University *of* New Hampshire

Graduate School Catalog

2013–2014

Volume I

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Graduate School

» http://www.gradschool.unh.edu/

Introduction

The University of New Hampshire enrolls 12,000 undergraduate students and 2,200 graduate students in Durham and has a full-time faculty of more than 600. A comprehensive research university, it retains the look and feel of a New England liberal arts college with a faculty dedicated to teaching. The University is ideally located within easy driving distance to the White Mountains, the Seacoast area of New Hampshire, and Boston.

UNH is a land-, sea-, and space-grant research university. It comprises the following academic units: the College of Engineering and Physical Sciences; College of Liberal Arts; College of Life Sciences and Agriculture, which includes the Thompson School of Applied Science; College of Health and Human Services; Peter T. Paul College of Business and Economics; University of New Hampshire at Manchester; University of New Hampshire School of Law in Concord; and the Graduate School.

The University System of New Hampshire, of which UNH is a member, also includes Keene State College, Plymouth State University, and Granite State College.

The University awarded its first Ph.D. in 1896, placing it among the earliest American universities to award that degree. Doctoral programs in their present form began in the 1950s.

Graduate Education

The mission of the Graduate School is to provide innovative, responsive, and accessible master's and doctoral degree programs of the highest quality to graduate students. Our programs foster a close interdependence between research and classroom teaching. The 600 graduate faculty members and more than 2,200 graduate students at UNH work together to develop new theoretical and empirical acknowledge, design innovative methods and technologies to discover and disseminate that knowledge, and engage in undergraduate and graduate state-of-the-art teaching. The Graduate School is a source of intellectual capital for the University, the region, and the nation.

UNH is the primary institution within the University System of New Hampshire responsible for providing graduate programs that meet state, regional, and national needs and the only one at which doctoral programs are offered. Other units of the University System do offer some master's degree programs.

The Graduate School is led by the dean, who implements the policies of the graduate faculty. The dean is advised by the Graduate Council, which is composed of elected faculty members and graduate student representatives.

Graduate School

www.gradschool.unh.edu

The Graduate School provides assistance to prospective and current students from the time of their first inquiry about graduate study until completion of their graduate programs. Students are encouraged to contact the Graduate School staff with questions regarding academic policy, financial assistance (scholarships, fellowships, and travel grants), and availability of University services.

Graduate Council

The Graduate Council comprises 12 graduate faculty members and four graduate students. The council advises the dean of the Graduate School on policies concerning graduate education and is responsible to the graduate faculty for recommendations concerning new graduate programs. Standing committees of the council include the doctoral program committee, the master's program committee, the student affairs committee, and program review committee.

Master's Programs

The University offers master's degree programs in a wide variety of disciplines, which can serve either as professional terminal degrees or as intermediate degrees for those intending to pursue further graduate study. In many programs, students can elect options that will permit them to study one aspect of a discipline in depth by preparing a thesis or to gain a broader mastery of a discipline by electing to take coursework in lieu of a thesis.

Doctoral Programs

The University offers doctoral programs in those disciplines that have both the faculty and facilities to support high-quality advanced graduate education. Care has also been taken to ensure that the programs will make a significant contribution to the opportunities for doctoral education in the New England region. Doctoral education properly focuses upon preparing the student to contribute to the growth of knowledge through research. Most doctoral programs also provide opportunities for students to work as teaching assistants and to

participate in seminars on teaching led by experienced faculty members. After receiving a dual grounding in the development and communication of knowledge, graduates from UNH doctoral programs have gone on to find excellent teaching and research positions.

Interdisciplinary Programs

The Graduate School encourages and supports interdisciplinary study within existing programs and in the form of new and innovative graduate curricula. While self-designed courses of study are not available at the University, many of our programs offer a range of electives, cross-disciplinary study, and independent projects that allow students to tailor their work to reflect individual interests. This is especially true at the doctoral level. In addition, the Graduate School oversees intercollegiate programs that involve faculty and coursework from more than one school or college. Intercollegiate programs offer students the opportunity to pursue new and emerging fields of study that draw upon multiple disciplines, leading to solid disciplinary foundations as well as cross-disciplinary skills useful for solving new social and scientific problems. Opportunities for interdisciplinary research are also available in the institutes and centers at the University.

UNH Graduate School Manchester Campus

www.gradschool.unh.edu/manchester

The University of New Hampshire Graduate School Manchester Campus (UNH GSMC) offers post-baccalaureate programs in applied professional fields. Centrally located in Manchester's historic Millyard in the heart of the I-93 corridor, the Graduate School offers the expertise of University of New Hampshire faculty, contemporary curricula, modern educational facilities, convenient access, flexible schedules, and most important, a graduate degree from the University of New Hampshire, the state's flagship public university.

McNair Graduate Opportunity Program

www.unh.edu/mcnair

The McNair Graduate Opportunity Program provides eligible undergraduate students with ongoing consultation and support from faculty mentors and staff to help ensure their success in making the transition from undergraduate to graduate education. There is both an academic year and a summer component to the program. Application is required.

Graduate Student Senate

The Graduate Student Senate (GSS) provides a collective voice for the more than 2,000 graduate students who form an integral part of the University

community. The representative structure of the GSS comprises representatives from each college and on-campus housing unit. GSS representatives advocate for graduate students at the USNH Board of Trustees and on various University boards and committees. The GSS also promotes the graduate student community through sponsoring professional development opportunities and social events.

Communication to Students

University Communications are sent to students through the following channels:

Webcat

Students receive billing statements, register, view grades, student accounts, and financial aid awards through Webcat, a part of MyUNH (Blackboard).

University E-mail

Important notifications are sent to students by many departments and offices via a UNH e-mail address that is assigned by the University. Students are responsible for checking this e-mail address on a regular basis.

MyUNH (Blackboard)

Course material and University announcements are available through MyUNH, a student portal system.

Mail to permanent address

Some notifications are sent in the student's name to the permanent mailing address.

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» http://www.gradschool.unh.edu/

Associate in Applied Science

Master of Arts

Development Policy and Practice

Economics

English

- Language and Linguistics
- Literature

Environmental Education

History

- Museum Studies

Justice Studies

Music

- Music Education
- Music Studies

Political Science

Sociology

Spanish

Master of Science

Accounting

Animal Sciences

Biochemistry

Chemical Engineering

Chemistry

Civil Engineering

Communication Sciences and Disorders

- Adult Neurogenic Communication Disorders
- Early Childhood Intervention
- Language and Literacy Disabilities

Computer Science

Earth Sciences

- Geology
- Ocean Mapping

Electrical Engineering

Family Studies

- Marriage and Family Therapy

Genetics

Hydrology

Information Technology

Kinesiology

Management of Technology

Materials Science

Mathematics

- Applied Mathematics
- Statistics

Mechanical Engineering

Microbiology

Natural Resources

- Environmental Conservation
- Environmental Economics
- Forestry
- Soil and Water Resource Management
- Training for the Integration of Decision-Making and Ecosystems Science
- Wildlife and Conservation Biology

Nursing

Nutritional Sciences

Occupational Therapy

Oceanography

Ocean Engineering

- Ocean Mapping

Physics

Plant Biology

Recreation Management and Policy

- Recreation Administration
- Therapeutic Recreation Administration

Resource Administration and Management

Zoology

Master of Arts in Liberal Studies

Liberal Studies

Master of Arts in Teaching

Secondary Education

Master of Business Administration

Business Administration

Master of Education

Counseling

Early Childhood Education

Special Needs

Elementary Education

Reading

Secondary Education

Special Education

Teacher Leadership

Master of Engineering

Chemical Engineering

Civil Engineering

Electrical Engineering

Mechanical Engineering

Master of Fine Arts

Painting

Writing

Master of Public Administration

Public Administration

Master of Public Health

Public Health

Master of Science for Teachers

Chemistry
English
Mathematics

Master of Social Work

Social Work

Education Specialist

Educational Administration and Supervision

Doctor of Philosophy

Animal and Nutritional Sciences
Biochemistry
Chemical Engineering
Chemistry
Chemistry Education
Civil Engineering
Computer Science
Earth and Environmental Sciences
Economics
Education
Electrical Engineering
English
Genetics
History
Materials Science
Mathematics
Applied Mathematics
Mathematics Education
Statistics
Mechanical Engineering
Microbiology
Natural Resources and Environmental Studies

Nursing Practice
Ocean Engineering
Oceanography
Physics
Plant Biology
Psychology
Sociology
Systems Design
Zoology

Certificate Programs

Adapted Physical Education
Assistive Technology
Adolescent Development
Autism Spectrum Disorder
Child Advocacy and Family Policy
College Teaching (Offered Online)
Geospacial Science
Industrial Statistics
Leadership in Children's Health and Disability
Mentoring Teachers
Nursing: Family Practitioner (Post Masters)
Ocean Mapping: Basic and Advanced
Public Health
Software Systems Engineering
Special Education Administration
Substance Abuse Disorders
Sustainability Politics and Policy

Accounting (ACFI) ▼

» **http://www.wsbe.unh.edu/graduate-programs**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.S.

The master of science in accounting offered by the Peter T. Paul College of Business and Economics develops students' competencies to become innovative problem solvers in public accounting firms as well as small businesses, non-profit organizations, and major corporations. Designed for students with undergraduate degrees in accounting, the graduate program can be completed in one year. Applicants without an undergraduate degree in accounting can still apply but will need additional undergraduate business and accounting courses prior to beginning the graduate program.

The program satisfies the 150-hour course load required by most U.S. state licensing boards including the state of New Hampshire. The Paul College is AACSB accredited. The M.S. in accounting program strives to ensure that students have range and depth in the field, and it emphasizes strong analytical and communication skills as well as fosters awareness of ethical issues.

Admission Requirements

The primary admission period for the program is the fall. Admission requirements include a personal history that demonstrates high academic achievement, as well as the applicant's potential and desire for graduate study in accounting. Applicants are required to submit copies of prior academic records, current GMAT scores, three references, and a complete Graduate School application. A baccalaureate degree program must be completed prior to beginning the M.S. program.

Admission to the program is highly selective and limited, so it is in the applicant's best interest to apply early.

Degree Requirements

Upon admission to the program, applicants are required to complete ten courses detailed in the following program outline. All admitted candidates are expected to have completed a series of prerequisite courses. ACFI 850 (Accounting Theory and Research) is the capstone course. If an applicant has not completed all the prerequisite courses, the admissions committee may offer provisional admission and require that the applicant take the

prerequisite courses prior to moving into full degree candidacy.

Fall Semester

Abbreviation	Course Number	Title
ACFI	820	Corporate Taxation
ACFI	844	Topics in Advanced Accounting
ACFI	895	Government and Non-Profit Accounting
ADMN	898	Advanced Topics in Tax
ADMN	898	Fraud Accounting

Spring Semester

Abbreviation	Course Number	Title
ACFI	890	Accounting Information Systems
ACFI	830	Advanced Auditing
ADMN	898	Business Law II
ACFI	897	Ethics & Professional Practice
ACFI	850	Accounting Theory and Research

For students with non-accounting business degrees:

Prerequisites that must be completed at the undergraduate level are:

- ACFI 621, Intermediate Financial Accounting I
- ACFI 622, Intermediate Financial Accounting II
- MGT 647, Business Law I
- ACFI 723, Advanced Managerial Accounting Concepts and Applications
- ACFI 724, Auditing
- ACFI 726, Introduction to Federal Income Taxation

Students who do not possess an undergraduate degree in business must also complete:

- ADMN 02, Financial Accounting
- ADMN 503, Managerial Accounting
- ECON 401, Principles of Economics (Macro)
- ADMN 420, Business Statistics
- ADMN 601, Financial Management
- ADMN 970, Managerial Economics

In addition, students must choose two of the following three:

- ADMN 575, Behavior in Organizations
- ADMN 585, Marketing
- ADMN 580, Quantitative Decision Making

Animal and Nutritional Science (ANSC)

» **http://mcbsgrad.unh.edu/**

» **Click to view course offerings**

This program is offered in Durham.

The Department of Molecular, Cellular, and Biomedical Sciences offers the Ph.D. in animal and nutritional sciences in conjunction with the animal science program in the Department of Biological Sciences.

Information on the Ph.D. program is described below. For information about the master of science programs in nutritional sciences (**www.mcbsgrad.unh.edu**) or animal science (**www.biolsci.unh.edu**), please visit the respective website links, including the course listings for molecular, cellular, and biological sciences (MCBS) and nutritional sciences (NUTR).

Degree Offered: Ph.D.

The Ph.D. degree in animal and nutritional sciences has as its primary research foci the study of biological and nutritional processes that promote animal and human health and disease, and in the case of animal health, its effect on production. Areas of research specialization include human nutrition, mammalian physiology and pathology, nutritional biochemistry and metabolism, and reproduction and endocrinology. Research activities utilize human, animal, and cell culture systems to investigate nutrient metabolism and a molecular-level understanding of life processes and diseases.

Admission Requirements

Students applying for the Ph.D. program will be expected to present recent (within five years) general Graduate Record Examination (GRE) scores and possess a background in basic sciences appropriate for advanced study in the proposed area of specialization (for example, courses in biology, chemistry, organic chemistry, biochemistry, and physics). Although not required for candidacy in the Ph.D. program, an M.S. degree is suggested for most students. The student's committee may require certain undergraduate courses as part of the graduate program if additional competencies would be beneficial to the student.

Degree Requirements

Ph.D. in Animal and Nutritional Sciences

The Ph.D. in animal and nutritional sciences trains students to gain advanced knowledge and develop research expertise in such areas as the cellular and molecular biology of various nutrients, nutritional physiology and biochemistry, vascular biology and cardiovascular disease, immunology and genetics, obesity and diabetes, dairy nutrition, human nutrition, reproductive physiology, and endocrinology. It prepares students for future careers in technical consulting, education, and research in academic, industrial, and government institutions. Students with appropriate academic training at the baccalaureate or master's degree level will design a program of study in conjunction with a faculty guidance committee.

The student will advance to candidacy after successful completion of all relevant graduate courses and passing a qualifying examination conducted by the guidance committee, which will contain oral and/or written components at the discretion of the committee members. The "guidance" committee for doctoral students will consist of a minimum of five members, three of whom must be from within the Animal and Nutritional Sciences Program; at least one member must be from outside the program. After the student's advancement to candidacy for the Ph.D. degree, a doctoral committee (which can be different from the guidance committee) will be appointed to supervise and approve the dissertation.

The dissertation must be based on original hypothesis-driven research of publishable quality. A public presentation of the dissertation research findings will be followed by a final examination, which will be primarily an oral defense of the dissertation. The candidate will be required to serve as a teaching assistant for a minimum of two semesters or to teach a course for one semester. Skills in communicating scientific information will be fostered by presenting one seminar during each year of enrollment. This requirement could include the dissertation defense seminar.

Courses

For a complete listing of courses, check **animal science**; **molecular, cellular, and biological sciences**, and **nutritional science**.

» **Click to view course offerings**

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Animal Science (ANSC)

» **http://www.animalsci.unh.edu/**

» **Click to view course offerings**

This program is offered in Durham.

The Department of Biological Sciences, **www.biolsci.unh.edu/**, offers the master of science degree in animal science.

Degree Offered: M.S.

Areas of research specialization in the M.S degree in animal science include dairy cattle nutrition, mammalian physiology and pathology, reproduction, and endocrinology. Research activities utilize animal and cell culture systems to investigate nutrient metabolism and a molecular-level understanding of life processes and diseases.

Admission Requirements

Students applying for the M.S. program will be expected to present recent (within five years) general Graduate Record Examination (GRE) scores and possess a background in basic sciences appropriate for advanced study in the proposed area of specialization (for example, courses in biology, chemistry, organic chemistry, biochemistry, and physics).

Degree Requirements

M.S. in Animal Science

Animal science M.S. students must become actively engaged in a research project and gain a comprehensive understanding of animal sciences through coursework and research. This degree is for students with a strong background in the basic biology, chemistry, and animal sciences who anticipate a professional career involving research or discovery. This path is appropriate for students who expect to pursue additional graduate studies or professional school after graduation.

The program of study must include a minimum of 30 graduate credits and completion of a master's thesis based on a research project. Six credits of thesis research (ANSC 899) are required. No more than 4 credits of investigations (ANSC 995) can apply. A thesis committee will be appointed early in the program and consist of at least three members of the graduate faculty; one of these will be the primary mentor. Students will design a program of study in consultation with the thesis committee. Candidates will be required to pass an oral examination based on graduate courses and completed thesis.

» **Click to view course offerings**

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Biochemistry (BCHM)

» **http://mcbsgrad.unh.edu/**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.S., Ph.D.

The Department of Molecular, Cellular, and Biomedical Sciences offers a five-year B.S./M.S., a master of science, and a doctor of philosophy degree in biochemistry. Research opportunities are available in the general areas of molecular biology, cellular biology, and biochemistry, with specific research programs in eukaryotic gene regulation; reproductive physiology; molecular population genetics; macromolecular interactions; cell signaling pathways in cancer and leukemia; evolution of eukaryotic genomes; glycobiology; protein kinases and phosphatases in plant signaling; structure/function relationships in macromolecules, proteomics, and epigenomics; DNA repair mechanisms; etiology of vascular disease; and sensory transduction. Opportunities also exist for interdisciplinary research in marine biochemistry, biochemical nutrition, and cell biology in adjunct facilities on campus.

Admission Requirements

An applicant is expected to have completed basic courses in chemistry, biological sciences, mathematics, and physics. Otherwise well-qualified applicants will be permitted to correct deficiencies in undergraduate education by enrollment in the appropriate courses or by independent study during the first year. Applicants must submit current scores (within five

years) from the general test of the Graduate Record Examination. Applicants from non-English-speaking countries must also provide TOEFL (Test of English as a Foreign Language) scores.

Degree Requirements

M.S. Degree Requirements

A student will meet the Graduate School's requirements for the master's degree (minimum 30 credits) and will be expected to develop a thesis (6-10 cr.) on a basic research problem or to prepare a report or publication based on original research in biochemistry or molecular biology. Demonstration of proficiency in physical chemistry and biochemistry will be assessed in the first year. A guidance committee meeting will be held soon after a thesis adviser is identified. All candidates for the M.S. degree will be required to pass an oral examination based on the thesis or project report and on the graduate courses completed in the degree program.

B.S./M.S. Degree Requirements

This accelerated five-year program leading to a combined bachelor's degree and master's degree in biochemistry is designed for highly motivated and qualified undergraduate UNH students seeking additional training to further their career goals as researchers in the life sciences. Admission to the combined degree program is highly competitive. Students wishing to pursue this program must have a grade point average greater than 3.2 at the time of application. A thesis adviser must be identified during the junior year, and the approval of the adviser must be obtained. Prior to the first semester of the senior year, the student must formally apply to the department through the Graduate School and receive early admission. The requirement for the Graduate Record Examination is waived for combined degree applicants. Thirty credits of graduate level (800-999) coursework (including dual-credit courses) must be completed. Six to 8 credits of graduate-level courses must be taken during the senior year and are applied to both the B.S. and M.S. requirements. All other requirements for the M.S. degree must be followed.

Ph.D. Degree Requirements

The Ph.D. in biochemistry requires the completion of significant, original independent research and preparation of a thesis for submission to the Graduate School. In most cases it is expected that the Ph.D. degree will be completed within four to six years of admission to the graduate program.

Credits: Graduate credits are earned for courses numbered 800-999. A minimum of two semesters of Doctoral Research (BCHM 999) is required. Most Ph.D. candidates enroll in BCHM 851-852 during their first year of study, unless the diagnostic examinations indicate a sufficient undergraduate preparation in general biochemistry.

Guidance Committee: During the second semester and after selecting a thesis adviser and a potential project, the student, in conjunction with the adviser, will choose a Guidance Committee. This committee consists of five faculty members: the adviser (as chairperson),

two other members of the biochemistry faculty, and up to two faculty members from outside departments. However, only three members of the Guidance Committee are required for the second-year exam. The committee will meet soon after selection of a thesis project to determine the student's curriculum. Courses required by the Guidance Committee must be taken for credit and completed with a passing grade (at least a B-). Courses recommended by the committee may be audited or taken for credit, but in either case, the student is expected to be familiar with the subject matter of these courses. The Guidance Committee will meet each semester thereafter to assess the student's academic and research progress. The Supervisory Committee Nomination Form needs to be completed and submitted to the Graduate School by the end of the first year.

Doctoral Committee: The Doctoral Committee is composed of the faculty adviser (as chairperson), two other faculty members in the graduate program in biochemistry, and two faculty members from other departments. In most cases, the Guidance Committee will constitute the Doctoral Committee. The Doctoral Committee evaluates the dissertation and administers the final examination. The Doctoral Committee will meet annually to assess the progress toward completion of the Ph.D. requirements.

Written Thesis: The student is required to prepare a written doctoral dissertation for submission to the Doctoral Committee. The dissertation must represent significant and original research written in a clear, comprehensible style. A copy of the complete thesis must be made available to the committee at least two weeks before the date of the final examination. Publication of the dissertation by University Microfilms is required. All costs associated with the preparation and publication of the thesis are the responsibility of the student.

Candidacy: Candidacy is reached following 1) written and oral defense of research proposal during spring of second year and 2) written and oral qualifying/proposal examination. Further details can be found at **http://mcbsgrad.unh.edu/diagnostic-exams**

Final Defense: An oral examination of the doctoral dissertation consists of two parts: an oral presentation of the research that is open to the public, and an oral defense of the dissertation conducted by the Doctoral Committee. Final approval of the doctoral dissertation will be determined by a majority vote of the Doctoral Committee. The final examination must be completed by the date listed in the Graduate School calendar.

Teaching Requirement

Teaching assignments in the laboratory, in lectures, or in an individual instruction format are an essential part of the graduate academic programs of the department and are designed to give graduate students practical teaching experience. Normally, one year of part-time teaching will be required of each Ph.D. student.

Biological Sciences (BIOL)

» **Click to view course offerings**

Business Administration (ADMN)

» **http://www.wsbe.unh.edu/graduate-programs**

» **Click to view course offerings**

*This program is offered in Durham and in Manchester through **GSMC**.*

Degree Offered: M.B.A.

This program is offered in Durham, Portsmouth, Manchester, and online

The Peter T. Paul College's M.B.A. programs are all AACSB (Association to Advance Collegiate Schools of Business) accredited, the gold standard for business school accreditation. We are proud to be one of only two full-time M.B.A. programs with AACSB accreditation in the state of New Hampshire and the only executive, part-time, and online M.B.A. programs to hold the AACSB seal of accreditation in the state.

Our M.B.A .programs incorporate and rely on strong partnerships with the corporate community. Externally engaged and firmly focused, we create technologically proficient problem solvers, innovative and creative thinkers, effective communicators, and ethical business leaders.

The Paul College brings together students of great promise, faculty on the cutting edge of research, real-world business partners, and our network of successful alumni to create a vital new center for business education at the University of New Hampshire.

In 2012, the full-time M.B.A. program had a 95 percent job placement rate.

Admission Requirements

The Paul College welcomes applicants with an above-average academic record in any undergraduate specialty. The crucial requirement for admission into the M.B.A. program is a history that demonstrates that the applicant has the potential and desire for graduate study in business. Consequently, a portfolio approach to admissions is utilized in which an applicant's work and military experience, along with other indicators of maturity, motivation, and self-discipline, are considered in addition to the applicant's test scores and academic record. All applicants to the full-time, online and part-time MBA programs are required to take the Graduate Management Admission Test (GMAT) unless they hold a prior, relevant graduate-level degree (e.g., M.S., M.A., Ph.D., Ed.D, etc.). GMAT waivers may be requested and are possible based on professional experience. Please contact the department for more information.

Applicants are expected to have successfully completed one semester of calculus, statistics, or have demonstrated proficiency in quantitative reasoning. Interested applicants are encouraged to contact Joanne Stone, Admissions & Recruiting, Paul College, 10 Garrison Avenue, Durham, NH 03824, 603-862-1367.

Each M.B.A. program has a different pricing structure. For current rates and fees, please visit the business services website: **http://www.unh.edu/business-services/tuitmba.html**.

Degree Requirements

Full-time M.B.A. Program

Our new and innovative curriculum was designed specifically to accelerate your progress through this highly-ranked **AACSB**-accredited M.B.A. program. We do this by integrating courses, identifying key skills and concepts necessary for success in business, and then helping you to master these skills and concepts through class discussions, cases, guest lectures, and projects.

The program includes a New York Residency, a Corporate Consulting Project, and an International Residency.

Students finish their coursework in early July and have a September 1 graduation date.

Throughout the program, you will be exposed to the knowledge that builds insight into complex organizations. Core courses, indicated as green in the table below, will focus on the functional areas of business, how they interact, how they contribute to the goals and objectives of the organization, and how they can be managed effectively. You will learn the behavioral and social skills that empower effective leaders in any organization, as well as the technical skills necessary to understand complex business processes, manage the development of technology projects, and utilize data for effective decision-making.

Foundation Work: July-August	**Term 1: August - Sept. (5 weeks)**	**Term 2: October-December (10 weeks)**	**Term 3: January-March (10 weeks)**	**Term 4: March-May (10 weeks)**	**Term 5: May-June (5 weeks)**
On-line Quantitative Methods Module	ADMN 919, Management Accounting	ADMN 970, Economics	ADMN 956, Managerial Decision Making	ADMN 940 Technology & Operations Management	Corporate Consulting Project
On-Line Accounting Module	ADMN 912, Organizational Behavior	ADMN 960, Marketing Management	ADMN 952, Organizations, Leadership, and Environments	ADMN 982, Strategic Management: Decision Making	
		ADMN 926, Information Systems and Enterprise Integration	ADMN 840, International Business	Elective	
		ADMN 930, Financial Management	Elective*	Elective	

** Students with fewer than two years of work experience take the M.B.A. Internship in lieu of an elective. The internship begins in October.*

Core courses and electives build an understanding of the business environment, and the Corporate Consulting Project (CCP) provides a first-rate opportunity to apply this knowledge to the real world of business. The class works closely with major companies such as Fidelity Investments and Liberty Mutual Life Insurance; the class is divided into small teams and each team is assigned a real-life problem. Teams work closely with the host company and faculty advisers. At the end of the projects, the class makes presentations to company sponsors.

Part-time M.B.A. Program

The Master of Business Administration degree Part-Time option is an excellent choice for practitioners in the workforce who are seeking to advance their careers. The innovative program provides the opportunity for students to earn their degrees in less than two years. Courses are offered at the Durham and Manchester campuses.

The Part-Time evening M.B.A. program, instituted in 1996, has rapidly grown to become the Paul School's most popular M.B.A. program. The Part-Time and Full-Time programs share the same faculty. This evening model is primarily designed for those who are highly motivated and capable of balancing a full-time work schedule with evening study. Classes meet from 5:30-9:15 p.m.

Highlights

- Our fast-track M.B.A. Part-Time option allows students to earn an advanced degree from an AACSB-accredited institution in less than two years.
- Students have the opportunity to spend 10 days abroad as part of the International Management course. The International Residency combines lectures, corporate visits, and cultural activities.
- Three areas of specialized concentration are available: Marketing and Supply Chain Management, Entrepreneurial Venture Creation, and Financial Management, as well as a variety of elective courses.

Curriculum

- The program includes both core courses and specialized concentration.

Courses

- Business Strategy
- Economics
- Financial Management
- Information Systems and Enterprise Integration
- Management Accounting
- Managerial Decision Making
- Marketing
- Operations Management
- Organizational Behavior
- Organizations, Leadership, and Environments
- Six electives

Online M.B.A.

The Online Master of Business Administration degree is an excellent choice for practitioners in the workforce who are seeking to advance their careers. This innovative program provides students with the opportunity to earn their degrees in two to six years from anywhere in the world.

The online model is primarily designed for those who are highly motivated and capable of balancing a full-time work schedule with online study. Courses facilitate information sharing

outside the constraints of time and place among a network of people .

Highlights

- Our Online M.B.A. option allows students to earn an advanced degree from an AACSB-accredited institution in two to six years from anywhere in the world.

Courses

- Business Strategy
- Economics
- Financial Management
- Information Systems and Enterprise Integration
- Management Accounting
- Managerial Decision Making
- Marketing
- Operations Management
- Organizational Behavior
- Organizations, Leadership, and Environments
- Six electives

Executive M.B.A.

The Paul College Executive M.B.A. program is held at the **Sheraton Harborside Hotel** in historic Portsmouth, N.H. The only Executive M.B.A. program north of Boston, this fast-paced E.M.B.A. targets mid- to senior-level professionals with multiple years of work experience who are looking for a top-level business degree and to expand their network and learn from other professionals.

The program meets on alternating weekends (Friday and Saturday), giving busy professionals time to complete a degree while balancing work and family commitments.

Featuring small class sizes, top-level UNH professors, and peer teamwork, the E.M.B.A. encourages stimulating participation and networking opportunities. All students spend Friday nights at the Sheraton to work and study with their teams and attend occasional speaking events. E.M.B.A. students also participate in a 10-day off-campus spring residency abroad as part of the International Management course.

The Whittemore Graduate School at the Paul College is AACSB-accredited and is an active founding member of the Executive MBA Council—the organization that unites Executive MBA programs globally in their mission, direction, and quality.

Highlights

- The curriculum features a strong and broad business foundation for career success.
- Leadership strategy and development are core curricular components.
- Emphasis on analytical tools, skills, and concepts for management.
- Distinguished faculty who bring broad-based, international experience to the classroom.
- A strong support network among students, faculty, and alumni—a key benefit for success in career advancement.
- Team projects that offer exposure to new ideas and processes and represent a broad cross-section of fields and industries.

- Collaborative learning community encourages faculty interaction.

Full-time M.B.A. Degree Requirements

The curriculum for the one-year intensive full-time M.B.A. program begins with six weeks of required online foundation work during July and August. Students begin classes on campus at the end of August after a three-day orientation program and continue together as a cohort through the academic year. The 48-credit program is comprised of eleven required courses, three electives, a ten-day international residency, and culminates with a five-week 6 credit corporate consulting project. Electives can be taken in such areas as marketing, finance, entrepreneurship, supply chain management, leadership, and general management. A specialization in Entrepreneurship is available in the full-time MBA program and includes an additional Silicon Valley residency.

Students with less than two years of professional work experience must complete an internship that satisfies one elective course.

Part-time and Online M.B.A. Degree Requirements

Part-time (evening) and online students typically begin the program in the fall term, although January admission with a reduced course load may be possible. Offered on both the Durham and Manchester campuses, the degree is comprised of ten required core courses and six electives. ADMN 982 (Strategic Management) is the concluding experience. Students may petition to waive up to three core courses. A waiver is typically granted if the student possesses a major (five to six courses from an AACSB-accredited institution) in a core area earned within five years of matriculation, e.g., a student with a major in finance may petition to waive the M.B.A. core course in finance. The program is designed to permit students who begin in the fall to complete the degree in two years, although a reduced pace is also possible. Specializations are available in the following areas:

Marketing and Supply Chain Management

This specialization covers such topics as market research and analysis and new product and services development. A cross-functional approach is utilized to teach students how to manage fundamental value processes involved in the production and marketing of goods and services. The specialization is unique in its integrative emphasis on meeting customer and market needs in an effective and efficient manner given technological and operational constraints.

Entrepreneurial Venture Creation

This specialization is designed to promote an environment that produces an entrepreneurial culture and promotes learning through experiential, real-world, real-time learning. It provides a basis to learn about the high-growth entrepreneurial venture process of value creation through an application of technology in a dynamic environment and is appropriate for students who intend to start a high-growth business, work for a new venture, become involved in a new venture creation within an established organization, or are interested in the field of venture capital.

Financial Management

This specialization is designed for the student who wants to take a coherent set of finance courses offered within the general framework of the M.B.A. The study of finance provides students with opportunities in a wide variety of disciplines including banking, insurance, corporate finance, investment management, and risk management.

General Management

Students may elect to take the six electives in fields of their choice. Two of the electives may be completed as independent studies, which allow students to study a unique topic in-depth that is not offered as a traditional course. Additionally, students may petition for approval of two graduate-level courses offered by departments other than the business school and may count them toward the degree.

Project Management

The specialization provides a comprehensive, integrative understanding of the project management process and methods to manage large and complex projects, including the management of innovation in a high-technology environment. As the complexity and technological sophistication of business today increases, the demand for individuals with the skills to plan, manage, and execute complex projects is also growing. By completing this specialization, students will learn how to contribute to the systematic management of projects, programs, portfolios, and businesses to achieve the organization's operational and strategic goals, and balance project requirements and constraints as they relate to scope, schedule, budget, and quality.

Executive M.B.A. Degree Requirements

The Executive M.B.A. curriculum is designed to meet the needs of individuals with full-time work experience at a highly professional level. The curriculum is comprised of seventeen courses emphasizing general management and provides broad-based exposure to the functional areas of finance and accounting, human resources, marketing, operations, international business, and strategic management. In the second year, all students take a track in International Business and choose between a second track in either Entrepreneurial Venture Creation or Managing Technological Innovation. The Integrative Management Seminar taken each term brings in regional business leaders to discuss current business topics and challenges in a globally networked and competitive world. ADMN 982 (Strategic Management) is the capstone course.

The program is offered off site at an executive conference facility in Portsmouth, New Hampshire, and includes housing and meals to enrich the cohort experience. The nineteen-month program begins in early September with two days in residence spent on orientation activities, team building, and networking, followed by two days of regular classes on Friday and Saturday. Thereafter, classes are held twice each month in all-day Friday and all-day Saturday sessions. In their second year, students spend two days on Wall Street as part of their required finance course, plus ten days in an "International Residency" as part of the requirements of the international business course.

Registration Policies

M.B.A. courses are primarily intended for matriculated students who have been admitted to the M.B.A. program. Other degree-seeking students and M.B.A. alumni may request

permission to register for courses on a space-available basis.

Audit: Required M.B.A. core courses cannot accommodate auditors. Other degree-seeking students and M.B.A. alumni may request permission from the instructor to audit M.B.A. electives.

Online MBA

The online MBA progam follows the same curriculum as the part-time MBA allowing students to move within the two models if they choose. Admission points are in late August and January. The program is asynchronous and students can log on at anytime during the week adding to the flexiblity of the online option. The program is AACSB accredited and inculdes ten core courses and six elective courses.

Chemical Engineering (CHE)

» **http://www.unh.edu/chemical-engineering/**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.Eng., M.S., Ph.D.

The Department of Chemical Engineering offers the M.Eng. degree, M.S. degree, and the Ph.D. degree in chemical engineering. All levels include research opportunities in biofuels, biomedical engineering, biochemical engineering, electrochemical engineering, tissue engineering, advanced materials, reaction engineering, energy, and environmental engineering.

M.Eng. Admission Requirements

An applicant to the master of engineering program will have completed a baccalaureate degree in chemical engineering. Students with good undergraduate records but with deficiencies in certain areas may be admitted on condition that they complete specified courses without credit to make up for their deficiencies. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination. International students are required to submit TOEFL test scores. IELTS scores are accepted on a case-by-case basis, and students must have a minimum score of 6.5.

M.Eng. Degree Requirements

A master of engineering degree is a professional degree for chemical engineers. A minimum of 30 credits, which must include Advanced Fluid Mechanics (CHE 913), Heat Transfer (CHE 915), Diffusive Mass Transfer (CHE 916), Advanced Chemical Engineering Thermodynamics (CHE 923), and Advanced Chemical Engineering Kinetics (CHE 932), is required for the master of engineering degree. An additional 12 credits of coursework is required. These 12 credits can be made up of electives offered by the department or by the college. In addition, courses

taken by the UNH School of Law and the Paul College of Business and Economics can apply with approval. The remaining 3 credits will be for faculty supervised projects.

M.S. Admission Requirements

An applicant is expected to have completed a baccalaureate degree in chemical engineering. Students with good undergraduate records but with deficiencies in certain areas may be admitted on condition that they complete specified courses without credit to make up for their deficiencies. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination. International students are required to submit TOEFL test scores. IELTS scores are accepted on a case-by-case basis, and students must have a minimum score of 6.5.

M.S. Degree Requirements

A minimum of 30 credits, which must include Advanced Fluid Mechanics (CHE 913), Heat Transfer (CHE 915), Diffusive Mass Transfer (CHE 916), Advanced Chemical Engineering Thermodynamics (CHE 923), and Advanced Chemical Engineering Kinetics (CHE 932), is required for the master of science in chemical engineering. These five core courses constitute 15 credits. The remaining 9 course credits can be made up of electives offered by the department or by the college. Students take electives after consulting with their adviser. A thesis is required, for which a minimum of 6 credits will be allowed, unless the candidate is specifically exempted by the faculty because of previous research experience.

Ph.D. Admission Requirements

Students admitted to the Ph.D. program normally have a master's degree in chemical engineering. Exceptional students with a baccalaureate degree in chemical engineering are eligible for admission to the program. To be admitted, students must present evidence that they have a strong foundation in chemical engineering. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination. International students are required to submit TOEFL test scores. IELTS scores are accepted on a case-by-case basis, and students must have a minimum score of 6.5.

Ph.D. Degree Requirements

Following entrance into the program, the Ph.D. student's adviser assists the student in outlining his/her program and may specify individual coursework requirements in addition to the required core courses. The core courses are fluid dynamics, mass transfer, heat transfer, thermodynamics, and reaction kinetics. Each doctoral student must complete 39 course credit hours or eleven courses (whichever comes first) beyond the bachelor's degree with five of those courses specified as core at the 900 level. The remaining courses (totaling 24 credits) may be at the 800- or 900-level, and can be 3- or 4-credit courses. Students entering with a master's degree from an other university will be required to take a minimum of 15 credits or five courses at the 800- or 900-level at UNH. These students may be required to take or repeat some or all of the required core courses depending upon their credentials and preparation. This will be determined by the department's Graduate Committee.

The graduate coordinator also conducts an annual in-depth review of the student's progress and, following completion of the student's coursework (the five core courses), administers the written qualifying examination in each of the core courses. All coursework, including electives, should normally be completed by the end of the second year of full-time graduate study and must be completed before the student can be advanced to candidacy.

The student must prepare a research proposal, which is different from his/her Ph.D. dissertation research, and defend the proposal in an oral examination before a committee. Upon the successful completion of the oral qualifying examination, the student is advanced to candidacy and, upon the recommendation of the graduate coordinator, a doctoral committee is appointed by the dean of the Graduate School. The doctoral committee conducts an annual review of the student's progress, supervises and approves the doctoral dissertation, and administers the final dissertation defense.

There is no language requirement.

Chemistry (CHEM)

» **http://www.unh.edu/chemistry/**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.S., Ph.D.

The Department of Chemistry offers programs leading to the doctor of philosophy and the master of science degrees in the areas of organic, inorganic, physical, and analytical chemistry. The department also offers a Ph.D. in chemistry option in chemistry education.

Admission Requirements

Admission to the master of science and the doctor of philosophy degrees is based upon a strong undergraduate record and requires satisfactory work in the usual undergraduate courses in inorganic chemistry, analytical chemistry, organic chemistry, and physical chemistry, as well as the normal supporting courses in mathematics and physics. Applicants are to submit GRE scores as a part of their admission application. Entering graduate students are expected to take proficiency examinations in chemistry to ensure they begin their graduate work at the appropriate level. These examinations will be offered the week prior to the opening of the fall semester during the Department of Chemistry's Graduate Student Orientation week.

M.S. Degree Requirements

The master's degree requires completion of coursework appropriate to the student's field of study and the completion of a research problem presented in the form of a thesis (6-10 cr.). A minimum of 30 credit hours is required to earn the degree.

