of Maryland System 1986
Azizian, Mohammad F 1987 Research Associate Sch of Chem/Bio/Envr Eng University Honors College Faculty. BS University of Tehran 1978; MS University of Tehran 1983; PHD Oregon State University 1993

## B

Babb, Sandra L 2015 Assistant Professor Music. BMUS Florida State University 1996; MM Florida State University 2000; PHD Florida State University 2010
Babbar-Sebens, Meghna 2012 Assistant Professor Associate Professor Sch of Civil/ Constr Engr. MS Univ of Illinois at UrbanaCha 2002; PHD Univ of Illinois at UrbanaCha 2006
Baca, Beau Y 2014 Advisor-Academic Liberal Arts Admin. BA Cal State Univ-Sacramento 1996; MA Vanderbilt University 2006; PHD Vanderbilt University 2006
Bachman, Jennifer 2006 Director-Online Education College of Education. BS Univ of California-San Diego 1988; MS Univ of California-Los Angeles 1992; PHD Oregon State University 2011
Baden, Evan 2015 Instructor Art. MA Columbia College Chicago 2014
Bae, Harold T 2014 Assistant Professor Sch of Bio/Pop Hlth Sci. PHD Boston University 2014
Bahde, Anne 2012 Assistant Professor Library
University Honors College Faculty. BA
University of Chicago 2001; MLS Univ of Illinois at Urbana-Cha 2002; MA Central Washington University 2007

Bailey, Demian A 2011 Mgr-Project Ship Operations. BS United States Naval Academy 1994; MS University of Washington 2006
Bailey, John D 2005 Professor Forest Eng/ Resourcs/Mgmt. BS Virginia Polytechnic Institute 1983; MF Virginia Polytechnic Institute 1985; PHD Oregon State University 1997
Bailey, Mike 2004 Professor Sch Elect Engr/ Comp Sci University Honors College Faculty. BS Purdue University Main Campus 1975; MS Purdue University Main Campus 1976; PHD Purdue University Main Campus 1979
Baio, Joe E 2013 Assistant Professor Sch of Chem/Bio/Envr Eng University Honors College Faculty. BS Univ of CaliforniaBerkeley 2004; PHD University of Washington 2011
Baird, William M 1997 Professor Enviro/ Molecular Toxic University Honors College Faculty. BS Lehigh University 1966; PHD Univ of Wisconsin System 1971
Bakalinsky, Alan T 1989 Associate Professor Food Science and Techno University Honors College Faculty. BS Univ of California-Davis 1979; MS Univ of California-Davis 1983; PHD Univ of California-Davis 1989
Baker, C Scott 2006 Professor Marine Mammal Institute. BA New College of Florida 1977; PHD Univ of Hawaii at Manoa 1985
Baker, Keith P 2014 Assistant Professor School of Public Policy. PHD Univ of Birmingham 2008
Baker, Mark L 2010 Instructor (PAC) Physical ActivityCourses. BA Brigham Young University Main 2004; MFA Southern Utah University 2008
Bakos, Yong J 2016 Instructor Acad Prog/ Student Aff. BA Northwestern University 1999; MS Regis University 2014
Balasubramanian, Ravi 2011 Assistant Professor Sch of Mech/Ind/Mfg Engr University Honors College Faculty. BS National Univ of Singapore 2000; PHD Carnegie Mellon University 2006
Baldivieso, Pablo 2016 Statistics Instructor Instructor Acad Prog/Student Aff. MS Portland State University 2008
Baldridge, David C 2004 Associate Professor College of Business. BGS Univ of MichiganAnn Arbor 1986; MBA Univ of MichiganAnn Arbor 1988; PHD University of Connecticut 2001
Baley, Nichole A 2013 Faculty Research Assistant Klamath Basin Res\&ExtCtr. BS Cal State Univ-Chico 2012
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Ball, Patrick 2011 Senior Instructor I Acad Prog/Student Aff. BS University of Montana 1991; PHD University of Montana 2000
Banks, Michael A 2001 Director CIMRS (Inst/ Marine Res). BS Univ of Cape Town 1981; MS Univ of Texas-Austin 1983; PHD Univ of California-Davis 1994
Banks, Michael A 2001 Marine Fisheries Geneticist Professor COMES - Newport Exp Sta. BS Univ of Cape Town 1981; MS Univ of Texas-Austin 1983; PHD Univ of CaliforniaDavis 1994
Bannon, David T 2001 Instructor Physics. BA Dartmouth College 1983; MS Univ of California System 1987

Barajas, Miguel F 2014 Faculty Research Assistant Fisheries and Wildlife. BS
University of Southern Maine 2013
Barbar, Elisar J 2003 Professor Biochem/ Biophysics. BS American University of Beirut 1984; MS American University of Beirut 1985; PHD Portland State University 1993
Barber, John 2012 Advisor-Academic Sch of Mech/Ind/Mfg Engr. BA University of Oregon 1982; MDIV Fuller Theological Seminary 1986
Barbosa, Andre R 2011 Assistant Professor Sch of Civil/Constr Engr. BS Foreign Institution 1998; MS Foreign Institution 2002; PHD University of San Diego 2011
Barbour, Nancy 2009 Instructor Women/ Gendr/Sxlt Studies. BA Oregon State University 1996; MA Oregon State University 2012
Barbour, Philip L 1987 Senior Faculty Research
Asst I Earth, Ocean \& Atmo Sci. BS Oregon
State University 1985; MS Oregon State University 1991
Barbour, Richmond T 1992 Professor Sch of
Wrtg Lit \& Film. BA Stanford University
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Barden, Jeffrey Q 2013 Associate Professor College of Business. BA Univ of N CarolinaChapel Hill 1992; MBA Indiana UniversityBloomington 1999; PHD Duke University 2006
Barnd, Natchee 2012 Assistant Professor Ethnic Studies University Honors College Faculty. BA Sonoma State University 1997; MA Univ of California-Los Angeles 1999;
MA University of San Diego 2001; PHD
University of San Diego 2008
Barnes, Jeffrey R 1984 Professor Earth, Ocean \& Atmo Sci. BS Iowa State University 1975; MS
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Barnes, Scott 2017 VP \& Athletic Director Intercolleg Athletics. MA Cal State UnivFresno 1992
Barnhart, Michelle 2009 Associate Professor College of Business University Honors College Faculty. BS Stanford University 1994; PHD University of Utah 2009
Barreto, Felipe S 2015 Assistant Professor Integrative Biology. BS University of Florida 2001; MS Univ of N Carolina-Wilmington 2003; PHD Univ of California-Irvine 2009
Barroso, Judit 2014 Assistant Professor
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Barton, Michael L 2010 Faculty Research Assistant Superfund Research Ctr. BS Oregon State University 2010
Bassinette, John P 1995 Faculty Research Assistant Ag Botany/Plant Path. BS Cornell University 1989; MS University of Idaho 1995
Batson, Danielle E 2014 Advisor-Academic
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Batten, Belinda A 1993 Administrator 1-Assoc Dean College of Engineering University Honors College Faculty. BS Univ of Maryland-College Park 1985; MS Univ of Maryland-Baltimore Cty 1987; PHD Clemson University 1991
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Bearden, David T 2001 Department Chair Pharmacy. D PHAR Univ of Illinois-Chicago 1997
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Durham 1993; BS University of Florida 1996;
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Beechler, Brianna R 2005 Assistant Professor
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Behan, Jeffrey R 2001 Faculty Research
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Behrenfeld, Michael J 2004 Professor Ag
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Below, Amy 2009 Associate Professor Political Science. BA Univ of Cal-Santa Barbara 1997; MA Univ of Southern California 2000; PHD Univ of Southern California 2008
Bennett, Max 1999 Associate Professor Ext Jackson Co Office. BA University of Oregon 1987; MS Oregon State University 1993
Benoit-Bird, Kelly J 2004 Professor Earth,
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Bentley-Townlin, Tracy L 1990 Manager of Access Services Disability Access Srvcs. BA University of New Mexico 1987; BS University of New Mexico 1987; MED Oregon State University 1994; PHD Oregon State University 2002
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Bhattacharyya, Sharmodeep 2015 Assistant Professor Statistics (Science). PHD Univ of California-Berkeley 2013
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Biespiel, David 2001 Instructor Sch of Wrtg
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Biga, Lindsay M 2006 Instructor Integrative Biology. BA Denison University 2005; PHD Oregon State University 2013
Bildfell, Robert J 1998 Interim Director -VDL
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Biles, Kathy E 1997 Senior Instructor I Acad Prog/Student Aff. BS Charleston Southern University 1996; MS Oregon State University 2000; PHD Oregon State University 2004