Ph.D. Degree Requirements

This degree requires completion of coursework appropriate to the student's field of study and the completion of a research problem presented in the form of a dissertation. Students will also demonstrate to the guidance committee that they have a broad basic knowledge of the field of chemistry by completing certain fundamental graduate courses; by means of a series of examinations in the major field; and by presenting and defending an original research proposal before the end of the third year. Students who successfully complete these requirements will be advanced to candidacy. The dissertation will be based upon original research. When the dissertation is complete, the candidate will submit it to his/her doctoral committee. A public presentation of the dissertation will be followed by an oral defense of the work to the student's committee.

The Ph.D. degree program includes an option in chemistry education. Please contact the department for more information.

Interdisciplinary Programs in Chemistry

Graduate students in chemistry may elect to enter one of the interdisciplinary programs offered jointly with the chemistry department and other departments. In these programs, the graduate student, with the advice of the guidance committee, elects courses in chemistry and in the related disciplines, and writes the dissertation on a research problem appropriate to the interdisciplinary research. Students interested in these programs should contact the graduate coordinator for further information.

Preparing Future Faculty (PFF)

Students who desire a career in college-level teaching will follow their regular degree program in addition to meeting the university's PFF requirements.

Teaching Requirement

All graduate students who are doctor of philosophy or master of science degree candidates will obtain some teaching experience during their tenure.

Civil Engineering (CIE)

» **http://www.unh.edu/civil-engineering**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.Eng., M.S., Ph.D.

The Department of Civil Engineering offers the master of engineering degree in civil engineering, the master of science degree in civil engineering, and a Ph.D. degree in civil engineering with the following areas of specialization: structural, materials, geotechnical, water resources, and environmental engineering. Interested applicants are encouraged to visit the department website for information on current research in the department and to contact faculty members in their area of interest directly. The department website has information on program requirements and frequently asked questions. Applicants with questions not

answered by the department or graduate school website should write to the graduate program coordinator for specific information.

Admission Requirements

An applicant must have completed a baccalaureate science degree in engineering, mathematics, or science at an accredited college or university. If coursework or laboratory experience is deficient, an admitted student will be required to fulfill, without graduate credit, all undergraduate prerequisites for graduate courses. In some cases, the student's adviser may require additional undergraduate courses in order to achieve a well-integrated program of study. Applicants must submit current scores (within five years) from the general test of the GRE, unless waived by the graduate coordinator (for current UNH undergraduate civil engineering [CIE] or environmental engineering: municipal processes [ENE:MP] majors only).

Degree Requirements

M.Eng. Degree Requirements

All master of engineering degree students must complete a minimum of 30 total credits. UNH bachelor's degree students admitted to the Accelerated Master's Degree program may register for a maximum of 8 credits of graduate-level courses prior to completing their bachelor's degree. Such courses may upon recommendation of the department and approval of the Graduate School count toward both a bachelor's and master's degree. M.Eng. students are required to complete one of the following options as a concluding experience:

- Option A, Masters Project: Students must complete a 3 credit master's project (CIE 888) on a civil engineering topic.
- Option B, Oral Exam: Students must complete an oral exam. The oral exam does not count toward the number of required credits.
- Option C, Written Exam: Students must complete a written exam. The written exam does not count toward the number of required credits.

The M.Eng. option is designed to facilitate completion of B.S./M.Eng. civil engineering degrees within five years. M.Eng degree students are not eligible for an assistantship. For graduation, a grade of B- or better in each course, an overall B average (3.00 GPA), and successful completion of one of the above concluding experiences must be achieved.

M.S. Degree Requirements

All master of science degree students must complete a minimum of 31 total credits that includes a minimum of 25 course credits and 6 thesis credits. UNH bachelor's degree students admitted to the Accelerated Master's program may register for a maximum of 8 credits of graduate-level courses prior to completing their bachelor's degree. Such courses may upon recommendation of the department and approval of the Graduate School count toward both a bachelor's and master's degree.

A formal oral presentation/thesis defense is required. All M.S. degree students are eligible for

teaching or research assistantships and are required to register for Master's Student Seminar (CIE 900) for one semester. Students are required to make two presentations during their programs of study. For graduation, a grade of B- or better in each course, an overall B average (3.00 GPA), and a successful thesis defense must be achieved.

Ph.D. Degree Requirements

Following admission into the program, a guidance committee is appointed for the student by the dean of the Graduate School upon recommendation of the graduate coordinator. This committee assists in outlining the student's course of study and may specify individual coursework requirements.

Within 18 months after admission, the student must pass both written and oral qualifying exams. The student must successfully complete at least 24 course credit hours beyond a master's degree.

Minor Requirements: An identifiable group of courses (9 credits minimum) in an area outside of the civil engineering department and approved by the guidance committee must be successfully completed to provide a minor to the Ph.D. degree. A minor may be satisfied by courses taken toward a master's degree other than civil engineering, but the credits will not be applied against the 24 credit-hour minimum.

Language or Research Tool: Students are required to gain or prove proficiency in a language or research tool in an appropriate area, such as mathematics, statistics, or data analysis; laboratory analysis or procedures; instrumentation; computer programming; or a foreign language suitable to the area of concentration. The proposed language or research tool must be approved by the guidance committee and may be achieved through the successful completion of coursework, an examination, or both.

Teaching Experience: A minimum of one semester as a teaching assistant or comparable experience is required. The guidance committee will evaluate whether a student's past teaching assistantship satisfies this requirement.

Doctoral Candidates: Upon successful completion of the Ph.D. qualifying examinations and the language or research tool requirement, a doctoral student is advanced to the status of doctoral candidate. When a student achieves candidacy, a doctoral committee is established. The doctoral committee directs research, conducts a semi-annual review of the student's progress, supervises and approves the doctoral dissertation, and administers the final examination (also known as the dissertation defense).

Upon completion of the dissertation, and with the approval of the doctoral committee, the student schedules an oral defense in accordance with the requirements of the Graduate School. For graduation, a B average (3.00 GPA) and successful dissertation defense must be achieved.

College Teaching (GRAD)

» **http://www.unh.edu/teaching-**

excellence/Academic_prog_in_coll_teach/index.html

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: Cognate in College Teaching

Certificate Offered: College Teaching

Application Requirements

Test Scores: None
New England Regional: No

The College Teaching Program prepares graduate students for academic teaching positions, and students are ready to teach in their field or discipline upon completion of program requirements. The transfer and relationship between theory and research and instructional practice is emphasized in all courses.

This is a University-wide program coordinated by the Office of the Dean of the Graduate School and involving the Center for Excellence in Teaching and Learning as well as faculty members from many fields and disciplines. Two academic programs are offered: the cognate in college teaching and the certificate in college teaching.

Admission Requirements

Applicants to the cognate program must have completed one year in a doctoral program at UNH and have the support and recommendation of their doctoral program coordinator. Students in terminal master's degree programs at UNH may be eligible to enroll in the cognate program.

Degree Requirements

Cognate in College Teaching Requirements

The Cognate in College Teaching offers a series of core and elective courses to prepare individuals to teach at institutions of higher education. The Cognate is available to doctoral students and students in selected master's degree programs at UNH.

Students must apply and be formally admitted to the program. The cognate appears as a minor on the student's transcript, and is awarded concurrently with the Ph.D. or master's degree.

This program requires the satisfactory completion of 13 academic credits. Students elect, with the permission of their graduate coordinator, to add the cognate to their graduate degree. The cognate will be awarded at the time of the award of the qualifying graduate degree.

Requirements include 8 credits in core courses and 4 credits in elective courses. Students must also create and submit an electronic teaching portfolio for 1 credit.

Core Courses, 8 credits

GRAD 950, Issues in College Teaching, 2 cr.
GRAD 951, Teaching with Writing, 2 cr.
GRAD 961, Cognition, Teaching, and Learning, 2 cr.
GRAD 965, Classroom Research and Assessment Methods, 2 cr.

Electives, minimum of 4 cr.

GRAD 930, Ethics in Research and Scholarship, 2 or 3 cr.
GRAD 963, College Students and the Undergraduate Culture, 2 cr.
GRAD 970, Special Topics in College Teaching: Teaching Online, 2 cr.
GRAD 971, Teaching and Learning in Science, 3 or 4 cr.
GRAD 995, Independent Study, 1 or 2 cr.

Integrative Experience, 1 credit

GRAD 998, College Teaching Portfolio, 1cr.

Graduate Certificate in College Teaching

This program requires the satisfactory completion of 12 academic credits. The certificate is available to anyone with a bachelor's degree and above who is interested in preparing for a college teaching career. Requirements include 8 credits in core courses and 4 credits in elective courses.

Core Courses, 8 credits

GRAD 950, Issues in College Teaching, 2 cr.
GRAD 951, Teaching with Writing, 2 cr.
GRAD 961, Cognition, Teaching, and Learning, 2 cr.
GRAD 965, Classroom Research and Assessment Methods, 2 cr.

Electives, minimum of 4 cr.

GRAD 930, Ethics in Research and Scholarship, 2 or 3 cr.
GRAD 963, College Students and the Undergraduate Culture, 2 cr.
GRAD 970, Special Topics in College Teaching: Teaching Online, 2 cr.
GRAD 971, Teaching and Learning in Science, 3 or 4 cr.
GRAD 995, Independent Study, 1 or 2 cr.

Communication Sciences and Disorders (COMM)

» **http://www.chhs.unh.edu/csd**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.S.

The Department of Communications Sciences and Disorders offers a master of science degree. Students are prepared to practice in a variety of job settings within the field of speech-language pathology and to meet the academic and practicum requirements of the American Speech-Language-Hearing Association (ASHA) for the certificate of clinical competence in speech-language pathology. The program is accredited by the Council on Academic Accreditation of ASHA.

The graduate program integrates an array of academic and clinical experiences to prepare students for a variety of careers in speech-language pathology. The program offers a master of science degree program in communications sciences and disorders. Students can elect to self-design their program, choosing from an array of required and elective courses that best suit their career objectives. This is referred to as the "no option" concentration. Three additional options, language/literacy disabilities, adult neurogenic communication disorders, and early childhood, are available to those students seeking particular expertise in one of these areas. Irrespective of which of the three options students select, the program of study will prepare them to treat the full range of communication disabilities across the life span.

Faculty and students are actively engaged in research activities. Their projects include examinations of the efficacy of language intervention for adults with aphasia, management of motor speech deficits, functional outcomes of augmentative and alternative communication, role of communication in fostering inclusive education, relationships between language and literacy, and ways of enhancing the process of clinical supervision.

Application Requirements

Deadlines: Applications must be completed by February 1st.

In lieu of the Graduate School personal statement, each applicant must respond to the following in no more than a total of two pages.

1. Describe yourself. We are interested in learning about you as a person.
2. Where do you see yourself professionally five years from now? Ten years from now?
3. What one issue in the field of communication sciences and disorders interests you most at this point your educational development? Why?

Applications are not acted upon by the CSD Department until all required documents have been received by the Graduate School. It is the student's responsibility to check with the Graduate School to ensure that all required documents have been received and the application is complete by the February 1st deadline.

For additional information regarding the application process, check the **University of New Hampshire Graduate School**.

Admission Requirements

Applicants for admission should possess a bachelor's degree in communication sciences and disorders or its equivalent. The following courses, or their equivalents, are undergraduate prerequisites for the master's program:

- Anatomy and Physiology of the Speech and Hearing Mechanism
- Language Acquisition
- Clinical Phonetics
- Basic Audiology
- Speech-Hearing Science
- Statistics

Students are also required to have completed coursework in typical human development, and both biological and physical sciences in preparation for fulfillment of ASHA requirements.

Applicants with degrees in related fields may be admitted to the Graduate School as *provisional students*, with the expectation that they will complete the above prerequisites prior to, or concurrent with, graduate courses.

Acceptance to the communications sciences and disorders program is based primarily on grade-point average, GRE scores, and written statement. Applicants must submit current scores of the **GRE revised General Test**. Generally, students have earned a minimum grade-point average of 3.6 and GRE scores at the 50th percentile to be considered for admission. Letters of recommendation are considered for the awarding of scholarships, assistantships, and other sources of support.

M.S. Degree Requirements

Four options are offered: "no option" or generalist option; option in language/literacy disorders; option in early childhood communication disorders; and option in adult neurogenic communication disorders. Regardless of the option selected, students will complete a combination of core, required, and elective courses to earn a minimum of 61 credits. See course descriptions for a list of all CSD graduate courses.

The following core courses are required of all students:

COMM 876, Ethics/Professional Issues in Speech Language Pathology, 1 cr.
COMM 880, Diagnosis of Speech and Language Disorders, 3 cr.
COMM 890, Advanced Audiology for Speech Language Pathologists, 3 cr.
COMM 891, Neurology for Speech-Language Pathologists, 3 cr.
COMM 903, Therapy Process, 2 cr.
COMM 910, Practicum, 4 cr. [1 credit each semester years one and two]
COMM 911, Externship, 8 cr. [4 cr. fall of year two, 4 cr. spring of year two]
COMM 917, Research Methods, 3 cr.
COMM 920, Counseling Clients and Families with Communication Disorders, 2 cr.

In addition to the academic and clinical requirements, the UNH Department of Communication Sciences & Disorders implemented an Essential Functions Policy on June 7, 2010. This policy identifies basic communication, motor, cognitive, sensory, and behavioral-social abilities that are necessary for completion of our master's program and professional practice. Some of these abilities should be in place when students begin the program, while others will be developed throughout the program.

Early each fall, the Essential Functions Policy will be reviewed with new students beginning our program. Students are expected to sign that they have reviewed and understand the policy and will follow the stated guidelines.For additional information about the graduate program, see the **Handbook for Graduate Students and Practicum Manual**.

No Option or Generalist Option

This option prepares students for professional practice as a generalist. Students design a course of study that matches their career goals. Practicum experiences in educational, rehabilitative, and private practice settings are available to enhance applied learning. Upon completion of coursework and clinical training, students are prepared to provide clinical services to individuals of all ages who face communication challenges.

In addition to the core courses, required courses for this option are:

COMM 900, Articulatory and Phonological Disorders in Children, 3 cr.
COMM 901, Dysphagia, 3 cr.
COMM 902, Stuttering, 3 cr.
COMM 905, Motor Speech Disorders, 3 cr.
COMM 906, Voice Disorders, 2 cr.

Students will also select 6 elective courses from the following:

COMM 875, Advanced Language Ac*quisiti*on, 3 cr.
COMM 904, Aphasia in Adults, 3 cr.
COMM 907, Advanced Seminar in Aural Rehabilitation, 3. cr.
COMM 908, Disorders of Language/Literacy I, 3 cr.
COMM 909, Disorders of Language/Literacy II, 3 cr.
COMM 912, Language Disorders Birth to Five, 3 cr.
COMM 913, Cognitive Communication Disorders, 3 cr.
COMM 914, Augmentative and Alternative Communication, 3 cr.
COMM 916, Autism Spectrum Disorders, 3 cr.
COMM 920, Graduate Seminar

Other approved courses outside the department

Option in Language Literacy Disabilities

This option prepares students for professional practice in the diagnosis and treatment of

language-based learning disorders in school age children. Students learn theory and practice in oral language as it relates to literacy acquisition and learning in the content areas. Practicum experiences in schools are available to enhance applied understanding. Upon graduating, students are equipped to meet the challenge of diagnosing and managing an array of language-based learning disabilities as team members alongside their professional colleagues in regular education, reading education, and learning disabilities. Those interested in obtaining dual certification in reading education and speech-language pathology are encouraged to contact the Education Department.

In addition to the core courses, required courses for this option are:

COMM 875 Advanced Language Acquisition 3 cr.
COMM 900 Articulatory and Phonological Disorders in Children 3 cr.
COMM 901 Dysphagia 3 cr.
COMM 902 Stuttering 3 cr.
COMM 905 Motor Speech Disorders 3 cr.
COMM 906 Voice Disorders 2 cr.
COMM 908 Disorders of Language/Literacy I 3 cr.
COMM 909 Disorders of Language/Literacy II 3 cr.
COMM 912 Language Disorders Birth to Five 3 cr.

Students will also take three elective courses from the following:

COMM 904 Aphasia in Adults 3 cr.
COMM 907 Advanced Seminar in Aural Rehabilitation 3 cr.
EDUC 907 Foundations of Literacy Instruction 4 cr.
COMM 913 Cognitive Communication 3 to 4 cr.
COMM 914 Augmentative and Alternative Communication 3 to 4 cr.
COMM 916 Autism Spectrum Disorders 3 cr.
COMM 920 Graduate Seminar 3 cr.

Other approved courses outside the Department

Option in Early Childhood Communication Disorders

This option prepares students for professional practice in the diagnosis and treatment of early childhood communication disorders in young children. Students learn theory and practice for a variety of speech-language-communication-swallowing disorders typically seen in babies through early elementary age children. An essential component of this option is supporting families of young children with communication disorders. Practicum experiences in educational and pediatric rehabilitative settings, early intervention centers, and private practice are available to enhance applied learning. Upon completion of coursework and clinical training, students are prepared to diagnose and treat a wide array of early childhood speech-language-communication-feeding disorders and collaborate with their professional colleagues in educational and rehabilitative teams.

In addition to the core courses, required courses for this option are:

COMM 900, Articulatory and Phonological Disorders in Children, 3 cr.

COMM 901, Dysphagia, 3 cr.
COMM 902, Stuttering, 3 cr.
COMM 905, Motor Speech Disorders, 3 cr.
COMM 906, Voice Disorders, 2 cr.
COMM 908, Language/Literacy Disorders I, 3 cr.
COMM 912, Language Disorders Birth to Five, 3 cr.
COMM 916, Autism Spectrum Disorders, 3 cr.
EDUC 856, Supporting Families of Students with Special Needs, 4 cr.

Students will also take two elective courses from the following:

COMM 875, Advanced Language Acquisition, 3 cr.
COMM 904, Aphasia in Adults, 3 cr.
COMM 907, Advanced Seminar in Aural Rehabilitation, 3 cr.
COMM 909, Language/Literacy Disorders II, 3 cr.
COMM 913, Cognitive Communication Disorders, 3 cr.
COMM 914, Augmentative/Alternative Communication, 3 cr.
COMM 920, Graduate Seminar
EDUC 941, Diversity and Child Development, 4 cr.
HHS 898, Neurodevelopmental and Related Disorders, 1 to 8 cr.

Other approved courses outside the department

Option in Adult Neurogenic Communication Disorders

This option prepares students for the clinical practice in the diagnosis and treatment of neurogenic communication disorders in adults. Students receive extensive training in the theories and processes of brain dysfunction (e.g. stroke, acquired brain injury, dementia, and other progressive diseases) as well as the current practices in the application of neurorehabilitation management. Practicum placements in medical and rehabilitative facilities provide applied experience to enhance learning. Upon completion of the coursework and clinical training, students are prepared to provide speech-language pathology services for a wide array of neurogenic communication disorders (i.e. acquired impairment in language, speech, and cognition) and collaborate as a contributing member with other professionals in medical and rehabilitation teams.

In addition to the core courses, required courses for this option are:

COMM 900, Articulatory and Phonological Disorders in Children, 3 cr.
COMM 901, Dysphagia, 3 cr.
COMM 902, Stuttering, 3 cr.
COMM 904, Aphasia, 3 cr.
COMM 905, Motor Speech Disorders, 3 cr.
COMM 906, Voice Disorders, 3 cr.
COMM 908 or 912, Disorders of Language/Literacy I or Language Disorders Birth to Five, 3 cr.
COMM 913, Cognitive-Communication Disorders, 3 cr.

Students will also take three elective courses from the following:

COMM 875, Advanced Language Acquisition, 3 cr
COMM 907, Advanced Aural Rehab, 3 cr.
COMM 908, Language Literacy Disorders I, 3 cr. [if not chosen in required category]
COMM 909, Disorders of Language/Literacy II, 3 cr.
COMM 912, Language Disorders Birth to Five, 3 cr. [if not chosen in required category]
COMM 914, Alternative/Augmentative Communication, 3 cr.
COMM 916, Autism Spectrum Disorders, 3 cr.
COMM 920, Graduate Seminar [advanced medical options]
PSYCH 914, Advanced Seminar in Cognition, 3 cr.
Other approved courses outside the department

Clinical Practicum

All students are required to complete four practicum rotations and two externships during their graduate studies. Practicum assignments take place at the UNH **Speech-Language-Hearing Center** (SLHC) and University-supervised satellite programs. Externships are available at a broad range of department-approved settings, including public and private schools, language-based preschool programs, early intervention programs, health care settings, and private practices. UNH requires students to have 15 documented observation hours prior to the start of clinical work.

During fall and spring semesters of year 1, students complete clinical work that directly and simultaneously corresponds to coursework. Clinical assignments are completed at the UNH Speech-Language-Hearing Center (SLHC) as well as University-supervised satellite programs. During year 2, students complete two semesters of diagnostic clinic at the UNH SLHC along with two externships at two different settings. Students shall participate in at least one externship that corresponds to their selected option in order to develop clinical skills in their area of interest. Since the UNH CSD Graduate Program is a full-time program, we expect students to be available for clinical assignments when not in class.

Students are responsible for transportation to satellite programs, externships, and other community learning experiences. Practicum sites may require a physical, including a tuberculin test; proof of immunizations such as poliomyelitis, rubella and hepatitis; health insurance; and drug/urine testing. In addition, students are responsible for meeting the criminal record clearances established by the practicum site. Failure to pass required medical and other clearance checks could render a student ineligible for a practicum assignment and thus unable to complete program requirements.

To learn more about the available externships, see the **CSD Externship Database**.

Capstone Experience

The capstone experience is divided into two phases:

Phase I: Year-One Comp

Phase I is a comprehensive exam scheduled at the end of the first year of graduate studies. For the *Year-One Comp,* all students will write for two hours, answering two out of three integrated questions addressing content specific to the first year.

Phase II: Year-Two Comp or Thesis

Year-Two Comprehensive Exam (non-thesis)

All students except those writing a thesis must pass a *Year-Two Comp* designed to assess their mastery of the full two-year curriculum. Students will write for six hours, answering six out of eight integrated questions. Students who have selected either the *Early Childhood Communication Disorders*, *Language/Literacy Disorders*, or the *Adult Neurogenic Communication Disorders* options are required to respond to one question specific to their course of study during the *Year-Two Comp*.

Thesis

Students may choose to write a thesis in lieu of the Year-Two Comp. Upon completion of an original research project, students must defend the thesis in an oral examination and must gain approval of the thesis committee. In addition to required coursework, students must register for 6 credits of COMM 899.

Computer Science (CS)

» **http://www.cs.unh.edu**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.S., Ph.D., Software Systems Engineering certificate

The Department of Computer Science offers both the M.S. and the Ph.D. in computer science.

The M.S. program is designed to help students increase the breadth and depth of their computer science knowledge, strengthen their software development skills, and build their research skills. Professionally-oriented students often complete industry internships, and the program has an outstanding job placement record for its graduates. Research-oriented students complete an M.S. thesis under the guidance of a faculty mentor, which usually leads to publication and provides clear evidence of the developed research skills useful for obtaining a leadership position in industry or to go on to do a Ph.D. Applications are welcomed from students whose undergraduate degree is not in computer science. In this case, a well-defined set of undergraduate prerequisites must be completed as part of the M.S. program of study.

The Ph.D. program is designed to develop a student's ability to carry out advanced research, as well as ensure the breadth and depth of computer science knowledge required to obtain a faculty position in academia or a research position in industry or at a national laboratory. Students first work to obtain breadth knowledge and a faculty research mentor. Then, working with their mentor, they carry out advanced work that results in original research publications and a doctoral dissertation.

Certificate Offered: Software Systems Engineering

The department also offers a graduate certificate in software systems engineering. This certificate is designed to help software developers with 3 to 5 years of experience transition to the higher value position of software systems engineer, also known as software architect, chief engineer, or technical lead. Individuals in this position help their organizations make the tough decisions concerning architecture, performance, availability, security, and safety. To obtain the certificate, students must complete four courses: one required course that provides an overview of the entire software systems engineering process, plus three elective courses, which focus on a particular area, such as requirements engineering, security, architecture, or testing.

Admission Requirements

The computer science graduate program is designed for students with a B.S. degree in computer science. However, applications from students whose undergraduate degree is not in computer science are also welcome. In this case, a well-defined set of undergraduate prerequisites must be completed as part of the M.S. program of study. The prerequisites include an introduction to computer science, object-oriented programming, data structures, machine organization, operating systems, and computer science theory.

These prerequisites can be satisfied at UNH by the following undergraduate courses:

CS 415, Introduction to Computer Science I
CS 416, Introduction to Computer Science II
CS 515, Data Structures
CS 520, Assembly Language Programming and Machine Organization
CS 620, Operating System Fundamentals
CS 659, Introduction to the Theory of Computation
Some students may need to take additional mathematics classes.

Students without a B.S. or M.S. in computer science are not normally admitted directly into the Ph.D. program, but it is possible to transfer from the M.S. program to the Ph.D. program.

Applicants must submit current scores (within five years) for the general test of the GRE. Students who have taken computer science courses at UNH can request a waiver of this requirement.

Degree Requirements

M.S. Degree Requirements

The M.S. program has three options: thesis, project, and exam.

M.S. Thesis Option

1. CS 900, Computer Science Seminar.

2. Eight CS graduate courses of at least 3 credits each.

   a. Two must be implementation intensive (see list below).
   b. Three courses must be chosen from three different breadth groups (see list below).

c. At least two courses must be above 900.

3. Thesis (6 credits). The student must complete a thesis under the supervision of a thesis adviser and a thesis committee of at least three members.

M.S. Project Option

1. CS 900, Computer Science Seminar.

2. Ten CS graduate courses of at least 3 credits each.

a. Two must be implementation intensive (see list below).
b. Four courses must be chosen from four different breadth groups (see list below).
c. At least three courses must be above 900; one of these must be related to the project area.

3. Project (3 credits). The student must complete a project under the supervision of a faculty adviser.

M.S. Exam Option

1. CS 900, Computer Science Seminar.

2. Ten CS graduate courses of at least 3 credits each.

a. Two must be implementation intensive (see list below).
b. Four courses must be chosen from four different breadth groups (see list below).
c. At least three courses must be above 900.

3. Comprehensive exam that includes four different examination topics (see list below).

One topic must be selected from one of the topics in the Theory breadth group (see list below); the other three topics must be selected from three different breadth groups (which can include a second theory topic).

Ph.D. Degree Requirements

1. CS 900, Computer Science Seminar.

2. Seven CS graduate courses (3 credits or more) beyond the M.S. or fifteen CS graduate courses beyond the B.S.

a. Two must be implementation intensive (see list below).
b. All students must take CS 845, Formal Specification and Verification of Software Systems.

3. Breadth requirement. Courses must be taken from at least four breadth groups (see list below), with one of the groups being the Theory group. Students must obtain a 3.4 GPA in the four breadth courses. The student designates which four courses are used to compute the GPA.

4. Research tool. A research tool represents knowledge and skills in another discipline that can help the student carry out his or her research plan. This is typically satisfied by taking a non-

computer-science graduate level course.

5. Depth requirement. Under the direction of a depth adviser and a depth committee, the student carries out some preliminary research that is likely to lead to a dissertation topic. The student must produce two written reports (a literature survey and a research report) and make a presentation as part of an oral examination on the material.

6. Dissertation. The student must complete original research and present and defend a dissertation describing that research. The research is carried out under the supervision of a faculty member dissertation adviser and a dissertation committee of at least five members, including one from outside the department.

Implementation Intensive Courses

Implementation intensive courses include: CS 812, 820, 830, 835, and 870.

Examination Topic Groups

The list below identifies the seven topic groups used for the M.S. comprehensive exam.

Group: Exam Topics

1. Theory: Formal Specification and Verification, Algorithms

2. Operating Systems: Advanced Operating Systems

3. Compiler and Language: Compilers

4. Database: Database

5. Artificial Intelligence: Artificial Intelligence

6. Interactive Systems: Graphics

7. Computer Networks: Computer Networks

Breadth Course Groups

The list below identifies the eight breadth course groups and introductory (800-level) graduate courses in each group. It is also acceptable to satisfy a group requirement by taking an advanced course (900-level) in the specified area. (Note that there are courses in the curriculum that are not in any of the identified groups.)

Group: Introductory Course

1. Theory: CS 845, 858

2. Systems: CS 820, 821, 823

3. Compiler and Language: CS 812, 835, 871

4. Database: CS 875

5. Artificial Intelligence: CS 830

6. Interactive Systems: CS 860, 867, 870

7. Software Engineering: CS 818, 819, 851, 852, 853

8. Networks: CS 825

Development Policy and Practice (DPP)

» **http://www.unh.edu/madpp/**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.A.

The master of arts in development policy and practice (MADPP) is a program that prepares individuals for advanced policy- and practice-oriented work in sustainable development both in the United States and in developing countries. The program has two pathways to complete the master's degree: a **14-month pathway** and a **24-month pathway**. The master's program offers an integrated conceptual framework guiding the coursework, high-level tools, and the best thinking in the field. Students are early- and mid-career adults working in a variety of development fields, and in particular those from public agencies and international and domestic non-profit and nongovernmental organizations (NGOs). Applicants to the program come from both international and domestic organizations and work in areas ranging from public policy, planning, economic development, sustainable development, environmental policy, public health, education, microenterprise, and more.

Objectives

1. Educate development practitioners working in non-profit organizations, NGOs, community-based organizations, government agencies, and private corporations, using a peer-based learning framework
2. Promote innovative approaches to development practice and policy development, identifying those that can increase the effectiveness of development practitioners
3. Expose development practitioners to global trends in development work
4. Using state-of-the-art communication technologies, connect practitioners to each other and to participants in similar programs across the globe

The degree program includes courses in the core disciplines of management, social sciences, health sciences, and natural sciences (including ecology, agriculture, natural resource management, and energy and climate studies).

UNH/**Carsey** is committed to teaching, supporting, and implementing sustainable development practices to overcome poverty and protect the environment.

Students in the MADPP program will:

1. Develop interdisciplinary knowledge and skills through a combination of core courses designed to integrate theory, policy, as well as data collection and analysis
2. Acquire an understanding of complex development issues and problems through a set of electives spanning engineering, natural sciences, public health, management, and social sciences
3. Apply their learning to real-world situations, by carrying out a four-term field project in

their home community

A unique feature of this program is that students can continue working while earning their degree. The **14-month pathway** includes two intensive summer sessions of four to six weeks and three semesters of online work. The **24-month pathway** is the same as the 14-month pathway, except for the addition of two online semesters. This meets the practical needs of both students and their employers, enabling participants to join an exciting advanced degree program that will enhance their performance and their commitment to work. Students will gain an array of skills that will help them more effectively meet the challenges in their development sectors. They will also develop a network of peers and advisors to continue to inform and inspire them.

Social change begins with strong leadership, and graduates of MADPP will have the tools, networks, and fresh insights to help improve the conditions and opportunities in the communities they serve.

Admission Requirements

Students are expected to have completed an undergraduate degree (B.A., B.S., or equivalent) from an accredited university before applying.

TOEFL scores are required if English is not your first language. GRE scores are accepted but not required.

All applicants must submit the following materials to be considered for admission: application form, letters of recommendation, resume, personal statement, and official transcripts. More specific information can be found on the **MADPP** website.

All application materials must be submitted electronically to the UNH Graduate School. Application materials as well as more specific details regarding the application process, including deadlines, are available at the **UNH Graduate School** website. Please note that the program has only one start date each year and that is in May.

Degree Requirements

Degree Requirements

In order to earn the MADPP degree, students must complete thirteen courses (equivalent to 39 credits), including the four-term project requirement, with a GPA of 3.0 or higher. Ten of the thirteen courses are required courses, while the remaining three are elective courses.

Course of Study

The Master of Arts in Development Policy and Practice program is structured around four competency areas:

- *Management* — including project design, management and evaluation, budgeting and financial management, human resource management, leadership, negotiations, and communication
- *Health sciences* — including health policy, health systems design and management, nutrition, population sciences, and reproductive health and basic epidemiology of infectious and noninfectious diseases
- *Social sciences* — including economics, anthropology, sociology, political science, and research methodologies
- *Natural sciences and engineering* — including agriculture, forestry, water management, energy, and climate and environmental sciences

Successful practitioners must be able to perceive problems from multiple points of view and through a variety of cultural lenses, including traditional academic and policy perspectives, as well as those of the communities and individuals to be served. Viewed in this way, neither traditional approaches (which emphasize theory and disciplinary academic content) nor "pedagogical inversions" (which give primacy to engagement and practice while deemphasizing theory and policy) create well-rounded development practitioners. The MADPP program will examine each of the core disciplinary areas within the cross-cutting lenses of theory, policy, data collection and analysis, and practice.

Core Curriculum

The curriculum is a series of courses designed to help students develop and strengthen interdisciplinary breadth and communication and to build program identity and a sense of community. All courses are 3-credit courses. The ten required courses comprise 30 credits in total, and students need to complete three elective courses (9 credits).

The sequence by which students take the ten required and three elective courses depends on the amount of time that they plan to take to complete the degree. There are two options — a 14-month pathway and a 24-month pathway.

14-Month Pathway

Academic Term		Courses
1st Summer Term (on-campus in Durham, N.H.)	Weeks 1 & 2	• **DPP 901: Integrated Approaches to Development Policy and Practice** (required) • **DPP 980: Project Design** (required)
	Weeks 3 & 4	• **DPP 909: Environmental Sciences and Infrastructure for Sustainable Communities and Development** (required) • Elective course*
	Weeks 5 & 6	• Elective course* • **Sustainable Microenterprise and Development Program (SMDP) Certificate** (elective course)**
Fall Term (online)	Late August - early	• **DPP 902: Economic Analysis and Development** (required course)

	December	• **DPP 981: Project Implementation** (required course)
Winter/J-Term (online)	January (3 weeks)	• Elective course*
Spring Term (online)	Late January - early May	• **DPP 905: Fiscal Management for Development Organizations** (required course) • **DPP 982: Project Management** (required course)
2nd Summer Term (on-campus in Durham, N.H.)	Weeks 1 & 2	• **DPP 906: Leadership, Collaboration and Communication** (required course) • **DPP 908: Policy Analysis, Policymaking and Sustainable Development** (required course)
	Weeks 3 & 4	• **DPP 983: Project Monitoring and Evaluation** (required course) • Elective course*
	Weeks 5 & 6	• Elective course* • **Sustainable Microenterprise and Development Program (SMDP) Certificate** (elective course)**

* Detailed discussion of **elective courses** is found at the end of this section.

** The SMDP certificate can be taken as an elective course; for details, visit **http://carseyinstitute.unh.edu/smdp**.

24-Month Pathway

Academic Term		Courses
1st Summer Term (on-campus in Durham, N.H.)	Weeks 1 & 2	• **DPP 901: Integrated Approaches to Development Policy and Practice** (required) • **DPP 980: Project Design** (required)
	Weeks 3 & 4	• **DPP 909: Environmental Sciences and Infrastructure for Sustainable Communities and Development** (required) • Elective course*
	Weeks 5 & 6	• Elective course* • **Sustainable Microenterprise and Development Program (SMDP) Certificate** (elective course)**
1st Fall Term (online)	Late August - early December	• **DPP 981: Project Implementation** (required course)

Winter/J-Term (online)	January (3 weeks)	• Elective course*
1st Spring Term (online)	Late January - early May	• **DPP 982: Project Management** (required course)
2nd Summer Term (on-campus in Durham, N.H.)	Weeks 1 & 2	• **DPP 906: Leadership, Collaboration and Communication** (required course) • **DPP 908: Policy Analysis, Policymaking and Sustainable Development** (required course)
	Weeks 3 & 4	• **DPP 983: Project Monitoring and Evaluation** (required course) • Elective course*
	Weeks 5 & 6	• Elective course* • **Sustainable Microenterprise and Development Program (SMDP) Certificate** (elective course)**
2nd Fall Term (online)	Late August - early December	• **DPP 902: Economic Analysis and Development** (required course)
2nd Spring Term (online)	Late January - early May	• **DPP 905: Fiscal Management for Development Organizations** (required course)

* Detailed discussion of **elective courses** is found at the end of this section.

** The SMDP certificate can be taken as an elective course; for details, visit **http://carseyinstitute.unh.edu/smdp**.

As noted above, summer terms are offered on-campus in Durham, New Hampshire, while courses offered during the fall, winter/J, and spring terms (when students are in their home communities) are offered online.

The 14- and 24-month pathways have the same courses during the summer and winter/J terms. The only difference between the two pathways is that students opting for the 14-month pathway take two required courses each during the fall and spring terms, thereby allowing them to complete 39 credits in 14 months. On the other hand, students who choose the 24-month pathway take only one required course each during the fall and spring terms; thus they need two fall and spring terms to complete the 39-credit requirement.

Elective Courses

Students are required to take three elective courses. These courses are offered during the Summer term (on-campus in Durham) and the Winter/J-term (online for three weeks in January). At least three elective courses will be offered during each Summer term, and one elective course during the Winter/J-term. Below is a list of elective courses.

- **DPP 903: Global Health**

- **DPP 904: Environmental Sustainability and Development**
- **DPP 907: Sustainable Engineering for Development Practice**
- **DPP 950: Current Issues in Microfinance & Microenterprise Development**
- **DPP 952: Balancing Resource Management, Land Use, and Development**
- **DPP 954: Sustainable Agriculture and Food Systems**
- **DPP 953: Community Medicine and Epidemiology**
- **DPP 955: Sexuality and HIV/AIDS in Sub-Saharan Africa**
- **DPP 960: Social Enterprise**

Earth Sciences (ESCI)

» **http://www.unh.edu/esci/**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.S., Ph.D.

The Department of Earth Sciences offers the master of science degree in Earth sciences with options in geology, ocean mapping, and a specialization in geochemical systems. The department offers the master of science degree in hydrology. The department also offers a master of science and a Ph.D. in **oceanography**. A Ph.D. in earth and environmental sciences is offered through the **Natural Resources and Earth System Science Program**. Graduate students in the department may conduct research through the Institute for the Study of Earth, Oceans, and Space and the Center for Coastal and Ocean Mapping.

The geology option is intended for students with interests in petrology, mineralogy, structural geology, tectonics, geophysics, sedimentation, glacial geology, paleoclimate, glaciology, hydrogeology, stratigraphy, paleontology, low- or high-temperature geochemistry, and isotope geochemistry.

The ocean mapping option is intended for students with interests in hydrography and hydrographic survey technology.

The geochemical systems specialization is intended for students with interests in all aspects of geochemistry: bedrock, sediment, water, ice, and air with particular emphasis on interpreting and modeling the interaction of these media (e.g., biogeochemistry, air quality, and climate change).

The hydrology degree is intended for students with interests in fluvial processes, global-scale hydrology, groundwater hydrology, hydroclimatology, surface-water hydrology, water quality, and quantitative hydrology.

Admission Requirements

An applicant to the M.S. program is expected to have completed one year of calculus and at least four semesters of college chemistry, physics, and/or biology; and to have an

undergraduate degree or equivalent in geology, chemistry, physics, mathematics, engineering, or the biological sciences. Applicants must submit current scores (within five years) from the general test of the GRE. Students lacking some background in a particular area may be admitted provided they are prepared to complete courses, without graduate credit, in which they may be deficient. The program of study a student wishes to follow and the student's undergraduate major determine the level of preparation necessary. The preparation of each student is determined before the beginning of the first semester in residence in order to plan the course of study. Each entering student is assigned an academic adviser to assist in planning a program of study.

Degree Requirements

Students in the M.S. programs are required to complete the core curriculum for their respective areas. Students in the thesis option must satisfactorily complete at least 30 credits, which include the credits accumulated in the core curriculum. Students in this option must complete a master's thesis (6 credits) and give an oral presentation of the results.

Students in the non-thesis option must satisfactorily complete at least 34 credits, which includes the core curriculum, a 2-credit directed research project (ESCI 898), and a written and oral presentation of that research.

Geology

The core curriculum for the option in geology normally includes at least three courses from 825, Igneous Petrology; 826, Metamorphic Petrology; 834, Geophysics; 841, Geochemistry; 845, Isotope Geochemistry; 854, Sedimentology; 859, Geological Oceanography; and 862, Glacial Geology. Students are also required to take 997, Seminar in Earth Sciences (1 cr. first year), and 998, Proposal Development (1 cr. first year).

Ocean Mapping

The core curriculum for the option in ocean mapping normally includes 858, Introductory Physical Oceanography; 859, Geological Oceanography; 871, Geodesy and Positioning for Ocean Mapping; 872, Research Tools for Ocean Mapping; 874, Fundamentals of Ocean Mapping I; 875, Fundamentals of Ocean Mapping II; Math 831, Math for Geodesy; 972, Hydrographic Field Course; 997, Seminar in Earth Sciences (1 cr. first year); and 998, Proposal Development (1 cr. first year). For this option, a total of 36 credits, including thesis or directed research project, is normally required.

Students may fulfill the Category A (professional) International Federation of Surveyors/International Hydrographic Organization/International Cartographic Association (FIG/IHO) Standards of Competence for Hydrographic Surveyors by completing some additional specialized requirements. For more information, please visit the Center for Coastal and Ocean Mapping website, **www.ccom.unh.edu**.

Geochemical Systems

The core curriculum for the specialization in geochemical systems normally includes three courses from 841, Geochemistry; 846, Analytical Geochemistry; 847, Aqueous Geochemistry; 852, Chemical Oceanography; 864, Data Analysis in Earth System Science; EOS/NR 844, Biogeochemistry; ESCI/EOS 815, Global Atmospheric Chemistry; ESCI 845, Isotope Geochemistry. Students are also required to take 997, Seminar in Earth Sciences (1 cr. first

year); and 998, Proposal Development (1 cr. first year).

Hydrology

The core curriculum for the major in hydrology normally includes 805, Principles of Hydrology; 810, Groundwater Hydrology; 997, Seminar in Earth Sciences (1 cr. first year); and 998, Proposal Development (1 cr. first year).

In each of the options listed above, additional electives are to be selected from 800- and 900-level courses in the department and/or from courses numbered 700 and above in related disciplines outside of the department (e.g., natural resources, civil engineering, chemistry, zoology). More detailed information is available from the department.

Certificate in Ocean Mapping

The program goal is to provide advanced graduate training to working professionals in the area of ocean mapping. These professionals will come from a variety of backgrounds ranging from Earth science, geology, and biology to engineering. The graduate certificate in ocean mapping is awarded for completion of the core courses and associated practicum. The graduate certificate program fulfills the Category A International Federation of Surveyors/International Hydrographic Organization/International Cartographic Association (FIG/IHO/ICA) Standards of Competence for Hydrographic Surveyors.

For more information, please visit the ocean mapping website (**www.ccomjhc.unh.edu/index.php?p_&page=education.php#certificate**) or e-mail **info@ccom.unh.edu** at the Center of Coastal and Ocean Mapping Joint Hydrographic Center.

Applying

Please visit the Graduate School PBACC site (**www.gradschool.unh.edu/pbacc.html**) for detailed instructions about applying to the certificate program.

Certificate Requirements

ESCI/OE 871, Geodesy and Positioning for Ocean Mapping (4 cr)
ESCI/OE 872, Research Tools for Ocean Mapping (3 cr)
MATH 831, Math for Geodesy (3 cr)
ESCI/OE 874, Fundamentals of Ocean Mapping I (4 cr)
ESCI/OE 875, Fundamentals of Ocean Mapping II (4 cr)
ESCI/OE 972, Hydrographic Field Course (4 cr)
OE 677, Seamanship & Marine Weather (P/F)
ESCI 896, Coastal Remote Sensing (3 cr) for the optional Remote Sensing specialty

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Earth, Oceans, and Space (EOS)

» **http://www.eos.sr.unh.edu/**

» **Click to view course offerings**

This program is offered in Durham.

The Institute for the Study of Earth, Oceans, and Space offers students the opportunity for interdisciplinary study and research. Certain graduate degree programs in Earth sciences,

physics, natural resources, and zoology may be accessed through the institute as follows: all the M.S. programs in Earth sciences, the specialization in space physics and astrophysics (M.S. and Ph.D.), and departmental (M.S.) or interdepartmental (Ph.D.) program in natural resources and Earth systems sciences. Admission and degree requirements are set by the respective departments and program. See the graduate program descriptions in Earth sciences, physics, zoology, natural resources, and the natural resources and Earth systems sciences program (NRESS) for admission and degree requirements.

» **Click to view course offerings**

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Economics (ECON)

» **http://www.wsbe.unh.edu/graduate-programs**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.A., Ph.D.

Programs are offered through the Peter T. Paul College of Business and Economics

Students seek graduate training in economics for several reasons. Some pursue the M.A. as a terminal degree and become professional economists employed in a variety of business and government settings, including banking, investment, insurance, consulting, the Federal Reserve, and international organizations such as the World Bank and the World Health Organization. Other students may wish to become professional economists who advance to the very highest levels of management in business, government, or academia. Students with these career goals continue their graduate studies by earning the Ph.D. degree.

The graduate programs in economics at UNH are some of the most distinctive in the country. The M.A. program is based on a fast-track, ten-month calendar that provides rigorous training in economic theory and applied statistics. It also allows students to pursue applied coursework in international finance, environmental and resource economics, health economics, data analysis and information management, and international business. The doctoral program at UNH is one of only a few with a dual emphasis on training first-rate economists and outstanding college teachers. Students learn economic theory and econometrics at the highest level and can pursue coursework and receive supervised training in the teaching of economics. Beyond its strengths in the fields of international economics, health economics, and environmental economics, the department is known for its emphasis on the history of economic thought and methodology. The Department of Economics maintains an active and high-quality weekly research seminar, which attracts leading economists and researchers from around the country.

Admission Requirements

In addition to requirements established by the Graduate School, applicants must submit current scores (within five years) from the general test of the Graduate Record Exam (GRE). The graduate programs seek students whose undergraduate experiences provide evidence of

superior ability and that indicate the promise of independent scholarship. At a minimum, undergraduate preparation should include courses in economics at the intermediate level, as well as courses in calculus and statistics. Coursework in econometrics is strongly encouraged. Because the first year of the M.A. and Ph.D. programs overlap to a large extent, students who wish to pursue a Ph.D. degree are usually considered initially for admissions into the M.A. program. The doctoral program requires a master's degree in economics from a U.S. institution.

Master of Arts in Economics

The M.A. program in economics builds on the core economic theory and econometrics classes from the Ph.D. program. This coursework is considerably more rigorous than what might be found at a stand alone M.A. program. Consequently, master's students are exceptionally well trained.

The fast-track, ten-month program is based on four terms: one five-week term (Term 1) and three ten-week terms (Terms 2-4), running from the end of August through the end of May. It consists of three components: the foundation (Term 1: mathematical economics), the core (Term 2: theory and foundational skills), and concentrations (Term 3 and 4: specialized fields and independent research). As part of the requirements, students participate in weekly research seminars where they are exposed to cutting-edge research presented by UNH faculty and by scholars from around the country. The culminating experience for the program is a master's paper written during Term 4, which affords students the opportunity to work closely with faculty members while conducting original research in their chosen concentration.

Requirements

Students must earn 36 credits to graduate, usually consisting of ten, 3-credit courses, plus 6 hours of graduate economics seminar.

I. The Foundation (3 credits)

ECON 825, Mathematical Economics

The course is typically offered in the five-week Term 1. Class meets four days a week and students earn 3 credits, the same as in the other terms.

II. The Core (9 credits)

ECON 976, Microeconomics I
ECON 972, Macroeconomics I
ECON 926, Econometrics I

These courses enable students to advance to specialized areas in the third and fourth terms with a strong background in theory and econometrics.

III. Electives (15 credits)

ECON 927, Econometrics II or an approved skills course
Field/elective courses

Students may take a variety of economic electives or choose to specialize in an area such as

international finance, environmental and resource economics, health economics, data analysis and information management, and international business. Up to two electives as substitutes for economics electives may be taken in courses offered outside of the department, subject to approval by the department. All elective courses must be at the 800 level or higher.

IV. Graduate Economics Seminar (6 credits)

Students are required to register and participate in the Graduate Economics Seminar (ECON 988) in Terms 2, 3, and 4. No more than 6 credits can be counted toward the degree.

V. Master's Paper (3 credits)

Students are required to take the Research Skills course (ECON 979) in preparation to write a master's research paper. The master's research paper is the capstone experience of the master of arts in economics. Students do research under the direct supervision of a faculty member and present their work at the end of Term 4.

Ph.D. in Economics

Students demonstrating exceptional promise in economics (usually after completing the master's program) and who are interested in teaching and research find the doctoral program a unique challenge. The doctoral program in economics has four key elements: (1) a broad education in economics; (2) an integrative research experience; (3) a dual emphasis on training first-rate economists and outstanding college teachers; and (4) specialized training in environmental economics, health economics, and international economics.

Nationally, doctoral study in economics has increasingly involved quantitative rigor. UNH's program has responded to this trend, but not at the expense of providing a broad background in economics. Beyond the core theory and econometrics classes, students study methodology and the history of economic thought.

The doctoral program encourages students to develop their research skills early on through an integrative research experience. The cornerstone of this experience is the department's weekly research seminar. Students participate in the seminar by writing critical reviews and referee reports of the papers presented, acting as discussants, and presenting their own research.

A distinctive feature of UNH's doctoral program is its dual emphasis on training economists and college teachers. The Department of Economics, in conjunction with the Teaching Excellence Program in the Graduate School, has developed a nationally known program that provides training in pedagogy for students whose career goals include teaching at the college level. This program, called the Cognate in College Teaching, is an option that Ph.D. students may pursue in addition to the requirements of the Ph.D. degree.

Requirements

The degree requirements include: nine core courses, comprehensive exams, two fields of concentration (a major field and a minor field), field and research workshops, a major field exam, doctoral dissertation proposal defense and final defense, and proficiency in one foreign language if deemed necessary by the student's dissertation chair. Candidacy is reached following successful completion of (1) comprehensive examinations in microeconomics and

macroeconomics; (2) exam in major field (health economics, environmental economics or international economics).

I. Core courses

ECON 976, 977, Microeconomics I and II
ECON 972, 973, Macroeconomics I and II
ECON 970, Advanced Economic Theory
ECON 926, 927, Econometrics I and II
ECON 957, History of Economic Thought
ECON 958, Topics in Economic Thought and Methodology

II. Comprehensive Examinations in Microeconomics and Macroeconomics

III. Fields of Concentration

Students must complete the requirements for one major field and one minor field.

Environmental Economics

Requirements for a Major Field
1. ECON 908, Environmental Economics: Theory and Policy
2. ECON 909, Environmental Valuation
3. RECO 911, Natural & Environmental Resource Management or other approved course
4. ECON 992, Field Workshop

Requirements for a Minor Field
1. Two of the following: ECON 908, ECON 909, or RECO 911

Health Economics

Requirements for a Major Field
1. ECON 941, Survey of Health Economics
2. ECON 942, Selected Topics in Health Economics
3. One of the following: PHP 901, Epidemiology; PHP 907, Public Health Policy; PHP 922, Public Health Economics; or other approved course
4. ECON 992, Field Workshop

Requirements for a Minor Field
1. ECON 941 and ECON 942

International Economics

Requirements for Major Field
1. ECON 945, International Trade
2. ECON 946, International Finance
3. One of the following: ADMN 846, International Financial Management; ECON 846, Multinational Enterprises; ECON 807, Economics of Sustainable Development; ECON 868, Seminar in Economic Development; ADMN 841, International Management; or other approved course
4. ECON 992, Field Workshop

Requirements for a Minor Field

1. ECON 945 and ECON 946

IV. Examination in Major Field

V. Elective Course

Beyond the core theory courses and field requirements, students must take one additional graduate course from the department or an approved 800-level class from another department.

VI. Graduate Economics Seminar

The doctoral program entails an integrative research experience that encourages students to develop research skills early on. The cornerstone of this experience is the department's weekly research seminar, which brings scholars from around the country to present cutting-edge research. In their first two years of study, students are required to sign up for the Graduate Economics Seminar (ECON 988) in Terms 2, 3, and 4, and write critical reviews of papers presented.

VII. Research Workshop

Beyond their second year of study, students continue to participate in the department's weekly seminar by enrolling in two terms of Research Workshop (ECON 996). Research Workshop students present their own research in the research seminar series. They may also serve as discussants for outside speakers and write referee reports for the papers presented. Students must secure a dissertation adviser prior to signing up for their first term of Research Workshop. The research-workshop requirement should be completed by the end of the fourth year of study.

VIII. Foreign Language Requirement

Students may need to demonstrate reading knowledge of one foreign language if it is determined to be essential to the student's area of research by his or her dissertation chair.

IX. Dissertation Proposal Defense

Prior to defending his/her proposal, a student must find a dissertation chair and form a dissertation committee. The dissertation proposal may be defended as part of the Research Workshop or separately from the Workshop.

X. Final Dissertation Defense

Cognate in College Teaching

The Ph.D. degree in economics from UNH is a research degree that provides students with a deep understanding of economic theory, institutions, and empirical analysis. Most graduates of the program move into faculty positions at other institutions of higher learning where teaching is an important component of their responsibilities.

In conjunction with the Teaching Excellence Program in the Graduate School, the department has developed a track in its doctoral program that provides formal training in pedagogy for students whose career goals include teaching at the college level. This track, called the Cognate in College Teaching, is an option that Ph.D. students may select in addition to the

requirements of the doctoral degree (discussed above). The Cognate is a 13-credit program and is awarded, upon satisfaction of all requirements, concurrently with the Ph.D. The Cognate can only be awarded in conjunction with the Ph.D. and none of the course requirements of the Cognate can be substituted for those of the Ph.D.

To enter the program, a student must formally apply to the Graduate Dean after at least one year of full-time graduate studies in economics. Admission to the Cognate will be decided by the graduate dean, based upon recommendations of the Economics Graduate Program Coordinator and the Teaching Excellence Program Director.

Requirements of the Cognate

Cognate in College Teaching Requirements

The Cognate in College Teaching offers a series of core and elective courses to prepare individuals to teach at institutions of higher education. The Cognate is available to doctoral students and students in selected master's degree programs at UNH.

Students must apply and be formally admitted to the program. The Cognate appears as a minor on the student's transcript, and is awarded concurrently with the Ph.D. or Master's degree.

This program requires the satisfactory completion of 13 academic credits. Students elect, with the permission of their graduate coordinator, to add the cognate to their graduate degree. The cognate will be awarded at the time of the award of the qualifying graduate degree. Requirements include 8 credits in core courses and 4 credits in elective courses. Students must also create and submit an electronic teaching portfolio for 1 credit.

Core Courses, 8 credits
GRAD 950, Issues in College Teaching, 2 cr.
GRAD 951, Teaching with Writing, 2 cr.
GRAD 961, Cognition, Teaching, and Learning, 2 cr.
GRAD 965, Classroom Research and Assessment Methods, 2 cr.

Electives, minimum of 4 cr.
GRAD 930, Ethics in Research and Scholarship, 2 or 3 cr.
GRAD 963, College Students and the Undergraduate Culture, 2 cr.
GRAD 970, Special Topics in College Teaching: Teaching Online, 2 cr.
GRAD 971, Teaching and Learning in Science, 3 or 4 cr.
GRAD 995, Independent Study, 1 or 2 cr.

Integrative Experience, 1 credit
GRAD 998, College Teaching Portfolio, 1cr.

Upon completion of these requirements, the Cognate in College Teaching is awarded and noted on the graduate transcript. For more information please visit the Teaching Excellence web site: **http://www.unh.edu/teaching-excellence/Academic_prog_in_coll_teach/index.html**

Education (EDUC)

» **http://www.unh.edu/education/**

» **Click to view course offerings**

*This program is offered in Durham and in Manchester through **GSMC**.*

Degrees Offered: M.A., M.Ed, M.A.T., Ed.S., Ph.D.

Certificates Offered: Autism Spectrum Disorder, Mentoring Teachers

Note: The Department of Education has suspended admission, effective Spring 2012, to the Master of Education degree in Administration and Master of Education degree in Reading.

The Department of Education offers a variety of programs leading to the master's degree, the doctor of philosophy degree, and the education specialist degree. The department also offers graduate certificate programs in autism spectrum disorder and mentoring teachers.

The master of arts in teaching is offered in secondary education. The master of education is offered in counseling, early childhood education (including an option in special needs), elementary education, secondary education, special education, and teacher leadership. Special education certification is also available to those who complete the M.Ed. programs in elementary or secondary education or who complete the M.A.T program in secondary education.

The education specialist degree is offered in educational administration and supervision. The doctor of philosophy is offered in education.

The master of science for teachers is offered through the departments of chemistry, English, and mathematics. (See those departments for information.) Most programs are available to part-time admitted graduate students.

Admission Requirements

In addition to the materials required by the Graduate School, each application must include recent (within five years) Graduate Record Examination (GRE) general test scores and a thoughtful, well-written statement of purpose for undertaking graduate study in a particular program.

Individual programs within the department may have additional admissions requirements. Applicants should refer to specific program descriptions. Consultation with a program faculty member is recommended. In all cases, the applicant's relevant experience, references, and professional goals will be considered in the admission process.

Action on applications to Department of Education programs varies by individual program. Applicants to this program must refer to the online Programs of Study listing for additional application instructions. This can be done by referring to the Graduate School's Admissions web page and then Application Requirements. The additional application instructions can be found under Requirements and Supplemental Documents.

Doctor of Philosophy

Program information: Please contact education department.

The Department of Education offers a Ph.D. in education with specialization in fields related to the areas of teacher education, educational leadership and policy studies, curriculum and instruction, literacy and schooling, and experiential/outdoor education. The doctoral program is designed to engender a broad understanding of the field of education by encouraging focused scholarly inquiry grounded in the reality of educational practice. Professors and students work to place educational issues in a philosophical and socio-cultural context. Collaborative projects sometimes move beyond the boundaries of the University into other educational settings. The program enrolls full- and part-time students.

An individual program of study is planned by the student and her or his guidance committee. Each student's program includes a set of common core courses, specialized study, a number of selected electives from across areas of inquiry, and required research preparation. Students must meet specific University, department, and program requirements. Within this framework, individual programs can vary widely from student to student depending upon the student's own interests and goals.

The Ph.D. in education provides students with preparation for research, teaching, and leadership in a variety of settings. Graduates hold positions at all levels of schooling, from colleges and universities to K-12 schools. Former students are also involved in work as policy makers, community agency directors, consultants, and research analysts.

Admission

Students admitted to the program must have completed a master's degree in education or a related field and will normally have worked full time as an educator at the elementary, secondary, or college level. Entering students are expected to have completed some graduate-level coursework in educational psychology, curriculum and instruction, educational structure and change, and the philosophical and social foundations of education. Exceptional candidates who do not meet all of these course prerequisites will be considered. To apply, candidates must submit a Graduate School application, transcripts of all undergraduate and graduate coursework, and Graduate Record Examination (GRE) general test scores.

In addition to the personal statement required on the Graduate School application, candidates must submit an essay on an educational issue. This essay should discuss one issue in the field of education that is of interest to the candidate. It should explore the opportunities and challenges this issue poses and explain why the applicant finds it personally compelling (1,000 to 1,500 words in length).

Prior to completing and submitting the application, it is highly recommended that the candidate arrange for an on-campus interview with the director of doctoral studies or with an appropriate department faculty member. Applicants from distant locations may interview by phone. Contact the Department of Education by phone: (603) 862-2310 or e-mail: education.department@unh.edu.

Degree Requirements

Candidates for the degree must meet admission requirements, develop and complete an approved program of study in consultation with their guidance committee, complete required coursework, undergo an annual assessment review by the Doctoral Advisory Committee (for first- and second-year students), pass a qualifying examination to advance to candidacy, establish a dissertation committee, develop an approved dissertation proposal, write and present the dissertation, and pass the final oral examination.

Program of Studies

Upon acceptance to the program, students are assigned an adviser. During the first year of study, students identify, either in consultation with their adviser or with the director of doctoral studies, faculty members to serve as their guidance committee. Programs for the doctoral degree in education are planned individually by students and their guidance committees. The program of study consists of four major elements: common core courses, specialization specific to the student's scholarly interests, a number of selected electives from across areas of inquiry, and research preparation, including specific advanced research modules. At least five common core courses are required of all students: Proseminar in Doctoral Studies: Critical Inquiry in Education; Normative Inquiry in Education; Qualitative Inquiry in Education; Introduction to Statistics: Inquiry, Analysis, and Decision Making; Applied Regression Analysis for Educational Research; and Quantitative Inquiry: Methods and Techniques of Educational Research. Typically students complete 52 to 64 hours in graduate coursework following their matriculation. These hours do not include doctoral research (EDUC 999).

Qualifying Examination

To be advanced to Ph.D. candidacy, students must satisfactorily complete qualifying examinations as well as other program requirements. After completing at least two-thirds of their coursework, students may take the qualifying examination. The examination is a written exam to be developed, supervised, and evaluated by the student's guidance committee. The qualifying examination is used to evaluate the student's general knowledge in relevant areas of inquiry, and his or her fitness for engaging in research, particularly in the subject proposed for the dissertation.

Dissertation

To complete the degree, the student must present and defend a dissertation of original research and publishable quality.

Administration and Supervision

Program information: Todd DeMitchell, Virginia Garland

The Department of Education offers the degrees of master of education and education specialist in Educational Administration and Supervision.

Master of Education

Note: The Department of Education has suspended admission, effective Spring 2012,

to the Master of Education degree in Administration.

The program is designed for the experienced teacher who wishes to become qualified in the broad area of supervision and administration, grades K-12. Emphasis is on the elementary and secondary school principalship. This program leads to certification in New Hampshire as a principal.

Core requirements (28 credits): 953, Seminar in Curriculum Study; 961, Public School Administration; 962, Educational Finance and Business Management; 965, Educational Supervision; 967, School Law; 969, Practicum in Educational Administration; and 972, Educational Program Evaluation.

Electives (8 credits): Electives are elected in consultation with the program adviser.

Concluding experience: A degree candidate must successfully complete one of the following: a comprehensive oral examination based on a set of theses statements prepared by the candidate, or a major research study related to school administration, curricula, or educational supervision.

Education Specialist (Ed.S.)

This program, formerly the C.A.G.S. degree program, is designed for those who possess a master's degree in school administration or a master's degree in a related educational field. This program offers advanced preparation for those educators who desire careers as school superintendents, assistant superintendents, state department of education personnel, vocational education coordinators, curriculum coordinators, or educational personnel in private organizations. This program leads to certification as a superintendent in New Hampshire. It is possible to also receive certification as a principal under special circumstances.

Core requirements (20 credits): Ed.S. students will take the following five core courses: 964, Human Resources in Education; 968, Collective Bargaining in Public Education; 971, School Facilities Management; 973, Policy, Politics, and planning in Education; and 977, Leadership: The District Level Administrator.

Electives (8 credits): Electives are selected in consultation with the program adviser. A student who does not hold a master's degree in administration may be required to take specific courses as electives.

Concluding experience (8 credits): A student must complete a field internship and a significant field project in an approved administrative setting.

Counseling Program

Program information: Loan Phan, Janet Thompson

The Graduate Program in Counseling prepares counselors to function in a variety of institutions, agencies, and schools dedicated to the educational, social, vocational, and psychological development of the person. Graduates are typically involved in team delivery of services and work in collaboration with other human services professionals. Students are encouraged to develop a fundamental psychotherapeutic approach that can be applied to

diverse client populations. Students may also individualize their program of study to serve the needs of a particular clientele. This can be accomplished through selected readings and projects in required courses, internship experiences, elective courses, and independent study or research projects. The program meets educational requirements for certification in school counseling (M.Ed.).

Master of Education (48 credit hours)

Core requirements (44 credits): 919, Counseling Practicum: Professional and Ethical Orientation; 920, Counseling Theory and Practice; 921, Psychology of Career and Personal Development; 922, Assessment in Counseling; 923, Group Counseling; 924, Psychological Disorders: Variations in Human Development; 925, Counseling Internship I; 926, Counseling Internship; 932, Society and Culture: Contemporary Issues in Counseling; 933, Developmental Models of Comprehensive School Guidance; 851c, Teaching Exceptional Learners: Related Services.

Electives (4 credits): Selected in consultation with the student's adviser, electives may be chosen from graduate-level courses on campus, or may be completed through an approved independent study.

Concluding experience: Degree candidates must complete a comprehensive essay examination.

Early Childhood Education

Program information: Eun Kyeong Cho

The Department of Education offers the master of education degree in early childhood education and an option in special needs. When completed in conjunction with a degree, certification is available as an early childhood teacher (PreK - 3rd). Certification requirements are additional to the master's degree but may be completed as electives for the degree. This program is an advanced course of study designed for teachers, administrators, and other early childhood practitioners who wish to improve their professional competence and broaden their career opportunities. The program emphasizes the acquisition of knowledge and competencies in child development (birth through eight years), learning environments, developmentally appropriate curriculum, developmental and cultural diversity, and professional leadership. The coursework culminates in extensive field-based experience.

Admission requirements: All admitted students are expected to have had at least one course in child development at the upper-division level and at least 200 hours of supervised classroom experience with children from birth through eight years of age, or the equivalent.

Core requirements (26 credits): 861, Inclusive Curriculum for Young Children; 941, Diversity and Child Development; 942, Sociocultural Perspectives on Teaching and Learning; 948, Leadership and Advocacy in Early Childhood Education; one course selected from the special needs option courses offering (EDUC 856, 860, or 862); and two semesters (6 credits) of internship in EDUC 900B and 901B.

Electives (10 credits): Selected in consultation with the program adviser.

Concluding experience: Degree requirements 36 credits. All degree candidates must

successfully complete two concluding experiences: (1) one of the following: comprehensive written and oral examination, or a research thesis, (2) and a graduation portfolio.

Special Needs Option

Program information: Eun Kyeong Cho

The Department of Education offers the master of education degree in early childhood education with an option in special needs. When completed in conjunction with a degree, certification is available as an early childhood special education teacher (birth through eight years). Certification requirements are additional to the master's degree but may be completed as electives for the degree.

This program is an advanced course of study designed for teachers, administrators, and other early childhood practitioners who wish to improve their professional competence and broaden their career opportunities. The program emphasizes the acquisition of knowledge and competencies in child development (birth through eight years), learning environments, developmentally appropriate curriculum, developmental and cultural diversity, and professional leadership. The coursework culminates in extensive field-based experience.

Admission requirements: All admitted students are expected to have had at least one course in child development at the upper-division level and at least 200 hours of supervised classroom experience with children from birth through eight years of age, or the equivalent.

In addition to the early childhood core requirements described above, students choosing this option will concentrate on young children who are at risk for, or have, developmental difficulties and special needs. Coursework emphasizes an understanding of the role of the family, community, and social policy in early development and intervention. The program is non categorical in its approach to assessment and educational planning.

Core requirements (34 credits): The core requirements of the early childhood program with the addition of three courses.

EC core requirements: 861, Inclusive Curriculum for Young Children; 941, Diversity and Child Development; 942, Sociocultural Perspectives on Teaching and Learning; 948, Leadership and Advocacy in Early Childhood Education; and two semesters (6 credits) of internship in EDUC 900B and 901B.

Additional Special Needs core requirements: 860, Introduction to Young Children with Special Needs; 862, Curriculum for Young Children with Special Needs: Evaluation and Program Design; and 856, Supporting Parents of Students with Special Needs.

Electives (8 credits): Selected in consultation with the program adviser.

Concluding experience: Degree requirements 42 credits. A degree candidate must successfully complete two concluding experiences: (1) one of the following: a comprehensive written and oral examination, or a research thesis, (2) and a graduation portfolio.

Reading

Note: The Department of Education has suspended admission, effective Spring 2012, to the Master of Education degree in Reading.

Program information: Paula Salvio, Ruth Wharton-McDonald

The graduate program in reading prepares literacy specialists and teachers to provide leadership and instruction in literacy in a variety of educational contexts. The instructional sequence integrates theory, research, and instructional practice, and incorporates field-based and clinical components. Particular emphasis is placed on the interrelationship of reading and writing. Graduates of the program provide direct instruction in literacy and offer leadership in organizing, managing, and evaluating literacy programs.

Core requirements (24 credits): 907, Foundations of Literacy Instruction; 908-909, Clinical Diagnosis and Remediation of Reading Difficulties and Disabilities; 910, Reading and Writing Methods in the Middle/Secondary School; 913, Field Practicum in Reading; 914, Seminar in Reading Research.

Electives (12 credits): Selected in consultation with the program adviser; a student using the research thesis option as a concluding experience will use 8 credits for EDUC 899, Master's Thesis.

Concluding experience: A degree candidate will successfully complete either a written examination or a research thesis.

Special Education

Program information: Vincent Connelly, Georgia Kerns, William Wansart

The special education program prepares highly qualified educators who possess the knowledge, disposition, and skills necessary to take the lead in establishing effective teaching and learning environments for a diverse population of learners, who are capable of collaborating with classroom teachers as team leaders or consultants, and who utilize these skills within their school communities, and within the profession itself. The program meets current certification requirements in the state of New Hampshire in General Special Education, Learning Disabilities, **intellectual and developmental disabilities** , and Special Education Administration.

Degree Requirements

Prerequisites for General Special Education Certification:

1. All candidates are required to complete a course in mathematics teaching methods and a course in reading teaching methods. At UNH, courses that meet the reading requirement are EDUC 806, Introduction to Reading Instruction and EDUC 907, Foundations of Reading Instruction. Courses that meet the mathematics requirement are MATH 701, Exploring Math for Teachers I and MATH 702, Exploring Math for Teachers II. Equivalent courses taken at another college or university may be substituted.

2. All students are required to complete EDUC 850, Introduction to Exceptionality and EDUC 851, Educating Exceptional Learners. Equivalent courses taken at another college or university

may be substituted.

3. Credits for prerequisite courses will not count toward those needed for the M.Ed. degree.

Core Courses (32 credit hours)
Required courses for all students:

EDUC 756/856, Supporting Families of Individuals with Exceptionalities 4 cr.
EDUC 900C, Internship and Seminar in Special Education 6 cr.
EDUC 901C, Internship and Seminar in Special Education 6 cr.
EDUC 938, Advanced Seminar in Special Education 4 cr.
EDUC 939, Assessment of Children with Learning Difficulties 4 cr.
EDUC 940, Teaching Children with Learning Difficulties 4 cr.
EDUC 981, Methods and Techniques of Educational Research 4 cr. or an equivalent educational research course

Elective Courses (12 credit hours minimum)
EDUC 852, Contemporary Issues in Learning Difficulties 4 cr.
EDUC 853, Contemporary Issues in Behavior Disorders 4 cr.
EDUC 854, Contemporary Issues in Developmental Disabilities 4 cr.
EDUC 855, Fostering Social Relationships for Students Who Experience Severe Disabilities 2 cr.
EDUC 860, Introduction to Young Children with Special Needs 4 cr.
EDUC 876, Reading for Children with Special Needs 4 cr.
EDUC 908/909, Diagnosis and Remediation of Reading Difficulties 4 cr.
EDUC 947, Curriculum for Young Children with Special Needs: Evaluation and Program Design 4 cr.

EDUC 951, Laws and Regulations Affecting the Education of Individuals with Disabilities 4 cr.

EDUC 952, Inclusive Assessment, Curriculum, Instruction and Communication Supports 4 cr.

EDUC 956, Positive Behavioral Supports 4 cr.Students will select elective courses in consultation with their adviser. At most, 4 credit hours of EDUC 899, Thesis may count as elective work.

Other courses may be included on recommendation from the adviser.

Core Courses for certification in Learning Disabilities in addition to those necessary for certification in General Special Education:

EDUC 852, Contemporary Issues in Learning Disabilities 4 cr.
EDUC 908/909, Diagnosis and Remediation of Reading Disabilities 4 cr./4 cr.
EDUC 910, Reading and Writing Methods in the Middle/Secondary School 4 cr.

Core Courses for certification in intellectual and developmental disabilities (IDD) in addition to those necessary for certification in General Special Education:

EDUC 854, Contemporary Issues in Developmental Disabilities 4 cr.
EDUC 855, Fostering Social Relationships for Students who Experience Severe Disabilities 2 cr.
EDUC 876, Reading for Children with Special Needs 4 cr.
EDUC 952, Inclusive Assessment, Curriculum, Instruction and Communication Supports 4 cr.

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EDUC 938, Advanced Seminar in Special Education 4 cr.
EDUC 956, Positive Behavioral Supports 4 cr.
COMM 914, Seminar in Alternative and Augmentative Communication 3 cr.

Core Courses for Special Education Administration in addition to those necessary for certification in General Special Education:

EDUC 951, Laws and Regulations in Special Education 4 cr.
EDUC 956, Learning to Listen: Positive Behavioral Supports 4 cr.
EDUC 961, Public School Administration 4 cr.
EDUC 962, Educational Finance and Business Management 4 cr.
EDUC 964, Human Resources in Education 4 cr.
EDUC 974, Administrative Internship 6 cr.

Concluding Experiences
All students will have the option of one of two concluding experiences:

1. Research project with a defense, or

2. A research thesis that meets the requirements of the Graduate School and the Education department (6-10 credits).

Requirements for the thesis are explained in the Graduate School publication entitled *Thesis and Dissertation Manual.* Which can be found at **www.gradschool.unh.edu**. Requirements for the project may be obtained from the adviser or on the program website.

Grades and Credit Hours
The M.Ed. degree requires a minimum of 44 hours of graduate-level credits. The exact number of credit hours will depend on the student's background, competencies, and professional goals, and will be determined by the adviser.

Teacher Education Program

Program information: Tom Schram, Cindy Glidden

The Teacher Education Program prepares teachers who possess the knowledge, disposition, and skills necessary to take the lead in establishing effective teaching and learning environments within their own classrooms and school communities.

The Department of Education offers the master of arts in teaching degree in secondary education and the master of education degree in elementary and secondary education for those seeking initial teacher licensing. The master of education degree in teacher leadership is available for experienced teachers.

Applicants to teacher education programs are evaluated on the following criteria: undergraduate academic record, Graduate Record Examination (GRE) general test scores, personal statement, and letters of recommendation regarding academic ability, motivation, interpersonal skills, and potential for success as a teacher. Those seeking admission to programs leading to teacher licensing should also have a positive recommendation from EDUC

500, Exploring Teaching, or equivalent experience.

In the admissions process, we seek evidence that students have the following knowledge, abilities, and dispositions: motives to teach that include a strong social commitment to contribute to society through education; a disposition to care for their students; an ability to interact positively with children and adults; a capacity to win the respect of peers and be effective in group interaction, showing openness to the needs and views of others; well-developed communication skills, including speaking, writing, and listening skills, as well as an ability to engage others in both the giving and receiving of information and feelings; perceptiveness or the ability to identify and process the relevant details in their environment, especially in the context of a classroom; the ability to make reasonable judgments in a context of complex situations that change from moment to moment; the capacity for clear thinking and an ability to translate thoughts into simple and clear explanations; superior academic skills, extensive knowledge of at least one major discipline, intellectual curiosity, the ability to be open to the unknown, and the willingness to tolerate uncertainty in the face of enormous pressure to deny it; a disposition to take charge of their own learning, which includes the active pursuit of feedback and the willingness to take thoughtful risks.

Any course taken in the Department of Education that will be used to fulfill a teacher licensure requirement must be completed with a grade of B- or better.

Master of Arts in Teaching and Master of Education Programs for Those Seeking Teacher Licensure

These programs are designed for two types of students: UNH undergraduates who anticipate completing the Five-Year Teacher Preparation Program at UNH, and students who completed an undergraduate degree either at UNH or elsewhere with little or no coursework in education. The programs lead to teaching licensure at the elementary and secondary levels. Admission to these programs is competitive.

Licensure requirements that must be met prior to or as part of the master's degree program include completion of 4 credits or an equivalent in each of the following: 500/935, Exploring Teaching; 800, Educational Structure and Change; 801, Human Development and Learning: Educational Psychology; 803, Alternative Teaching Models; 805, Alternative Perspectives on the Nature of Education; 851A or B, Educating Exceptional Learners; 900A, 901A, Internship and Seminar/Teaching (6 credits each, must be taken as part of the program).

Elementary teacher licensure requirements include two additional courses: 806, Introduction to Reading Instruction in the Elementary Schools; and a mathematics course: EDUC 741/841, MATH 701, Exploring Mathematics I, or MATH 702, Exploring Mathematics II (4 credits each), or the equivalent.

Students pursuing teacher licensure in art, biology, chemistry, Earth sciences, general science, physics, or social studies must also complete EDUC 807, Teaching Reading through the Content Areas (2 credits).

Preparation for licensure in general special education is available to those who complete the M.A.T. or M.Ed. programs in either elementary or secondary education. This licensure allows recipients to serve as general special education teachers. In order to qualify for licensure in general special education, students must complete 22 credits (18 of which may be used

toward the M.Ed. degree, or 6 toward the M.A.T. degree); a reading methods course; a mathematics methods course; 850, Introduction to Exceptionality; 851, Educating Exceptional Learners; 939-940, Assessment and Teaching of Children with Learning Difficulties; 900C, 901C, Internship and Seminar (3 credits each).

Dual licensure in early childhood education and elementary education is available to those who are enrolled in the M.Ed. in Elementary Education. This dual licensure allows recipients to serve as early childhood and/or elementary teachers. The early childhood/elementary education dual-certification program option is intended for students who have majored in family studies with an option in child studies or young child/P-3 program, or the equivalent. Dual licensure requires three graduate courses in early childhood education to be selected in consultation with an adviser from the early childhood program. The three early childhood courses will count as a graduate concentration in the M.Ed. elementary program. Students will complete a full-year internship at the K-3 level under the auspices of the teacher education program.

Master of Arts in Teaching (Secondary)

Students complete an Internship (12 credits) and an additional 20 credits. Of the 20 additional credits at the graduate level, three courses totaling 9 to 12 credits must be taken from a subject field outside education. The remaining 8-11 credits can be in education or in another department.

In consultation with his/her adviser, a graduate student in this program is strongly encouraged to develop a subject-area concentration consisting of at least 3 courses.

Concluding experience: A degree candidate must successfully complete a teacher education program portfolio and colloquium in conjunction with the internship.

Master of Education (Elementary and Secondary)

Students complete an Internship (12 credits) and an additional 20 credits. Of the 20 additional credits at the graduate level, 10 must be in education and 10 can be in either education or in another department.

Concluding experience: A degree candidate must successfully complete a teacher education program portfolio and colloquium in conjunction with the internship.

Master of Education in Teacher Leadership

This program is designed for experienced teachers who wish to remain in the classroom but expand their leadership role in improving schooling. The program provides a context in which teachers can build upon their classroom experiences as teachers and learners; expand their understanding of the roles of teachers in schools; develop tools of inquiry that enable them to investigate questions about teaching, learning, and school reform; inspire others to work toward institutional change; and collaborate effectively with other teachers, administrators, and parents in ways that move the teaching profession forward. Students must complete a minimum of 32 credits, 12 of which are a required core. At least four courses must be taken in the Department of Education.

Core requirements: 958, Analysis of Teaching; 953, Seminar in Curriculum Study; and one of the following: 981, Quantitative Inquiry: Methods and Techniques of Educational Research; 984, Teacher as Researcher; or

Concentration: A set of courses (three or more), which reflect a personal interest, need, or goal, is chosen by the student in consultation with his or her adviser. The concentration may be in or outside education. Potential areas of concentration include mentoring, curriculum, ESL, and increasing knowledge in subject matter fields.