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Black, J Lynette R 2004 Associate Professor
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Black, Wendy M 1993 Faculty Research
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Blair, Lesley M 1993 Senior Instructor II Integrative Biology. BS Univ of Illinois Central Offic 1987; MS Univ of Illinois Central Offic 1989; PHD Oregon State University 2002
Blair Jr, Brantley B 2008 Advisor - Academic College of Forestry Adm. BS Univ of Mary Hardin-Baylor 1999; BS Oregon State University 2010
Blakemore, Paul R 1999 Associate Professor Chemistry. BS Univ of Southampton 1995; PHD Univ of Glasgow 1999
Blanchard, Nicholas E 2007 Instructor History.
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Blaustein, Andrew R 1978 Distinguished Professor Integrative Biology University Honors College Faculty. BA Southampton Institute of Highe 1971; MS University of
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Blessing, Benita C 2012 Instructor World
Languag \& Cultures. MS Monterey Inst of
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Bloomer, Sherman H 1995 Director-Budget \&
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Blouin, Michael 1995 Professor Integrative
Biology. BA University of Virginia 1982; MS
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Bluhm, Andrew A 2000 Senior Faculty
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Boal, Nathan J 2009 Instructor Music. BA
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Elect Engr/Comp Sci. BS Birla Inst of Tech \& Science 2000; MS Univ of Maryland-College Park 2007; PHD Univ of Maryland-College Park 2009
Bobbitt, Andra M 1991 Senior Faculty Research Asst I CIMRS (Inst/Marine Res). BA Univ of California-San Diego 1984
Bobe, Gerd 2009 Associate Professor Animal \& Rnglnd Sciences. MS Iowa State University 1997; MPH Johns Hopkins University 2006; PHD Iowa State University 2002
Bogart, Kathleen 2012 Assistant Professor Sch of Psychological Sci. BS Louisiana St Univ and A \& M 2004; MA San Francisco State University 2008; PHD Tufts University 2012
Boggess, Carolyn F 1998 Interim Dir-Env Sci
Grad Prog Graduate School Admin. MS University of Florida 1987; MBA Oregon State University 2005; PHD University of Florida 1994
Boggess, William G 1995 Exec Assoc Dean \& Asst Dir College of Ag Admin. BS Iowa State University 1974; PHD Iowa State University 1979
Boggess, William G 1995 Professor Applied Economics. BS Iowa State University 1974; PHD Iowa State University 1979
Bogley, William A 1990 Professor Mathematics
University Honors College Faculty. BA Dartmouth College 1981; MS University of Oregon 1983; PHD University of Oregon 1987
Bohle, Mylen G 1989 Associate Professor Ext
Crook County Office. BS Montana State
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Bohnert, David W 1998 Director EOARC -
Burns Exp Sta. BS Angelo State University
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University of Kentucky 1998
Bohnert, David W 1998 Professor EOARC -
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Bokil, Vrushali A 2006 Associate Professor Mathematics University Honors College Faculty. BS University of Pune 1991; MS Indian Institute of Technology 1993; MS New Mexico St Univ-Main 1996; PHD University of Houston 2003

Bolden, David D 2008 Instructor (PAC) Physical ActivityCourses. BS Touro College 2008
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Bolte, John P 1987 Department Head Biol \& Ecol Engineering. BS University of Florida 1979; MS University of Florida 1983; PHD Auburn University Central Offi 1987
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Bonady, Devon 2016 Instructor Horticulture. BA Dartmouth College 2000; MS University of Oregon 2012
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Bondi, Michael C 1978 Regional Administrator Extension Service Admin. BS Iowa State University 1973; MS Univ of Canterbury 1977
Bonventre, Josephine A 2012 Research Associate (Post Doc) Biochem/Biophysics. BS Gettysburg College 2004; MS Adelphi University 2006; PHD Rutgers UniversityCentral Off 2012
Boock, Michael 2003 Associate Professor Library. BA Univ of Wisconsin-Milwaukee 1989; MLS Kent State Univ-Main Campus 1994
Boone, Carmen E 2004 Faculty Research Assistant Enviro/Molecular Toxic. BS Univ Peruana Cayetano Heredia 1996; MS Oregon State University 2007
Boonstra, Michael J 2011 Instructor Art. BFA Univ of Michigan-Ann Arbor 1996; MFA University of Oregon 2002
Boovy, Bradley 2012 Assistant Professor World Languag \& Cultures University Honors College Faculty. MA Tulane University 2003; MA Univ of Texas-Austin 2006; PHD Univ of Texas-Austin 2012
Boren, Blake C 2006 Instructor Sch of Mech/ Ind/Mfg Engr. PHD Oregon State University 2015
Borradaile, Glencora 2009 Associate Professor Sch Elect Engr/Comp Sci University Honors College Faculty. BS University of Western Ontario 2002; MS Brown University 2004; PHD Brown University 2008
Bose, Bella 1980 Associate School Head Sch Elect Engr/Comp Sci University Honors College Faculty. BS Madras Christian College 1973; MENG Indian Institute of Science 1975; PHD Southern Methodist University 1980
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Bothwell, Michelle K 1994 Associate Professor Sch of Chem/Bio/Envr Eng University Honors College Faculty. BS Purdue University Main Campus 1989; PHD Cornell University 1994
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Boudet, Hilary S 2012 Assistant Professor
Sociology. BA Rice University 2001; PHD Stanford University 2010
Boudraa, Nabil 2003 Associate Professor World Languag \& Cultures University Honors College Faculty. BA Foreign Institution 1993; MA CUNY Queens College 1998; PHD Louisiana St Univ and A \& M 2002
Bourdeau, Virginia D 1987 Professor EXT 4-H YouthDev OnCmps. BS Oregon State University 1980; MS Southern Oregon University 1983
Bourne, Amy 2006 Senior Instructor I College of Business. BS Texas Tech University 1996; MS Texas Tech University 1996; PHD Anderson University 2008
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Bovbjerg, Viktor E 2009 Associate Professor Sch of Bio/Pop Hlth Sci University Honors College Faculty. BS Iowa State University 1985; MPH University of Washington 1992; PHD University of Washington 1996
Bowers, Brian T 2011 Director - VTH Pharmacy Pharmacy. D PHAR Unknown College 2009
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Bowman, Sally 1993 AssocDirFCH\&PrgLeadSNAP/EFNEP EXT Fam/CommHlth OnCmps. BA Auburn University Main Campus 1973; MA Auburn University Main Campus 1976; PHD University of Oregon 1993
Bowman, Sally 1993 Professor EXT Fam/ CommHlth OnCmps. BA Auburn University Main Campus 1973; MA Auburn University Main Campus 1976; PHD University of Oregon 1993
Boyd-Berman, Holly 2009 Instructor College of Education. BA Emory University 1999; MA Georgia State University 2006
Braaten, Justin D 2009 Faculty Research Assistant Earth, Ocean \& Atmo Sci. BA Univ of N Dakota-Main Campus 2007; MS Univ of N Dakota-Main Campus 2009