Elective courses: Graduate-level courses in or outside education may be taken in addition to the concentration.

Concluding experience: A degree candidate must complete an inquiry project, which may be theoretical or empirical in nature. Theoretical projects focus on a problem or issue of interest to the candidate and require synthesis of professional experience, coursework, and professional literature. Empirical projects involve the systematic collection, analysis, and reporting of data using appropriate methodologies. Students may also develop a portfolio with a reflective essay (including portfolios developed for the National Board of Professional Teaching Standards). Students may choose to do a research thesis. Students choosing the research thesis must complete 6 credits, 4 of which will count toward their concentration.

Graduate Certificate in Autism Spectrum Disorder

This program will serve the professional development needs of a wide variety of individuals, including: (1) parents of children with ASD; (2) special and general education teachers and administrators; speech-language pathologists, occupational therapists, behavioral consultants, recreation therapists; and (3) graduate students in other University majors such as sociology or psychology. For more information please visit the **Autism Spectrum Disorder website**.

Applying

Please visit the **Graduate School website** for detailed instructions about applying to the certificate program.

Certificate Requirements

The coursework for the graduate certificate consists of 19-23 credits from the following required and elective course offerings. Highly qualified individuals may petition for permission to waive a required course. Applicants are urged to schedule an appointment with the program coordinators to develop their individualized course of study. Applications for graduate certificates are available through the **Graduate School website.**

Required Courses

EDUC 857A, Contemporary Issues in ASD

COMM 916, Autism Spectrum Disorders

Elective Courses (two from among the following choices based on individual advising [other electives may be added in the future]

EDUC 853 Contemporary Issues in Behavior Disorders

EDUC 855, Social Relationships and Students with Disabilities

EDUC 857C, Contemporary Issues in ASD

EDUC 952, Assessment, Curriculum, Instruction, and Supports for Students with Disabilities

EDUC 956, Positive Behavior Supports

OT courses in Assistive Technology

COMM 914, Augmentative and Alternative Communication

Graduate Certificate in Mentoring Teachers

The Teacher Education Program works with approximately 150 “cooperating teachers” and more than 25 supervisors each year in its full-year internship program. Mentoring is a crucial element in the preparation of effective teachers, as well as in the transition from teacher preparation programs to the first years of teaching. The N.H. Department of Education has also recognized the need for mentoring early-career public school teachers in its “Induction Through Mentoring Projects.” The UNH Department of Education proposes to offer a graduate certificate program in mentoring teachers to help advance the preparation of professionals in the field. For more information please visit the **Mentoring Teachers website** .

This certificate is designed to serve:

- Experience teachers interested in the mentoring and the professional development of new teachers.
- Experience teachers interested in preparing for leadership positions that require mentoring skills.
- Experience teachers interested in exploring a graduate program in education by first earning a graduate certificate.

Applying

Please visit the **Graduate School website** for detailed instructions about applying to the certificate program.

Certificate Requirements

The program of study required for the certificate consists of four required courses and a total of 16 credit hours. The program focuses on the development of mentoring skills that draw upon: (1) models of adult development; (2) approaches to effective teaching; (3) an understanding of teacher supervision and assessment; and (4) strategies for problem solving, conflict resolution, and communication.

EDUC 957, Collaborative Supervision (4 cr.) OR EDUC 965, Educational Supervision (4 cr.)
EDUC 958, Analysis of Teaching (4 cr.)
EDUC 990, Developmental Perspectives on Adulthood (4 cr.)
EDUC 897, Teacher as Researcher [note: course number will change in 05-06]
(Under special circumstances and with the approval of their adviser, students may substitute

an elective for EDUC 897)

Electrical Engineering (ECE)

» **http://www.ece.unh.edu**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.Eng., M.S., Ph.D.

The Department of Electrical and Computer Engineering offers three paths to obtaining a master's degree. It offers both a thesis and non-thesis masters of science degree (MSEE) and a master of engineering degree (M.Eng.). The non-thesis MSEE substitutes additional coursework in place of the research and writing associated with completing a thesis. The M.Eng. program is also a non-thesis program, and it differs from the non-thesis MSEE option in that it allows for coursework in business and law. While the non-thesis degree programs do not require a formal thesis, students choosing thesis options are be required to give two technical presentations and to submit a technical paper.

In addition to the master of science, a Ph.D. program is also offered in electrical engineering.

Opportunities

Advanced degrees in electrical engineering open the door to a wider variety of job opportunities, particularly with regard to consulting, research and development, and positions in academia. Within the department, opportunities for formal study, research, and individual or team projects are available in the following areas: biomedical engineering; communication systems; digital signal processing; computer engineering, computer networks, digital systems, and logical synthesis; robotics and neural networks; image processing and pattern analysis; control systems; fiber optics; electromagnetics; pervasive computing; ocean engineering; and instrumentation.

Admission Requirements

An applicant should have completed a baccalaureate degree in electrical engineering or have comparable training, which includes courses in mathematics and physical science, network theory, digital systems, fields and waves, electronics, and electrical circuits, with appropriate laboratory experiences. Students with a baccalaureate degree from a non-U.S. university must take and submit current (within five years) general scores from the Graduate Record Examination (GRE).

Degree Requirements

Master of Engineering (M.Eng.)

The graduation requirement for the ECE M.Eng. degree is based on course credits and concluding experiences. Specifically, students must complete at least 30 credit hours of

coursework, with at least 24 credits being earned in the ECE department or related technical disciplines (those disciplines will be determined by the student in conjunction with his/her adviser); of those 24 credit hours in the ECE department, at least 12 must be at the 900 level. Courses outside of the ECE department can be related to management and/or law (courses in financial management, organizational behavior, economics, accounting, intellectual property, etc.). The concluding experiences will be in the form of a technical paper suitable for conference publication and two technical presentation.

Students enrolled in the ECE M.Eng. program are not eligible to serve as teaching assistants (TAs) or research assistants (RAs) except by special permission from the ECE Graduate Committee. All transfers into the ECE M.Eng. program from any of the other three ECE graduate programs will require approval by the ECE Graduate Committee through the existing petition process. If a student holding a TA or RA position in the ECE Department transfers into the ECE M.Eng. program, they are required to relinquish that position.

Master of Science in Electrical and Computer Engineering (MSEE)

Master of science in electrical engineering (M.S.E.E.) degree students must take a minimum of 34 graduate credits including:

Thesis Option:

- 24 credit hours of graduate coursework, with at least 12 of those credit hours earned in 900-level courses
- 4 credits of ECE 900 Seminars
- 6 credits of thesis work

Non-Thesis Option:

- 30 credit hours of graduate coursework, with at least 18 of those credit hours earned in 900-level courses
- 4 credits of ECE 900 Seminars
- Students are required to write a technical paper and make two technical presentations

Up to 12 credits earned in non-ECE courses numbered 700-799 may be taken for graduate credit by ECE M.S. degree students provided the courses are petitioned and approved by the dean of the Graduate School. A student may petition that a maximum of 12 graduate credits taken prior to admission in the UNH ECE master of science degree program be applied to fulfill the degree requirements.

Under certain circumstances it may be desirable to take courses outside the ECE department to attain the goals outlined in the student's program of study. In these cases, up to two non-ECE 900-level courses are allowed without petition, provided that they are approved by the student's academic adviser and that the student take at least two 900-level courses (neither of which may be independent studies) within the department. A student wishing to take more than two courses (either 800 or 900 level) outside the department must petition the ECE Graduate Committee.

Declaration of Thesis or Non-Thesis M.S. Degree

M.S. degree students must declare in writing whether or not they are choosing the thesis option or the non-thesis option by the end of their second semester of graduate study. A

form for such declaration is available on the **ECE Graduate Student website**. When choosing the thesis option, the student is responsible to seek out a qualified faculty adviser. The faculty adviser must agree to being the thesis adviser prior to submitting the declaration form. The selection form must be signed by both the faculty adviser and the student and is then to be submitted to the ECE graduate coordinator. When choosing the non-thesis option, the form must be signed by the student and the student's assigned academic adviser and then is to be submitted to the ECE graduate coordinator. If a student fails to submit a signed form by the end of their second semester of study, they may be in jeopardy of being dismissed from the M.S. degree program. Once a choice for the M.S. thesis option has been made, the student cannot revert to the non-thesis option without petitioning the ECE Graduate Committee.

Technical Presentation and Paper Requirement for the Non-Thesis Option

Students in the non-thesis option are required to submit a technical paper and to deliver two technical presentations as part of their program. Many of the courses in the ECE graduate program require technical reports and presentations, and some of these may be appropriate for satisfying the technical requirement for students in the non-thesis option. However, there are other approaches for satisfying this requirement as indicated below.

The objective in requiring a technical paper is to ensure that the student has some facility in documenting technical information. The evaluation of that paper is to be performed by the ECE Graduate Committee, and the evaluation will result in either acceptance or rejection of the work submitted. The criterion for technical papers to be considered acceptable is that they describe a contemporary technical concept or development with a degree of depth and clarity evident in conference papers. The student must be the sole author on the technical paper, and it is to be submitted to the chair of the ECE Graduate Committee electronically before the last day of classes. As noted above, technical papers associated with regular ECE graduate courses or independent studies may be used to satisfy the requirement, as are papers prepared for technical conferences or publications. Papers accepted for presentation at refereed conferences or for publication in refereed journals will automatically satisfy the technical paper requirement.

The objective in requiring the two technical presentations is primarily to ensure that students have the opportunity to present in front of a group. Presentations that fulfill one of the criteria below will be considered acceptable for this requirement:

1. Presentation of a technical lecture (20 minutes or longer) as part of the requirements for a course in which the student is enrolled.
2. Presentation of a technical lecture in a course as a "stand in" for the faculty member in charge.
3. Presentation of a technical seminar at UNH (for example, presenting a seminar for ECE 900) or to a public group or industry.
4. Presentation of a technical paper as part of a professional job function.
5. Presentation of a paper at a professional technical conference.

It is the responsibility of the student to satisfy this requirement before graduation. Students must get approval from their adviser for any activity that is intended to be used as a technical presentation experience. The two presentations required must be different; giving the same seminar twice does not count as two presentations. If the activity does not fall into one of the

five categories listed, prior approval of the ECE Graduate Committee must also be obtained. The student should write a brief letter for each of the two required experiences, stating the nature of the experience and the date on which it was satisfied. This letter is to be signed by the student, signed and approved by the student's adviser, and, if applicable, by the faculty member in charge of the related course. This letter should be placed in the student's departmental file.

Ph.D. Degree Requirements

The degree of doctor of philosophy (Ph.D.) in electrical and computer engineering is conferred on qualified candidates who have passed written and oral examinations on the subject matter of their field of study, who have completed an original investigation in this field and have embodied the results in an acceptable dissertation, and who have passed an oral examination in defense of the dissertation. The degree of Ph.D. is essentially a research degree. It is not given merely for the completion of course credits. Detailed information can be found on the ECE departmental website.

English (ENGL)

» **http://www.unh.edu/english**

» **Click to view course offerings**

This program is offered in Durham.

Professor: Maya Ravindranath (Abtahian)

Degrees Offered: M.S.T., M.A., M.F.A., Ph.D.

The Department of English offers four advanced degrees: master of arts with options in literature or English language and linguistics; master of science for teachers; master of fine arts in writing; and doctor of philosophy.

Admission Requirements

All applicants must submit writing samples in accordance with guidelines available from the English department graduate office. All applicants (except those for the M.F.A. and M.S.T.) must submit current scores (within five years) from the general test of the GRE. Applicants for the doctor of philosophy degree program in literature must also submit scores for the subject test of literature in English. A student admitted to the Ph.D. program must hold an M.A. degree or be in the final stage of completing requirements for the degree.

All applicants who wish to be considered for teaching assistantships or tuition scholarships must complete an application form, available from the English department graduate office or from their website listed above or from the graduate school forms page (see the Graduate Aid section).

Degree Requirements

M.A. Degree Requirements

Literature Option

An M.A. candidate must complete 36 credit hours at the 800 or 900 level, including three seminar courses and a fourth seminar in literature or ENGL 998, Master's Paper. At least six courses must be literature courses offered by the English department (as distinct from courses in critical theory, linguistics, writing, or teaching methods); there are additional distribution requirements. If a student chooses the Master's Paper option, the six-course requirement is reduced to five literature courses. Each M.A. candidate must also pass ENGL 925, The Graduate Study of Literature, and one course in literary theory. The literary theory requirement would normally be met by successful completion of ENGL 813, 814, or 926. As a general rule, all courses counting toward the M.A. degree should be taken in the English department, but two courses may be taken in other departments with approval. No more than two literature courses should be taken in a combined 700/800 (split) level course.

M.A. candidates must pass a reading examination in a foreign language or demonstrate that they have passed a fourth-semester college-level language course with a grade of B or better. Students whose native language is not English may be exempt from this requirement.

English Language and Linguistics Option

Students who wish to specialize in any of the various areas of English language and linguistics may design an M.A. program to meet their interests. Specialties include applied linguistics and the teaching of English as a second language as well as the traditional subfields of linguistics. Psycholinguistics courses are offered through the psychology department.

To earn the M.A. degree, students must complete at least 32 credit hours at the 800 or 900 levels, including one seminar course, and 4 credits of ENGL 998, in which they are to produce a substantial scholarly paper. Unless the student already has a strong background in linguistic theory, the program of study must include one course in phonetics and phonology (ENGL 893) and one in syntax and semantics (ENGL 894). Reading knowledge of one foreign language is required. This may be demonstrated by passing a departmental examination or by receiving a grade of B or better in a fourth-semester college-level language course. Students whose native language is not English may be exempt from this requirement. The student's course of study must be approved by the program adviser.

M.S.T. Degree Requirements

The master of science for teachers is designed for high school teachers. No foreign language is required. Students must take the Writing Institute (part of the Literacy Institutes sponsored by the University of New Hampshire) or an equivalent course in the teaching of writing such as English 810 (4 cr. version). The student must complete 32 credit hours at the 800 or 900 levels. At least 24 of these credits must be in the Department of English. Courses taken outside the department must be approved by the student's adviser. Students must complete a capstone experience (creative writing option, teacher inquiry option, or curricular option).

The department offers special summer programs, which can be taken to fulfill some or all of the course requirements for the M.S.T. degree. The New Hampshire Literacy Institutes are summer institutes that focus on the teaching of writing and reading in grades K-12. Summer institutes emphasize writing workshops in fiction, nonfiction, and poetry and may include

courses in literature and composition theory and research.

Master of Fine Arts in Writing Requirements

In the fall of 2007, UNH launched a master of fine arts in writing, creating a three-year, 48-credit program that aims to provide students with the intensive training in their craft that they'll need to start their lives as professional writers. Students concentrate in fiction, nonfiction, or poetry and are taught by a faculty of nine working writers, each of whom specializes in one of these fields. Students learn in small workshops and in individual conferences with their teachers. Conference teaching is a cornerstone of the UNH graduate writing program.

Students are required to take four workshops in their major genre. In addition, students take one form and theory course in their major genre, five elective courses that may include additional writing courses or courses from the English department's offerings in other fields (such as literature, linguistics, or composition studies), and 8 credit hours of the M.F.A. thesis. Teaching assistants are required to take English 910, Practicum in Teaching College Composition, as one of their electives. There is no foreign language requirement.

The M.F.A. thesis is a book-length, publishable manuscript. For fiction writers, the thesis could be a collection of short stories, a story cycle (linked stories), or a novel. For nonfiction writers, the thesis could be a collection of themed essays and/or magazine articles or a book of creative nonfiction. For poets, the thesis would be a book-length collection of poems. The minimum length of the thesis is 150 pages for fiction and nonfiction writers and 45 pages for poets. Students will work closely with a thesis adviser as they write and pass an oral defense of the thesis, a defense conducted by a three-member thesis committee of writing faculty. Students will also conduct a public reading of their thesis in an event organized by the writing faculty.

In addition, the M.F.A. program offers students opportunities to publish in an online journal called *Barnstorm*, as well as intern at publishing houses and magazines and teach in the community at prisons, senior centers, and schools. A select number of students are chosen to teach UNH undergraduate writing courses and to work in the University's Writing Center.

The program admits an average of 15 new students a year, which creates a writing community of 45 student writers.

Ph.D. Degree Requirements

The Ph.D. program combines the essential guidance and discipline of coursework with the equally essential freedom of independent study and research. To be admitted to the doctoral program, a student must hold an M.A. degree. Students choose between two areas: literature and composition studies. Students choosing either area or program must demonstrate basic proficiency in two languages or advanced proficiency in one. Basic proficiency may be demonstrated by passing a departmental examination or by receiving a grade of B or better in a fourth-semester college-level language course. Advanced proficiency is demonstrated by passing a rigorous departmental examination.

The doctoral program in literature is designed to train students to be teachers and scholars in the fields of literature and language. Students in this program will complete nine graduate

courses of which four must be seminars. The other courses must be at the 800 or 900 levels and must include the Practicum in Teaching College Composition (ENGL 910), the Seminar in Literary Theory (ENGL 926), and the ungraded 2-credit course in Dissertation and Profession (ENGL 924). In addition, students must pass a general examination in English and American literature, a more specialized qualifying examination, and the final oral defense of their dissertation. The program in composition studies is designed to train experts in the teaching of composition who are also qualified to teach general courses in literature or linguistics. Students in composition studies will complete 10 graduate-level courses of which four must be seminars. The other courses must be at the 800 or 900 levels and include a Practicum in Teaching College Composition (ENGL 910) and Research Methods in Composition (ENGL 918). Students will take a combined general and qualifying examination that focuses both on the theory of composition and rhetoric, and on a secondary area of specialization. Their dissertation work will be on a topic in composition.

Ph.D. students normally hold assistantships and teach under supervision; such teaching is considered a vital part of the student's professional training.

Environmental Education (ENED)

» **http://www.unh.edu/education/index.cfm**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.A.

The department offers a part- or full-time master of arts degree with a major in environmental education. An innovative and collaborative effort of the Department of Education and the Department of Natural Resources, the program is dedicated to preparing educators who can effectively promote awareness, knowledge, and constructive participation in deliberation over the important environmental questions that we face. The program has flexible requirements and gives students the opportunity to work closely with an adviser to create an individualized course of study that meets their interests, reflects their prior experiences, and focuses on their professional goals. Students apply during the fall or spring terms and begin the program with an intensive four-week Summer Institute. The program also includes a field-based Practicum where students are given the opportunity to hone their teaching at one of a variety of local environmental and educational organizations.

Admission Requirements

Applicants to the M.A. program in environmental education must possess a baccalaureate degree from an approved institution with a GPA of 2.7 or higher and have successfully completed a minimum of five life science or physical science courses at the undergraduate or graduate level. Applicants are required to submit the following materials for consideration: official transcripts from all relevant educational institutions; an essay outlining relevant interests, prior experience, and educational goals; and three letters of recommendation from individuals who possess detailed knowledge of the applicant's ability to engage in graduate study. Documentation of other experiences or abilities as an educator is also welcome.

Admissions decisions are made on a rolling basis by the executive committee of the program. The Graduate Record Exam (GRE) is optional. Promising students who fail to meet one or more of the preceding criteria may be admitted provisionally, with a plan appropriate to their specific needs.

Degree Requirements

A total of 32 credits is required to complete the degree. The program includes:

- Summer Institute (8 credits)
- Course electives (20 credits)
- Teaching Practicum (4 credits)

Students will also produce a Program Portfolio.

The M.A. program in environmental education helps prepare educators who are able to integrate and put into practice the three focus areas that constitute the program's academic core:

1. Environmental Science: understanding the physical and biological processes and relationships that constitute ecosystems.

2. Curriculum and Pedagogy: an understanding of teaching as a critical, self-reflective, and inquiry-based activity, collaboratively undertaken in diverse communities.

3. Environmental Values, Policy, and Planning: an understanding of the social (e.g., economic, political, and institutional) and ethical dimensions of environmental policy.

The Summer Institute (8 credits): Students enter the program by enrolling in an intensive Summer Institute that is coordinated and taught by an interdisciplinary team of UNH faculty. The curriculum involves a case study approach, integrating the three focus areas in an experiential setting. This experience gives students a foundation for creating a rigorous, coherent, and challenging program of study, which they begin (on a part- or full-time basis) during the following year.

Individualized Program of Study (20 credits): The three focus areas of the program provide the structure within which students include at least one graduate-level course in each area and integrate the courses. With the guidance of an adviser, students select a group of courses that balances depth and breadth. All individualized programs of study are approved by the program's executive committee.

Practicum (4 credits): The field-based Practicum is taken as the final course in the program. Students teach at an internship site demonstrating their ability to put into practice a thoughtful and effective vision of environmental education. In the seminar that accompanies the internship, students create and present a portfolio that reflects what they have achieved in the program. Completion of the program portfolio marks the fulfillment of the requirements for the master's degree.

Family Studies (FS)

» **http://www.chhs.unh.edu/fs/**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.S.

Certificates Offered: Adolescent Development, Child Advocacy and Family Policy

The Department of Family Studies offers two programs of study leading to a master of science degree in family studies: the Core Areas of Study Program and the Marriage and Family Therapy Program.

The goal of both programs is to provide students with an understanding of theory and methods relevant to child and family studies and to prepare them to work with families in therapeutic, educational, and community or corporate settings. The Core Areas of Study program has three foci: Adolescent Development, Child Advocacy and Family Policy, and Child Development. Students may elect a thesis or comprehensive exam. The Marriage and Family Therapy Program is accredited by the Commission on Accreditation for Marriage and Family Therapy Education and requires a minimum of two years of full-time study, including two summers.

The Department of Family Studies also offers a one-year, 14- to 15-credit, multidisciplinary program of study leading to a graduate certificate in Adolescent Development or Child Advocacy and Family Policy (CAFP). The certificate program is intended for individuals who are working in the field but who lack specific knowledge about adolescence or child advocacy and family policy, as well as those who are changing careers or who are already working in related fields and need to meet continuing education requirements or desire additional academic preparation.

Admission Requirements

Students in good standing with undergraduate degrees in any field and a specific interest in working with individuals and families are encouraged to apply.

Candidates for the master's degree program must have completed an introductory statistics course or the equivalent as part of their undergraduate program. If their undergraduate program did not include such a course, students who are accepted into the M.S. program must successfully complete an introductory statistics course before they graduate. (Note: Students in the Core Area of Study program must also complete a graduate statistics course; see "Program Requirements" for the Core Area of Study .)

In lieu of the standard UNH Graduate School personal statement, applicants to the MFT program must answer the questions listed on the department's MFT admissions website at **http://www.chhs.unh.edu/fs/mftadmiss.html**. Responses to the MFT questions should be submitted in numbered format, and should address each question separately and explicitly. Answers to the MFT questions should be submitted with the application (either online or in hard copy).

Individuals applying to the Core Areas of Study and Certificate programs should submit a standard personal statement with their applications.

M.S. Degree: Core Areas of Study Program

Adolescent Development: This core area of study is designed to develop general competence in understanding and applying theory and research regarding adolescents within the context of their families and communities. Students are expected to participate in projects involving adolescents and to complete a practicum in a program that serves adolescents.

Child Advocacy and Family Policy: This core area of study is designed to develop general competence in understanding theory and research regarding advocacy and policy issues impacting children and families. Those accepted into the program for this core area of study are expected to complete two practica with selected state, national, and international agencies as child advocacy and family policy interns, develop expertise on at least one advocacy/policy issue, and conduct research on an advocacy/policy related topic.

Child Development: This core area of study is designed to develop an understanding of theory and research regarding children from infancy through the early school years and to prepare students to work in a variety of social science positions focused on children's family and school experiences. Students are expected to complete a practicum in a child-focused setting.

M.S. Degree: Marriage and Family Therapy Program

The Marriage and Family Therapy Program specifically prepares students to work in mental health, family service, medical, and human service settings. The emphasis is on structural, strategic, and systemic approaches to marriage and family therapy. Clinical training is provided under the direction of an approved supervisor of the American Association for Marriage and Family Therapy in the department's Marriage and Family Therapy Center. The clinical training emphasizes treating the individual, couple, and family in relationship to the larger systems that influence them. Supervised practica continue throughout the program. The program is fully accredited by the Commission on Accreditation for Marriage and Family Therapy Education (COAMFTE) and meets the academic requirements for clinical membership in the American Association for Marriage and Family Therapy (AAMFT). AAMFT standards require five hundred (500) hours of clinical practice during the program. Additional hours of clinical practice under supervision will be required to meet AAMFT standards for clinical membership after graduation. See **www.aamft.org** for information on clinical membership.

Certificate Program

The certificate in adolescent development builds general competence in understanding and applying theory and research regarding adolescent development, with particular emphasis on the influences of families and communities. The program is grounded in an ecological approach that focuses on supporting the health and well-being of all adolescents, with special attention to using a developmental perspective to develop programs, policies, and other interventions that address contemporary risk and protective factors.

The certificate in child advocacy and family policy (CAFP) develops general competence in understanding theory and research regarding advocacy and policy issues impacting children and families. CAFP certificate students will develop competency in planning for, implementing,

and evaluating family policies, as well as identifying barriers to effective advocacy and policy-making.

M.S. Degree Requirements: Core Areas of Study Program

Program requirements for the Core Areas of Study include:

1. Completion of the 12-credit core curriculum that includes FS 991, Professional Issues for Family Specialists; FS 993, Theoretical Approaches to Family Studies; and FS 994, Research Seminar;

2. Twenty-two (22) hours of coursework including four (4) semester hours of practicum or internship (FS 911C), and a graduate-level statistics course; and

3. Successful completion of a research thesis (6-10 credits in FS 899), OR a comprehensive written examination, plus eight (8) credits of approved electives in place of FS 899.

Students in the Child Advocacy and Family Policy core area of study must complete an additional four (4) hours of practicum/internship, for a total of eight (8) hours.

Thesis Option: Students electing to complete a research thesis must write and defend a thesis based on original research. Students must earn a minimum of 6 credits of FS 899 (Master's Thesis).

Comprehensive Examination: Students electing to complete a comprehensive examination must take an additional 8 credits of approved electives in place of thesis credits. The comprehensive examination consists of a timed, three-hour closed-book portion and a one-week take-home exam.

A graduate student who fails a course must immediately attend a mandatory meeting with the instructor of the course, the family studies graduate coordinator, and, if desired, the student's adviser. If a graduate student receives grades below "B-" in two or more courses, the family studies graduate coordinator will make a recommendation to the Graduate School that the student be dismissed from the family studies graduate program.

MS Degree: Core Areas of Study Courses

Abbreviation	Course Number	Title	Credits
FS	807	Practicum	1 TO 6
FS	808	Child and Family Center Internship	1 TO 6
FS	809	Child Study and Development Center Internship	1 TO 6
FS	833	Supervising Programs for Young Children	4
FS	834	Curriculum for Young Children	4
FS	843	Families, Schools, and Community	4
FS	846	Human Sexuality	4

FS	857	Race, Class, Gender, and Families	4
FS	860	Family Programs and Policies	4
FS	871	Observation and Assessment of Young Children	4
FS	872	International Approaches to Child Advocacy	4
FS	873	International Perspectives on Children and Families	4
FS	876	Children, Adolescents and the Law	4
FS	894	Families and the Law	4
FS	897	Special Topics	1 TO 4
FS	899	Master's Thesis	1 TO 6
FS	911	Graduate Internship	2 TO 8
FS	930	Child Development in Context	4
FS	950	Contemporary Issues in Adolescent Development	4
FS	991	Professional Issues for Family Specialists	4
FS	993	Theoretical Approaches to Family Studies	4
FS	994	Research Seminar	4

M.S. Degree Requirements: Marriage and Family Therapy Program

Program requirements include:

1. The 12-credit core curriculum (FS 991, Professional Issues for Family Specialists; FS 993, Theoretical Approaches to Family Studies; and FS 994, Research Seminar);

2. Thirty-five to thirty-six (35-36) semester hours of coursework, including FS 841, Marital and Family Therapy; FS 930, Child Development in Context (or an approved elective); FS 942, Advanced Systems of Marital and Family Therapy; FS 945, Family Therapy Practice I; FS 946, Critical Problems in Family Life; FS 947, Family Therapy Practice II; FS 952, Clinical Interventions in Couples Therapy; and FS 954, Human Sexuality, the Treatment of Sexual Problems, and the Clinical Applications of Sexual Therapy; and one 3-4 credit elective approved by the student's adviser.

3. Successful completion of 24 credits of FS 898, Marriage and Family Therapy Practicum (500 hours of supervised clinical practice); and

4. Successful completion and presentation of an integrative paper and video representing the student's theory of change.

A graduate student who fails a course must immediately attend a mandatory meeting with the instructor of the course, the family studies graduate coordinator, and, if desired, the student's adviser. If a graduate student receives grades below "B-" in two or more courses, the family studies graduate coordinator will make a recommendation to the Graduate School that the student be dismissed from the family studies graduate program.

M.S. Degree: MFT Program Courses

Abbreviation	Course Number	Title	Credits
FS	841	Marital and Family Therapy	4
FS	897	Special Topics	1 TO 4
FS	898	Marriage and Family Therapy Practicum	1 TO 8
FS	930	Child Development in Context	4
FS	942	Advanced Systems of Marital and Family Therapy	4
FS	945	Family Therapy Practice I	4
FS	946	Critical Problems in Family Life	4
FS	947	Family Therapy Practice II	4
FS	952	Clinical Interventions in Couples Therapy	4
FS	954	Human Sexuality, The Treatment of Sexual Problems, and the Clinical Applications of Sexual Therapy	4
FS	991	Professional Issues for Family Specialists	4
FS	993	Theoretical Approaches to Family Studies	4
FS	994	Research Seminar	4

Certificate Requirements: Adolescent Development

A certificate in Adolescent Development is awarded upon completion of: (1) a 2-course core curriculum; and (2) an additional two elective courses, one of which must be a family studies course.

Core Curriculum Courses

Abbreviation	Course Number	Title	Credits
FS	950	Contemporary Issues in Adolescent Development	4
FS	995E	Seminar & Special Problems - Human Development	3

Family Studies Electives (choose at least one)

Abbreviation	Course Number	Title	Credits
FS	846	Human Sexuality	4
FS	860	Family Programs and Policies	4
FS	857	Race, Class, Gender, and Families	4
FS	876	Children, Adolescents, and the Law	4
FS	897	Special Topics (prior approval required)	4
FS	991	Professional Issues for Family Specialists	4
FS	993	Theoretical Approaches to Family Studies	4

Multidisciplinary Electives

Abbreviation	Course Number	Title	Credits
EDUC	810C	Youth Organizations	4
EDUC	817	Growing Up Male in America	4
RMP	805	Management and Policy in Therapeutic Recreation	3
RMP	830	Camp Administration and Leadership	3
RMP	860	Community Sports Organizations: Administration and Leadership	3
SOC	815	Criminological Theory	4
SOC	820	Sociology of Drug Use	4

SOC	840	Sociology of Mental Health	4
SOC	876	Family Violence Research Seminar	4
SOC	975	Sociology of the Family	4
SW	805	Child and Adolescent Risks and Resiliency: Program, Policy and Practice	3
SW	815	Practice with Gay, Lesbian, Bisexual and Transgender People	3

Other family studies or multidisciplinary electives may be selected with adviser approval.

Certificate Requirements: Child Advocacy and Family Policy

A certificate in Adolescent Development is awarded upon completion of: (1) a 2-course core curriculum; and (2) an additional two elective courses, one of which must be a family studies course.

Core Curriculum Courses

Abbreviation	Course Number	Title	Credits
FS	860	Family Programs and Policies	4
FS	995E	Seminar & Special Problems - Human Development	3

Family Studies Electives (choose at least one)

Abbreviation	Course Number	Title	Credits
FS	857	Race, Class, Gender, and Families	4
FS	872	International Approaches to Child Advocacy	4
FS	873	International Perspectives on Children and Families	
FS	876	Children, Adolescents, and the Law	4
FS	894	Families and the Law	4
FS	897	Special Topics – Families in Poverty	4
FS	991	Professional Issues for Family Specialists	4
FS	993	Theoretical Approaches to Family Studies	4

Multidisciplinary Electives

Abbreviation	Course Number	Title	Credits
RMP	912	Non-Profit Administration and Leadership	3
RMP	924	Grantwriting and Fund Development	3

SOC	820	Sociology of Drug Use	4
SOC	842	Sociology and Social Policy	4
SW	805	Child and Adolescent Risks and Resiliency: Program, Policy and Practice	3
SW	815	Practice with Gay, Lesbian, Bisexual and Transgender People	3

Other family studies or multidisciplinary electives may be selected with adviser approval.

Genetics (GEN)

» **http://mcbsgrad.unh.edu/**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.S., Ph.D.

The interdepartmental genetics program offers graduate work leading to the degrees of master of science and doctor of philosophy. Faculty members are housed in the Departments of Molecular, Cellular, and Biomedical Sciences; Biological Sciences; and Natural Resources and the Environment. The genetics graduate program integrates disciplines ranging from molecular and cellular biology to environmental and evolutionary genetics and genomics, in microbial, plant, and animal systems.

Admission Requirements

Qualified applicants are admitted with the approval of the genetics graduate faculty. Undergraduate preparation should include mathematics, including calculus; chemistry, including organic; physics; microbial, animal, or plant biology courses with laboratories; and at least one course in genetics. A course in statistics is also desirable. Admitted students with deficiencies in background courses may be required to complete necessary coursework without graduate credit.

Applicants must submit a personal statement, current scores (within five years) from the general GRE test and three letters of recommendation. If possible, the personal statement should specify the applicant's research interests and potential faculty mentors. International applicants living outside the U.S. should initially complete a free **online pre-application**. If approved for a full application, applicants must submit current TOEFL scores in addition to the items listed above.

Degree Requirements

M.S. Degree Requirements

The coursework for the master of science degree is formulated with input from the student's guidance committee. Students admitted to the M.S. program are required to conduct a research project under the guidance of a faculty adviser, write and submit a thesis based on

this research, and pass an oral examination covering graduate courses and thesis. Students must take a minimum of 30 credits, including at least three genetics courses (minimum of 10 credits), preferably covering breadth in genetics, attend seminars each semester, present one seminar per year, and write and defend a thesis before their guidance committee.

Ph.D. Degree Requirements

The coordinator of the genetics graduate program, with the concurrence of the student's thesis adviser, nominates the student's guidance and doctoral committees, which administer the qualifying and final examinations, respectively. Doctoral students are expected to have a broad exposure to genetics courses, exceeding that required of master's degree students. Specific course requirements are developed by the student and the guidance committee. Students must attend seminars each semester and present one seminar per year. Upon completion of coursework, the student must pass written and oral qualifying examinations conducted by the guidance committee in order to advance to candidacy. Doctoral students must complete a dissertation on original research in genetics, give a public seminar and orally defend their dissertation before the doctoral committee.

Courses

In addition to courses in **genetics**, all graduate students are required to take **MCBS 997, Seminar**.

Geospatial Science

» **http://gss.unh.edu/**

» **Click to view course offerings**

This program is offered in Durham.

To help meet the growing need to use geospatially referenced data to study and model scientific phenomena, the University of New Hampshire now offers a Graduate Certificate in Geospatial Science. This certificate focuses on the increased use of spatial thinking with relevant skills in methods and technologies that develop, analyze, and visualize geospatial data and will prepare students and professionals for work within this exciting multidisciplinary field of study.

Certificate Offered: Geospatial Science

Admission Requirements

Students must hold a baccalaureate degree by an accredited college or university. Four 4-credit courses totaling 16 credit hours (listed below) are required. Courses taken at other institutions are not eligible to be transferred into the program.

Certificate Requirements

The program of study required for the certificate consists of four required courses and a total of 16 credit hours.

Course offerings and requirements are as follows:

Elements of Geospatial Science (Core Requirement)

Abbreviation	Course Number	Title
GSS	800	Elements of Geospacial Science

Geographic Information Systems (One of the following)

Abbreviation	Course Number	Title
CIE	896	GIS in Water Resources
GSS	805	Applied GIS for Research
NR	858	GIS for Community Mapping
NR	860 *	GIS for Natural Resources

Data Analysis (One of the following)

Abbreviation	Course Number	Title
BIOL	811	Applied Biostatistics II
EOS	864 **	Data Analysis for Earth Systems Science
MATH	836	Advanced Statistical Methods for Research
MATH	839	Applied Regression Analysis
MATH	944 **	Spatial Statistics
SOC	901	Intermediate Social Statistics

Electives (Two of the following)

Abbreviation	Course Number	Title
ESCI	895	Time Series Analysis
EOS	864 **	Data Analysis for Earth Systems Science
EOS	896	Remote Sensing for Earth Systems Research
MATH	885	Mathematics for Geodesy
MATH	944 **	Spatial Statistics
NR	857	Remote Sensing of the Environment
NR	859 **	Digital Image Processing
NR	882	Monitoring Forest Health
NR	912	Sampling Techniques
OE/ ESCI	871	Geodesy and Positioning
OE/ ESCI	885	Coastal Remote Sensing
SOC	897	Sociological Methods – Survey Research

Please note the following when selecting a course:

** = Prerequisite needed*

*** = Math 944 or EOS 864 may be taken as an elective if not used to fulfill the Data Analysis Core requirement.*

Applying

Please visit the **UNH Graduate School site** for detailed instructions about applying to the certificate program.

Courses

Courses

Abbreviation	Course Number	Title	Credits
GSS	800	Elements of Geospatial Science	4
GSS	805	Applied Geographic Information Systems for Research	4

» **Click to view course offerings**

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Health and Human Services (HHS)

» **http://www.shhs.unh.edu/**

» **Click to view course offerings**

Health Management and Policy (HMP)

» **http://chhs.unh.edu/hmp/index**

» **Click to view course offerings**

*This program is offered in Durham and in Manchester through **GSMC**.*

History (HIST)

» **http://www.unh.edu/history**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.A., Ph.D.

The Department of History offers the master of arts and doctor of philosophy degrees. The master of arts is offered in many fields. A formal option in museum studies is available. Doctoral dissertations may be written on the history of the United States or on topics comparing the United States with other societies or areas.

Admission Requirements

The department usually requires evidence of substantial preparation in history at the undergraduate level, together with some preparation in other areas of humanities and social sciences.

Applicants for admission to any graduate program in history should have a minimum of a B average in history, allied humanities, and social sciences. In addition, applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE). The department assesses the student's entire application, including letters of recommendation and writing sample, in making its decision on admission. Deficiencies in an undergraduate program may be rectified by coursework as a special student, but such coursework cannot be used to satisfy requirements for an advanced degree. The department also recommends that a beginning graduate student have some training in a foreign language. Students in seminar or reading courses in other than American history may be required to have a reading knowledge of at least one foreign language appropriate to the particular course. Applicants should include with their applications a personal statement indicating their reason for undertaking graduate study at the University of New Hampshire. Normally, an entering student intending to be a candidate for the doctorate will complete an M.A. program as a prerequisite. However, students with the M.A. from another institution, or with exceptionally strong preparation at the undergraduate level, can begin the doctoral program immediately. In addition, a student in residence can, with the consent of the department, omit the M.A. and proceed directly toward the Ph.D.

Degree Requirements

M.A. Degree Requirements

A master's student designs a specific program to meet one of three plans. Plan A allows substantial training and research in a single subfield of history but within a foundation of broader coursework. Plan B allows substantial breadth over at least two subfields. The subfields in history include the following: the ancient world, medieval Europe, early modern Europe, modern Europe, European intellectual history, medieval England, early modern England, modern England, early modern France, modern France, early modern Germany, modern Germany, Iberia, Russia, early U.S., modern U.S., colonial Latin America, modern Latin America, the Far East, the Near East, sub-Saharan Africa, and the history of science. Plan C allows students who enter the doctoral program without an M.A. to pursue the M.A. and Ph.D. degrees simultaneously.

Plan A requires at least eight courses in history numbered 800 or above, including at least one research seminar, and a thesis in a single subfield (equivalent to two courses).

Plan B requires at least 10 courses in history numbered 800 or above, including at least one research seminar, and an oral examination demonstrating competence in two subfields of history.

Plan C requires at least 30 credits of coursework during preparation for the Ph.D. qualifying examinations, as described below; submission of a seminar or other research paper as a

demonstration of competence in basic research techniques; and passing Ph.D. qualifying examinations.

Museum Studies Option

Students who are seeking or considering careers in the museum world, rather than in teaching and/or research, may pursue the option in museum studies. Students basically follow the History M.A. Plan B. Of the 10 required courses, students must take History 871, Museum Studies; History 872, Studies in Regional Material Culture; one research seminar; and two internships (taken for credit) in nearby museums or other historical institutions. The final requirement is either a one-hour oral exam or the completion of a major project related to the student's work in museum studies.

Ph.D. Degree Requirements

A doctoral student's program, which must be approved by the graduate committee of the department, shall include each of the following requirements: two research seminars, one in early U.S. history and one in modern U.S. history; two reading seminars, one in early U.S. history and one in modern U.S. history; a course in historical methods; correction of any deficiencies in the student's previous program; proficiency in one foreign language; History 970, Graduate Seminar in Teaching History (applies to all doctoral candidates awarded teaching assistantships); preparation through reading and coursework in the entirety of U.S. history, with emphasis upon either early or modern U.S.; preparation through reading and coursework of two subfields outside of U.S. history, one of which may be a cognate field outside of history entirely; qualifying exams; dissertation proposal; and dissertation and successful defense.

Candidacy is reached after successful completion of the following: 1) complete research seminars in early and modern U.S. history, reading seminars in early and modern U.S. history, a course in Historical Methods, History 970 (teaching assistants only), and courses to prepare fields or correct any deficiencies in the student's previous preparation; 2) demonstrate proficiency in a foreign language; 3) pass written and oral qualifying exams.

Note: In the definition of fields above, United States and U.S. are understood to mean the United States and its colonial antecedents.

Apprenticeship and Degree Regulations

The department considers that graduate work in history, and particularly doctoral work, is professional training. The department recognizes the dual concerns of the historian's life: teaching and research. When feasible, all doctoral students are expected to undertake teaching in the department during a part of their residence. Participation in proseminar and in teaching constitutes an apprenticeship in conjunction with formal study. Doctoral students may choose to pursue the Cognate in College Teaching offered through the Graduate School. All graduate students are reviewed annually by the faculty of the department. A student accumulating two course failures is automatically barred from continuing in any degree program in history, but the department reserves the right to exclude others whose overall performance does not give reasonable assurance of a successful program completion. Students are allowed no more than three attempts to meet any language requirement.

Information Technology (IT)

» **http://manchester.unh.edu/msit**

» **Click to view course offerings**

*This program is offered in Manchester through **GSMC**.*

Degree Offered: M.S.

The Division of Science and Technology at UNH Manchester offers a master of science in information technology (M.S. IT). The program prepares students for a professional IT or computing-related career and for advanced studies in a computing discipline.

The program is designed for computing professionals to advance their careers, working adults seeking a career change, or qualified candidates with interest in the IT field. The learning environment of the M.S. IT program uses a blended learning model, which combines in-class and online educational activities, emphasizes collaboration and communication among peers, and integrates practice with computing technologies and authentic project experiences.

The M.S. IT program has 33 credits (11 courses). All courses are offered in the evening, in fall, spring, and summer terms. If enrolled part-time and taking, on average, two courses per term, students can complete the program's coursework in two years.

The program's educational objectives for graduating students are:
1. Proficiency in applying knowledge and skills in core and advanced information technologies to help organizations achieve their goals.
2. Proficiency in identifying, analyzing, and making plans to meet the IT needs of a large spectrum of users, from end users of information systems to managers of enterprise applications and developers of IT solutions.
3. Proficiency in developing, applying, integrating, administering, and evaluating IT systems and services.

Admission Requirements

Applicants must meet the admission standards of the UNH Graduate School and have a bachelor's degree in a computing discipline: computer science, information technology, computer information systems, information sciences, computer engineering, or software engineering.

Students with undergraduate degrees in other fields are invited to apply and required to schedule an interview with the program coordinator. The minimal formal coursework required of students without a B.S. degree in computing includes: introduction to programming, operating systems, networking, databases, and college mathematics above college algebra (such as finite mathematics, discrete mathematics, or statistics).

Students can satisfy the program's prerequisites by taking the following undergraduate courses at UNH Manchester and getting a minimum grade of B:

- COMP 425, Introduction to Programming

- COMP 520, Database Design and Development
- COMP 542, Operating Systems Applications
- COMP 550, Networking Concepts
- MA 418, Precalculus or MA420, Finite Mathematics

Degree Requirements

The M.S. IT program has two options: thesis and project.

Both options require completion of 33 credits (11 courses), including:

- Five core information technology courses (18 credits) and
- Two IT integration courses (6 credits).

In addition,

- M.S. Thesis option requires
  - Two elective course (6 credits) and
  - Thesis (6 credits) to be completed under the supervision of a thesis adviser and a thesis committee of at least three members.
- M.S. Project option requires
  - Three elective courses (9 credits) and
  - Project (3 credits) to be completed under the supervision of a faculty adviser.

Core IT Courses
COMP 805, Web Application Development
COMP 815, Information Security
COMP 820, Database Systems and Technologies
COMP 830, Object-Oriented Software Development
COMP 835, Networking Technologies

IT Integration Courses
COMP 851, System Integration and Architecture
COMP 852, Computing Infrastructures

Elective Courses
COMP 880, Topics
COMP 890, Internship
COMP 895, Independent Study
COMP 905, Advanced Web Systems and Services
COMP 915, System and Network Security
COMP 920, Advanced Database Systems
COMP 930, Open Source Software Development
COMP 932, Design Patterns
COMP 935, Server Technologies and Applications

Elective courses can also be selected from the curriculum of the graduate certificate in Software System Engineering that is offered by the CS department and whose courses are taught in Manchester:

CS 818, Software Systems Engineering Process
CS 823, Performance Evaluation and Computer Systems
CS 851, System Requirements Engineering
CS 852, Software Architecture Concepts
CS 853, Software Project Management
CS 854, System/Software Test and Evaluation

Other options are courses in the part-time MBA program.

Project Course
COMP 898, Master's Project
The project course typically deals with an authentic project or problem to solve, which is integrative in nature and requires IT research.

Master's Thesis
COMP 899, Master's Thesis (6 credits)

Integrated Applied Mathematics (IAM)

» **http://math.unh.edu/graduate-study**

» **Click to view course offerings**

Degrees Offered: M.S., Ph.D.

The Integrated Applied Mathematics program offers both the master of science in mathematics with an option in applied mathematics, and the doctor of philosophy program in applied mathematics. Both programs are housed in the Department of Mathematics, and **additional information is available here**.

The essence of modern applied mathematics is the interplay between mathematical analysis, numerical computation and scientific/engineering specialization. Thus, the IAM curriculum is designed to provide applied mathematics graduate students with advanced training in these three broad, inter-related topics: (1) Mathematical Methods, (2) Scientific Computing, and (3) a Scientific or Engineering Area of Specialization.

M.S. Degree Requirements (Applied Mathematics Option)

This program requires 30 credit hours, consisting of the courses MATH 931, IAM 933, an approved two-course sequence in applied mathematics (such as MATH 967/977). In addition to these courses, the student chooses either a thesis or project option. The thesis option consists of 6 credits of Master's Thesis (MATH 899) and four elective courses. The project option consists of 3 credits of Master's Project (MATH 898) and five elective courses. The elective courses need not be in mathematics, but must be at the 800 level or higher, and at least one must be a technical course in statistics or some other department. The broad elective flexibility allows the student's application interests to have a substantial role in the content of the program. The student's full program plan must be proposed in writing to the applied mathematics faculty and approved prior to the student's second semester of study. There is no comprehensive examination in this option.

Ph.D. Requirements

The following are the requirements of completing the Ph.D. in Applied Mathematics program:

Candidacy

Students are advanced to candidacy after meeting the following requirements:

1. Must take 9 courses totaling 27 credits from the following list: PHYS 931, IAM 830, IAM 851, IAM 932, IAM 933, IAM 961, IAM 962. One of the following 2-course sequences can also apply: MATH 847/IAM 950, ME 807/ME 909 or PHYS 953/PHYS 951.

2. In addition, must take a minimum of 3 technical electives totaling 9 credits from the following list: IAM 940, ME 812, ME 911, and other approved courses.

3. Pass a 3-part Ph.D. Qualifying Exam:
*Comprehensive exam in mathematical methods
*Comprehensive exam in numerical analysis and high-performance computing
*Oral or written exam in specialization area

4. Seminar presentation of thesis proposal to dissertation committee.

Dissertation

Each Ph.D. student must submit a dissertation that includes original results in integrated applied mathematics.

Justice Studies (JUST)

» **http://www.unh.edu/justice-studies/**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.A.

The goal of the master of arts degree program in justice studies is to produce graduates who have a high level of knowledge about law and justice in American society and worldwide. Upon completion, graduates will be able to enhance their careers in the justice system, enter new careers in the justice system, or continue their graduate training in law, social sciences, or humanities.

The program addresses issues of justice that are not necessarily criminal in nature. It will familiarize students with legal and justice ideas, legal institutions, and the legal process. It will provide tools for a reasoned appraisal of how the law works and of the policies that underlie it. The courses address a wide variety of subjects, including philosophy of law, American legal history, psychological aspects of the law, social control, criminology, juvenile delinquency, law and literature, and family law. Courses are taught by faculty with backgrounds in both the social sciences and humanities.

Special Note on Tuition:

The justice studies masters of arts degree program has a different pricing structure. You can

find the most current pricing for this program on the **business services website**.

Admission Requirements

In addition to meeting the general Graduate School requirements, applicants must submit current scores (within five years) from the general test of the GRE or the LSAT.

Students are admitted for the summer term. Classes for this program begin the during the last week in July. The application deadline to be considered for financial assistance is March 1st. The deadline for consideration without financial assistance is April 1st.

Degree Requirements

The master of arts in justice studies requires that students complete a minimum of nine courses (36 credit hours) in justice studies from the following list:

Required courses:
JUST 830, Theories of Justice
JUST 901, Proseminar
JUST 905, Quantitative Research Methods
JUST 907, Applied Research Methods

One of the three listed below:
SOC 815, Criminological Theory
SOC 880, Social Conflict
SOC 921, Crime and Conflict

Concluding Experience:
JUST 897, Culminating Project (4 credits), and
JUST 950/951, Internship (4 credits)

or

JUST 899, Masters Thesis (8 credits)

Electives:
From the following list, choose two courses if taking JUST 899 or two courses plus JUST 950/951 if taking JUST 897 (no more than one from any department other than justice studies):

EDUC 867, Students, Teachers, and the Law
EDUC 897, Higher Education and the Law
EDUC 951, Laws and Regulations Affecting the Education of Students with Disabilities
EDUC 967, School Law
EDUC 968, Collective Bargaining in Public Education
FS 872, International Approach to Child Advocacy
FS 897, Children, Adolescents, and the Law
FS 894, Families and the Law

HMP 940, Legal Strategies in Health Care
HIST 809, United States Legal History Special Topics
HIST 949, Colloquium in United States History
JUST 950, Internship
JUST 951, Research Internship
JUST 965, Special Topics
JUST 995, Reading and Research
POLT 801, Courts and Public Policy
POLT 803, Urban and Metropolitan Politics
PSYC 954, Advanced Seminar in Social Psychology
SW 897, Special Topics: Domestic Violence
SW 979, Social Work and the Law
SOC 815, Criminological Theory
SOC 820, Sociology of Drug Use
SOC 876, Family Violence Research Seminar
SOC 880, Social Conflict
SOC 921, Crime and Conflict
SOC 976, Violence in the Family

Kinesiology (KIN)

» **http://www.unh.edu/kinesiology/**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.S.

Certificate Offered: Adapted Physical Education

Master of Science Degree

The Department of Kinesiology offers a master of science degree with the following areas of concentration: exercise science, outdoor education, and sport studies. In addition, the Departments of Kinesiology and Social Work offer a dual degree program, which consists of a master of science in kinesiology with a concentration in outdoor education, as well as a master in social work (M.S.W.).

Additionally, a graduate certificate in adapted physical education is offered.

Admission Requirements

Admission is based on undergraduate preparation, academic record, Graduate Record Examination general test scores (current scores, within the last five years), and letters of recommendation. Applicants must be above-average students and show adequate preparation in the basic support courses of the selected concentration area. Applicants who have not met

specific course prerequisites should expect to take additional undergraduate work without receiving graduate credit.

Students applying for the dual degree program must meet both the admission requirements for kinesiology and for social work and be admitted to both programs (applications to each program required). See social work for their admission requirements.

Degree Requirements

Students may follow either the thesis, the non-thesis, or the advanced research plan. All degree candidates will be required to take KIN 901, Analysis of Professional Literature; the designated concentration core; and electives as required.

Exercise science core: A graduate statistics course (PSYC 702, SW 962, EDUC 881, or equivalent), KIN 804, Electrocardiography; KIN 805, Topics in Applied Physiology; KIN 824, Metabolic Adaptations to Exercise; KIN 836, Fitness and Graded Exercise Test and Prescription; and two semesters of KIN 902, Colloquium.

Sport studies core: A graduate statistics course (PSYC 702, SW 962, EDUC 881, or equivalent), KIN 880, Psychological Factors in Sport; one adviser-approved KIN elective at the 800 or 900 levels; and KIN 840, Athletic Administration or KIN 843, Sport Marketing.

Outdoor education core:
KIN OE Concentration: EDUC 881, Statistics; KIN 883, Psychological Aspects of Adventure Education; KIN 884, Foundations of Adventure Education; KIN 885, Program Models and Evaluation in Outdoor Education; KIN 886, Organization and Administration of Outdoor Education Programs; KIN 887, Theory of Adventure Education; KIN 901, Analysis of Professional Literature.

Integrated M.S.W./M.S. Dual Degree Program: The UNH Departments of Social Work and Kinesiology offer an Integrated M.S.W./M.S. Dual Graduate Degree Program. This program is the first of its kind in the nation. It organizes a significant number of existing resources and assets at UNH in a way that empowers participating students for a career in adventure therapy.

The use of adventure experiences as a therapeutic or socio-educational intervention for clients with mental health needs is well documented. Prospective graduate students in the SW/OE Integrated Dual-Degree program apply and need to be accepted into each separate graduate program. Upon acceptance in both programs, students progress through the integrated curriculum, graduating from both programs at the end of their third year. The exception to this would be an Advanced Standing student in social work, who could graduate from both programs in two years. In order to graduate with the dual degrees, the student completes a 24-hour per week social work/adventure therapy-related field internship in their third year as well as an Outdoor Education Thesis or Advanced Studies Project in their last semester. Contact Dr. Michael Gass for additional information.

Any remaining coursework in each concentration should be taken within the Department of Kinesiology; however, approval may be granted to take relevant courses outside the department.

Thesis plan: A minimum of 30 approved graduate credits, including a thesis (24 graduate

course credits plus 6 thesis credits), as well as an oral defense of the thesis, are required in the thesis plan.

Non-thesis plan: A minimum of eight approved graduate courses (with a minimum of 30 credits) are required in the non-thesis plan. Four credits of KIN 895, Advanced Studies, are required. A student may take KIN 895 only after completing at least three approved graduate courses including KIN 901.

Advanced research plan: Exercise science students who elect this plan must take 6 credits of KIN 896, Advanced Research in Exercise Science. Outdoor education students who elect this plan must take 6 credits of KIN 897, Advanced Research in Outdoor Education. In addition, exercise science and outdoor education students must orally defend their research.

Dual degree students take classes simultaneously over the course of three years in both kinesiology: outdoor education and social work and complete a minimum of 77 credits for graduation. This includes two internships, one during their first year of study and a second specialized internship during the third year, which concentrates on the utilization and application of adventure therapy in an agency setting.

Certificate in Adapted Physical Education

The Department of Kinesiology at the University of New Hampshire now offers a graduate certificate in Adapted Physical Education. The intent of this certificate is to better prepare teachers to enhance their overall knowledge of students with disabilities in general and adapted physical education settings. For more information, please contact Michelle Grenier at (603) 862-1835 or email **grenier@unh.edu**.

Certificate Requirements

Students must hold a baccalaureate degree from an accredited college or university and have a valid New Hampshire physical education teaching license or be enrolled in the master in education program at the University of New Hampshire and complete 15 credit hours of specified coursework. A minimum of 15 graduate credits are required for the certificate. Required courses: KIN 831, Inclusive Teaching Through Sport; KIN 742/842, PE Practicum for Students with Disabilities; KIN 895, Advanced Studies.

Applying

Please visit the **Graduate School website** for information about applying to the certificate program.

Languages, Literatures, and Cultures (LLC)

» **http://www.unh.edu/languages/**

» **Click to view course offerings**

Lecturer: Mary Marshall Campbell

Liberal Studies (LS)

» **http://www.unh.edu/mals**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.A.L.S.

The program offers a master of arts in liberal studies (M.A.L.S.) degree. The master of arts in liberal studies is an innovative, interdisciplinary graduate program. Housed within the College of Liberal Arts but drawing its courses and instructors from across the University, the program makes available a diverse spectrum of offerings and a wealth of faculty expertise and resources.

The liberal studies curriculum is intended to promote broad intellectual comprehension and enrichment rather than vocational or professional training within a single field or discipline. Designed to address the particular interests of students who seek to deepen their knowledge, the program offers a challenging but flexible program of cross-disciplinary learning.

Admission Requirements

Admission to the master of arts in liberal studies is selective. A bachelor's degree is required for admission. Students will be asked to provide relevant transcripts of their educational experience, a resume, and letters of recommendation. They will also be asked to submit a brief essay describing why they are particularly interested in this program and indicating the sort of interdisciplinary focus or area of learning in which they might like to concentrate their study. The Graduate Record Exam (GRE) is not required but is helpful.

Degree Requirements

The program consists of seven courses (30 credits) divided into three parts: a core seminar specifically designed for and required of every student, to be taken within one year of entrance to the program; a concentration made up of five elective courses chosen from various disciplines across the liberal arts that centers on an interdisciplinary theme or topic; and a master's thesis or project, which is intended to act as an integrating capstone experience for liberal studies students.

Core seminar LS 800 (4 credits): Each liberal studies student is required to take one core seminar as an introduction to the program as a whole. The seminar must be taken within the first year of a student's matriculation in the program, preferably in the first semester. Although all core seminars focus on interdisciplinary issues and themes, each is meant to introduce students to different topics and divergent disciplines from across the liberal arts such as literature, the arts, philosophy, history, women's studies, political science, and sociology.

Concentration (20 credits): Students will work with the director of the program and a concentration and thesis adviser to develop an interdisciplinary concentration program of study, which focuses on a significant topic, issue, perspective, or cultural development, and is made up of five graduate-level elective courses offered in various departments throughout the college and University. A concentration should constitute a sustained thematic exploration and may be selected from a menu of suggested concentrations or may be self-designed by each student with the help of his or her adviser. The five courses are to be selected from 700-900-

level courses regularly offered within departments and colleges across the University, including up to three independent study courses carried out as a tutorial with particular faculty members (with permission). It is expected that a student's concentration will culminate in a concluding final project or thesis.

The following are typical examples of cross-disciplinary concentration programs of study: American studies, the humanities, ecology and values, justice studies, labor studies, religious studies, urban studies, and women's studies.

LS 898, Project or LS 899, Thesis (6 credits): With the support of their concentration and thesis adviser, students prepare a final project consistent with their concentration and interests. A capstone experience, the project can be a scholarly thesis or equivalent creative endeavor, which integrates the student's learning in a particular concentration. The director of the program will meet periodically with those students enrolled for thesis credit in order to provide a forum for discussing their research and writing.

Life Sciences and Agriculture (LSA)

» **http://www.colsa.unh.edu/academics/**

» **Click to view course offerings**

Management of Technology (MOT)

» **http://www.wsbe.unh.edu/graduate-programs**

» **Click to view course offerings**

*This program is offered in Manchester through **GSMC**.*

Degree Offered: M.S.

The Peter T. Paul College of Business & Economics has suspended admission, effective January 2013, to the Master of Management of Technology degree.

Certificates Offered: Business Fundamentals for Technical Managers, Advanced Concepts for Technical Managers, Advanced Management of Technology

The Paul College offers a master of science in the management of technology (M.S. MOT). The degree comprises 36 credits (12 courses) and is divided into three certificate modules: Business Fundamentals for Technical Managers, Advanced Concepts for Technical Managers, and Advanced Management of Technology.

The MOT program is a flexible evening-based program for professionals in technical fields or working adults seeking a career change. Depending on the starting term, the degree can be completed in roughly 18 months if choosing the full-time option. Part-time configurations allow for life- and work-interruptions without severe penalty to program continuity.

M.S. MOT graduates have demonstrated successful career advancement in industries challenged by rapid technological innovation and organizations that emphasize project-based work. Applications are accepted for the fall and spring semesters with start dates in late

August and early January, respectively.

Please contact the Paul College Graduate Programs Office for details.

Admission Requirements

Applicants must have a minimum of a bachelor's degree from an accredited college or university and meet the admissions standards of the University of New Hampshire Graduate School. A candidate should have significant (about five years or more) work experience. While the GMAT exam is not required, applicants may be asked to take the GMAT if the initial review of their transcripts reveals specific areas of concern or question.

Applicants are required to submit copies of prior academic records, three letters of recommendation, a resume, and a complete Graduate School application.

Please contact the Paul College Graduate Programs Office for details.

Degree Requirements

Please contact the Paul College Graduate Programs Office for details.

Materials Science (MS)

» **http://www.unh.edu/materials-science/**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.S., Ph.D.

The materials science program offers the master of science degree in materials science and doctor of philosophy degree in materials science and engineering. The program offers research opportunities over a broad range of areas including synthesis and characterization of thin films, fullerenes and nanotubes, molecular templates, self-organizing nanostructures, polymers and polymer nanoparticles, using scanning probe microscopy, physical and chemical vapor deposition methods, micromechanics, molecular beam mass spectrometry, and computational methods.

Admission Requirements

Admission to the master of science and doctor of philosophy degrees is based upon a strong undergraduate record. A minimum GPA of 3.0 is required, but undergraduate students with exceptional experience or other mitigating factors will be considered. Except under special circumstances, applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE). Since materials science is an interdisciplinary field, students from mechanical engineering, chemical engineering, electrical engineering, chemistry, mathematics, physics, and other engineering- and science-related disciplines will be considered. A suitable undergraduate program should contain: multivariable calculus and differential equations, two semesters of university (calculus-based) physics, one semester of thermodynamics or physical chemistry, one semester of computer programming, one semester

each of fluid mechanics and heat transfer or two semesters of solid mechanics, and one semester of materials science. Members of the faculty are available to evaluate each student's undergraduate curriculum. A series of appropriate courses will be required for those students with deficiencies in their undergraduate program.

Qualified physics students at the University of New Hampshire may be admitted to an accelerated program leading to a combined bachelor of science degree in physics and a master's degree in materials science within a total of five years. Please consult the materials science website for details.

Degree Requirements

M.S. Degree Requirements

A student will meet the Graduate School's requirements for the master's degree (30 credits) and will complete either a thesis option and a project option. In both options, the student is required to take MS 860, Thermodynamics and Kinetics of Materials I; MS 961, Thermodynamics and Kinetics of Materials II; one course each satisfying the areas of synthesis and processing, characterization, and structure-property relationships, and two semesters of MS 900, Materials Science Seminar.

For the **thesis option**, the student will take one additional course (24 course credits) in addition to 6 credits of MS 899, Master's Thesis.

For the **project option**, the student will take two additional courses (27 course credits) in addition to 3 credits of MS 898, Master's Project.

All students are expected to take at least 6 course credits at the 900 level. Students who have done graduate work at other schools that included courses similar to those in the Materials Science Program may petition for waivers of UNH degree requirements.

Ph.D. Degree Requirements

Students must complete 39 postbaccalaureate course credits. The student is expected to take MS 860, Thermodynamics and Kinetics of Materials I; MS 961, Thermodynamics and Kinetics of Materials II; one course each satisfying the areas of synthesis and processing, characterization, and structure-property relationships, and two semesters of MS 900, Materials Science Seminar. In addition, the student must take five additional courses with at least 12 total credits at the 900 level (including those courses taken at the master's level). Students who have done graduate work at other schools that included courses similar to those in the Materials Science Program may petition for waivers of UNH degree requirements.

The student will be advanced to candidacy after he or she has completed an M.S. degree or 24 credits of graduate courses with at least 6 credits at the 900 level and the qualifying examination. The qualifying exam shall consist of two parts. The student must present a written proposal adhering to NSF guidelines, followed by an oral defense of that proposal. In addition, the student must submit a substantive review paper and an oral presentation on that paper. A materials science program faculty committee will determine the subject of the paper. A substantive record of publication in conjunction with an oral presentation at a conference may substitute for the review paper. A materials science program faculty

committee will decide whether the previous publication record is substantive. The committee will evaluate the paper, the proposal, and the two oral presentations to determine whether the student is suitably prepared for graduate research at the Ph.D. level. The proposal and paper for the qualifying exam should normally be completed within six months of completing 24 credits of coursework.

Upon the successful completion of the qualifying examination, the student is advanced to candidacy and, upon the recommendation of the graduate coordinator, a doctoral committee is appointed by the dean of the Graduate School. The doctoral committee conducts an annual review of the student's progress, supervises and approves the doctoral dissertation, and administers the final dissertation defense.

Courses

The link to course offerings below shows courses with a M.S. designation. Several other courses that count as electives in the Materials Science Program are taught by faculty in chemistry, mechanical engineering, physics, and other departments. For a complete list of these courses, please see the *Graduate Student Handbook* on the **Materials Science website**.

Mathematics and Statistics (MATH)

» **http://www.math.unh.edu**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.S., M.S.T., Ph.D.

Certificate Offered: Industrial Statistics

The Department of Mathematics and Statistics offers programs leading to a master of science for teachers (M.S.T.) in mathematics, master of science in mathematics, master of science in mathematics with an option in applied mathematics, and a master of science in mathematics with an option in statistics. Students in the master of science in applied mathematics option may choose to study for the integrated applied mathematics (IAM) program **click here for additional information**).

The department also offers doctor of philosophy programs in mathematics, applied mathematics, statistics and mathematics education. Students in the doctor of philosophy in applied mathematics programs pursue the degree requirements of the integrated applied mathematics program (**click here for additional information**).

In general, the master's degree programs offer the student a high level of preparation for professional employment as well as appropriate preparation for programs leading to the Ph.D. The Ph.D. programs prepare the student primarily for a career in university teaching and research.

The graduate programs have limited enrollment, allowing students to work closely with faculty members in their areas of expertise. Research within the department is currently being conducted in many areas of the mathematical sciences, including: operator theory, Hilbert spaces, geometric function theory, complex analysis, ring theory, commutative algebra, homological algebra, quantum groups, tensor categories, combinatorics, topology, algebraic topology, category theory, nonlinear dynamics and chaos, data compression, chaotic prediction and control, spectral analysis, asymptotic analysis, mathematical control theory, environmental statistics, spatial and spatio-temporal statistics, Bayesian and computational statistics, wavelets in statistics, teaching and learning of mathematics, teaching and learning of probability and statistics, mathematics curriculum and teacher education, calculus learning, and undergraduate mathematics education.

Additionally, a graduate certificate in industrial statistics is offered.

Admission Requirements

Applicants for the M.S. and Ph.D. degrees must have completed significant undergraduate coursework in mathematics, preferably in algebra, analysis, and topology. Applicants for the M.S. with applied mathematics option must have completed significant coursework in analysis or applied analysis. Applicants for the M.S. with statistics option will typically have an undergraduate degree in the mathematical, physical, biological, or social sciences or in engineering; must have completed mathematical coursework at least through multivariate calculus; and must have knowledge of basic statistics and basic linear algebra at the undergraduate level. Applicants for the degree of master of science for teachers (M.S.T.) usually possess a background equivalent to at least a minor in mathematics and must have completed education courses sufficient for certification, or have three years teaching experience, or currently hold a full-time teaching position.

Degree Requirements

M.S. Degree Requirements

Pure Mathematics Option

This program requires 30 credit hours, consisting of at least 10 semester courses approved by the department and chosen from courses in MATH 801-899, MATH 931-978 and IAM courses 830-962. The following stipulations apply:

- At least 5 of the 10 courses must be chosen from MATH 931-978 or from 900-level IAM courses.
- At least 3 courses must be chosen from MATH 931-956.
- Courses in MATH 900 through MATH 929 may not be used to satisfy course requirements.
- With approval of the graduate committee, 2 non-MATH graduate-level courses taken at UNH may be used to satisfy course requirements.

As a concluding experience, the student will take an oral exam before a committee of three faculty members. The committee membership is suggested by the student and is approved by the graduate program committee.

Applied Mathematics Option

This program requires 30 credit hours, consisting of the courses MATH 931, IAM 933, an approved two-course sequence in applied mathematics (such as MATH 967/977). In addition to these courses, the student chooses either a thesis or project option. The thesis option consists of 6 credits of Master's Thesis (MATH 899) and four elective courses. The project option consists of 3 credits of Master's Project (MATH 898) and five elective courses. The elective courses need not be in mathematics, but must be at the 800 level or higher, and at least one must be a technical course in statistics or some other department. The broad elective flexibility allows the student's application interests to have a substantial role in the content of the program. The student's full program plan must be proposed in writing to the applied mathematics faculty and approved prior to the student's second semester of study. There is no comprehensive examination in this option.

Statistics Option

This program requires 30 credit hours, consisting of at least ten semester courses approved by the department, which includes completion of a project (MATH 898) consisting of a substantial application of statistical methodology to a real problem. Most of the courses will be taken from the department's statistics courses in the range MATH 837-979 and must include all of MATH 839, 840, 855, and 856, unless some of these or equivalent courses were taken prior to enrollment in the program. At most, three of the required ten courses may also be taken from the department's approved nonstatistics courses (in the range MATH 837-979) and/or approved courses offered in other departments. MATH 898, the Master's Project, is conducted under the supervision of a faculty adviser and concludes with a written report and a public oral presentation. MATH 898 may be taken for 3 to 6 credits, depending on the level of substantial research and methodological development required for project completion; the appropriate number of credits is determined by the statistics faculty. A master's committee of at least two statistics faculty members oversees the student's progress and determines credit for the project. There is no comprehensive examination in this option.

M.S.T. Degree Requirements

The program requires 30 credit hours of coursework, which must include MATH 900, 905, 906, 909, 913, 915, 918 and 925. In addition to the 22 credit hours from the required courses, at least eight additional credit hours must be taken from courses numbered MATH 900-929. A concluding experience consisting of a mathematics portfolio and a comprehensive problem set is required. The program courses will be a combination of regular summer courses and academic-year online courses; a typical student in the program might expect to take as many as four program courses online. .

Ph.D. Requirements

The following are the requirements of completing the Ph.D. programs.

Candidacy

Students are advanced to candidacy after meeting the following requirements:

Doctor of Philosophy in Mathematics

1. All of the courses MATH 951, 952, 953, 954, 955.

2. Mathematics Ph.D. students must pass written comprehensive examinations in algebra,

analysis, topology and an elective subject. Elective subjects include functional analysis, algebraic topology, applied mathematics, statistics, advanced algebra, advanced complex analysis, advanced mathematics education, et al.

3. Advanced coursework in a minor field (usually within mathematics, but possibly in another area of the mathematical sciences), and a major field (that of the student's intended dissertation work) followed by successfully completion of oral examinations in their minor and major areas.

4. Experience in teaching equivalent to at least half-time for one year

Doctor of Philosophy in Statistics

1. All of the courses MATH 836, 839, 840, 855, 856..

2. Successful completion of written qualifying examinations in theory of statistics and in applied statistics

3. Advanced coursework in statistics: all of the courses MATH 941, 945, 946; three elective courses from among MATH 837, 841, 843, 844, 942, 944, 969, 979 (MATH 969 and 979 are topics courses and may be taken more than once)

4. Minor coursework: one course in analysis (either MATH 867 or MATH 953) and two ocurses in a focused minor area to be selected in consultation with the program advisor

5. Participation in the one-credit statistics seminar during at least three semesters

6. Successful completion of a dissertation proposal defense in the major field of statistics

Doctor of Philosophy in Mathematics Education

1. All of the courses MATH 951, 952, 953, 954, 955.

2. Successful completion of written comprehensive examinations in algebra, analysis, mathematics education and an elective subject.

3. Advanced coursework in the major field (mathematics education), including MATH 958, 968A, and 968B, and at least two semesters of MATH 978, and in a minor field (usually a related one, such as educational psychology or research methodology, but possibly in an area of mathematics) followed by qualifying examinations in each.

4. Successful completion of a dissertation proposal defense in the major field of mathematics education and a presentation in the minor field.

5. Experience in teaching equivalent to at least half-time for one year

Doctor of Philosophy in Applied Mathematics

1. Must take nine courses totaling 27 credits from the following list: PHYS 931, IAM Â 830, IAM 851, IAM 932, IAM 933, IAM 961, IAM 962. One of the following 2-course sequences can

also apply: MATH 847/IAM 950, ME 807/ME 909 or PHYS 953/PHYS 951.

2. In addition, must take a minimum of three technical electives totaling 9 credits from the following list: IAM 940, ME 812, ME 911, and other approved courses.

3. Pass a three-part Ph.D. Qualifying Exam:
*Comprehensive exam in mathematical methods
*Comprehensive exam in numerical analysis and HPC
*Oral or written exam in specialization area

4. Seminar presentation of thesis proposal to dissertation committee.

Dissertation

Each Ph.D. student must submit a dissertation as follows:

Doctor of Philosophy in Mathematics: A dissertation that includes original results in mathematics.

Doctor of Philosophy in Statistics: A dissertation that includes original results in statistics.

Doctor of Philosophy in Mathematics Education: A dissertation that includes original results in mathematics education.

Doctor of Philosophy in Applied Mathematics: A dissertation that includes original results in Integrated Applied Mathematics.

Certificate in Industrial Statistics

The Department of Mathematics and Statistics offers a graduate certificate in the area of industrial statistics. For more information please visit the **Mathematics & Statistics site.**

Admissions Requirement

Individuals holding a Bachelor's degree are eligible to apply for admission to a graduate certificate program.

Applying

Please visit the **Graduate School website** for detailed instructions about applying to the certificate program.

Certificate Requirements

A graduate certificate in industrial statistics is awarded for completion of four courses as follows:
**Note that all of these have as a prerequisite an introductory statistics course, such as MATH 835, Statistical Methods for Research.*

Three required courses chosen from:

Abbreviation	Course Number	Title
MATH	836	Advanced Statistical Methods for Research
MATH	837	Statistical Quality Improvement (SQI)
MATH	839	Applied Regression Analysis
MATH	840	Design of Experiments I
		Note that all of these have as a prerequisite an introductory statistics course, such as MATH 835: Statistical Methods for Research.

One elective course chosen from the remaining course of the

Abbreviation	Course Number	Title
MATH	841	Biostatistics and Life Testing
MATH	843	Time Series Analysis
MATH	844	Design of Experiments II (DOE II)
MATH	855	Probability and Stochastic Processes
MATH	941	Bayesian and Computational Statistics
MATH	942	Beyond ANOVA: Generalized Linear & Semi-parametric Smoothing Methods
MATH	944	Spatial Statistics
		or any other approved special topics course in the area of industrial statistics Other special topics courses are occasionally offered and may be added to the list of elective courses.

Mechanical Engineering (ME)

» **http://www.unh.edu/mechanical-engineering/**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.Eng, M.S., Ph.D.

The Department of Mechanical Engineering offers degree programs at both the master's and doctoral levels. The department offers studies leading to specialization in the following six concentrations: fluid and thermal science, mechanics, materials science, design and manufacturing, dynamic systems and control, and ocean engineering.

Admission Requirements

A bachelor of science degree in mechanical engineering is normally required for admission to the graduate program in mechanical engineering. Students from other disciplines may also be admitted to the program. However, in order to be properly prepared for graduate-level

coursework, these students must have taken the equivalent of the UNH mechanical engineering undergraduate core courses listed below. Students who are deficient in three or fewer courses may be admitted to the department on a provisional basis. Students who are deficient in more than three courses must apply and enroll as an undergraduate student until they meet the core course requirement. It is department policy that engineering courses taken as part of an engineering technology program are generally not considered equivalent to any of the courses listed below. The decision on equivalence for any courses taken at an institution other than UNH is at the discretion of the Graduate Committee of the Mechanical Engineering Department.

Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE).

Core courses required for admission to the M.S. in mechanical engineering degree program:

Mathematics and Physics Courses:
MATH 425, Calculus I; MATH 426, Calculus II; MATH 527, Differential Equations; MATH 528, Multi-Dimensional Calculus; PHYS 407, General Physics; PHYS 408, General Physics II

Mechanics Courses:
ME 525, Mechanics I; ME 526, Mechanics II; ME 627, Mechanics III; ME 643, Elements of Design

Thermal Sciences:
ME 503, Thermodynamics; ME 608, Fluid Mechanics; ME 603, Heat Transfer

Other Courses:
ME 561, Materials Science; ME 670, Systems Modeling and Controls; EE 537, Circuits and Signals

Degree Requirements

Master of Science
Each candidate must complete 24 semester hours of coursework, 8 semester hours of ME 899, Master's Thesis, and defend a thesis. The coursework must include at least two 900-level courses of 3 or more credits each. A “B” average (3.00 GPA) with no grade below “B-” is required in all the coursework. No more than 12 credit hours from UNH graduate courses (8 credit hours from non-UNH graduate courses) taken prior to admission to the Graduate School may be applied to the master's degree. Note: an oral examination (thesis defense) covering the candidate's graduate work is conducted and a thesis is prepared in accordance with the **Graduate School rules**.

All full-time graduate students are required to attend a weekly Mechanical Engineering Graduate Seminar and make one presentation per year.

Master of Engineering
Each candidate must complete 28 semester hours of coursework, 4 semester hours of ME 992, Master's Project, and present a project. Two 900-level courses of at least 3 credits each must be taken in addition to ME 992. Individuals who can demonstrate accomplishments from professional engineering experience comparable to that expected from a master's project may

petition the department to substitute an additional 900-level course for the ME 992, Master's Project requirement. A “B” average (3.00 GPA) with no grade below “B-” is required in all the coursework. No more than 12 credit hours from UNH graduate courses (8 credit hours from non-UNH graduate courses) taken prior to admission to the Graduate School may be applied to the master's degree. A written report and an oral presentation of the project are required. The format of the project report is determined by the candidate’s research advisor. Master of engineering students are usually not eligible for a research or teaching assistantship.

All full-time graduate students are required to attend a weekly M.E. Graduate Seminar and make one presentation per year.

Ph.D. in Mechanical Engineering

Following admission into the program, a temporary research adviser and a guidance committee consisting of three professors including the research adviser are appointed for the student by the graduate coordinator. The student's research adviser assists in outlining the student's course of study and may specify individual coursework requirements.

A student entering with a B.S. degree must successfully complete at least twelve 3- or 4-credit courses with five at the 900 level. Students entering with an M.S. degree in engineering are required to take a minimum of five 3- or 4-credit courses with three at the 900 level. This course requirement represents the department's minimum for any Ph.D. student. Students normally take more than the required number. Further course requirements are identified by the student's area of concentration and by the guidance committee. The guidance committee also administers the qualifying examination. Upon successful completion of required coursework and the qualifying examination, the student may advance to candidacy. A doctoral committee may be appointed once candidacy has been attained. The committee will have at least five members.