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Brandt, Jeanne D 1985 Professor Ext Linn County Office. BS Oregon State University 1982; MS Oregon State University 1984
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Braunworth Jr, William S 1986 Associate Professor Horticulture. BS Colorado State University 1975; MS Colorado State University 1977; PHD Oregon State University 1986
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Brekken, Ted K 2006 Associate Professor Sch Elect Engr/Comp Sci. BSEE Univ of Minnesota-Twin Cities 1999; MS Univ of Minnesota-Twin Cities 2002; PHD Univ of Minnesota-Twin Cities 2005
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Brook, Edward J 1996 Professor Earth, Ocean \& Atmo Sci. BS Duke University 1985; MS University of Montana 1988; PHD Massachusetts Inst of Technolo 1993
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Brown, Shane A 2013 Associate Professor Sch of Civil/Constr Engr University Honors College Faculty. BS Oregon State University 1995; MS Univ of California-Davis 1998; PHD Oregon State University 2005
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Browne, Cornelius 2002 Associate Professor Acad Prog/Student Aff. BA University of Central Florida 1993; MA The Ohio State Univ Main 1995; PHD The Ohio State Univ Main 2001
Browne, Cornelius 2002 Associate Professor Sch of Wrtg Lit \& Film. BA University of Central Florida 1993; MA The Ohio State Univ Main 1995; PHD The Ohio State Univ Main 2001
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Cities 2003; PHD Univ of Minnesota-Twin Cities 2006
Burgher, Jesse A 2015 Faculty Research
Assistant Fisheries and Wildlife. BS Ithaca College 2012
Burke, Molly K 2015 Assistant Professor
Integrative Biology. BS Univ of California-Los
Angeles 2004; PHD Univ of California-Irvine 2010
Burkhardt, Brett 2011 Assistant Professor Sociology. MS Univ of Wisconsin-Madison 2006; PHD Univ of Wisconsin-Madison 2011
Burnett, Margaret M 1993 Distinguished
Professor Sch Elect Engr/Comp Sci. BA Miami University-Oxford 1970; MS University of
Kansas 1981; PHD University of Kansas 1991
Burnett, Timothy R 2016 Instructor Acad Prog/
Student Aff. BS Cal State Univ-San Marcos
2008; MS San Diego State University 2012
Burr, Terry A 2005 Instructor Crop/Soil Sci
Extension. BS Oregon State University 1987

Burris, Frank A 2000 Associate Professor Ext Curry County Office. BS Univ of Alaska Fairbanks 1986; MS Univ of Alaska Fairbanks 1991
Burrows, Sean M 2012 Assistant Professor Chemistry University Honors College Faculty. BS University of Central Florida 2004; PHD Texas Tech University 2009
Burton, Robert M 1978 Professor Mathematics University Honors College Faculty. BA Washington University-St Louis 1972; PHD Stanford University 1977
Burton, Vicki T 1993 Director Writing
Intensive Prgrm. BA Wake Forest University
1967; MAT Duke University 1968; PHD
Auburn University Main Campus 1993
Burton, Vicki T 1993 Professor Sch of Wrtg Lit \& Film. BA Wake Forest University 1967; MAT Duke University 1968; PHD Auburn University Main Campus 1993
Busby, Posy E 2001 Assistant Professor Ag Botany/Plant Path. BA Harvard University 2002; MS Harvard University 2006; PHD Stanford University 2012
Bushnell, Bobette 1995 Senior Instructor I Speech Communication. BS Brigham Young University Main 1966; MA Brigham Young University Main 1969; PHD Oregon State University 1993
Bushnell, John T 2007 Instructor Sch of Wrtg
Lit \& Film. BA Linfield College 2002; MFA
University of Oregon 2007
Bushnell, Tyler D 2006 Instructor (PAC)
Physical ActivityCourses. BS Brigham Young
University Main 2002; MS Brigham Young University Main 2005
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Polk County Office. BS Kent State Univ-Main
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Cabrera, DeMara T 2004 Instructor Speech Communication. BA Stanford University 2004; MS Oregon State University 2006; MFA Boston University 2013
Caddis, Connie L 2013 Advisor-Academic College of Business. BA Eastern Washington University 1984
Cadell, Seth R 2007 Assistant Professor (Sr Res.) Nuclear Engineering. BS Principia College 2007; MS Oregon State University 2009; PHD Oregon State University 2013
Cahn, Megan 2008 Research Associate (Post Doc) Sch of Soc/Bhav Hlth Sci. BA Lewis \& Clark College 2002; BA Napa Valley College 2002; MPH Oregon State University 2010; PHD Oregon State University 2015
Calvo-Amodio, Francisco J 2012 Assistant Professor Sch of Mech/Ind/Mfg Engr University Honors College Faculty. BS Foreign Institution 2000; MS Foreign Institution 2003; PHD Texas Tech University 2012
Campana, Michael E 2006 Professor Earth, Ocean \& Atmo Sci University Honors College Faculty. BS College of William \& Mary 1970; MS University of Arizona 1973; PHD University of Arizona 1975; PHD University of Arizona 1975

Campbell, Courtney S 1990 Hundere Chair Professor Philosophy University Honors College Faculty. BA Yale University 1981; MA
Univ of Virginia-Main Campus 1984; PHD
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Campbell, Courtney S 1990 Professor
Philosophy University Honors College Faculty. BA Yale University 1981; MA Univ of Virginia-Main Campus 1984; PHD Univ of Virginia-Main Campus 1988
Campbell, Holly V 2007 Instructor Political Science. BA Northern Illinois University 1979; MS University of Utah 2006; JD University of Oregon 1991; PHD Oregon State University 2011
Campbell, John L 2000 Assistant Professor (Sr Res) Forest Ecosyst \& Society. BA Reed College 1991; MS Univ of WisconsinMadison 1998; PHD Oregon State University 2004
Campbell, Matthew I 2013 Professor Sch of
Mech/Ind/Mfg Engr University Honors
College Faculty. BS Carnegie Mellon
University 1995; MS Carnegie Mellon
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Campbell, Scott 2014 Instructor Sch of Mech/ Ind/Mfg Engr. BS Oregon State University 2014; MS Oregon State University 2016
Cann, David P 2004 Professor Sch of Mech/
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Capalbo, Susan M 2008 Professor Applied Economics University Honors College Faculty. BA University of Rhode Island 1974; MS University of Rhode Island 1976; PHD
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Cappellazzi, Jed 2010 Faculty Research Assistant Wood Science/Engr. BS SUNY CollEnv Sci \& Forestry 2007; MS Oregon State University 2014
Cardinal, Bradley J 1997 Professor Sch of Bio/ Pop Hlth Sci University Honors College Faculty. BA Eastern Washington University 1985; MS Eastern Washington University 1987; PHD Temple University 1993
Cardwell, Allison 2010 Senior Faculty Research Asst I Enviro/Molecular Toxic. BS University of Washington 1998
Carlisle, Trevor K 2016 Instructor Sch of Chem/Bio/Envr Eng. PHD Univ of ColoradoBoulder 2011
Carlson, Anders 2002 Associate Professor Earth, Ocean \& Atmo Sci. BA Augustana College 2001; MS Univ of Wisconsin Colleges 2002; PHD Oregon State University 2006
Carlson, Angela R 1969 Senior Instructor I Music. BA University of Idaho 1964; MM Univ of Wisconsin-Madison 1965
Carlson, Marlan G 1969 Professor Music. MA Kansas State University 1959; MM University of Rochester 1961

Carozza, Susan E 2009 Associate Professor Sch of Bio/Pop Hlth Sci University Honors College Faculty. BS Texas A\&M Univ-College Station 1981; MPH Univ of N CarolinaChapel Hill 1993; PHD Univ of N CarolinaChapel Hill 1997
Carpena-Mendez, Fina 2009 Assistant Professor Anthropology. BA Univ Autonoma de Barcelona 1996; MA Univ Autonoma de Barcelona 1998; PHD Univ of CaliforniaBerkeley 2006
Carpenter, Laura J 2007 Instructor (PAC)
Physical ActivityCourses. BA San Francisco State University 1998; BA San Francisco State University ; MA Western Oregon University 2011
Carr, Emily 2013 Dir-MFA-Creative Writing Acad Prog/Student Aff. BA Univ of MissouriColumbia 2000; MFA Univ of N CarolinaWilmington 2004; PHD Nazarene University College 2011
Carrell, Steven J 2011 Faculty Research Assistant Vet Biomedical Science. BS Oregon State University 2016
Carson, Mina J 1989 Professor History University Honors College Faculty. BA Harvard University 1975; MA Harvard University 1979; MS Portland State University 1995; PHD Harvard University 1984
Carter, Rich G 1997 Professor Chemistry. BS Gettysburg College 1993; PHD Univ of TexasAustin 1997
Case, Patricia E 2000 Associate Professor Ext Klamath Co Office. BS Univ of CaliforniaDavis 1984; MS Univ of Nebraska-Lincoln 1987
Casey, Patrick M 1994 Head Coach-Baseball Intercolleg Athletics. BS George Fox University 1988
Casey, Thomas W 2016 Counselor-Student Success Extended Campus. BS Oregon State University 1995; EDM Oregon State University 1997
Cassidy, James R 2003 Senior Instructor I Crop and Soil Science. BS Oregon State University 2000; MS Oregon State University 2002
Cassidy, Kevin 2011 Instructor College of Business. BS Virginia Polytechnic Institute 1975; MBA Univ of Colorado-Boulder 1984
Castagnoli, Steve P 1992 Associate Professor Ext Hood River Co Office. BA Univ of California-Santa Cruz 1981; MS Univ of California-Davis 1988
Castagnoli, Steve P 1992 Director MidColumbia Exp Sta. BA Univ of CaliforniaSanta Cruz 1981; MS Univ of CaliforniaDavis 1988
Castillo, Salvador 2011 Director-Institutional Resrch Institutional Research. BS Massachusetts Inst of Technolo 1987; MS Univ of Southern California 1988; MA Univ of Cal-Santa Barbara 1994
Catania, Joseph A 2006 Professor Sch of Soc/ Bhav Hlth Sci University Honors College Faculty. BA Univ of Wisconsin-Madison 1975; MA University of Chicago 1977; PHD Univ of Cal-San Francisco 1986
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Cating, Robert 2013 Faculty Research Assistant Hermiston Exp Sta. BA Indiana UniversityBloomington 2002; MS University of Florida 2010; PHD University of Florida 2010

Cazares-Cervantes, Abraham 2015 Instructor College of Education. PHD Oregon State University 2014
Cebra, Christopher 1997 Dept Chair - Clinical Sciences Veterinary Medicine. BA University of Pennsylvania 1986; MA University of Pennsylvania 1986; MS Colorado State University 1995; DVM University of Pennsylvania 1991
Cebra, Christopher 1997 Professor Associate Professor Vet Clinical Sciences. BA University of Pennsylvania 1986; MA University of Pennsylvania 1986; MS Colorado State University 1995; DVM University of Pennsylvania 1991
Ceraso, Marion 2017 Associate Professor (Practice) Sch of Bio/Pop Hlth Sci. BA Rutgers University-New Brunswi 1984; MS Johns Hopkins University 1991; MA Univ of Wisconsin-Madison 2009
Cervantes, Brandy T 1998 Research Associate Earth, Ocean \& Atmo Sci. BS Univ of Michigan-Ann Arbor 1997; PHD Oregon State University 2004
Chadwell, Faye A 2007 D\&D Campbell Univ Librarian Library. BA Appalachian State University 1984; MA Appalachian State University 1987; MLS Univ of Illinois at Urbana-Cha 1988
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Chadwick, William 1989 Professor (Sr Res) CIMRS (Inst/Marine Res). BA Colorado College 1981; PHD Univ of Cal-Santa Barbara 1988
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Chan, Francis 2001 Associate Professor (Sr Res) Integrative Biology University Honors College Faculty. BA Hampshire College 1993; PHD Cornell University-Ithaca 2001
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Chaplen, Frank W 1996 Associate Professor Biol \& Ecol Engineering. BS Oregon State University 1989; PHD Univ of WisconsinMadison 1995
Chaplin, Tanya A 1997 Head Coach-Women's Gymnastics Intercolleg Athletics. BA Univ of California-Los Angeles 1990
Chapman, Christopher C 2006 Associate Professor Music University Honors College Faculty. BMUS The Ohio State Univ Main 1992; MM The Ohio State Univ Main 1998
Chappell, Marisa A 2005 Associate Professor History University Honors College Faculty. BA Emory University 1991; MA
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Chappell, Patrick E 2005 Assistant Professor (Clinical) Vet Biomedical Science University Honors College Faculty. BA Emory University 1991; PHD Northwestern University 1999
Charlton, Brian A 1994 Senior Instructor I Klamath Basin Res\&ExtCtr. BS Oregon State University 1994; MS Iowa State University 2006
Chase, Patricia A 2017 Professor (Clinical) Pharmacy. BS Albany College of Pharmacy 1971; MS Univ of N Carolina-Chapel Hill
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Chastain, Donna L 2007 Director \& Interim
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Chastain, Thomas G 1989 Professor Crop and Soil Science. BA Cal State Univ-Chico 1981;
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Chavarria-Bechtel, Loren 1996 Senior
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Chen, Hsiou-Lien 1995 Associate Professor College of Business. BA Fu Jen Catholic University 1982; MS The Ohio State Univ Main 1990; PHD The Ohio State Univ Main 1995
Chen, Jiyao 2011 Assistant Professor Associate Professor College of Business. BS Tongji Medical University 1995; MS Central South Univ of Tech 1998; PHD Stevens Institute of Technolog 2007
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Chen, Yong 2009 Associate Professor Applied Economics. BA Beijing Foreign Studies Univer 1999; MA Peking University 2003; PHD The Ohio State Univ Main 2009
Chen, Yue 1994 Instructor Music. MAIS Oregon State University 1992
Cheng, Li-Jing 2013 Assistant Professor Sch Elect Engr/Comp Sci. PHD Univ of MichiganAnn Arbor 2008
Cheng, Qunkang 2017 Research Associate (Post Doc) Central Oregon Exp Sta. MS Univ of Tennessee-Knoxville 2011; PHD Univ of Tennessee-Knoxville 2017

Cheong, Ha Yeon 2009 Associate Professor Chemistry University Honors College Faculty. PHD Cal State Univ-Los Angeles 2007
Cherian, Deepak A 2017 Research Associate (Post Doc) Earth, Ocean \& Atmo Sci. BS Indian Institute of Technology ; MS Indian Institute of Technology ; PHD Massachusetts Inst of Technolo 2016
Cherian, Gita 1999 Professor Animal \& Rnglnd Sciences. BVSC Kerala Agricultural University 1979; MS University of Alberta 1985; PHD University of Alberta 1993
Chesbro, Jon 2014 Instructor Economics. BS Texas A\&M Univ-College Station 1996; MA University of Montana 2001
Cheseby, Maziet 1998 Senior Faculty Research Asst I Earth, Ocean \& Atmo Sci. BA Univ of Colorado-Boulder 1991
Cheung, Itchung S 2007 Senior Instructor I Hatfield Marine Sci Ctr. BA Univ of California-Santa Cruz 1998; MS Univ of California-Santa Cruz 2007
Cheyney, Melissa J 2003 Associate Professor Anthropology University Honors College Faculty. BA Calvin College 1994; MA Western Michigan University 1997; PHD University of Oregon 2005
Chi, Chunhuei 1990 Professor Sch of Bio/Pop Hlth Sci. BS Foreign Institution 1978; MPH Univ of Texas System Office 1982; D SCI Harvard University 1990
Chiang, Patrick Y 2006 Associate Professor Sch Elect Engr/Comp Sci University Honors College Faculty. BS Univ of CaliforniaBerkeley 1998; MS Stanford University 2001; PHD Stanford University 2006
Cho, Jeewon 2011 Associate Professor College of Business. BBA Duksung Womens University 1995; MBA Seoul National University 1997; PHD SUNY-College at Buffalo 2007
Cho, Sam Y 2014 Assistant Professor College of Business. MA Hitotsubashi University 2003; MBA University of Rochester 2010; PHD Washington State University 2014
Choate, Jeffery B 1999 Assistant Professor (Practice) Ext Lane County Office. BS University of Oregon 1999; MS University of Oregon 2004
Choi, Jaewoo 2012 Research Associate Linus Pauling Institute. BS Foreign Institution 2001; MS Foreign Institution 2003; PHD Case Western Reserve Univ 2010
Chouinard, Adam J 2010 Instructor Integrative Biology. BS Univ of New Hampshire-Durham 2006; MS Univ of New Hampshire-Durham 2010
Choun, Soyoung 2002 Research Associate (Post Doc) Sch of Soc/Bhav Hlth Sci. BA Ewha Womans University 1979; MS Oregon State University 2006; PHD Oregon State University 2012
Chow, Eileen S 2007 Senior Faculty Research Asst I Integrative Biology. BS Oregon State University 2009
Christensen, John M 1979 Professor Pharmacy. BS University of Utah 1975; PHD University of Utah 1980
Christensen, Russell L 2009 Instructor Music. BED University of Oregon 1979; MED Western Oregon University 1984