Each Ph.D. candidate must conduct research of sufficient originality and significance to warrant the awarding of the Ph.D. degree. The final examination (oral defense) is the defense of the student's dissertation. This will be scheduled in accordance with the Graduate School rules. The candidate will be informed of the results of the defense by the dissertation chair.

All full-time graduate students are required to attend a weekly M.E. Graduate Seminar and make one presentation per year.

Microbiology (MICR)

» **http://mcbsgrad.unh.edu/microbiology**

» **Click to view course offerings**

This program is offered in Durham.

Please view as well, the course listings for molecular, cellular, and biological sciences (MCBS).

Degrees Offered: M.S., Ph.D.

The Department of Molecular, Cellular, and Biomedical Science (MCBS) offers the master of science and the doctor of philosophy degrees in microbiology. Research opportunities are available in a broad range of areas, including plant-microbe interactions, signal transduction,

microbial development, host-microbe interactions, environmental microbiology, environmental and molecular virology, microbial ecology, microbial evolution, microbial genetics and genomics, molecular microbiology, and biotechnology.

Admission Requirements

Applicants are expected to have had adequate preparation in the biological and physical sciences. This typically includes general and organic chemistry, physics, one semester of calculus, a year of general biology, a semester or more of biochemistry, and general microbiology. Formal courses in quantitative analysis and statistics are recommended. Applicants with deficiencies in these background courses who are admitted to the program may be required to complete appropriate coursework without graduate credit. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE). Each applicant to the graduate program must be sponsored by a faculty member in the department. The sponsor's decision is usually based on the Statement of Interest section of the student's application to the Graduate School. Laboratory rotations are available to identify a faculty sponsor, but a mutual decision must be made before the start of the next semester. Persons planning to apply to the program should contact the Microbiology Graduate Program Coordinator to obtain information on the department.

Degree Requirements

M.S. Degree Requirements

Students admitted to the M.S. program are required to conduct an independent research project in conjunction with a faculty adviser and must submit a thesis based on this research to a graduate committee, which determines its acceptability. Specific coursework is determined in conjunction with the graduate committee. A minimum of 30 credits, including thesis credits, is required. All M.S. students are required to attend all seminars and present one seminar each year. A master's thesis and a formal defense are also required. In addition, the student must submit at least one manuscript for publication to a peer-reviewed journal.

Ph.D. Degree Requirements

Students with appropriate academic training at the baccalaureate or master's level may be considered for admission to the doctoral program. Advancement to candidacy requires the successful completion of the following:

1. All courses required by the Graduate Committee
2. A written qualifying exam administered by the Graduate Program Coordinator and graduate faculty
3. An independent research proposal developed in conjunction with a faculty adviser
4. An oral defense of the research proposal

Students enrolled in the doctoral program are required to complete one semester of teaching and successfully complete and defend a dissertation based on their research proposal. The acceptance of the dissertation is contingent on its approval by the doctoral committee and evidence that at least two manuscripts based on the thesis research have been submitted to

a peer-reviewed journal appropriate to the topic.

All graduates are expected to enroll in MCBS 997, Seminar, each semester and present one seminar each year.

Courses

For a complete listing of courses, check **microbiology** and **molecular, cellular, and biological sciences**.

» **Click to view course offerings**

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Molecular, Cellular, and Biomedical Sciences (MCBS)

» **http://microbiology.unh.edu**

» **Click to view course offerings**

Music (MUSI)

» **http://www.unh.edu/music**

» **Click to view course offerings**

This program is offered in Durham.

Please view as well, the course listings for music education (MUED).

Degree Offered: M.A.

The Department of Music offers programs leading to the degree of master of arts with options in music studies and music education. The program is flexible, allowing the student to emphasize any of a variety of areas, and is built around a core curriculum stressing a broad knowledge of music. Graduates have established successful careers in performance, conducting, public school teaching, college teaching, and research. The program also serves as excellent preparation for doctoral study.

Admission Requirements

For the music studies option, a bachelor's degree in music, or its equivalent, from an accredited institution is required for admission. For the option in music education, applicants must already have teacher certification and a bachelor's degree in music. Graduate Record Exams are not required. However, an entrance exam in music theory is required for admission. Please contact the Department of Music graduate coordinator for details. A placement examination covering aural skills and music history will be administered to incoming students prior to registration. Any deficiencies in aural skills or music history must be remediated by the end of the second semester in order to remain in the program. In the music studies option, a reading knowledge of both German and French is strongly recommended for candidates who intend to continue on for a Ph.D. in musicology.

Applicants planning to enter the music studies option should contact the graduate coordinator concerning additional application requirements. Applicants for the music education option must arrange for an interview with the music education coordinator.

Graduate students interested in earning teacher certification in music should apply for the master of arts in teaching offered through the Department of Education.

Degree Requirements

Music Studies Option

This option offers the opportunity for in-depth study of music history and literature. The option has also proven valuable to students who wish to augment undergraduate degrees in performance and/or music education with more intensive studies in music theory, composition, music literature, instrumental and vocal performance, historical performance practices, and conducting. Required courses are MUSI 955, 956, 957, 958, 991, and 994. Additional courses at the 800 and 900 levels in music, or at the 800 and 900 levels in other departments, may be selected with the approval of the student's adviser to augment the required courses for a minimum total of 30 credits. Candidates pursuing advanced study in performance, conducting, or composition may also present a recital in consultation with their adviser and major teacher. A written essay of a substantive nature on a topic of the candidate's special interest is required, as approved by the adviser. Candidates must also pass a comprehensive oral examination that includes questions on the essay and on a number of unidentified scores from different historical periods. (Students are allowed to study these scores two hours prior to the exam.)

Music Education Option

The goal of the option in music education is to develop a broad knowledge at the graduate level in the fields of music education, performance, history, and theory. Required courses are MUSI 955, 994, and two courses selected from MUSI 805, 807, 809, 811, 813, 815, 956, 957, and 958. Also required are MUED 996 and either MUED 983 or 984. Each candidate will also complete an independent project (MUED 995) of a substantive nature in an area of the candidate's special interest as approved by the adviser. Additional courses at the 800 and 900 levels in music, or at the 800 and 900 levels in other departments, may be selected with the approval of the student's adviser to augment the required courses for a minimum total of 30 credits. Candidates must also pass a comprehensive oral examination that includes questions on the final project as well as on music history and/or theory, to be determined in consultation with the members of the candidate's oral examination committee.

Courses

For a complete listing of courses, check both **music** and **music education**.

» **Click to view course offerings**

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Music Education (MUED)

» **http://www.unh.edu/music/index.cfm?id=8ED2726B-DCA9-AB19-**

09B09B870282A910

» **Click to view course offerings**

This program is offered in Durham.

Natural Resources (NR)

» **http://www.naturalresources.unh.edu/**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.S.

The Department of Natural Resources and the Environment offers a master of science in natural resources in the following options.

Natural Resources: Environmental Conservation
Areas of interest include natural resource policy, conservation biology, sustainability, ecological ethics and values, international environmental affairs, and spatial data analysis (remote sensing and GIS).

Natural Resources: Environmental Economics
Areas of interest include agricultural economics, community and regional economics, land economics, water economics, and environmental economics.

Natural Resources: Forestry
Areas of interest include forest resource economics and management, biometrics, genetics, forest ecosystem dynamics, and spatial data analysis (remote sensing and GIS).

Natural Resources: General
This program is designed for students whose work crosses disciplinary boundaries within the natural resources and does not easily fit within one of the existing options. Students can later choose to specify one of the six options if their research interests change or if they become specific to one individual area.

Natural Resources: Soil and Water Resource Management
Areas of interest include wetlands, land-water interactions, groundwater chemistry, and biogeochemistry.

Natural Resources: TIDES (Integrated Coastal Ecosystem Science, Policy, and Management)
Areas of interest include ecosystem science, coastal resource management, natural resources and environmental policy, and marine resource education.

Natural Resources: Wildlife and Conservation Biology
Areas of interest include field and laboratory aspects of wildlife energetics, wildlife use of managed and unmanaged forest systems, habitat management and fragmentation, conservation biology, wetland wildlife ecology, and population dynamics.

Admission Requirements

Applicants are expected to have completed either an undergraduate degree in the field in which they plan to specialize or show adequate preparation in the basic support courses of the field. Students with good undergraduate records who lack a background in a particular field may be admitted to a program, provided they are prepared to correct any deficiencies. All entering students must have taken at least one statistics course or do so at the graduate level. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE).

Students entering the forestry option may elect to develop concentrations within any of the above-listed areas. Applicants are expected to have backgrounds in forestry or related biological sciences. Students interested in soil and water resource management are required to have adequate preparation in chemistry and mathematics as well as biological or Earth sciences. Students interested in wildlife and conservation biology are expected to have adequate preparation in biological sciences, chemistry, and mathematics. Students interested in environmental conservation should have a background appropriate for their area of interest. Since environmental conservation covers such a broad area, applicants are always reviewed carefully on an individual basis. Students interested in environmental economics should have a background in both economics and the environment. Four or more undergraduate courses in economics or environmental economics, including intermediate microeconomics and intermediate macroeconomics, are required as well as calculus and statistics. Students interested in the TIDES (Integrated Coastal Ecosystem Science, Policy, and Management) option are required to have adequate preparation in ecology, social sciences, and statistics.

Prior to submitting an application, applicants should contact one or more graduate faculty advisers to discuss programs and funding, and secure a commitment of a faculty member to serve as graduate adviser.

Degree Requirements

An M.S. degree is conferred upon successful completion of a program of not less than 30 credits for Natural Resources options: forestry, environmental conservation, environmental economics, general, soil and water resource management, and wildlife and conservation biology.

Course requirements or equivalents:
NR 903, Approach to Research (2 credits) and
One additional research methods class:
- NR 904, Survey Research Methods (2 credits) or
- NR 905, Grant Writing (2 credits) or
- LSA 950, Scientific Communication (2 credits)

NR 993, Seminar **or** NR 947, Current Issues in Ecosystem Ecology
NR 996, Natural Resource Education
Quantitative methods course
NR 899, Master's Thesis and a formal presentation of the thesis **or**
NR 998, Directed Research and directed research results

Environmental Conservation Option Requirements:
- One course in Ecology

Environmental Economics Option Requirements:

ECON 926, Econometrics I

ECON 976, Microeconomics I

Natural Resources: TIDES option requires a minimum of 36 credits.

NR: TIDES course requirements or equivalents:

NR 903, Approach to Research

NR 915, Seminar: Coastal Challenges for Science-Policy Collaborations

NR 916, Linking Decision-making and Coastal Ecosystem Science

NR 917, Coastal Ecosystem Science Policy and Management Internship

NR 824, Resolving Environmental Conflicts

Quantitative methods course

One ecology course

One resource management course

NR 998, Directed Research and directed research results

A Cooperative Doctoral Program

The Department of Natural Resources and the Environment participates in the Natural Resources and Earth System Science Ph.D. Program (NRESS), an interdepartmental degree offered at UNH. For further details on this program, please visit the NRESS program page.

Natural Resources and Earth Systems Science (NRES)

» **http://www.unh.edu/nressphd/**

» **Click to view course offerings**

This program is offered in Durham.

Affiliate Assistant Professor: Mark B Green

Degree Offered: Ph.D.

The graduate program in Natural Resources and Earth Systems Science (NRESS) is an interdepartmental program offering the Ph.D. degree for interdisciplinary work in areas related to the understanding and management of the environment in the broadest context. Areas of study include, but are not limited to, ecosystem science, biogeochemical cycling, geochemical systems, atmospheric science, environmental philosophy, forestry, geologic science, hydrology, marine science, oceanography, social science, environmental policy and ethics, environmental education, and multidisciplinary natural resources management.

The NRESS Ph.D. program offers two degrees:

- Ph.D. in Natural Resources and Environmental Studies (NRES)

Students in NRES focus on problems dealing with the allocation and distribution of natural resources, policies at the local to global scale, and ethical and societal factors that affect resource management. Students receiving the Ph.D. degree in NRES will typically have a bachelor's and/or master's degree in economics, environmental conservation, philosophy, political science, or sociology.

- Ph.D. in Earth and Environmental Sciences (EES)

Students in EES focus on problems dealing with the physical, chemical, and/or biological processes that affect earth and environmental systems. Students receiving the Ph.D. degree in EES will typically have a bachelor's and/or master's degree in biology, ecology, environmental science, geology, hydrology, or microbiology.

Admission Requirements

Applicants to the NRESS Program come from a wide range of undergraduate majors and master's degree concentrations. Individuals are admitted based on the quality of their previous work and its relevance to the particular area of study they propose to pursue.

Students are expected to have completed a master's degree before entering the program, although this is not a requirement.

All applicants must identify an adviser before being admitted, and this faculty member must agree to serve as the applicant's adviser. Certain applicants may be admitted with deficiencies identified by their adviser and/or by the executive committee. These deficiencies normally must be corrected in the first year of the program. All applicants must submit GRE scores. Please see the program website for details on applying to the program.

Degree Requirements

The requirements of the doctoral program are flexible to accommodate the diverse interests and needs of students. All students in the NRESS program must meet the requirements listed below.

Committees and Coursework

The Ph.D. guidance and dissertation committees must consist of at least five members. The chair must be a member of the NRESS faculty. Three of the five members (including the chair) must be NRESS faculty, and committee members must be from more than one academic department. Students are strongly encouraged to include at least one off-campus member. Off-campus committee members must hold a doctoral degree and be approved by the student's adviser, the NRESS Program, and the Graduate School dean. Students should select their guidance committee in a timely manner, within one year for full-time students and two years for part-time students.

Core Area Course Requirements

All students will take one course in each of four core areas while enrolled in the program: natural sciences, ethics/policy/law, methods, and seminar. Students are also required to take NRES 997, Interdisciplinary Research in Natural Resources and Earth and Environmental Sciences, preferably within the first year of enrollment. Any course used to satisfy the natural sciences, ethics/policy/law, and methods core areas must be a classroom course of at least 3 credits. The seminar course must be interactive and must be at least 1 credit. Independent study courses may not be used to satisfy core requirements. Students must complete a Coursework Approval Form, which summarizes all courses to be taken, and obtain signatures from their adviser, committee members, and the NRESS program chair once the coursework is

completed.

Students Entering the Program without a Master's Degree

Students entering the program without a master's degree are expected to complete a minimum of 36 credit hours. There is not a specific credit requirement beyond the required four core courses for students who have completed a M.S. or M.A. degree in a related field. Students enter the NRESS program with diverse backgrounds and preparation in their particular area of study. Therefore, final credit requirements are determined by the guidance committee and may include additional coursework necessary to enhance the student's selected field of study and/or correct any deficiencies in the student's previous program. Students may apply a maximum of 12 credits of independent study and/or seminar courses to their total course requirement.

Transfer Credits

Graduate-level courses taken prior to admission may be transferred into the program and applied to the total only if they were not taken while matriculated in another degree program, as per Graduate School policy. These courses may not be used to meet the core course requirements. Transfer of credits must be approved by the adviser, the guidance committee, and the Graduate School.

Language Proficiency

Language proficiency may be required at the discretion of the student's adviser/committee. If required, a student will need to show proficiency in one foreign language or one computer language.

Examinations

Each student is required to pass three examinations, each of which has both a written and oral component. Additional preliminary examinations may be administered before the three required exams as the committee deems necessary. Performance on such an exam will determine areas where the student needs additional coursework or could result in the student's removal from the program.

Comprehensive exam: The student must prepare an extensive written answer to one question from each committee member that covers the concepts and factual material deemed essential for the student's program. Three weeks are allowed for completion of the exam, after which the student gives an oral presentation to the committee. This exam is taken within three years of initiation of graduate study in the program. The committee may require a student to repeat part or all of the comprehensive exam if the student's performance is deemed unsatisfactory.

Proposal exam: The student must present to the committee a written proposal on the dissertation research topic. Once the proposal is written, the student will complete a public oral presentation of the proposed research, followed by an oral examination by the committee.

Final exam: The student must complete a written Ph.D. dissertation prior to the final exam. Once written, the student is required to complete an oral defense of the dissertation, which will include both a public presentation and oral examination by the committee.

A student may be required to take additional courses following either the comprehensive or proposal exam, or may be removed from the program following failure of any of the required exams. Students are advanced to candidacy after successfully completing the comprehensive

exam, proposal exam, and all coursework required by the guidance committee as summarized on the Coursework Approval Form.

Nursing (NURS)

» **http://www.chhs.unh.edu/nursing/index.html**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: MS, DNP

The Department of Nursing offers the master of science degree in nursing under two programs: Graduate Program in Nursing and Direct Entry Master's in Nursing. We also offer the post-master's family nurse practitioner certificate program and doctor of nursing practice degree program.

Graduate Program in Nursing

The Graduate Program in nursing currently offers three clinical practice tracks: clinical nurse leader (CNL^{sm}), evidence-based nursing (EBN), and family nurse practitioner (FNP). Within the evidence-based nursing track, students can complete a program of study in clinical nursing education. Depending on track, programs are designed to be completed in three to four semesters of full-time study including one summer. Individual plans of study are available for those wishing to pursue part-time study. Although no guarantees are given, the department will try and accommodate student requests to the fullest extent possible. All tracks prepare nurses for evidence-based practice through critical inquiry using a variety of instructional modalities.

Admission Requirements

All applicants who are not native English speakers are required to demonstrate a sufficient level of proficiency in the English language to meet the admission requirement of the Graduate School. Proficiency can be demonstrated by the receipt of a bachelor's or advanced degree from an accredited institution of higher education in the United States or from a university in another country where English is the primary language of instruction. All other non-native speakers must achieve a minimum score of 550 (paper-based), 213 (computer-based), or 80 (Internet-based) on the Test of English as Foreign Language (TOEFL). The Graduate Record Exam (GRE) and Miller Analogies Test (MAT) are not required. Individuals apply to the University of New Hampshire Graduate School.

Graduate Program in Nursing Admission Requirements: Registered nurses (RNs) who have successfully passed the NCLEX-RN, currently hold an unencumbered active RN license in the United States, and who hold a baccalaureate degree in either nursing or another field can be considered for admission. Applicants are required to have a good academic record and completion of coursework in statistics and research.

RNs whose baccalaureate degree is in a discipline other than nursing may apply to the Evidence-Based Nursing track. Once the master of science degree in nursing (M.S.) is conferred, the student may apply to the Post-Master's Family Nurse Practitioner Certificate Program, if desired.

Letters of recommendation should be substantial, with at least one academic reference from your nursing program and two references from current nursing professionals with graduate education background. Letters of recommendation from family or friends are not acceptable. The application deadline for fall admission is April 1st. The deadline for spring admission is November 1st. An interview may be requested.

The Student Affairs Council in the Department of Nursing reviews completed applications September through May (rolling admission).

Post-Master's Family Nurse Practitioner Certificate Program Admission Requirements: In addition to the standard graduate school requirements, the nursing department requires:

1. Applicant must hold unencumbered, active RN license in the United States and have a master's degree in nursing.
2. Applicant should submit two letters of reference. References should be substantial with one academic, if available, and one current professional with graduate education background. Letters of recommendation from family or friends are not acceptable.
3. A course description should be submitted for any course you request waived.

Direct Entry Master's in Nursing Admission Requirements: A grade point average of 3.0 or better is suggested. Previous coursework and professional experience is taken into consideration. Prerequisite courses must be complete at the time the application is reviewed. These include Human Anatomy & Physiology I and II with lab, Microbiology at the cellular level, and Statistics with a grade of B or better.

Knowledge of the basic processes and methods of research is necessary for students entering the DEMN program. While many undergraduate programs include a research methods course, not all programs do so. If a student does not have a background in research, he or she should enroll in an introductory research course or self-study this content prior to matriculation in the DEMN program. The following are introductory nursing research textbooks that may be used for self-study:

- Boswell, C. & Cannon, S. (2009). *Introduction to Nursing Research: Incorporating Evidence Based Practice* 2nd ed. Jones & Bartlett Publishers;
- Fain, J. (2009). *Reading, Understanding, and Applying Nursing Research* 3rd ed. F. A. Davis Company; and
- Polit, D. & Tatano, B. (2009). *Essentials of Nursing Research: Appraising Evidence for Nursing Practice* 7th ed. Lippincott Williams & Wilkins.

Letters of recommendation should be substantial with at least one academic reference and two references from current professionals with graduate education background. Letters of recommendation from family or friends are not acceptable. The completed application deadline is April 1st with staggered admissions.

Doctor of Nursing Practice Admission Requirements:

- ***Graduate School Application*:** Applicants must complete the Graduate School application, which can be found at **www.gradschool.unh.edu**.
- ***Official Transcripts:*** Applicants must submit one official transcript from each post-secondary institution attended. Applicants must have completed a master's degree in nursing from a CCNE or NLNAC accredited institution. A minimum 3.25 cumulative GPA for graduate work is preferred.
- ***Registered Nurse Licensure:*** An unencumbered registered nurse license in the United States must be documented at the time of application.
- ***Advanced Nursing Certification:*** Applicant must have obtained an MS in Nursing and national board certification in their area of specialty, as appropriate. National certification is optional for applicants with an MSN in health systems management (nursing administration) or nursing informatics.
- ***Letters of Recommendation:*** Applicant must submit professional references from three persons who hold a doctoral degree addressing academic skills, including oral and written communication, as well as clinical competence. Applicants are strongly encouraged to select a doctorally prepared **nurse** as one of the three referees.
- ***Curriculum vitae or resume*** that includes academic preparation, clinical experience and professional activities.
- ***Professional Statement:*** The professional statement must include a written essay responding to each of the following.

  1) How will a Doctor of Nursing practice degree from the University of New Hampshire help you attain your professional goals?

  2) Describe your current advanced nursing role, or if you are pursuing a new specialty, explain what you are planning to do with your nursing career in your specialty after you complete the Doctor of Nursing Practice.

  3) In addition to the information contained in your resume, what strengths do you possess that would contribute to your success in the Doctor of Nursing practice program and in a community of interprofessional scholars?

  4) Identify one scholarly inquiry from your practice you would like to explore as part of the DNP program (e.g., quality improvement initiative, evidence-based practice guidelines, new model of care, policy analysis).
- ***Interview:*** After initial review of the application, applicants may be contacted for an interview.
- ***Technical Requirements:*** UNH Department of Nursing considers the Internet communication link an essential learning resource for doctoral students. DNP students will be required to have a home computer with Microsoft Office Suite (or equivalent), printer, and Internet service provider that has high-speed, broadband access. Proficiency required in PowerPoint and scholarly paper writing in APA format (American Psychological Association).

Application deadline is November 1 for spring admission.

Accelerated Master's Program for Current UNH Senior Students

Graduate Program in Nursing Accelerated Master's:

Qualified senior students at the University of New Hampshire may be admitted to the Graduate School provided they have followed normal application procedures; they must have been admitted for the semester in which they wish to enroll in courses for graduate credit. A 3.2 cumulative grade-point average is normally required to be considered for the accelerated master's program. Such seniors are normally admitted prior to the start of their last undergraduate semester. Seniors who have been admitted under accelerated master's program may register for a maximum of three courses for up to 12 graduate credits.

When seniors admitted to the accelerated master's program have registered for graduate courses, they must maintain a grade-point average of 3.20, complete their undergraduate degree as planned, and pass graduate courses taken for credit with a grade of B- or better. If these conditions are not met, admission is withdrawn.

Students accepted under accelerated master's follow the clinical nurse leader or evidence-based nursing track. Undergraduate students accepted as graduate nursing students under accelerated master's guidelines, are admitted with the stipulation that their RN license must be obtained prior to beginning any clinical course. Stipulation is removed upon verification of the RN license provided to the department of nursing.

Apply to the accelerated master's program through the Graduate School by **April 1 of your junior year** if you wish to begin summer after your junior year, by **July 1 after your junior year** if you wish to begin fall of your senior year. Apply **November 1 of your senior year** if you wish to begin spring of your senior year. Admission is provisional: must have RN license before registering for NURS 952 or NURS 955.

Direct Entry Master's in Nursing Accelerated Master's:

The Direct Entry Master's in Nursing Program provides an opportunity for accelerated admission to the graduate program for full time undergraduate UNH students who meet admission criteria. To be considered, undergraduate students must have completed all major requirements by the fall of their senior year. A grade point average of 3.4 or better is suggested. Previous course work is taken into consideration. Pre-requisite courses must be complete at the time the application is reviewed. These include human anatomy & physiology I and II with labs, microbiology at the cellular level, and statistics with a grade of B or better.

The curriculum begins in January and includes two summer sessions. Students graduate as an advanced generalist with a Master of Science (MS) degree in nursing and upon passing certification examination, as a Clinical Nurse Leader (CNL). Direct entry courses taken during the spring of the senior year of undergraduate program will fulfill elective credits to complete

BA/BS degree requirements at UNH. This accelerated, full-time program is a five-semester, 68-credit course of study.

Students are admitted with the stipulation that they must submit final transcript with degree conferred prior to enrolling in fall semester courses and pass NCLEX-RN prior to completing the program. The stipulation is met once the final transcript and RN license are received. Students are eligible to taken the NCLEX-RN after completing a total of 59 credits of accelerated study (including summer). Students take the CNL certification examination in their final semester.

Applicants are strongly encouraged to meet with the graduate program in nursing coordinator and their discipline-specific adviser early on in their undergraduate program to plan this course of study.

Students may apply during the second semester of their junior year in major by April 1 with staggered admissions until the class is filled. Applications are reviewed through May then review resumes in September.

Degree Requirements

Clinical Nurse Leader Track, 33 Credits

Students graduate as an advanced generalist as a Clinical Nurse Leader (CNL) with a master of science degree. Graduates are eligible to sit for the Clinical Nurse Leader national certification examination. The CNL is a role in the field of nursing designed to provide master's-prepared, point-of-care nurse leaders with the ability to manage and solve complex patient problems within a systems framework.

Fall

Abbreviation	Course Number	Title	Credits
NURS	908	Clinical Application of Human Physiology	3
NURS	951	Clinical Epidemiology & Decision Analysis	3
NURS	953	Promoting Quality Management	4

Spring

Abbreviation	Course Number	Title	Credits
NURS	925	Health Care Systems & Leadership	3
NURS	952	Clinical Nursing Leadership	2
NURS	952C	Clinical Nursing Leadership Clinical	6
NURS	968	Nursing Science and Evidence Based Practice	3

Summer

Abbreviation	Course Number	Title	Credits

NURS	901	Health Policy	3
NURS	958	Clinical Nurse Leader Capstone	6

Evidence-Based Nursing Track, 31 Credits

The evidence-based nursing track focuses on developing advanced generalist nursing practice in a focused area of study, promoting interdisciplinary collaboration, fostering life-long learning, and preparing students for the leading edge of health care knowledge and delivery. Students strengthen knowledge and skills in clinical decision making, the application of nursing interventions, and their ability to critique and appropriately use evidence as a foundation for practice. In this graduate track, students study nursing as an applied discipline, advancing their knowledge of theoretical perspectives for clinical practice, with an emphasis on leadership; the cultural, social, and political context of health and illness; and quality improvement methodologies. Students are mentored in the enactment of leadership strategies to improve quality care in nursing practice through an intensive clinical practicum. In NURS 956, the capstone course for the evidence-based nursing track, the student will be required to complete a scholarly project under the direction of a faculty member in collaboration with agency preceptor. A formal presentation is required.

Fall I

Abbreviation	Course Number	Title	Credits
NURS	908	Clinical Application of Human Physiology	3
NURS	944	Population Health Promotion and Risk Reduction	3
NURS	951	Clinical Epidemiology & Decision Analysis	3

Spring

Abbreviation	Course Number	Title	Credits
NURS	925	Health Care Systems & Leadership	3
NURS	968	Nursing Science and Evidence Based Practice	3

Summer

Abbreviation	Course Number	Title	Credits
NURS	901	Health Policy	3
NURS	953	Promoting Quality Management	4

Fall II

Abbreviation	Course Number	Title	Credits
NURS	909	Advanced Health & Illness Appraisal	3
NURS	955	Practicum in Advanced Nursing Practice	3
NURS	956	Capstone Project Seminar	3

Family Nurse Practitioner Track, 45 Credits

This program prepares family nurse practitioners (FNPs) with specialized knowledge and clinical competency to practice as licensed independent practitioners across the life span. FNPs practice in ambulatory, acute, and long-term care as primary and/or specialty providers to individuals, families, and groups. The UNH program prepares these advanced practice registered nurses (APRNs) to diagnose and manage acute episodic and chronic illnesses across the life span and simple-to-complex continuum. Health promotion, disease prevention, teaching, counseling, and coaching are emphasized. The capstone course, NURS 939, is the final integrated clinical practicum. At the completion of the program, students are eligible to sit for national certification as a family nurse practitioner. Students are also prepared to enter doctoral study. Upon licensure, FNPs may practice autonomously as well as in collaboration with other health professionals.

Fall I

Abbreviation	Course Number	Title	Credits
NURS	908	Clinical Application of Human Physiology	3
NURS	909	Advanced Health & Illness Appraisal	3
NURS	951	Clinical Epidemiology & Decision Analysis	3

Spring I

Abbreviation	Course Number	Title	Credits
NURS	907	Advanced Pharmacology	3
NURS	935	Primary Care of Families I	3
NURS	936	Practicum in the Primary Care of Families I	3
NURS	968	Nursing Science and Evidence Based Practice	3

Summer

Abbreviation	Course Number	Title	Credits
NURS	901	Health Policy	3
NURS	925	Health Care Systems & Leadership	3

Fall II

Abbreviation	Course Number	Title	Credits
NURS	937	Primary Care of Families II	3
NURS	938	Practicum in the Primary Care of Families II	3
NURS	944	Population Health Promotion & Risk Reduction	3

Spring II

Abbreviation	Course Number	Title	Credits

NURS	810	Families in Health & Illness	3
NURS	939	Seminar & Practicum in Primary Care of Families III	6

Post-Master's Family Nurse Practitioner Certificate, 12-39 Credits

The Department of Nursing offers the Post-Master's Family Nurse Practitioner Certificate Program for students who completed a master of science degree in nursing. The certificate of advanced practice is designed for those individuals with a master's degree in nursing who wish to expand their practice into the role of a family nurse practitioner. The PM-FNP specialty area prepares nurses to provide comprehensive care that includes health promotion, maintenance and restoration for persons across the life span.

Depending on educational background and previous coursework in master's program, students accepted into the PM-FNP certificate program are required to take as few as 3 and as many as 12 courses or 12-39 credits. Successful completion of the required curriculum qualifies the RN to sit for the Family Nurse Practitioner Certification Examination.

Fall I

Abbreviation	Course Number	Title	Credits
NURS	908	Clinical Application of Human Physiology	3
NURS	909	Advanced Health & Illness Appraisal	3
NURS	951	Clinical Epidemiology & Decision Analysis	3

Spring I

Abbreviation	Course Number	Title	Credits
NURS	907	Advanced Pharmacology	3
NURS	935	Primary Care of Families I	3
NURS	936	Practicum in the Primary Care of Families I	3

Summer

Abbreviation	Course Number	Title	Credits	Summer
NURS	925	Health Care Systems & Leadership	3	

Fall II

Abbreviation	Course Number	Title	Credits
NURS	937	Primary Care of Families II	3
NURS	938	Practicum in the Primary Care of Families II	3
NURS	944	Population Health Promotion & Risk Reduction	3

Spring II

	Course		

Abbreviation	Number	Title	Credits
NURS	810	Families in Health & Illness	3
NURS	939	Seminar & Practicum in Primary Care of Families III	6

Direct Entry Master's in Nursing, 68 Credits

The Direct Entry Master's in Nursing Program is an accelerated, full-time, five-semester, 68-credit course of study designed for non-RN students who hold a B.S. or B.A. or higher degree in a field other than nursing. Students are admitted with the stipulation that they must pass NCLEX-RN prior to completion of the program. The stipulation is met once the RN license is received. Students are eligible to take the NCLEX-RN after completing a total of 59 credits of accelerated study (including summer). The curriculum begins in January and includes two summer sessions. Students graduate as an advanced generalist with a master of science (MS) degree in nursing and upon passing certification examination, as a Clinical Nurse Leader (CNL). Students take the CNL certification examination in their final semester. The CNL is a role in the field of nursing designed to provide master's-prepared, point-of-care nurse leaders with the ability to manage and solve complex patient problems within a systems framework. As part of the CNL curriculum, students study master's level research in health promotion and illness management. Students complete a clinical immersion experience of approximately 300 clinical hours. Students conclude their CNL master's preparation in a clinical nurse leader capstone, NURS 958, Clinical Nurse Leader Capstone.

Spring I

Abbreviation	Course Number	Title	Credits
NURS	806	Clinical Inquiry	4
NURS	807	Pathophysiology and Pharmacology	4
NURS	813	Health Assessment and Clinical Nursing Theory	3
NURS	813C	Health Assessment and Clinical Nursing	2
NURS	825	Collaborative Care I: Care of Older Adult	3
Total			16

Summer I

Abbreviation	Course Number	Title	Credits
NURS	826	Caring for People with Severe & Persistent Mental Illness	2
NURS	826C	Caring for People with Severe & Persistent Mental Illness Clinical	2
NURS	830	Collaborative Care II: Childbearing & Childrearing Families	4
NURS	830C	Collaborative Care II: Childbearing & Childrearing Families Clinical	2
NURS	951	Clinical Epidemiology and Decision Analysis	3

Total			13

Fall

Abbreviation	Course Number	Title	Credits
NURS	827	Collaborative Care III: Managing Acute & Complex Care of Individuals	3
NURS	827C	Collaborative Care III: Managing Acute & Complex Care of Individuals Clinical	3
NURS	828	Public Health Nursing	3
NURS	908	Clinical Application of Human Physiology	3
NURS	953	Promoting Quality Management	4
Total			16

Spring II

Abbreviation	Course Number	Title	Credits
NURS	925	Health Care Systems & Leadership	3
NURS	952	Clinical Nursing Leadership	2
NURS	952C	Clinical Nursing Leadership Clinical	6
NURS	968	Nursing Science and Evidence Based Practice	3
Total			14

Eligible for NCLEX-RN

Summer II

Abbreviation	Course Number	Title	Credits
NURS	901	Health Policy	3
NURS	958	Clinical Nurse Leader Capstone	6
Total			9

Capstone Experience for All Master's Nursing Tracks

For clinical nurse leader (CNL), the capstone course, NURS 958, Clinical Nurse Leader Capstone, requires students to complete 112 clinical hours plus a scholarly project, which synthesizes advanced practice knowledge and skills to address substantive nursing practice issues. For evidenced-based nursing (EBN), the capstone course, NURS 956, Capstone Project Seminar, requires students to complete a scholarly project. CNL and FNP students may elect to complete Master's Thesis, NURS 899 (6 credits). EBN students may elect to complete a thesis and register for 6 credits of NURS 899 as the capstone in place of NURS 956. If a student opts to do a thesis, the student should discuss this option with a faculty adviser early in the program of study. For family nurse practitioner (FNP and PM-FNP), the capstone course, NURS 939, Primary Care of Families III, is the final integrated clinical practicum.

Doctor of Nursing Practice (DNP), 36 Credits

The purpose of the DNP is to prepare clinically focused advanced practice nurses who are capable of translating knowledge into the clinical setting. DNP prepared practitioners address the multiple strengths and weaknesses in the current health care systems through roles as leaders, educators and agents of change. The transfer of knowledge by DNP graduates positively impacts the development of individuals, families, communities, society and the discipline of nursing. Students previously enrolled in a CCNE-accredited, DNP program will be allowed to transfer two courses or 6 credits into the UNH DNP program. Waiver of required courses based on transfer courses will be determined by the Doctoral Program Director in collaboration with the Department of Nursing Student Affairs Council and The Graduate School.

DNP Curriculum

- Post-master's, practice-focused, professional doctorate program
- Executive education model
- 36 credits
- Hybrid and online courses held on select Tuesday evenings and Saturday
- Planned completion is 2.5 years

Requirements for the Doctorate of Nursing Practice degree include: 10 courses and 4 doctoral seminars completed at the level of B or better; verification of 1,000 advanced practice clinical hours; a submitted, accepted or published professional manuscript in a peer reviewed journal which was derived from the student's doctoral work; successful defense of a practice dissertation; and acceptance of the written practice dissertation by the doctoral committee.

Spring I

Abbreviation	Course Number	Title	Credits
NURS	961	Evolution of the DNP	1
NURS	962	Science of Advanced Nursing Practice	3
NURS	963	Advanced Epidemiology	3

Summer I

Abbreviation	Course Number	Title	Credits
NURS	964	Technology and Health Care	3

Fall I

Abbreviation	Course Number	Title	Credits
NURS	967	Evidence Synthesis	3
NURS	974	Organizational Behavior	3

January Term I

Abbreviation	Course Number	Title	Credits
NURS	971	Data Analysis I: Qualitative Methods	1

Spring II

Abbreviation	Course Number	Title	Credits
NURS	972	Data Analysis II: Quantitative Methods	3
NURS	973	Health Care Quality	3

Summer II

Abbreviation	Course Number	Title	Credits
NURS	980	Doctoral Seminar I	3

Fall II

Abbreviation	Course Number	Title	Credits
NURS	965	The Social Power of Leadership in the 21st Century	3
NURS	981	Doctoral Seminar II	3

January Term II

Abbreviation	Course Number	Title	Credits
NURS	982	Doctoral Seminar III	1

Spring III

Abbreviation	Course Number	Title	Credits
NURS	983	Doctoral Seminar IV	3

Research and Scholarly Activities

The graduate faculty of the University's nursing program believe learning is a creative process wherein students are active participants in their education, growth, and development. Faculty members are facilitators and mentors to students within a supportive scholarly environment. Students are prepared to be skilled, knowledgeable, and reflective leaders in health care who practice as nurse practitioners, clinical nurse leaders, or clinical educators.

The generation, dissemination, and application of evidenced-based nursing knowledge and practice are a central mission for the nursing department. Health care of vulnerable populations is the research focus among the faculty. Faculty engage in scholarly inquiry across diverse topics such as care-giving, acute symptom management, clinical decision-making, adolescent pregnancy, elder care-giving, and cultural diversity. Faculty publications, research, public policy initiatives, and other consultative/professional activities may be viewed at the department's website.

Nutritional Sciences (NUTR)

» **http://mcbsgrad.unh.edu/**

» **Click to view course offerings**

This program is offered in Durham.

The Department of Molecular, Cellular, and Biomedical Sciences (MCBS) offers the master of science degree in nutritional science, and in conjunction with animal science faculty in the Department of Biological Sciences, a Ph.D. in animal and nutritional sciences. MCBS also offers a postgraduate internship in dietetics.

Information on these programs is described below and at the website listed above. Please view as well, the course listings for animal sciences (ANSC) and molecular, cellular, and biological sciences (MCBS).

Degree Programs Offered: M.S., Ph.D.

The graduate program includes the M.S. degree in nutritional science and Ph.D. degree in animal and nutritional sciences. Areas of research specialization include human nutrition, mammalian physiology and pathology, nutritional biochemistry and metabolism, and reproduction and endocrinology. Research activities utilize human, animal, and cell culture systems to investigate nutrient metabolism and a molecular-level understanding of life processes and diseases.

Dietetic Internship Program

In addition to degree-granting programs, the UNH Nutrition Program offers an American Dietetic Association-approved dietetic internship program. The emphasis of the internship is on "Health Promotion and Disease Prevention." In addition to more than 1,200 hours of practicum work, students earn 12 graduate-level credits as part of the internship. These credits may be applied to a master's degree if the candidate is accepted into the graduate program at UNH.