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Chung, Woodam 1998 Associate Professor Forest Eng/Resourcs/Mgmt. BS Seoul National University 1993; MS Seoul National University 1995; PHD Oregon State University 2002
Ciannelli, Lorenzo 2005 Professor Earth,
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Faculty. BS Foreign Institution 1993; PHD
University of Washington 2002
Ciechanowski, Kathryn 2006 Associate
Professor College of Education. BA Univ of California-Davis 1995; BS Univ of CaliforniaDavis 1995; EDM Harvard University 1997;
PHD Univ of Michigan-Ann Arbor 2006
Cieri, Mike 2006 Instructor College of
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Ciuffetti, Lynda M 1989 Department Head Ag Botany/Plant Path. BS Massachusetts Maritime Academy 1973; MS Michigan Technological Univ 1976; PHD Purdue
University Main Campus 1983
Ciuffetti, Lynda M 1989 Professor Ag Botany/
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Academy 1973; MS Michigan Technological
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## Campus 1983

Claassen, Briana J 2014 Faculty Research
Assistant Ag Botany/Plant Path. BS
Northwest Nazarene University 2012
Claremont, Rita M 1997 Senior Faculty
Research Asst I Fisheries and Wildlife. BS Oregon State University 1994
Clark, JaTtik O 2010 Instructor Music. BMUS
Univ of S Carolina-Columbia 1997; MM Univ of Cincinnati Main 1999
Clark, Peter U 1988 Distinguished Professor Earth, Ocean \& Atmo Sci. BS St Lawrence University 1978; MS University of Waterloo 1980; PHD Univ of Colorado System 1984
Clark, Sara E 1997 Instructor Mathematics. BS Pacific Lutheran University 1997; MS Oregon State University 1999
Clark, Steve 2011 Vice President VP Univ
Relations \& Mktg. BS Oregon State University 1975
Clauson, Milo L 1971 Senior Faculty Research Asst I Wood Science/Engr. BA Eastern Oregon University 1969
Claycomb, Doretta A 2000 Senior Faculty Research Asst I Food Innovation Center. BS Oregon State University 1979
Clough, Sharyn 2003 Professor Philosophy University Honors College Faculty. BA University of Calgary 1987; MA University of Calgary 1989; PHD Simon Fraser University 1997
Cluskey, Mary M 1994 Associate Professor Sch of Bio/Pop Hlth Sci. BS Southern Illinois U-Carbondale 1976; MS Illinois State University 1979; PHD Oregon State University 1992
Cluver, Brigitte G 1994 Instructor College of Business. BS Univ of California-Davis 1993; MS Oregon State University 1996; PHD Oregon State University 2008
Coakley, James R 1990 Associate Professor
College of Business. BS Oregon State
University 1970; MBA University of Utah
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Coakley, James R 1990 Senior Assoc DeanAcademicProg College of Business. BS Oregon State University 1970; MBA University of Utah 1976; PHD University of Utah 1982
Coblyn, Matthew Y 2005 Research Associate Sch of Chem/Bio/Envr Eng. BS Oregon State University 2008; MS Univ of CaliforniaIrvine 2009; PHD Oregon State University 2015
Coffin, Christopher M 2005 Instructor Physics. BS Oregon State University 1983; MAT Western Oregon University 2002
Cogliati, Karen M 2014 Research Associate Fisheries and Wildlife. BS University of Windsor 2007; MS University of Windsor 2009; PHD Mc Master University 2013
Cohn, Greg M 2016 Faculty Research Assistant Forest Ecosyst \& Society. BS University of Montana 2008
Colantonio, Ernest S 2008 Faculty Research Assistant Earth, Ocean \& Atmo Sci. BS Univ of Illinois at Urbana-Cha 1981; MS Univ of Wisconsin-Madison 1994
Cole, Elizabeth C 1981 Senior Faculty Research Asst I Forest Eng/Resourcs/Mgmt. BS Utah State University 1981; MS Oregon State University 1984
Coleri, Erdem 2014 Assistant Professor Sch of Civil/Constr Engr. BS Middle East Tech University 2005; MS Middle East Tech University 2007; PHD Univ of CaliforniaDavis 2011
Collins, Tess E 2011 Consultant-Academic Advisor Veterinary Medicine. BA Boise State University 2006
Colomer, Soria E 2015 Assistant Professor College of Education. BA Millsaps College 1998; MS Univ of Mississippi-Main Campu 2000; PHD University of Georgia 2012
Colonna, Ann E 2002 Sensory Program Manager Senior Faculty Research AsstII Food Innovation Center. BS University of Arizona 1997
Colwell, Frederick S 2006 Professor Earth, Ocean \& Atmo Sci University Honors College Faculty. BA Whitman College 1977; MS Northern Arizona University 1982; PHD Virginia Polytechnic Institute 1986
Comar, John F 2014 Rep-Shipyard Ship Operations. BS United States Coast Guard Acad 1989; MS Unknown College
Combes, Vincent 2010 Research Associate Earth, Ocean \& Atmo Sci. MENG Foreign Institution 2005; MS Georgia Institute of Technolog 2007; PHD Georgia Institute of Technolog 2010
Condon, Khrystal C 2016 Academic Advisor Public Hlth/HumanSci Adm. BS Univ of Wisconsin-River Falls 2010; MED Iowa State University 2012
Conley Jr, John F 2007 Professor Sch Elect Engr/Comp Sci University Honors College Faculty. BSEE Penn State Univ-Main Campus 1991; PHD Penn State Univ-Main Campus 1995
Conner, Roby D 2008 Instructor Sch of Wrtg Lit \& Film. BA Schreiner College 1994; MFA University of Oregon 2007
Connolly, Lanelle R 2006 Senior Faculty Research Asst I Biochem/Biophysics. BS Eastern Oregon University 1999

Contreras, Ryan N 2009 Associate Professor Horticulture. BS North Carolina State Univ 2002; MS North Carolina State Univ 2006; PHD University of Georgia 2009
Conway, Bryan A 2010 Instructor Economics. BS University of Oregon 1991; MS Oregon State University 1994
Conway, Flaxen D 1989 Dir-MRM Program Earth, Ocean \& Atmo Sci. BS Oregon State University 1984; MS Oregon State University 1986
Conway, Flaxen D 1989 Professor Sea Grant. BS Oregon State University 1984; MS Oregon State University 1986
Cook, Erin A 2003 Instructor Speech Communication. BA Oregon State University 2004; MAIS Oregon State University 2007
Cook, Steve 1997 Senior Instructor II Earth,
Ocean \& Atmo Sci. BS Univ of Alaska System 1973; MS Univ of Alaska System 1982; PHD University of Florida 1995
Cooke, Flavia N 2009 Faculty Research Assistant EOARC - Burns Exp Sta. BS Foreign Institution 2006; MS University of Florida 2008
Cooke, Reinaldo F 2009 Associate Professor EOARC - Burns Exp Sta. BS Universidade de Sao Paulo 2003; MS University of Florida 2006; PHD University of Florida 2008
Cooley, Richard B 2006 Assistant Professor (Sr Res) Biochem/Biophysics. BA Middlebury College 2004; PHD Oregon State University 2011
Cooley, Stacy D 2007 Assistant Professor (Clinical) Vet Clinical Sciences. BA Middlebury College 2005; DVM Oregon State University 2010
Coon, Scott A 2015 Assistant Professor (Clinical) Pharmacy. D PHAR University at Buffalo, SUNY 2013
Coop, Leonard B 1987 Assistant Professor (Sr Res) Integrtd Plant Prot (Ag). BA Baker University 1979; MS Oregon State University 1982; PHD Oregon State University 1987
Cooper, Laurel 1997 Research Associate Ag Botany/Plant Path. BS University of Alberta 1989; PHD University of Alberta 1997
Copeman, Louise A 2006 Assistant Professor (Sr Res) Earth, Ocean \& Atmo Sci. BS Memorial Univ of Newfoundland 1996; MS Memorial Univ of Newfoundland 2001; PHD Memorial Univ of Newfoundland 2011
Corcoran, Patrick E 1987 Associate Professor Ext Clatsop Co Office. BS Univ of WisconsinEau Claire 1984; MS Oregon State University 1989
Cordoba, Maria 2016 Research Associate (Post Doc) Crop and Soil Science. BS Foreign Institution 2005; PHD Foreign Institution 2009
Cordova, Angela J 1998 Instructor Speech Communication. BS Oregon State University 1998; MAIS Oregon State University 2003
Cornwall, Winston A 1996 Instructor College of Education. BA Wesleyan University 1978; MS Oregon State University 1984
Corp, Mary K 1998 Director Columbia Basin Exp Sta. BS Eastern Oregon University 1989; MS Portland State University 1995
Corp, Mary K 1998 Professor Ext Umatilla Co Office. BS Eastern Oregon University 1989; MS Portland State University 1995

Corp, Mary K 1998 Regional Administrator Extension Service Admin. BS Eastern Oregon University 1989; MS Portland State University 1995
Corwin, Lauren N 2013 Consultant-Academic Advisor Pharmacy. BA University of Portland 2010
Cotilla-Sanchez, Eduardo J 2012 Assistant Professor Sch Elect Engr/Comp Sci University Honors College Faculty. BS Foreign Institution 2007; MS University of Vermont 2009; PHD University of Vermont 2012
Cowen, Robert 2013 Director Hatfield Marine Sci Ctr. PHD Univ of California-San Diego 1985
Cowen, Robert 2013 Professor Earth, Ocean \& Atmo Sci. PHD Univ of California-San Diego 1985
Cox, Daniel T 2002 Professor Sch of Civil/ Constr Engr University Honors College Faculty. BS University of Delaware 1987; MS University of Delaware 1989; PHD University of Delaware 1995
Cozzi, Elaine 2011 Assistant Professor Mathematics University Honors College Faculty. BA University of Virginia 2000; PHD Univ of Texas-Austin 2007
Craig, A M 1976 Professor Vet Biomedical Science University Honors College Faculty. BA Oregon State University 1965; PHD Oregon State University 1970
Craig, Ryan B 2006 Faculty Research Assistant Microbiology (Ag). BS Oregon State University 2006
Cramer, Lori A 1993 Associate Professor Sociology University Honors College Faculty. BS Illinois State University 1985; MS Utah State University 1988; PHD Utah State University 1993
Crangle, Kenneth 2012 Instructor College of Business. MBA University of Chicago 1984
Crawford, Dana C 2001 Family Advocate Instructor Child Development Lab. BA Scripps College 2001
Crawford, Robert J 2011 Faculty Research Assistant Forest Eng/Resourcs/Mgmt. BS Oregon State University 2015
Creason, Whitney 2013 Faculty Research Assistant Forest Ecosyst \& Society. BS University of Kansas 2010; MS Indiana University-Bloomington 2012
Creighton, Janean 2010 Associate
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Creutzburg, Megan K 2010 Research Associate INR-Or Biodvrsty InfoCtr. BA Whitman College 2003; PHD Utah State University 2009
Creveling, Jessica 2015 Assistant Professor Earth, Ocean \& Atmo Sci. BA Colorado College 2006; MA Harvard University 2010; PHD Harvard University 2012
Crisp, Gloria E 2016 Associate Professor College of Education. BBA University of Houston 1999; MA University of Houston 2002; EDD University of Houston 2006
Cross, Robin M 2000 Assistant Professor (Sr Res) Applied Economics. BS Oregon State University 1997; PHD Oregon State University 2005

Crowell, Cathleen B 2016 Associate Professor (Clinical) Sch of Bio/Pop Hlth Sci. BA Willamette University 2000; MA Univ of N Carolina-Chapel Hill 2002; PHD Univ of N Carolina-Chapel Hill 2006
Crowhurst, Rachel S 2008 Senior Faculty Research Asst 1 Fisheries and Wildlife. BS Brock University 2005; MS Oregon State University 2012
Cruickshank, Jenifer 2016 Assistant Professor (Practice) Ext Marion County Office. MS Univ of California-Davis 1998; PHD Univ of Wisconsin-Madison 2003
Crump, Byron C 2013 Professor Earth, Ocean \& Atmo Sci. BA Oberlin College 1990; MS University of Washington 1996; PHD University of Washington 1999
Cruz, Shannon M 2016 Visiting Assistant Professor Assistant Professor Speech Communication. BA Michigan State University 2012; BS Michigan State University 2012; MS Michigan State University 2015; PHD Michigan State University 2016
Cservenka, Anita 2016 Assistant Professor Sch of Psychological Sci. BS Univ of CaliforniaLos Angeles 2008; PHD Oregon Health \& Science Univ 2013
Cunningham, Sarah E 2007 Instructor Anthropology. MAIS Ball State University 2006; PHD Oregon State University 2012
Curran, Kaitlin M 2015 Assistant Professor (Clinical) Vet Clinical Sciences. DVM Washington State University 2011
Curry, Daniel G 2006 Dir-Seed Services Crop and Soil Science. BS South Dakota State University 1977; MBA Iowa State University 1998
Curry, Daniel G 2006 Supv-Farm Unit Corvallis Farm Unit. BS South Dakota State University 1977; MBA Iowa State University 1998
Curtin, Christopher D 2016 Assistant Professor Food Science and Techno. BS Foreign Institution 1999; PHD Foreign Institution 2001
Curtis, Daniel W 2007 Senior Faculty Research Asst I Crop and Soil Science. BS Oregon State University 1985; MS Oregon State University 1988
Curtis, Marc J 1996 Instructor Ag Botany/Plant Path. BS Southern New Hampshire Univ 1994; PHD Oregon State University 2003
Cusack, Leanne K 2009 Instructor Sch of Bio/ Pop Hlth Sci. MPH Oregon State University 2010; PHD Oregon State University 2014
Cusack, Leanne K 2009 Research Associate (Post Doc) Sch of Bio/Pop Hlth Sci. MPH Oregon State University 2010; PHD Oregon State University 2014
Cushing, Tamara 2014 Assistant Professor Forest Eng/Resourcs/Mgmt. BS University of Florida 1996; MS Mississippi State University 1999; PHD University of Georgia 2006
Cushing, Tamara 2014 Endowed Chair-Starker Forest Eng/Resourcs/Mgmt. BS University of Florida 1996; MS Mississippi State University 1999; PHD University of Georgia 2006