Admission Requirements

Students applying for the M.S. or Ph.D. program will be expected to present recent scores (within five years) from the general test of the Graduate Record Examination (GRE) and possess a background in basic sciences appropriate for advanced study in the proposed area of specialization (for example, courses in biology, chemistry, organic chemistry, biochemistry, and physics). Although not required for candidacy in the Ph.D. program, an M.S. degree is suggested for most students. The student's committee may require certain undergraduate courses as part of the graduate program if additional competencies would be beneficial to the student. Students interested in preparing themselves for admittance to a dietetic internship while pursuing the graduate degree should contact Clinical Associate Professor Ruth Reilly in advance of applying at (603) 862-2164, **ruth.reilly@unh.edu**) in order to determine the best course of action.

Degree Requirements

M.S. in Nutritional Sciences

In this program students become actively engaged in a research project related to the nutritional sciences and gain a comprehensive understanding of nutritional science through their coursework. Emphasis is placed on active participation in original hypothesis-driven research of publishable quality. The program is for students who anticipate a professional career involving research or discovery, with a strong background in the basic biology and chemistry of nutrition. This degree may be most appropriate for students who expect to pursue further advanced study, e.g., additional graduate studies or professional school, after graduation.

The program of study must include a minimum of 30 graduate credits as well as completion of a Master's Thesis based on a research project. Six credits of thesis research (NUTR 899) are required. No more than 4 credits of investigations (NUTR 995) can apply toward the total credit count. Each candidate must present at least two seminars (exclusive of the thesis defense) and must serve as a teaching assistant for at least one semester. A thesis committee will be appointed early in the program and will consist of at least three members of the graduate faculty; one of these will be the primary mentor. Students will design a program of study in close consultation with their thesis committee, including their academic courses and scientific research project. Candidates will be required to pass an oral examination based on their graduate courses and completed thesis. Skills in communicating scientific information will be fostered by presenting one seminar during each year of enrollment. This requirement could include the master's thesis defense seminar.

Ph.D. in Animal and Nutritional Sciences

Coursework for the Ph.D. in animal and nutritional science is determined by the student's committee.

Students must complete a dissertation based on original hypothesis-driven research of publishable quality. A public presentation of the dissertation research findings will be followed by a final examination, which will be primarily an oral defense of the dissertation. The candidate will be required to serve as a teaching assistant for a minimum of two semesters or to teach a course for one semester. Aptitude in scientific communication will be developed by presentation of one seminar during each year of enrollment, not including the dissertation defense.

For a more detailed description and list of courses offered, please visit **www.mcbsgrad.unh.edu**.

Courses

For a complete listing of courses, check **animal science** and **nutritional science**. All graduate students are required to take **MCBS 997, Seminar**.

» **Click to view course offerings**

^ **back to top**

Occupational Therapy (OT)

» **http://www.chhs.unh.edu/ot/**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.S.

Certificate Offered: Assistive Technology

The Department of Occupational Therapy offers the master of science degree in occupational therapy and a graduate certificate in assistive technology.

Admission Requirements

The master's degree prepares students for entry-level occupational therapy practice. Students gain the knowledge and skills to work with people of all ages to enable their participation within their natural environments and daily life activities, including education, work, self-care, home management, and leisure.

The Occupational Therapy Program at the University of New Hampshire is accredited by the Accreditation Council for Occupational Therapy Education (ACOTE) of the American Occupational Therapy Association (AOTA), located at 4720 Montgomery Lane, Suite 200 Bethesda, MD 20824-3449. ACOTE's telephone number is (301) 652-AOTA and its website is **www.acoteonline.org**.

Graduates of the program are eligible to sit for the Certification Examination for the Occupational Therapist, administered by the National Board for Certification in Occupational Therapy, Inc. (NBCOT). After successful completion of this exam, the individual will be an occupational therapist, registered (OTR). In addition, most states require licensure in order to practice; however, state licenses are usually based on the results of the NBCOT Certification Examination. A felony conviction may affect a graduate's ability to sit for the NBCOT Certification Examination or attain state licensure.

Applying to the Master's Program in Occupational Therapy

Applicants need a minimum overall grade point of 3.0 for undergraduate coursework and the following prerequisite courses:

- human anatomy and physiology (two courses with labs)
- neuroanatomy (with a lab preferred), abnormal psychology, human development (two courses, one in child development and one in adult development preferred), statistics.

Applicants must complete and submit the **Prerequisite Verification Form** with their application. All prerequisites must be completed prior to fall entry into the professional master's program. Priority for admission will be given to applicants with all prerequisite courses completed.

Three letters of reference must accompany the application. Two of these must address the applicant's educational abilities/performance. One letter must address the applicant's

interpersonal/communication skills as observed in a volunteer or paid-employment setting.

Applications are accepted beginning in the fall of the year prior to the year the candidate wishes to begin, until January 15. However, we encourage applications to be submitted to the Graduate School by the end of December to ensure that all applications are complete in time for review. We also encourage applicants to periodically review their application status on the graduate school website, and to contact the graduate school if items are missing. Due to limited space, admission to the program is a competitive process and not all qualified students are admitted.

Advanced-standing Professional Master's Degree Students: Students who have completed a baccalaureate degree in Occupational Science at UNH as part of a combined B.S./M.S. program will take the first year of the two-and-a-half year (five semesters) professional master's program as part of their senior year B.S. degree requirements. These students will be identified as advanced-standing students in the professional master's program and will need to complete three additional semesters of coursework, which includes fieldwork, to meet the M.S. degree requirements. Students in the combined B.S./M.S. program must apply for admission to the Graduate School to enter into the professional master's degree program, meet Graduate School requirements for entry into the graduate portion of their program, and be officially admitted by the Graduate School. An overall minimum grade point of 3.0 and a grade of B- or better in all senior-level OT coursework is required for admission.

Degree Requirements

Graduate students include those entering the first year of the professional OT M.S. program as new students and those who are in the B.S./M.S. professional OT program, who begin as graduate students in the second year of the OT professional program. The B.S./M.S. track students are considered advanced-standing graduate students. Graduate academic requirements are listed below for both the advanced-standing graduate students and new entering graduate students. In addition to coursework requirements, students must meet professional behavioral standards, which are outlined in the Department of Occupational Therapy Policy and Procedure Manual.

Professional OT Program M.S. Requirements for Advanced-Standing B.S./M.S. Graduate Students

The program consists of two-and-a-half years (five semesters) of coursework, including fieldwork experiences, with no summer semester coursework. Students are also required to enroll in a 1-credit January term (J-term) Level 1 fieldwork course in between the first and second semesters. For advanced-standing students, the first year of the program is completed as part of the B.S. degree in Occupational Science. Course requirements are listed below by year:

First year: OT 710, OT 741, OT 751, OT 752, OT 752L, OT 792 (J-term), one of OT 771 with OT 771L or OT 730 with OT 730L, OT 785, OT 760 with OT 760L, OT 745.

Second Year: OT 862 with OT 862L, OT 863 with OT 863L, one of OT 871 with OT 871L or OT 830 with OT 830L (whichever was not taken in year one), OT 854, OT 855, OT 856. The spring semester of the second year is an extended semester to accommodate the fieldwork schedule, requiring students to continue in their Level II fieldwork until the third week of June.

Third Year: OT 865, OT 875, OT 886. Students are also required to take a 3-4 credit graduate-level elective course, which is typically taken during the third year, and final semester.

Course requirements for OT 865, OT Practice and Professional Reasoning, include a capstone experience requiring students to synthesize knowledge from academic coursework and fieldwork experiences to develop a unique occupational therapy program to address the needs of a specific population or program.

Advanced-standing students are required to have 44 graduate credits, which includes 16 to 18 credits of fieldwork, in addition to 36 credits, which includes 1 to 3 credits of fieldwork, taken as part of the Occupational Science Degree.

Professional OT Program MS Requirements for Entering Graduate Students

The program consists of two-and-a-half years of study (five semesters) of coursework, including fieldwork experiences, with no summer semester coursework. Students are also required to enroll in a 1-credit January term (J-term) Level 1 fieldwork course in between the first and second semesters. The spring semester of the second year is an extended semester to accommodate the fieldwork schedule, requiring students to continue in their Level II fieldwork until the third week of June.

Required OT courses include:

First Year: OT 810, OT 841, OT 851, OT 852, OT 852L, OT 892 (J-term), one of OT 871 with OT 871/L or OT 830 with OT 830L, OT 885, OT 860 with OT 860L, OT 845

Second Year: OT 862 with OT 862L, OT 863 with OT 863L, OT 846, OT 871 with OT 871/L or OT 830 with OT 830L (whichever was not taken in year one), OT 854, OT 855, OT 856.

Third year: OT 865, OT 875, OT 886. Students are also required to take a 3-4 credit graduate-level elective course, which is typically taken in this third year, and final semester. The professional master's degree track requires the completion of 74 graduate-level credits, which includes 19 credits of fieldwork.

Course requirements for OT 865, OT Practice and Professional Reasoning, include a capstone experience requiring students to synthesize knowledge from academic coursework and fieldwork experiences to develop a unique occupational therapy program to address the needs of a specific population or program.

Academic Standards and Policies

Students must earn a minimum of B- in all required OT courses and receive a passing criterion score on the American Occupational Therapy Association Fieldwork Evaluation for the Occupational Therapist. Curriculum review and revision is undertaken annually. Students must maintain an overall GPA of 3.0 and meet professional behavioral standards that are explained in detail in the *OT Department Policy and Procedure Manual*. Occupational therapy faculty members work closely with students during academic advising sessions and share information about policy and requirement changes during registration periods as well as throughout the academic year. Students are also expected to take an active role in verifying expectations and should check with their departmental advisers each September for updated policies and

requirements. Program requirements and policies for retention in the major are posted annually in the *OT Department Policy and Procedure Manual*, which is available on the OT department's organization site on Blackboard.

Fieldwork experiences are scheduled in centers that are approved by the Department of Occupational Department. Students are responsible for transportation to off-campus fieldwork sites and other community learning experiences and are covered with basic personal liability insurance through UNH for the practical components of the curriculum. Students are responsible for meeting the health and criminal record clearances established by their fieldwork sites. Proof of immunization such as poliomyelitis, rubella, HINI, and hepatitis B may also be required. For Level II fieldwork, health insurance and a physical examination, including a tuberculin test, are required. After successfully completing both Level II fieldwork requirements and all academic work, students are awarded a master of science degree in occupational therapy. They are then eligible to sit for the National Board Certification Examination in Occupational Therapy (NBCOT). Consistent with NBCOT expectations, students must sit for the certification examination within two years of completion of coursework and fieldwork. A felony conviction may affect a graduate's ability to sit for the NBCOT certification examination and/or obtain licensure.

Curriculum design and schedule: Most classes will be scheduled during weekdays throughout the school day. Some courses require experiential learning, which students need to include in their weekly schedules.

Certificate in Assistive Technology

The graduate certificate in assistive technology is designed for individuals who have completed a bachelor's degree or higher, to provide assistive technology services for individuals with disabilities, at home, school, work, or play; to work collaboratively with a team implementing recommended assistive technology solutions and to become leaders in assistive technology. This certificate program applies to individuals pursuing or engaged in the following careers: occupational, speech, physical, or recreation therapy; rehabilitation counseling; engineering; education; special education; or nursing. For more information, please visit the **Assistive Technology website**.

Certificate Requirements

The 15-credit hour curriculum will consist of three 4-credit required courses plus one 3-credit elective.

Required Courses:

OT 822, Introduction to Assistive Technology (4 credits)

OR

* OT 830, Enhancing Occupational Performance Through Assistive Technology (3 credits) with co-requisite lab OT 830L (2 credits)

OT 826, Assistive Technology and Sensory, Communicative, and Cognitive Disabilities (4 credits)

One of the following courses:

OT 824, Assistive Technology and Physical Disabilities (4 credits)

COMM 920 02, AAC Seminar (4 credits)
COMM 914 02, Augmentative and Alternative Communication (4 credits)
EDUC 820, Introduction to Computer Applications for Education (4 credits)

One of the following elective course:
EDUC 850, Introduction to Exceptionality (4 credits)
EDUC 851C, Educating Exceptional Learners: Related Services (4 credits)
EDUC 854, Contemporary Issues of Developmental Disabilities (4 credits)
OT 852, Human Movement and Environmental Effects on Everyday Occupations (3 credits) with co-requisite lab 852L (1 credit)*
OT 895, Readings and Research in Occupational Therapy (4 credits)
OT 824, Assistive Technology and Physical Disabilities (4 credits)
COMM 914-02, Augmentative and Alternative Communication (4 credits)
COMM 920-02, AAC Seminar
EDUC 820, Introduction to Computer Applications for Education (4 credits)
SOC 860, Aging and Late Life Family (4 credits)
SW 812, Social Work and Developmental Disabilities (3 credits)
COMM 895, Special Topics (3 credits)

Note: With the exception of COMM 914, all assistive technology required courses will be offered on weekends to accommodate the needs of a diverse audience, many of whom work full time and could not otherwise take these courses. In addition, at least 25 percent of the content is provided off campus in order to take advantage of hands-on assistive technology learning opportunities in the community.

**** Courses restricted to OT majors only.***

Required and Elective Courses

Elective Courses

Abbreviation	Course Number	Title	Credits
OT	887	Upper Extremity Rehabilitation and Splinting	4
OT	890	Occupational Therapy and Sensory Integration	4
OT	891	Ergonomics and Occupational Therapy	4
OT	822	Introduction to Assistive Technology	4
OT	824	Assistive Technology and Physical Disabilities	4
OT	826	Assistive Technology and Sensory, Communicative, and Cognitive Disabilities	4
OT	893	Special Topics: AMPS - Assessment of Motor and Process Skills Training	4
OT	895	Readings and Research in Occupational Therapy	1 TO 6

Post-professional OT Program is closed to new admissions.

Required Professional OT Program Courses

Abbreviation	Course Number	Title	Credits
OT	841	Human Occupation	4
OT	851	Mind Body Systems/Neurologically-based Function and Dysfunction	3
OT	852	Human Movement and Environmental Effects on Everyday Occupations	3
OT	852L	Human Movement and Environmental Effects on Everyday Occupations Lab	1
OT	810	Occupational Therapy Practice and Professional Roles	3
OT	885	Research Methods and Application to Practice	3
OT	845	Administration and Policy for Occupational Therapy Practice	3
OT	860	Psychosocial Evaluation and Intervention	3
OT	860L	Psychosocial Evaluation and Intervention Lab	1
OT	871	Enabling Participation in Community Groups	3
OT	871L	Enabling Participation in Community Groups Lab	2
OT	830	Enhancing Occupational Performance Through Assistive Technology	3
OT	830L	Enhancing Occupational Performance Through Assistive Technology Lab	2
OT	892-J Term	Level 1 Fieldwork	1
OT	862	OT Evaluation and Intervention for Children	3
OT	862L	Occupational Therapy Evaluation and Intervention for Children Lab	1
OT	863	Occupational Therapy Evaluation and Intervention for Adults	3
OT	863L	Occupational Therapy Evaluation and Intervention for Adults Lab	1
OT	846	Transitions: Student to Professional	2
OT	854	Level II Fieldwork, I	8
OT	855	Level II Fieldwork, I Online Discussion	1
OT	856	Level II Fieldwork, II	8
OT	865	Occupational Therapy Practice and Professional Reasoning	3
OT	875	Leadership in Occupational Therapy Systems Practice	3
OT	886	Research Engagement	3

Ocean Engineering (OE)

» **http://www.unh.edu/oe**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.S., Ph.D., Certificate in Ocean Mapping

Ocean Engineering (OE) offers programs leading to the master of science and doctor of philosophy degree in ocean engineering. Programs in OE are by definition interdisciplinary and require students to interact with the ocean science community, as well as the traditional engineering disciplines. Students are exposed to the broad-based issues of working engineering problems in the ocean environment, as well as discipline specifics. In these programs they will be trained to develop responsible solutions to problems that will lead to sustainable activity and life in the ocean.

A master of science in ocean engineering with an option in ocean mapping is also available. There is a more structured path through this program, which is approved by the International Hydrographic Organization (IHO) and incorporates all aspects of hydrography as required by the IHO. Focus is on the engineering aspects of hydrography. The general purpose of these programs is to prepare engineering students for professional careers in ocean-related fields.

Additionally, a graduate certificate in ocean mapping is offered.

Admission Requirements

Applicants should have completed a baccalaureate degree in either chemical, civil, electrical, or mechanical engineering, or have an equivalent background.

M.S. Degree Requirements

Each student is required to take one oceanography course: ESCI 858, Introductory Physical Oceanography; ESCI 859, Geological Oceanography; or ZOOL 850, Biological Oceanography; as well as OE 990, 991, Ocean Engineering Seminar I, II.

In addition, each student must select three of the following core courses: OE 810, Ocean Measurements Laboratory; OE 854, Ocean Waves and Tides; OE 871, Geodesy and Positioning for Ocean Mapping; OE 874, Fundamentals of Ocean Mapping I and OE 875, Fundamentals of Ocean Mapping II; or OE 865 Underwater Acoustics. Students are also required to take a minimum of 12 credits of additional coursework and complete a master's thesis for 6 credits (OE 899).

Ocean Mapping Option

This option is offered in conjunction with the Joint Hydrographic Center/Center for Coastal and Ocean Mapping. Each student is required to take these core courses: OE 810, Ocean Measurements Lab; OE 865 Underwater Acoustics; OE 871, Geodesy and Positioning for

Ocean Mapping; OE 874, Fundamentals of Ocean Mapping I; OE 875, Fundamentals of Ocean Mapping II; OE 972, Hydrographic Field Course; OE 990, Ocean Seminars I; and OE 991, Ocean Seminars II.

In addition, each student must select at least four additional approved credits, including one course from these electives: OE 854, Waves and Tides; OE 857, Coastal Engineering; OE 895, Time Series Analysis; or ESCI 858, Physical Oceanography.

Students are also required to complete a master's thesis for 6 credits (OE 899).

Students may fulfill the Category A (professional) International Federation of Surveyors/International Hydrographic Organization/International Cartographic Association (FIG/IHO) Standards of Competence for Hydrographic Surveyors by completing, in addition to the core courses, some additional specialized requirements. For more information, please visit the **Center for Coastal and Ocean Mapping website**.

Ph.D. Requirements

Students admitted to this Ph.D. program come from traditional engineering degree programs including physics, mathematics, computer science, and in some cases, marine science programs. Those entering the Ph.D. program with a B.S. degree from an engineering program should be prepared to begin the Ph.D. program directly. Those coming from a B.S. in physics, mathematics, or computer science will have their transcripts more carefully reviewed on an individual basis, as additional courses may be required.

A student in the ocean engineering Ph.D. program will be expected to take a minimum of 12 courses (exclusive of dissertation research) beyond those required for a B.S. degree.

Required Courses

One course in oceanography or ocean science: ESCI/ZOOL 850, Biological Oceanography; ESCI 858, Introductory Physical Oceanography; or ESCI 859, Geological Oceanography

Three core courses in ocean engineering: OE 810, Ocean Measurements Lab; OE 844, Corrosion; OE 854, Ocean Waves and Tides; OE 856, Principles of Naval Architecture and Model Testing; OE 857, Coastal Engineering and Processes; OE 865, Underwater Acoustics; OE 871, Geodesy and Positioning for Ocean Mapping; OE 874, Fundamentals of Ocean Mapping I; or OE 875, Fundamentals of Ocean Mapping II.

Two courses in advanced OE topics (two at 900 level): OE 937, Advanced Hydrodynamics; OE 956, Dynamics of Moored Systems; OE 965, Advanced Underwater Acoustics; OE 972, Hydrographic Field Course; OE 973, Seafloor Characterization; OE 995, Coastal Sediment Transport

Two courses from the following (one at the 800 level; one at the 900 level): MATH 845, MATH 846, Foundations of Applied Mathematics; MATH 853, Introduction to Numerical Methods; MATH 856, Principles of Statistical Inference; MATH 888, Complex Analysis; MATH 896, Mathematics for Mapping; MATH 931, MATH 932, Mathematical Physics; ME 886, Introduction to Finite Element Analysis; or ME 986 Advanced Finite Element Analysis

Four electives (two at 800 level; two at 900 level): ME 807, Analytical Fluid Dynamics; ME 886, Introduction to Finite Element Analysis; ME 906, Convection Heat Transfer; ME 909, Viscous Flow; ME 910, Turbulence; ME 827, Advanced Mechanics of Solids; ME 824, Vibration Theory & Applications; ME 877, Computer Aided Engineering; ME 927, Theory of Plasticity; CIE 860, Foundation Design I; CIE 861, Foundation Design II; CIE 862, Introduction to Geotechnical Earthquake Engineering; CIE 866, Geo-Environmental Engineering; CIE 946, Advanced Bioenvironmental Engineering Design; ECE 814, Introduction to Digital Signal Processing; ECE 857, Fundamentals of Communication; ECE 860, Introduction to Fiber Optics; ECE 939, Statistical Communication Theory; ECE 940, Information Theory; ECE 941, Digital Signal Processing

The general progress of a student through this program is expected to follow the time frame listed:

Year 1: Coursework, qualifier at the end of the year
Year 2: More coursework, thesis proposal presentation at the end of the year
Year 3: Research
Year 4: Research/thesis defense
Year 5: Research/thesis defense

The course selection and sequencing will be established in consultation with the student's guidance committee. There will be a qualifying examination on the student's specific area of interest after the first year, but no later than the end of the second year. The goal of this exam is to test the breadth of a student's knowledge in topic areas essential to ocean engineering and the student's area of interest. For each student there will be a list of must-know topics; e.g., physical oceanography, underwater acoustics, fluid dynamics, mathematics. A formal Ph.D. proposal will then be written and presented in a seminar, which constitutes an oral exam. After successful completion, the student will be advanced to candidacy and work on the dissertation. The dissertation will be defended in a public forum when completed.

Certificate in Ocean Mapping

The program goal is to provide advanced graduate training to working professionals in the area of Ocean Mapping. These professionals will come from a variety of backgrounds ranging from earth science, geology, and biology to engineering. The graduate certificate in ocean mapping is awarded for completion of the core courses and associated practicum. The graduate certificate program fulfills the Category A International Federation of Surveyors/International Hydrographic Organization/International Cartographic Association (FIG/IHO/ICA) Standards of Competence for Hydrographic Surveyors.

For more information, please visit the **Ocean Mapping website** or contact the Center for Coastal and Ocean Mapping/Joint Hydrographic Center at **info@ccom.unh.ed**.

Applying

Please visit the **Graduate School website** for instructions about applying to the certificate program.

Certificate Requirements

ESCI/OE 871, Geodesy and Positioning for Ocean Mapping (4 cr)
ESCI 872, Research Tools for Ocean Mapping (3 cr)

MATH 896, Math for Mapping (3 cr)
ESCI/OE 874, Fundamentals of Ocean Mapping I (4 cr)
ESCI/OE 875, Fundamentals of Ocean Mapping II (4 cr)
ESCI/OE 972, Hydrographic Field Course (4 cr)
OE 877, Seamanship & Marine Weather for Ocean Engineers and Scientists (2 cr)
ESCI 896, Coastal Remote Sensing (3 cr) for the optional Remote Sensing specialty

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Oceanography (OCE)

» **http://www.unh.edu/oce/**

This program is offered in Durham.

Degrees Offered: M.S., Ph.D.

The Department of Earth Sciences (ESCI) in the College of Engineering and Physical Sciences (CEPS) offers M.S. and Ph.D. degrees in oceanography that will include the study of biological oceanography, chemical oceanography, marine geology and geophysics, and physical oceanography. The OCE program also supports focused research in coastal and estuarine processes.

Admission Requirements

Applicants should have completed an undergraduate major related to one of the oceanography disciplines, including biology, chemistry, engineering, geology, physics, or mathematics, or an appropriate array of science and engineering courses within their major field. Applicants are expected to have completed one year each of calculus and chemistry and two semesters of physics and/or biology. It is not necessary to have had previous coursework in oceanography. Applicants must submit scores (within the last 5 years) from the general test of the Graduate Record Examination (GRE).

M.S. Degree Requirements

Students must complete a minimum of 30 credits for the thesis option or 34 credits for the non-thesis option. This includes four core courses in biological (ESCI 850), chemical (ESCI 852), geological (ESCI 859), and physical oceanography (ESCI 858), as well as seminar (ESCI 997) and proposal development (ESCI 998). Students in the thesis option will complete a thesis of 6 credits (in addition to the course credits) that is acceptable to the thesis-examining committee, and must pass a thesis defense. Students in the non-thesis option will complete 32 course credits and a 2-credit directed research project (ESCI 898 or OCE 898).

Ph.D. Requirements

Students plan a program of study in conjunction with a faculty guidance committee (FGC). Students entering the program without a master's degree are expected to complete a minimum of 36 credit hours. Students with an M.S. degree in oceanography or related field in

physical science from UNH or another university should first demonstrate (through accredited transcript or the qualifying examination) acceptable mastery in the basic core areas. Those deficient in any discipline will be required to complete the respective course.

All students must complete at least one course from each of the following categories: natural sciences, methods, ethics/policy/law, and seminar. Please see below for a list of courses that meet these specifications. Additional credit hours are determined by the FGC (typically 15 credit hours). Foreign language requirement is determined by the FGC. Students must complete a Coursework Approval Form, which summarizes all courses to be taken, and obtain signatures from their adviser, committee members, and the OCE program coordinator once the coursework is completed.

Students wishing to be admitted to doctoral candidacy will undergo a qualifying examination by the guidance committee designed to test the student's in-depth knowledge in their major field and their ability to conduct independent and original research in oceanography. Qualifying students will present to the guidance committee a research proposal in which the soundness, originality, and feasibility of the investigation are clearly stated, and which when approved based on a proposal examination by the committee, will form the basis for the doctoral dissertation.

Students are advanced to candidacy after successfully completing the comprehensive exam, proposal exam, and all coursework required by the guidance committee. Students must complete a dissertation, present their results at a public seminar, and pass an oral examination by the thesis committee.

Although not a strict requirement, all graduate students are encouraged to obtain teaching experience, preferably as a teaching assistant.

All students are required to spend time in the field, even if their research project and interests are primarily based on analytical research, modeling studies, or laboratory experiments. The field requirement could include extended time at sea onboard one of the UNH, UNOLS, NOAA, or similar oceanographic research vessels, or include field experiments at locations in New Hampshire, the U.S., or around the globe, and includes possible nearshore studies, Antarctic expeditions, or other land-based studies related to oceanography. Successful completion of the field requirement will be determined by the guidance committee.

Research and Facilities

The oceanography graduate program within the Department of Earth Sciences is enhanced by the ocean engineering and zoology graduate programs within CEPS and COLSA, and by other departments and institutes at UNH, including the civil and mechanical engineering and zoology departments; the Institute for the Study of Earth, Oceans, and Space (EOS); the Center for Coastal and Ocean Mapping (CCOM); and the Ocean Processes Laboratory (OPAL). Other related programs include the N.H. Sea Grant Program, the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET), and the Center of Excellence in Coastal Ocean Observation and Analysis (COOA). Oceanographic laboratories at UNH include the Shoals Marine Laboratory (SML) on Appledore Island, the Coastal Marine Laboratory (CML) in Newcastle, the Jackson Estuarine Laboratory (JEL) at Adams Point on the Great Bay, and the Chase Ocean Engineering Laboratory (COEL) on the main UNH campus. Additional laboratories for the oceanography faculty are located on campus in James, Morse, Rudman, and Spaulding

Halls. The UNH Marine Program operates a marine support facility and two UNH research vessels moored in Portsmouth Harbor at the UNH pier, the R/V Gulf Challenger and the R/V Coastal Surveyor, as well as a number of small boats. The Marine Program also supports the UNH Diving Program and oversees a shared-use Instrumentation Pool for student and faculty use.

Natural Sciences

ESCI 850	Biological Oceanography	4 cr.
ESCI 852	Chemical Oceanography	3 cr.
ESCI 858	Intro to Physical Oceanography	3 cr.
ESCI 859	Geological Oceanography	4 cr.

Methods

CHEM 862	Intro. to Ocean Remote Sensing	3 cr.
EOS 895	Model & Anal. Biogeochem cycles	4 cr.
ESCI 864	Data Anal. in Earth Sys. Science	4 cr.
ESCI 870	Fundamentals of Ocean Mapping	4 cr.
ESCI 871	Geodesy & Positioning Ocean Map	4 cr.
ESCI 972	Hydrographic Field Course	4 cr.
ESCI 896	Time Series Analysis	4 cr.
IAM 940	Asymptotic & Perturbation Meth.	3 cr.
ME 807	Analytical Fluid Dynamics	3 cr.
MATH 835	Statistical Methods for Research	3 cr.
MATH 839	Applied Regression Analysis	3 cr.
MATH 845	Foundations of Applied Math	3 cr.
MATH 853	Intro. to Numerical Methods	3 cr.
OE 810	Ocean Measurements Lab	4 cr.

Ethics, Policy, and Law

ECON 908	Environ. Econ: Theory & Policy	3 cr.
NR 801	Ecological Sustainability & Values	4 cr.
NR 818	Law Natural Resources & Environ.	3 cr.
NR 820	Intern. Environ. Politic & Policies	4 cr.
NR 824	Resolving Environmental Conflicts	4 cr.
NR 902	Ecological Ethics and Values	4 cr.
NR 915	Coastal Challenges Science Policy	2 cr.
NR 916	Link Decision & Coastal Ecosys. Sci	4 cr.
GRAD 930	Ethics in Research and Scholarship	Var. cr.
POLT 880	Intern. Environ. Politics	3 cr.

Seminar and Proposal Development

OE 990	Ocean Seminars I	1 cr.
OE 991	Ocean Seminars II	1 cr.
ESCI 997	Seminar	1 cr.
ESCI 998	Proposal Development	1 cr.

Other Relevant Graduate Courses

CIE 847	Intro. to Mar. Pollution & Control	3 cr.
EOS 824	Intro. to Ocean Remote Sensing	3 cr.
EOS 831	Sys. Approach to Bio. Ocean Sci.	3 cr.
EOS 896	Bio-Optics & Primary Production	4 cr.
EOS 896	Dyn. of Global Marine Ecosystems	3 cr.
EOS 844	Biogeochemistry	4 cr.
EOS 895	Climate & Fisheries	4 cr.
ESCI 834	Geophysics	3 cr.
ESCI 841	Geochemistry	4 cr.
ESCI 845	Isotope Geochemistry	4 cr.
ESCI 847	Aqueous Geochemistry	4 cr.
ESCI 854	Sedimentology	4 cr.
ESCI 856	Geotectonics	3 cr.
ESCI 865	Paleoclimatology	3 cr.
ESCI 895	Paleoceanography	3 cr.
ESCI 896	Nearshore Processes	4 cr.
ESCI 952	Adv. Chemical Oceanography	4 cr.
ESCI 994	Advanced Ocean Seminar	1 cr.
ESCI 995	Geophysical Fluid Dynamics	3 cr.
ME 807	Analytical Fluid Dynamics	4 cr.
ME 812	Waves in Fluid	3 cr.
ME 909	Viscous Flow	3 cr.
ME 995	Turbulence	3 cr.
MICR 807	Marine Microbiology	5 cr.
MICR 817	Microbial Physiology	5 cr.
OE 844	Environment Acoustics I	4 cr.
OE 853	Ocean Hydrodynamics	3 cr.
OE 854	Ocean Waves & Tides I	4 cr.
OE 885	Environment Acoustics II	4 cr.
OE 895	Underwater Acoustics	4 cr.
OE 954	Ocean Waves & Tides II	4 cr.
OE 995	Coastal Sediment Transport	3 cr.
ZOOL 810	Ichthyology	4 cr.
ZOOL 811	Zooplankton Ecology	4 cr.
ZOOL 825	Marine Ecology	4 cr.
ZOOL 872	Fisheries Biology	3 cr.

Painting (ARTS)

» **http://www.arts.unh.edu/**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.F.A.

The Department of Art and Art History offers a program of courses leading to a master of fine arts degree in painting.

Admission Requirements

A bachelor of fine arts degree in painting or the equivalent in undergraduate coursework

(minimally this means 60 credit hours in studio art and 8 credit hours in art history) is required for admission to this program. Additionally, a minimum undergraduate GPA of 2.6 is required. Prospective students must submit 20 images on a CD of recent work to be reviewed by the graduate faculty of the Department of Art and Art History.

Degree Requirements

Each student in the master of fine arts degree in painting program shall complete 60 credit hours of work. Twenty-six credits of work will be in the area of concentration (painting) leading toward a thesis exhibition. Eighteen credits will be in graduate-level drawing. Eight credits will be in graduate-level art history and the final eight credits will be in art electives to be chosen from drawing, printmaking, painting, or art history. In addition to the thesis exhibition, degree candidates will be required to submit a two-page written artist statement focusing on aesthetic, technical, and historical issues related to their work. Also required is participation in two major critiques per year. The graduate student will present their work with a verbal or written rationale to the entire graduate painting faculty, invited guests, and student peers.

Physics (PHYS)

» **http://www.physics.unh.edu**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.S., Ph.D.

The Department of Physics offers the degrees of master of science and the doctor of philosophy. Areas of specialization are space physics and astrophysics, experimental nuclear physics, biomedical imaging, theoretical nuclear and high-energy physics, experimental physics of solids and nano-materials, and string theory.

Admission Requirements

Applicants to the master of science and doctor of philosophy programs are expected to have a bachelor's degree in science, with at least 24 credits in physics and closely allied fields. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE).

Degree Requirements

M.S. Degree Requirements

The courses required for the master of science in physics are PHYS 805, 931, 939, 941, and 943. Students are also expected to take PHYS 900 and PHYS 901. Students in the M.S. program are not required to take the Ph.D. comprehensive examination. Students may select one of the following plans:

- Complete 9 additional credits of coursework plus 6 credit hours of master's thesis work

and an oral thesis defense.

- Complete 12 additional credits of coursework plus 3 credit hours of research project work and an oral exam in the form of a seminar.
- Complete 15 additional credits of coursework and pass the written comprehensive and the oral qualifying exam (for students in the Ph.D. program only).

Ph.D. Degree Requirements

The courses required for a doctor of philosophy degree in physics are PHYS 805, 931, 935, 939, 941-942, and 943-944. Four additional electives must be taken (excluding 999); no more than two may be at the 800 level. Students are also expected to take two semesters of PHYS 806.

For students doing Ph.D. research in astrophysics or space physics, three of their four elective courses must be PHYS 951 and PHYS 953, and one of PHYS 954 or PHYS 987.

Admission to candidacy for the degree is based primarily on demonstrated ability in formal coursework; experience in teaching, equivalent to at least half time for one year; passing a written comprehensive examination; and passing an oral defense of a proposed thesis topic. The comprehensive examination is normally taken during the first year and must be passed by the middle of the second year. Upon completion of a dissertation, doctoral candidates will take an oral examination based on the area of their research.

Interdisciplinary Research

The department encourages research in areas related to physics or applied physics. If students desire to do research in a field related to physics, special provisions may be made. Contact the department chairperson or graduate adviser for details.

Plant Biology (PBIO)

» **http://www.plant.unh.edu**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.S., Ph.D.

The Department of Biological Sciences offers the master of science and doctor of philosophy degrees in plant biology. Research opportunities are available in basic and applied areas of plant biology, including breeding and genetics, cell biology, cell and tissue culture, ecology, molecular biology, genetic engineering, marine and freshwater biology, morphology and anatomy, pathology, phycology, physiology, systematic botany, crop production, and environmental horticulture.

Admission Requirements

Applicants are expected to have adequate preparation in plant biology and in the

fundamentals of physical and biological sciences. They must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE).

M.S. Degree Requirements

Students will meet the Graduate School's requirements for the degree (minimum of 30 credits). Students will be required to write and defend a thesis (6-10 credits) based on field or laboratory research.

Ph.D. Degree Requirements

Students will complete a program of study as determined by their guidance committee. Students will be advanced to candidacy after successfully completing comprehensive written and oral qualifying examinations covering a broad basic knowledge of their major and minor fields and their ability to design and carry out basic research in plant biology. Candidates must successfully defend a dissertation based on original research in plant biology.

Teaching Requirements

Teaching experience is required of all M.S. and Ph.D. degree students. The requirement may be fulfilled by enrolling in a supervised teaching course, by serving as a teaching assistant, or by having previous professional teaching experience.

Political Science (POLT)

» **http://www.unh.edu/political-science/**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.A., M.P.A.

Certificate Offered: Sustainability Politics and Policy

About the Department of Political Science Graduate Programs

The Department of Political Science at UNH offers two graduate degrees: the master of arts in political science and the master of public administration. Both provide advanced study in political science, public policy, and public administration for students interested in professions in the fields of government, public service, nonprofit management, electoral politics, education and research, or as preparation for Ph.D. programs. These degree programs give students the flexibility to tailor their coursework to individual interests within a curriculum that ensures a strong foundation in research methodology, management, and other needed skills in the professions. Faculty engage in teaching and research activities encompassing the fields of American politics, political thought, comparative/international politics, and public administration.

Both programs are offered to full- and part-time students. The M.A. program is offered in

Durham. The M.P.A. program offers evening courses for working professionals at Durham and Manchester.

Additionally, a graduate certificate in sustainability politics and policy is offered.

Admission Requirements

Applicants are expected to have majored in political science or a related field, or have worked in government or the nonprofit sector, and must possess a bachelor's degree from an accredited institution. Where undergraduate preparation has been insufficient, applicants may be admitted provided that they follow a program of study approved by the graduate committee. The Graduate Record Examination (GRE) general test is required for the M.A. program. M.P.A. applicants are strongly encouraged to include GRE test results with their application, but it is required only for those M.P.A. applicants requesting consideration for graduate assistant or tuition assistance awards. M.P.A. applicants may be asked to interview either in person or by conference call with the director of the M.P.A. program and the graduate program coordinator.

Degree Requirements

M.A. with Thesis Option Degree

Master's degree students must complete a minimum of 30 credits for the degree: eight courses and a 6-credit master's thesis (POLT 899). Of the eight courses, two are required seminars, Pro Seminar (POLT 900) and Introduction to Statistical Analysis (POLT 905), and are to be taken during the student's first semester. Students are also required to take electives totaling 9 credits. This must include two courses in the student's major subfield (Comparative Politics, International Politics, Political Thought/Theory, and American Politics/Public Administration).

Nine credits must be completed at the 800 or 900 level from political science courses or related discipline courses. The M.A. program director must provide approval if the course selected is a not a political science course.

Successful completion and defense of a 6-credit master's thesis is required.

M.A. Non-Thesis Option Degree

Master's degree students must complete ten courses totaling a minimum of 30 credits for the degree. Students must also pass a comprehensive exam. Of the ten courses, two are required, Pro Seminar (POLT 900) and Introduction to Statistical Analysis (POLT 905), and are to be taken during the student's first semester. Students are also required to take electives totaling 9 credits. This must include two courses in the student's major subfield (Comparative Politics, International Politics, Political Thought/Theory, and American Politics/Public Administration). One course in a minor subfield is also required for this degree option.

Fifteen credits must be completed at the 800 or 900 level from political science courses or a

related discipline. The M.A. program director must provide approval if the course selected is a not a political science course.

The comprehensive examination must be successfully completed in the student's final semester.

M.P.A. Degree Requirements

Master of public administration students must complete a minimum of 36 or 39 credits for the degree.