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Dahl, Nicholas D 2015 Instructor Acad Prog/ Student Aff. BS University of Oregon 1992; MA University of Oregon 1994; PHD Penn State Univ-Main Campus 2002
Dallas, David C 2004 Assistant Professor Sch of Bio/Pop Hlth Sci. BA Rice University 2008; PHD Univ of California-Davis 2012
Dalton, Daniel T 2006 Senior Faculty Research
Asst I Horticulture. BS University of Wyoming 2005
Dalton, Meghan M 2009 Faculty Research Assistant Earth, Ocean \& Atmo Sci. MS Oregon State University 2011
Daly, Christopher 1990 Professor (Sr Res) Sch of Chem/Bio/Envr Eng. BS Univ of California-Davis 1978; MA Univ of ColoradoBoulder 1984; PHD Oregon State University 1994
Daly, Elizabeth A 2003 Senior Faculty Research Asst I CIMRS (Inst/Marine Res). BS Univ of Maryland-College Park 1992
Dalziel, Benjamin D 2015 Assistant Professor Integrative Biology. BS University of Guelph 2004; MS University of Guelph 2006; PHD Cornell University-Ithaca 2014
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Dascaliuc, Radu 2011 Associate Professor Mathematics University Honors College Faculty. BS Foreign Institution 1997; MS Texas A\&M Univ-College Station 1999; PHD Texas A\&M Univ-College Station 2005
Dasenko, Mark A 1995 Senior Faculty Research Asst I Ctr Excellnce Genome Res. BS Oregon State University 1999
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Davis, Loren G 1999 Associate Professor Anthropology. BS Oregon State University 1991; MAIS Oregon State University 1995; PHD University of Alberta 2001
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Davison, Neil R 1995 Professor Sch of Wrtg Lit \& Film University Honors College Faculty. BA Univ of Maryland System 1982; MFA Columbia University-NYC 1984; PHD Univ of Maryland System 1993
Dawson, Patricia A 1988 Professor Ext Umatilla Co Office. BS University of Idaho 1981; MA Norwich University 1992
Day, Michelle A 2003 Faculty Research Assistant Forest Ecosyst \& Society. BA Bates College 1996; MS Oregon State University 2005
De Adder, Tyler J 2004 Coord of Undergrad Acad Prog Sch of Mech/Ind/Mfg Engr. BS Auburn University Main Campus 1995
De Amicis, Raffaele 2016 Associate Professor (Sr Res). Sch Elect Engr/Comp Sci. PHD Univ of Bologna 2001
De Leenheer, Patrick 2013 Professor Mathematics. MS Foreign Institution 1995; PHD Foreign Institution 2000 DeBano, Sandra J 2001 Riparian Entomologist Associate Professor Hermiston Exp Sta. BS Arizona State University 1990; MS Arizona State University 1992; PHD University of Kentucky 1997
DeGandi, Nicholas W 2014 Instructor (PAC) Physical ActivityCourses. BS Oregon State University 2014
DeWitt, Christina A 1997 Associate Professor Food Science and Techno. BS Texas A\&M Univ-College Station 1989; MS Oregon State University 1994; PHD Oregon State University 2000
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Delander, Gary E 1983 Associate Professor Pharmacy. BS Univ of Colorado-Boulder 1977; PHD U of Minnesota-Central Offices 1983
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Dennis, Alan B 2001 Multimedia Tech Designer Ext/Exp S Communications. BS Oregon State University 2006
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Detweiler, Amy Jo 1999 Associate Professor Ext Deschutes Co Office. BS Westminster College 1992; MS Colorado State University 1998

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Diebel, Penelope L 1995 Assistant Dean College of Ag Admin University Honors College Faculty. BS Colorado State University 1983; MS Colorado State University 1986; PHD Virginia Polytechnic Institute 1990
Diebel, Penelope L 1995 Associate Professor Applied Economics University Honors College Faculty. BS Colorado State University 1983; MS Colorado State University 1986; PHD Virginia Polytechnic Institute 1990
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Edwards, John A 1995 Director-Sch of Psych Sci Liberal Arts Admin University Honors College Faculty. BA Davidson College 1983; MA Univ of N Carolina-Charlotte 1989; MA The Ohio State Univ Main 1992; PHD The Ohio State Univ Main 1995

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Edwards, Mark 1997 Professor Sociology University Honors College Faculty. BA Univ of California-Davis 1984; MA University of Washington 1992; PHD University of Washington 1997
Egbert, Gary D 1988 Professor Earth, Ocean \& Atmo Sci. BA Univ of California-Berkeley 1977; MS University of Washington 1981; PHD University of Washington 1987
Egna, Hillary S 1986 Director and Unit Leader Associate Professor, Sr Res Aquaculture CRSP. BS Univ of Michigan-Ann Arbor 1980; MS Oregon State University 1985; PHD Oregon State University 1998
Egri, Denise M 2011 Instructor (ESL) INTO OSU Program. BA Univ of CaliforniaBerkeley 1997; MA Monterey Inst of Internat Stud 2003
Ehsan, Samina 2008 Instructor Sch Elect Engr/ Comp Sci. BS University of Dhaka 2007; MS University of Dhaka 2007; PHD Oregon State University 2012
Eisenhuth, Roland 2013 Assistant Professor Economics University Honors College Faculty. MA Northwestern University 2012; PHD Northwestern University 2013
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Elbom, Gilad 2009 Instructor Sch of Wrtg Lit \& Film University Honors College Faculty. BA Hebrew University of Jerusalem 1996; MFA Otis College of Art \& Design 2002; PHD Univ of N Dakota-Main Campus 2009
Elias, Sabry 1998 Associate Professor (Sr Res) Professor, Sr Res Crop and Soil Science. BS Foreign Institution 1974; MS Michigan State University 1988; PHD Michigan State University 1994
Elias, Valerie D 1999 Faculty Research Assistant Vet Biomedical Science. BS Michigan State University 1992
Elliott, Karen M 2002 Senior Instructor I Sch of Soc/Bhav Hlth Sci. BA Carroll College 1998; MS University of Montana 2002; PHD Oregon State University 2006
Elliott, Rebekah L 2004 Associate Professor College of Education. BA Univ of Cal-Santa Barbara 1985; PHD Univ of ColoradoBoulder 2002
Ellsworth, Lisa M 2000 Assistant Professor (Sr Res) Fisheries and Wildlife. BS Oregon State University 2001; MS Oregon State University 2006; PHD Univ of Hawaii at Manoa 2012
Elman, Miriam 2011 Senior Faculty Research Asst I Pharmacy. BA Reed College 2000
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Elston, Julie 2005 Professor Acad Prog/Student Aff. BA University of Washington 1982; MS CUNY-Bernard Baruch College 1985; PHD University of Washington 1992

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Ely, Roger L 2003 Associate Professor Biol \& Ecol Engineering. BS Oregon State University 1978; MS Oregon State University 1987; PHD Oregon State University 1996
Emerson, Patrick M 2006 Professor Economics. BA Lewis \& Clark College 1990; MA Univ of Wisconsin-Madison 1994; PHD Cornell University-Ithaca 2000
Emerson, Sarah C 2010 Associate Professor Statistics (Science). BS Stanford University 2004; PHD Stanford University 2009
Endress, Bryan A 2002 Assistant Professor Eastern Ore Univ Ag Prg. BA Luther College 1995; MS Univ of Illinois at Urbana-Cha 1997; PHD Miami University-Oxford 2002
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Field, Katharine G 1988 Director Bioresources Research University Honors College Faculty. BA Yale University 1975; MA Boston University 1979; PHD University of Oregon 1985
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Gibson, Yvette M 2011 Instructor Animal \& Rnglnd Sciences. BS Oregon State University 2012; MS Oregon State University 2015
Giebultowicz, Jadwiga M 1995 Professor Integrative Biology University Honors College Faculty. MS Univ of Warsaw 1974; PHD Univ of Warsaw 1981
Giebultowicz, Tomasz M 1995 Associate Professor Physics University Honors College Faculty. MS Univ of Warsaw 1968; PHD Univ of Warsaw 1975
Gilchrist, Della 2013 Instructor (ESL) INTO OSU Program. MA Cal State Univ-Los Angeles 1992; MA Biola University 2004
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Grutzmacher, Stephanie K 2015 Assistant Professor Sch of Bio/Pop Hlth Sci. BS Syracuse University-Main Campu 2002; MS Univ of Maryland-College Park 2004; PHD Univ of Maryland-College Park 2007
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Gupta, Rakesh 1991 Professor Wood Science/ Engr University Honors College Faculty. MS University of Manitoba 1984; PHD Cornell University 1990
Gutowska, Izabela 2011 Assistant Professor (Sr Res) Nuclear Engineering. BS Warsaw Univ of Technology 2011; MS Warsaw Univ of Technology 2012; PHD Oregon State University 2015
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Haggerty, Roy D 1996 Associate Vice President VP for Research University Honors College Faculty. BS University of Alberta 1990; MS Stanford University 1993; PHD Stanford University 1995; PHD Stanford University 1996
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Harvey, S Marie 2003 Distinguished Professor Sch of Soc/Bhav Hlth Sci University Honors College Faculty. BA University of Puget Sound 1969; MPH Univ of California-Los Angeles 1979; PHD Univ of California-Los Angeles 1984
Hasbrook, John 2010 Instructor College of Business. BA Willamette University 1987; JD Willamette University 1991
Hase, Claudia C 2003 Professor (Sr Res) Professor, Sr Res Vet Biomedical Science University Honors College Faculty. BS Univ of Gottingen, Sch of Medi 1984; MS Univ of Heidelberg 1986; PHD Univ of Wurzburg 1992
Hasenbeck, Aimee 2015 Faculty Research Assistant Food Innovation Center. BS Univ of Arkansas-Fayetteville 2011; MS Univ of Arkansas-Fayetteville 2014
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Heppell, Selina S 2001 Department Head Fisheries and Wildlife University Honors College Faculty. BS University of Washington 1991; MS North Carolina State Univ 1993; PHD Duke University 1998
Heppell, Selina S 2001 Professor Fisheries and Wildlife University Honors College Faculty. BS University of Washington 1991; MS North Carolina State Univ 1993; PHD Duke University 1998
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Karplus, Andy 1998 Distinguished Professor Biochem/Biophysics University Honors College Faculty. BS Univ of California-Davis 1978; PHD University of Washington 1984
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Kauffman, Melissa M 2009 Instructor (PAC) Physical ActivityCourses. BS Oregon State University 2011
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Keller, Jacquie K 2006 Instructor Child Development Lab. BS Western Oregon University 1994
Keller, Mark R 1988 Senior Faculty Research Asst I Animal \& Rnglnd Sciences. BS Oklahoma State Univ-Main 1978
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Kelley, Jason R 2001 Research Associate (Post Doc) Biol \& Ecol Engineering. BS Oregon State University 2012; PHD Oregon State University 2016
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Kelly, Elizabeth G 1995 Advisor - Distance Education Fisheries and Wildlife. BA Rutgers University-Central Off 1988; MS Oregon State University 2001
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Milligan, Kristen 2004 Assistant Professor (Sr Res) Integrative Biology. BS Evergreen State College 1992; PHD University of British Columbia 1998
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College of Education. BS Univ of Minnesota-
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Stawski, Robert S 2013 Associate Professor Sch of Soc/Bhav Hlth Sci. BS Oklahoma State Univ-Main 2000; MS Syracuse UniversityMain Campu 2004; PHD Syracuse UniversityMain Campu 2006
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Vorachek, William R 1999 Research Associate Vet Biomedical Science. BS Univ of Michigan-Ann Arbor 1981; PHD University of Virginia 1991
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- Mike Bailey, professor of computer science, OSU Corvallis
- Mark Baldwin, analyst programmer, OSU, Corvallis
- Patricia Bedient, executive vice president/chief financial officer (retired), Sammamish, WA
- Rani Borkar, vice president, OpenPOWER Development, IBM, Beaverton
- Julia Brim-Edwards, senior director, government and public affairs, Nike, Beaverton
- Darald Callahan, president (retired), Chevron Chemical Co., San Rafael, CA
- Michele Longo Eder, attorney (retired), Newport
- Paul Kelly, Jr., attorney (retired), Portland
- Brett Morgan, OSU student
- Laura Naumes, vice president, Naumes Inc., Medford
- Preston Pulliams, president, Gold Hill Associates, Jackson, MS
- Edward Ray, president, Oregon State University, Ex Officio
- Patricia Reser, chairman of the board, Reser's Fine Foods, Inc., Beaverton
- Kirk Schueler, chief executive officer and president, Brooks Resources Corporation, Bend
- Michael Thorne, wheat farmer, Pendleton
For further information, go to http:// leadership.oregonstate.edu/trustees.


## GRADUATE SCHOOL

## ADMINISTRATION

A300 Kerr Administration Building [Relocating to Heckert Lodge in Fall 2017] 541-737-4881; FAX 541-737-3313 Website: http://gradschool.oregonstate. edu
Jennifer Brown, Vice Provost and Dean
Stephanie Bernell, Associate Dean
Rosemary Garagnani, Assistant Dean for
Enrollment Management and Student Services
Jessica Beck, Assistant Dean of Graduate Student Development
Fran Saveriano, Assistant Dean for Recruitment and Financial Support
Kim Calder, Executive Assistant to the Dean
Maureen Childers, Assistant to the
Associate Dean and Assistant to the Office of Postdoc Programs

## GRADUATE COUNCIL

TBA - Chair
Sourabh Apte, College of Engineering, 2018
Rebekah Elliott (v. Ng), College of Education, 2018
Marie Harvey, College of Public Health \& Human Sciences, 2018
Lisa Price, College of Liberal Arts, 2018
Pat Chappell, College of Veterinary
Medicine, 2019
Jim Coakley, College of Business, 2019
Anite Grunder, College of Earth, Ocean,
\& Atmospheric Sciences, 2019
TBA - Student Member, 2018

## Ex-officios:

Jennifer Dennis - Graduate School
Chong Fang - Graduate Admissions Committee
Dorthe Wildenschild - Graduate School
Graduate Council Representation
(appointed annually):
Online Education Committee - TBA (ExOfficio, Non-voting), 2018
David Bernell - Executive Committee Liaison
Current and past Graduate Council
membership and information can be found at http://senate.oregonstate.edu/ graduate-council

## EQUAL OPPORTUNITY

Oregon State University, in compliance with state and federal laws and regulations, does not discriminate on the basis of age, color, disability, gender identity or expression, genetic information, marital status, national origin, race, religion, sex, sexual orientation, or veteran status in any of its policies, procedures, or practices. This nondiscrimination policy covers admission and access to, and treatment and employment in, university programs and activities, including but not limited to academic admissions, financial aid, educational services, and employment. Inquiries regarding the university's equal opportunity policies may be directed to the Equal Opportunity and Access, 541-737-3556 or visit http://eoa.oregonstate. edu/.

## General Information

Services for Student Support

Learning Centers and Programs

Division of Extended Campus

## Agricultural Sciences

Business

Earth, Ocean, and Atmospheric Sciences

Education

Engineering

Forestry

Graduate School

Interdisciplinary Studies

International Education

Liberal Arts

Pharmacy

Public Health and Human Sciences

Reserve Officer Training Corps

Science

University Honors College

Veterinary Medicine

Research

Faculty



[^0]:    ADMISSION OF INTERNATIONAL UNDERGRADUATE STUDENTS
    International students are admitted to OSU based on meeting the minimum OSU academic requirements, English language proficiency requirements and evidence of funding requirements (if an F-1 or J-1 visa is needed). Visit the Office of International Admissions online at http://admissions.oregonstate. edu/?q=international/.

    In general, international applicants

[^1]:    1 course from below or approved* alternative (3-4):
    ANTH 210. *Comparative Cultures (3)

[^2]:    Options
    Arid Land Ecology
    Ecological Restoration
    Fish and Wildlife Conservation