Required courses include:

- Four basic core curriculum courses in foundations and theory, organization and management, statistical analysis, and the Capstone internship or project (POLT 905, 906, 909, and the 908 Capstone). 12-15 credits
- Three advanced core curriculum courses in finance and budgeting, human resources, labor relations, public or nonprofit management, administrative law, policy and program evaluation, leadership, or legal and policy-making environments (POLT 804, 808, 812, 907, 911, 912, 914, 918). 9 credits
- Five electives in public administration, political science, or related discipline with adviser's approval. 15 credits
- Two of the five required electives will be waived for students who have successfully completed Level II of the New Hampshire Certified Public Manager Program.

The capstone internship or project is the culmination of the student's graduate work, applying academic knowledge with practical experience. Students without prior public or nonprofit sector professional experience are required to complete the internship component of the capstone.

Certificate in Sustainability Politics and Policy

The graduate certificate in sustainability politics and policy is administered by the Department of Political Science Graduate Program, though it can include coursework from a number of other graduate programs. The certificate is designed to give current graduate students, alumni, and others in the community training and analysis on issues connecting environmental and social sustainability, politics, and policy making initiatives. Such training is increasingly valuable for careers in the public sector, in nonprofit organizations, and in the private sector for both small and large companies. For more information, please visit the **Sustainability Politics and Policy website**. Students interested in this certificate are encouraged to contact Professor Jeannie Sowers at (603) 862-1752.

Applying

In accordance with Graduate School requirements, the graduate certificate in sustainability politics and policy requires:

- Completed UNH application for admission to a graduate certificate program
- Personal statement on applicant's interest and goals regarding sustainability
- Current resume

- Official transcripts from previous undergraduate education and graduate education (if applicant has received graduate degree)
- Three letters of recommendation

Please visit the **Graduate School website** for detailed instructions about applying to the graduate certificate program.

Certificate Requirements
The course requirements focus the debates, in both the global North and the global South, on exactly what sustainability politics should (and/or should not) include. The goal is to connect global sustainability policy debates to those occurring at the local and national levels in New England, the United States, and other countries.

This graduate certificate program requires 13 total credits.

Required courses:

- POLT 995/996, Independent Study "Defining and Debating Sustainability" (1 credit). The independent study will include a core list of readings on sustainability concepts and cases in wealthier and poorer societies and methodological debates about how these concepts may be measured and assessed.
- POLT 851, Comparative Environmental Politics and Policy (3 credits)
- POLT 880, International Environmental Politics (3 credits)

Electives (any two of the courses listed below) (6 credits):
Students will be advised by the certificate program director and other participating faculty members about which electives might be most appropriate and consistent with their interests and career goals. The list of approved electives affords students opportunities to focus on particular areas of environmental or social policy, or to seek to acquire additional methodological skills and disciplinary approaches in areas such as policy analysis or economics. Other electives offered by University of New Hampshire graduate programs may be approved by the sustainability certificate program director.

- POLT: 843, 862, 878, 912, 914, 918
- ECON: 807, 908
- NR: 801, 818, 820, 824, 831, 838, 850, 884, 885
- HIST: 818, 866
- PHP: 907, 914, 930
- RAM: 911
- RECO: 856
- SOC: 880, 894

Psychology (PSYC)

» **http://www.unh.edu/psychology/**

» **Click to view course offerings**

This program is offered in Durham.

Assistant Professor: Robert S. Ross

Degree Offered: Ph.D.

Department of Psychology offers a four- or five-year program of study leading to the doctor of philosophy degree. The basic goal of the program is the development of behavioral scientists who have a broad knowledge of psychology, can teach and communicate effectively, and can carry out sound research in an area of specialization. Although some students seek employment outside academia, the program is oriented toward developing the skills required by the research psychologist who intends to become a college or university teacher.

Areas in which the student may specialize are brain, behavior, and cognition; developmental psychology; or social psychology/personality. The department does not offer training in clinical or counseling psychology.

Distinctive Features of the Program

All psychology graduate students in the Ph.D. program receive a stipend and a full tuition waiver for up to five years. A low graduate student/faculty ratio provides opportunities to work closely with one or more faculty mentors. Graduates typically acquire tenure-track academic or postdoctoral positions at colleges and universities across the U.S.

The Department of Psychology is a national model for preparing future faculty. All graduate students teach Introduction to Psychology while taking a year-long seminar in the teaching of psychology, as well as one or two undergraduate survey courses in statistics and/or the student's area of specialization.

There are active research laboratories in all areas represented in the graduate program. The department has strong partnerships with such nationally recognized programs as UNH's Child Study and Development Center and the Family Research Laboratory. UNH also has a Center for Teaching Excellence to help graduate students and faculty improve the quality of their teaching.

Admission Requirements

In addition to meeting the requirements for admission to the Graduate School, applicants must intend to be full-time students working toward the doctoral degree (not just the master's degree), and they must submit Graduate Record Examination (GRE) general test scores, along with other standard application forms. The subject test in psychology is recommended. Scores must be current, within five years.

Ph.D. Degree Requirements

Required courses include first-year seminar (PSYC 904), three semesters of research methods and statistics (PSYC 905, 906, and 907 or 908), six advanced graduate seminars, and two semesters of the practicum and seminar in the teaching of psychology (PSYC 991-992). First-year students also participate in a noncredit graduate proseminar (PSYC 901-902), which introduces students to the research programs of the faculty. Depth in a particular area is obtained through participation in advanced seminars and by independent reading and research conducted under the supervision of a faculty member.

Prior to the doctoral dissertation, the student carries out original research that culminates in either a master's thesis or a paper of publishable quality. A master's degree is awarded upon the successful completion of a program approved by the department and dean of the Graduate School. This typically takes place by the end of the second year.

The third year of the program is dedicated to the practicum and seminar in the teaching of psychology in conjunction with the teaching of introductory psychology.

Advancement to candidacy for the Ph.D. degree depends on receiving the master's degree, passing a specialist examination in one of the department's areas of specialization, and identifying a topic for doctoral research. Advancement to candidacy is usually accomplished by the end of a student's fourth year in the program. During the fourth year, students typically begin dissertation research and teach an introductory course in their specialty area. Most students complete the Ph.D. degree in the fifth year.

Public Administration (POLT)

» **http://www.unh.edu/political-science/**

» **Click to view course offerings**

*This program is offered in Durham and in Manchester through **GSMC**.*

Degrees Offered: M.A., M.P.A.

Certificate Offered: Sustainability Politics and Policy

About the Department of Political Science Graduate Programs

The Department of Political Science at UNH offers two graduate degrees: the master of arts in political science and the master of public administration. Both provide advanced study in political science, public policy, and public administration for students interested in professions in the fields of government, public service, nonprofit management, electoral politics, education and research, or as preparation for Ph.D. programs. These degree programs give students the flexibility to tailor their coursework to individual interests within a curriculum that ensures a strong foundation in research methodology, management, and other needed skills in the professions. Faculty engage in teaching and research activities encompassing the fields of American politics, political thought, comparative/international politics, and public administration.

Both programs are offered to full- and part-time students. The M.A. program is offered in Durham. The M.P.A. program offers evening courses for working professionals at Durham and Manchester.

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Fifteen credits must be completed at the 800 or 900 level from political science courses or a related discipline. The M.A. program director must provide approval if the course selected is a not a political science course.

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Master of public administration students must complete a minimum of 36 or 39 credits for the degree.

Required courses include:

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This graduate certificate program requires 13 total credits.

Required courses:

- POLT 995/996, Independent Study “Defining and Debating Sustainability” (1 credit). The independent study will include a core list of readings on sustainability concepts and cases in wealthier and poorer societies and methodological debates about how these concepts may be measured and assessed.
- POLT 851, Comparative Environmental Politics and Policy (3 credits)
- POLT 880, International Environmental Politics (3 credits)

Electives (any two of the courses listed below) (6 credits):
Students will be advised by the certificate program director and other participating faculty members about which electives might be most appropriate and consistent with their interests and career goals. The list of approved electives affords students opportunities to focus on particular areas of environmental or social policy, or to seek to acquire additional methodological skills and disciplinary approaches in areas such as policy analysis or economics. Other electives offered by University of New Hampshire graduate programs may be approved by the sustainability certificate program director.

- POLT: 843, 862, 878, 912, 914, 918
- ECON: 807, 908
- NR: 801, 818, 820, 824, 831, 838, 850, 884, 885
- HIST: 818, 866
- PHP: 907, 914, 930
- RAM: 911
- RECO: 856
- SOC: 880, 894

Public Health (PHP)

» **http://www.shhs.unh.edu/hmp/gradhmp.html**

» **Click to view course offerings**

*This program is offered in Manchester through **GSMC**.*

Degree Offered: M.P.H.

Certificate Offered: Public Health

The College of Health and Human Services offers an interdisciplinary curriculum leading to the master of public health (M.P.H.). The program is designed to provide students with an integrated, generalist M.P.H. degree. The M.P.H. program is accredited by the Council on Education for Public Health (CEPH).

The Public Health Certificate Program provides a vehicle for individuals working in public or community health positions, with no formal academic background in public health, the opportunity to earn a graduate program in public health. To enter the certificate program, an

applicant must have a baccalaureate degree. Students completing the certificate program can apply to enter the M.P.H. program. If accepted, certificate credits can be applied to the M.P.H. degree program.

The master of public health and public health certificate seek to enhance the capacity of working public health professionals to perform the 10 Essential Services of Public Health. The program is only offered at the University of New Hampshire Graduate School Manchester Campus (GSMC). Academic classes are offered in semester units and each course is eight weeks in length and offered one evening per week for four hours. Working professionals can complete the M.P.H. program on a part-time basis over two years but have up to six years to complete the degree requirements.

Admission Requirements

(Please note that since these are part-time programs they do not meet the full-time study requirements for international applicants with F-1 or J-1 visas.)

Applications are accepted for fall, spring, and summer semesters. The program encourages applications from persons who hold a baccalaureate degree from an accredited college or university. The admission committee uses previous academic records, Graduate Record Examination (GRE) scores, current public health experience, responses to five essay questions regarding your interest in pursuing graduate education in public health, and recommendations from three individuals as indicators of success. Interviews with the program coordinator are encouraged.

To apply for the M.P.H. degree, applicants must submit:

1. A completed UNH Graduate School application form
2. Responses to five essay questions regarding their public health interests, goals, and beliefs (in lieu of a personal essay. See "Admissions Requirements" on the Graduate School's website)
3. Official transcripts from previous undergraduate and graduate education
4. Current résumé
5. Three letters of recommendation
6. GRE required. Applicants may request to have the GRE requirement waived if they have a previous master's degree already awarded (any field). See the **Test Score Waiver Process** to request a waiver. If required, request official test scores to be sent directly to the Graduate School by the testing service. Test scores more than five years old may not be acceptable. Student copies and photo copies of scores are not considered official. Our CEEB code is 3918. **View Test Score Information.**

Degree Requirements

M.P.H. Degree Requirements

The M.P.H. program is a 48-credit curriculum. In addition to the five core courses found in every public health program: public health care systems (PHP 900), epidemiology (PHP 901), environmental health (PHP 902), biostatistics (PHP 903), and social and behavioral health (PHP 904), the program requires that all students complete four additional courses:

administration (PHP 905), economics (PHP 922), policy (PHP 907), and ethics (PHP 908). Students must also complete five elective courses. The M.P.H. curriculum includes a field experience in which the student is expected to apply the theory and practice of public health to a particular area of student interest in a professional setting. The final course in the curriculum is an integrating seminar in which students work in teams, bringing both their individual and joint perspectives and expertise to address a particular public health problem for a New Hampshire-based public health entity.

Grades below the “B-” level in a graded course are considered failing grades for the purposes of determining academic standing. Repeating a course does not remove the original failing grade from the record. Students receiving failing grades in 6 or more credits either in two courses or in one course taken twice will be recommended by the M.P.H. program director to the Graduate School for dismissal from the M.P.H. or the Public Health Certificate Program. Students must have a cumulative grade-point average of 3.0 (B-), or higher, in order to graduate. Students admitted on a conditional or provisional basis must meet the conditions or provisions as stated in the letter of admission in order to remain in the Graduate School.

Public Health Certificate

As part of the Master of Public Health Program's continuing education program, a public health certificate (PHC) is offered.

Applying

Applications are accepted for both fall and spring semesters. Certificate program applicants must possess a baccalaureate degree from an accredited college or university. Students are expected to have experience in public health.

To apply for the certificate of public health, applicants must submit:

1. A completed UNH graduate certificate program application
2. Responses to five essay questions regarding their public health interests, goals, and beliefs
3. Official transcripts from previous undergraduate and graduate education
4. Current résumé
5. Two letters of recommendation

Please visit the **Graduate School website** for detailed instructions about applying to the graduate certificate program.

Certificate Requirements

The public health certificate is a 12-credit program that can be completed on a part-time basis over one calendar year. All courses (with the exception of workshops taken as part of PHP 996) must be taken at UNH. Students completing the Public Health Certificate Program can apply to enter the M.P.H. program. If accepted, certificate credits can be applied to the M.P.H. program. To earn the public health certificate, a student must successfully complete the following 12-credit curriculum consisting of following three required courses and one elective course.

PHP 900, Public Health Care Systems, 3 cr.
PHP 901, Epidemiology, 3 cr.
PHP 996, Applied Topics in the Essentials of Public Health, 3 cr. (This course has a unique

structure that allows students to tailor their learning experience about the Ten Essential Services of Public Health to their professional goals and interests. To learn more about this course design, please consult the Public Health Certificate Section of the ***M.P.H. Student Handbook***.)

One elective, 3 cr. (Students can take any M.P.H. course as long as any prerequisites have been met. To see a complete listing of M.P.H. courses offered, see the ***M.P.H. Student Handbook***.)

Recreation Management and Policy (RMP)

» **http://www.unh.edu/rmp/index.shtml**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.S.

The Department of Recreation Management and Policy offers the master of science degree in recreation management and policy with options in recreation administration or therapeutic recreation administration. The Department of Recreation Management and Policy is accredited by the National Council on Accreditation of Parks, Recreation, Tourism and Related Professions. An atmosphere of collegiality and collaboration fosters interactions between faculty and students. Faculty and students are actively engaged in applied research.

Recreation Administration Option

The recreation administration option prepares professionals with advanced knowledge and skills to plan and administer recreation services. Examples of postgraduate opportunities include directors of town and municipal recreation departments, YMCAs, resort programs, camps, campus/intramural sports, fitness centers, youth services agencies, and sports and recreation facilities as well as outdoor recreation planners for the U.S. Forest Service, National Park Service, and state park systems.

Therapeutic Recreation Administration Option

The therapeutic recreation administration option prepares advanced personnel for administrative responsibilities in clinical-based practice and administrative leadership in community-based recreation services that meet the needs of individuals with disabilities. Graduate education serves therapeutic recreation specialists who wish to move into administrative positions such as recreation therapy supervisor/manager/director, senior therapist, treatment coordinator, assisted-living manager, and senior center supervisor.

Students without an academic or clinical background in therapeutic recreation may use the M.S. program to satisfy the academic requirements for the national credentialing examination used by the National Council on Therapeutic Recreation Certification (NCTRC) and for New Hampshire state licensure. While the graduate program does not require prerequisite courses to qualify for admission, the credentialing examination does require coursework outside the M.S. curriculum requirements and the department may require leveling coursework upon

acceptance to the M.S. program.

Admission Requirements

Admission is based on a personal history that demonstrates academic achievement and/or exemplary work experience, as well as the applicant's ability to articulate in the personal statement his or her potential and desire for graduate study in recreation administration or therapeutic recreation administration. Generally, students must have earned a minimum grade-point average of 3.00 to be considered for admission. Applicants are required to submit copies of prior academic records, current scores (within five years) from the general test of the Graduate Record Examination (GRE), three references, a written personal statement, and a complete Graduate School application. A baccalaureate degree must be conferred prior to beginning the program. Interviews are encouraged but not required for all applicants. Students who wish to apply for a graduate assistantship should contact the department's graduate coordinator for an application. Admission to the program is selective and limited. It is in the applicant's best interest to apply early.

Degree Requirements

Individuals seeking a career change to recreation or therapeutic recreation administration with an undergraduate degree in a related field may be admitted to the Graduate School as a provisional student, with the expectation that they complete any required prerequisites prior to, or concurrent with, graduate courses.
A specially designed curriculum is available to provisionally admitted students.

The degree program consists of required and elective coursework. In consultation with a faculty adviser, students will select either a thesis or non-thesis track. Students in both options are required to complete 30 credits as detailed in the following program outline.

Required courses. There are four core courses (12 credits) that all M.S. students in recreation management and policy are required to take regardless of option area.

Elective courses. Students who take the non-thesis track complete five courses (15 credits) from a list of RMP courses and courses outside the department. Students in the thesis track take four elective courses (12 credits).

Capstone experience. All students take a capstone experience. This experience will be either RMP 899,Master’s Thesis (6 credits) or RMP 995, Colloquium Seminar (3 credits).

It is expected that the M.S. in recreation management and policy will take full-time students two years to progress through all degree requirements. Part-time students should be able to complete the program in three years. Courses are generally offered once a week in three-hour blocks in the afternoon and evenings.

Required Core Competencies (4 courses = 12 credits)

1. RMP 800, Concepts of Recreation and Leisure

2. RMP 805, Management and Policy in Therapeutic Recreation
   or
   RMP 806, Recreation Administration and Organizational Behavior

3. Research methods course from the following options:

EDUC 981, Methods and Techniques of Educational Research
FS 994, Research Seminar
KIN 901, Analysis of Professional Literature
OT 903, Research Methods for Occupational Therapists
SW 860, Research Methods in Social Work
RMP 998, Special Topics, Research Methods

4. Graduate-level statistics from the following options:

KIN 900, Applied Statistics
OT 902, Statistics for Occupational Therapists
SW 962, Research II, Statistics

Elective courses (4 courses/12 credits thesis option and 5 courses/15 credits non-thesis option with at least one elective from RMP)

RMP 811, Recreation Resource Management
RMP 830, Camp Administration and Leadership
RMP 860, Community Sport Organizations: Administration and Development
RMP 868, Theories and Philosophies of Youth Development
RMP 870, Management and Design of Recreation & Park Facilities
RMP 872, Law and Public Policy in Recreation Services
RMP 910, Conceptual Issues and Trends in Therapeutic Recreation
RMP 912, Non-Profit Administration and Leadership
RMP 924, Grantwriting and Fund Development
RMP 964, Graduate Internship
RMP 970, Teaching Practicum
RMP 980, Independent Study

Example of electives outside of the department:

SOC 970, Social Stress and Health
SOC 988, Medical Sociology: Health, Healing and Society
SOC 880, Social Conflict
SW 840, Implications of Race, Culture and Oppression for Social Work Practice
SW 814, Introduction to Addiction: Assessment and Intervention
ADMN 851, Advertising and Promotion
ADMN 855, Marketing of Services
NURS 945, Clinical Decision Making in Health Care
RAM 805, Ecotourism: Managing for the Environment
RAM 867, Social Impact Assessment
KIN 841, Social Issues in Contemporary Sports
KIN 843, Sport Marketing
KIN 890, Social and Health Issues in Sport Psychology
RAM 877, Fundamentals and Practice of Community Planning
PHP 920, Social Marketing
PHP 922, Public Health Economics

Capstone Course

RMP 899, Master's Thesis (6 credits)
or
RMP 995, Colloquium Seminar, non-thesis track (3 credits)

Resource Administration and Management (RAM)

» **http://envecon.unh.edu/graduate**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.S.

The Department of Natural Resources and the Environment coordinates the interdisciplinary master of science degree program in resource administration and management. Students may specialize in management of publicly and privately owned natural resources or in administration of natural resource laws and policies.

Admission Requirements

Applicants are expected to have completed either an undergraduate degree in the field in which they plan to specialize or show adequate preparation in the basic support courses of the field. A minimum of one course in each of the areas of ecology or natural resources, intermediate microeconomics, and introductory statistics is required. Persons having professional experience in resource administration, management, or related areas receive priority for admittance to the program. An applicant is required to submit an essay of up to 2,000 words describing his or her background and goals.

Applicants with good undergraduate records who lack a background in a particular field may be admitted to a program, provided they are prepared to correct the deficiencies. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE).

M.S. Degree Requirements

The master of science degree in resource administration and management is conferred upon successful completion of a program amounting to not less than 34 credits including the following course requirements or equivalent:

NR 903, Approach to Research
Quantitative methods or analytical techniques
RAM 911, Natural and Environmental Resource Management
An advanced course in environmental policy
RAM 898, Directed Research, 4-6 cr. or
RAM 899, Thesis, 6-10 cr.
Final oral and/or written examination

Social Work (SW)

» **http://chhs.unh.edu/sw/index**

» **Click to view course offerings**

*This program is offered in Durham and in Manchester through **GSMC**.*

Degree Offered: M.S.W.

Certificates Offered: Leadership in Children's Health and Disability and Substance Use Disorders Certificates

The Department of Social Work offers a master of social work (M.S.W.) degree. This program develops advanced professional knowledge and skills for persons interested in pursuing careers in the field of social work. The M.S.W. program is accredited by the Council on Social Work Education (CSWE). It requires two years of full-time study or three-to-four years of extended-time study. The full-time program is available in Durham only; the extended-time program is available in Durham or Manchester. The Manchester academic classes are delivered in a weekend model with admission every other year. Both programs require classroom work and two year-long field internships. Field internship hours are typically completed during normal business hours.

The program offers all students access to both micro (direct) practice and macro (community and administrative) practice content and skills. All students complete a foundation-year course of study, then complete a second concentration-year in advanced generalist social work practice.

Please note that beginning in the fall of 2013, the MSW program will no longer have second-year concentrations in either in direct/clinical practice or community/administrative practice. Students will still be able to complete field internships with either a direct practice (micro) or community and administrative (macro) focus. However, all students will receive instruction and training reflecting content and skills from both perspectives.

The program features an advanced generalist concentration, which is the most common concentration in social work. It is very well suited for practice in rural, suburban, and urban settings and is viable for career positions where a CSWE-accredited degree is required. MSW students will now be able to select four electives in one or more fields of practice: (1) Health and mental health; (2) Addictions and substance abuse; (3) Children, youth, and families, (4) Disabilities; or a self-designed field of practice.

In addition, the Department of Social Work offers two dual degrees. The social work and kinesiology dual-degree program consists of a master in social work (M.S.W.), as well as a master of science (M.S.) in kinesiology with a concentration in outdoor education. For additional information regarding the social work/kinesiology dual degree, contact Anita Tucker at **Anita.Tucker@unh.edu**. The Department of Social Work and the School of Law at the University of New Hampshire (UNH) also offer a dual degree resulting in the JD/M.S.W. In four years, students will be able to complete two graduate degrees, a master in social work (M.S.W.) and a Juris Doctor to prepare them for a career in law and social work. For

additional information regarding the social work/law dual degree, contact Sharon Murphy at **Sharon.Murphy@unh.edu**.

Additionally, the department offers a graduate certificate in Leadership in Children's Health and Disability and a Substance Use Disorders Graduate Certificate Program.

Admission Requirements

The department encourages applications from persons who hold a baccalaureate degree from an accredited college or university; have attained an overall grade-point average of "B" or better in undergraduate coursework; have completed courses in a broad range of liberal arts and science disciplines. Applicants should include a resume of two pages or less, which lists educational, work, and volunteer experiences, as well as any special skills or attributes. Applicants must submit professional recommendations from three individuals, one of whom could be a member of an academic faculty. Professional letters of reference should describe the applicant's volunteer or work duties, skills and values relevant to social work practice with diverse populations, ability to collaborate with others, and overall strengths and challenges relevant to graduate study. Applicants should complete a personal statement of interest in pursuing graduate education in the field. Significant volunteer and/or work experience in the field is strongly recommended. Application expectations include graduation from an accredited undergraduate institution with a broad liberal arts background including a research methods course. Applicants who do not meet these requirements may fulfill them after admissions but before their second year of study. All applicants are encouraged to contact departments directly to discuss program specific application questions. Standardized graduate examinations are not required, but results of such tests may be submitted to supplement other admission materials.

Students applying for advanced standing must hold a B.A. from an accredited S.W./B.S.W. program with a minimum overall grade-point average of 3.2 (4.0 point scale). This coursework must have been completed within five years of the date of M.S.W. matriculation. Advanced-standing applicants must also submit a reference from a B.S.W. faculty member and the undergraduate field supervisor or field coordinator. Students applying to the extended time program at UNH Manchester are advised that the Manchester program admits students every other year.

Students applying to the dual-degree programs must meet the application requirements for both the Departments of Social Work and Kinesiology or the UNH School of Law. See Kinesiology and the UNH School of Law for their admission requirements.

The M.S.W. program concentrates on strengths and empowerment models that encourage individuals and families, and communities and organizations to realize their full potential. The department supplies the students with a social and community systems context and promotes practice skills that are responsive to diversity issues. The program is housed in Pettee Hall with access to interview observation rooms and state-of-the-art classrooms and computer labs.

Financial aid opportunities in the department include grants for students interested in the child welfare field or in work with children with developmental disabilities and their families. The department also offers graduate research assistantships to a few second-year students. Graduates of the program are employed in a wide variety of social and human service

agencies as direct practitioners and in managerial roles. Please be aware that as a condition of being placed in some agency settings, graduate social work students may be required to complete a criminal record check with both state and law enforcement agencies.

Degree Requirements

M.S.W. Degree Requirements

An M.S.W. candidate must complete 62 credit hours of 800- or 900-level courses including two, two-semester field internships, comprising a total of 1,240 hours in the field. Grades below the B- level in a graded course or a "fail" in a credit/fail course are considered failing grades for the purposes of determining academic standing. Repeating a course does not remove the original failing grade from the record. Graduate students receiving failing grades in 9 or more credits, received either in three courses or in any combination of courses taken twice, will be dismissed from the M.S.W. program.

Although a significant portion of the curriculum is required, students will be able to complete four elective courses. At least one of these must be taken from among Department of Social Work course offerings.

Core MSW Program Advanced Generalist Courses, minimum 62 credits

SW 820, Social Welfare Policy I
SW 830, Advanced Generalist Social Work Practice I
SW 840, Race, Culture & Oppression
SW 850, Human Behavior & the Social Environment I (HBSE I)
SW 880, Field Internship I (seminar and concurrent two-day/week internship/academic year)
SW 831, Advanced Generalist Social Work Practice II
SW 851, Human Behavior & the Social Environment II (HBSE II)
SW 926, Social Welfare Policy II
SW 881, Field Internship II (seminar and two-day/week internship continued from SW 880)
SW 932, Advanced Generalist Practice III
SW 952, HBSE III
SW 962, Research I: Statistics and Data Analysis
SW 982, Field Internship III (seminar and concurrent three-day/week internship/academic year)
SW 933, Advanced Generalist Practice IV
SW 965, Research II: Program & Practice Evaluation
SW 983, Field Internship IV (seminar and three-day/week internship continued from SW 982)
Electives, four 3-credit elective courses from social work (other graduate programs with permission)

Advanced Standing Program

The M.S.W. program at the Durham campus considers advanced standing for exceptional students with undergraduate degrees from accredited baccalaureate social work programs. Applicants must have graduated from the B.S.W. program within five years of matriculation into the M.S.W. program. Advanced standing students complete a minimum of 35 credits for graduation. This includes a 10-week summer practicum and seminar, which students must take prior to their advanced practice and field placement. Additional information may be

obtained by contacting the coordinator of graduate admissions in the department office.

MSW Program Advanced Standing (post B.S.W./B.S.S.W.) Courses, minimum 35 credits (applies only to fall 2013 admission)

SW 900, Advanced Standing Seminar
SW 840, Race, Culture & Oppression
SW 932, Direct Practice III or
SW 936, CAP Practice III
SW 952, HBSE III
SW 962, Research II: Statistics
SW 982, Field Internship III (seminar and concurrent internship)
SW 926, Social Welfare Policy II (unless completed in B.S.W./B.S.S.W., then an elective)
SW 933, Direct Practice IV or
SW 937: CAP Practice IV
SW 965, Research III: Program & Practice Evaluation
SW 983, Field Internship IV (Seminar & Concurrent Internship)
Elective, one 3-credit course

Dual Degree Programs

Social Work and Kinesiology: Dual-degree social work and kinesiology students take classes simultaneously over the course of two-and-a-half years in both social work and kinesiology: outdoor education and complete a minimum of 77 credits for graduation. This includes two internships, one during their first year of study, and a second specialized block placement internship over the summer following the second year of study, which concentrates on the utilization and application of adventure therapy in an agency setting. This block placement internship may occur in New England or in other appropriate settings across the U.S. Students are required to also complete either a master thesis or an advanced studies project during their last year of study, which is supervised by faculty in kinesiology: outdoor education. For additional information regarding the Social Work/KIN dual degree course requirements, contact Anita Tucker at Anita.Tucker@unh.edu.

Social Work and UNH School of Law: The Department of Social Work and the School of Law at the University of New Hampshire (UNH) also offer a dual degree resulting in the JD/M.S.W. In four years, students will be able to complete two graduate degrees, a master in social work (M.S.W.) and a Juris Doctor to prepare them for a career in law and social work. For additional information regarding the social work/law dual degree course requirements, contact Sharon Murphy at **Sharon.Murphy@unh.edu**.

Certificates in Leadership in Children's Health and Disability and Substance Use Disorders

The M.S.W. program offers two certificate programs.

Leadership in Children's Health and Disability

This graduate certificate is part of a partnership with the New Hampshire LEND Program and the Seacoast Child Development Clinic. Accepted LEND trainees and others are eligible to apply for the Graduate Certificate for Leadership in Children's Health and Disability from the University of New Hampshire (separate application process through the UNH Graduate School). The websites listed are for the New Hampshire LEND Program and the Seacoast Child

Development Clinic. For more information, please contact Elizabeth Humphreys at the **New Hampshire LEND Program** at (603) 862-0561.

Applying

Please visit the **Graduate School website** for detailed instructions about applying to the graduate certificate program. In addition to the standard application requirements, this department requires that applicants submit a letter of intent. Please contact Patrick Shannon at Patrick.Shannon@unh.edu or (603) 862-5016 for details about applying for the certificate.

Leadership in Children's Health and Disability Certificate Requirements

The Leadership in Children's Health and Disability Certificate consists of 9 credit hours of required courses, 3 credit hours of an elective and 3 credit hours of independent study related to the graduate certificate program of study.

Students must take one of two introductory courses in developmental disabilities: EDUC 850, Introduction to Exceptionality, or SW 812, Social Work and Developmental Disabilities (3 cr.).

Students must complete both fall and spring semesters of HHS 898, Topics in Neurodevelopmental and Related Disabilities (6 cr. total). This course is also a requirement for trainees in the Leadership Education in Neurodevelopmental Disabilities (LEND) but is open to all students.

Students must complete an approved elective (3 cr.) from any department at the University of New Hampshire with a focus on children, special health care needs, and disabilities.

Students must complete an independent study that focuses on a leadership activity to support children with special health care needs, disabilities, and families (3 cr.).

Coursework must be completed within 3 years.

Substance Use Disorders Graduate Certificate Program Certificate Requirements

The Substance Use Disorders Graduate Certificate consists of 12 credit hours through a series of four courses covering (1) etiology of addictions, (2) addiction policy analysis, (3) addiction research and best practices, and (4) system theory and strengths perspective.

Courses are offered at the UNH Manchester campus during the evenings and weekends.

Applying*:* Please contact Brian Miller at Brian.Miller@unh.edu or (603) 862-1013 for details about applying for the certificate.

Sociology (SOC)

» **http://www.unh.edu/sociology/**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.A., Ph.D.

The Department of Sociology offers M.A. and Ph.D. degrees in sociology. The master's degree program emphasizes theory and methodology. Students in the doctoral program are expected

to select one major area for intensive study and examination. There are five major substantive areas for possible specialization: crime and conflict, family, social stratification, health and illness, and community and environment. Students may pursue specialties within or across the major areas of specialization or propose to the graduate committee other major areas of specialization that fall within the faculty's competence.

Admission Requirements

In addition to meeting the general Graduate School requirements, applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE).

Undergraduate majors in other fields may be admitted. However, if the student's undergraduate work has not included introductory courses in sociological theory, research methods, and statistics, these courses must be taken, or equivalent knowledge demonstrated, in addition to the requirements outlined above.

All students entering the program must complete the M.A. before admission to the Ph.D. program. The department welcomes applicants who plan to continue for the Ph.D. as well as students planning for the M.A. only.

Degree Requirements

M.A. Degree Requirements

Students must complete at least 26 credit hours (seven courses) of graduate-level coursework in sociology, including the Proseminar in Sociology (900, 2 cr.), Sociological Methods I (901), Sociological Methods II (902), Sociological Theory I (911), three elective graduate seminars, and 6-10 credits of Master's Thesis work (899). Successful completion of the thesis constitutes the capstone experience for the M.A. degree.

Ph.D. Degree Requirements

Students must complete a minimum of three years in residence and take a minimum of sixteen courses in sociology (at least eight as seminars) other than thesis or dissertation research, including the Proseminar in Sociology (900, 2 cr.), Sociological Theory I and II (911 and 912), Sociological Methods I, II, III, and IV (901, 902, 903, 904), four courses in a major area, and five elective courses. Students must pass written examinations in the major area of sociological specialization and in advanced theory and methodology, and write and defend the doctoral dissertation.

Spanish (SPAN)

» **http://www.unh.edu/llc/index.cfm?id=8DC5474D-D70F-8FE6-BC6C518419AB50E1**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: M.A.

The program in Spanish in the Department of Languages, Literatures, and Cultures offers a master of arts degree of Spanish with courses in the following areas: Topics in Second Language Acquisition, Pedagogy and Methodology; Topics in Hispanic Literature and Cultural Studies; and Topics in Hispanic Linguistics and Cultural Studies. The program also supports work in interdisciplinary Hispanic studies.

Admission Requirements

Applicants shall have received a bachelor's degree from an accredited institution with an undergraduate major in Spanish or its equivalent. The personal statement for the graduate application should be written in Spanish. Two of the three letters of recommendation should come from current or former professors. Graduate Record Examination (GRE) scores are not required.

Degree Requirements

To obtain the degree, the candidate must complete a minimum of 30 credits. To satisfy the course requirements, the candidate must successfully complete ten graduate courses, eight of which should be from the offerings of the Spanish program. Two of the ten courses can be taken in allied fields approved by the department. All candidates must take Spanish 901, a 3-credit course dealing with bibliography and methods of research. Preparation of a bibliographical essay in this course is the final requirement for graduation. Graduate assistants teaching in the department must take Spanish 903, a 3-credit course in applied linguistics. Both 901 and 903 count toward the ten courses required to complete the degree.

Systems Design (ENGR)

» **http://www.unh.edu/mechanical-engineering/**

» **Click to view course offerings**

This program is offered in Durham.

Degree Offered: Ph.D

Ph.D. Systems Design

The systems design doctoral degree is an interdepartmental program that addresses contemporary engineering and scientific technical problems that can be solved only through the cooperation of a variety of disciplines. Students in systems design can elect either one of two professional directions. The first develops professionals with the technical expertise of a Ph.D. and with the ability to work with and direct groups of people working on large-scale technical projects. The second direction develops engineers with capabilities in the theory and analysis of large-scale complex systems. Concentration in an area of specific individual interest is combined with participation in a larger interdisciplinary project.

The area coordinator is Professor Barry K. Fussell.

Admission Requirements

Qualified students with bachelor's or master's degrees in engineering, mathematics, or the physical sciences are eligible for admission to the program. Applicants must submit current scores (within five years) from the general test of the Graduate Record Examination (GRE). To be admitted, students must present evidence that they have sufficient background in the area in which they propose to specialize. They must also find a College of Engineering and Physical Sciences (CEPS) faculty member to serve as their adviser.

Degree Requirements

Following entrance into the program, a guidance committee is appointed for the student by the dean of the Graduate School upon recommendation of the student's area coordinator. This committee assists the student in outlining their program and may specify individual coursework requirements in addition to those required by the area of specialization. The committee also conducts an annual in-depth review of each student's progress and, following substantial completion of a student's coursework, administers the qualifying examination. This committee is also responsible for administering the language examination and/or research-tool proficiency requirements. Coursework and language requirements should normally be completed by the end of the second year of full-time graduate study and must be completed before the student can be advanced to candidacy.

Upon the successful completion of the qualifying examination and other proficiency requirements, the student is advanced to candidacy and, upon the recommendation of the student's area coordinator, a doctoral committee is appointed by the dean of the Graduate School. The doctoral committee conducts an annual review of the student's progress, supervises, and approves the doctoral dissertation, and administers the final dissertation defense.

To obtain a Ph.D. degree, a student must meet all of the general requirements as stated under academic regulations and degree requirements of the Graduate School. Students are normally expected to take coursework equivalent to two full-time academic years beyond the baccalaureate and to complete a dissertation on original technical research that will require at least one additional year of full-time study.

Zoology (ZOOL)

» **http://zoology.unh.edu/**

» **Click to view course offerings**

This program is offered in Durham.

Degrees Offered: M.S., Ph.D.

The Department of Biological Sciences offers M.S. and Ph.D. degrees in zoology.

Admission Requirements

Applicants ordinarily must have completed an undergraduate major in biology or zoology. A basic array of courses including general biology, development, general ecology, genetics,

morphology, and physiology is normally required. Additionally, organic chemistry and a semester each of calculus and physics are necessary. Applicants who are deficient in any of these requirements may be admitted to graduate status but may be required to remedy their deficiencies by taking courses that do not give graduate credit. Applicants must submit current Graduate Record Examination (GRE) scores (within five years) from the general test.

Degree Requirements

M.S. Degree Requirements

Students plan a program of study (minimum of 30 credits) in conjunction with a faculty advisory committee. Students complete a thesis of 6 to 10 credits that is acceptable to the thesis-examining committee. Prior to the receipt of the master's degree, all candidates must pass a thesis defense, which will include questions covering general knowledge in zoology in addition to specific questions relevant to the student's research at UNH.

Ph.D. Degree Requirements

Students plan a program of study in conjunction with a faculty guidance committee. The student will present to the committee a research proposal in which the soundness, originality, and feasibility of the investigative ideas are clearly revealed, and which, when approved, will serve as the basis of the doctoral dissertation. After the approval of the proposal, students who wish to be admitted to doctoral candidacy must demonstrate, in a qualifying examination, a broad basic knowledge of their major and minor fields and their ability to carry out basic research in zoology. All students must complete an original dissertation project, present the results at a public seminar, and pass an oral defense consisting of questions put forth by members of the dissertation committee.

Teaching Experience

All graduate students are encouraged to obtain appropriate teaching experience, preferably as a teaching assistant.

Research and Facilities

The zoology graduate program is enhanced by courses and research in other biological science departments and institutes at the University. These include the Marine Program and its associated centers and programs; the Center for Marine Biology; the Center for Ocean Sciences; the Center for Ocean Engineering; N.H. Sea Grant Program; the Cooperative Institute for Coastal and Estuarine Environmental Technology (CICEET); the Center of Excellence in Coastal Ocean Observation and Analysis (COOA); the Institute for the Study of Earth, Oceans, and Space (EOS); UNH Center for Coastal and Ocean Mapping (CCOM); the Joint Hydrographic Center; and the Ocean Processes Analysis Laboratory (OPAL). There are five marine laboratories: Jackson Estuarine Lab, Judd Gregg Marine Research Complex, Anadromous Fish and Aquatic Invertebrate Research Lab (AFAIR), the Aquaculture Research Center (ARC), and Shoals Marine Lab (SML).

In addition, the Center for Freshwater Biology (CFB) jointly administers (with the UNH Cooperative Extension) the Lakes Lay Monitoring Program, which is dedicated to the preservation and sound management of lakes through citizen-based monitoring and research. The Hubbard Center for Genomic Studies provides training and research in comparative and environmental genomics, with a special emphasis on novel model species. It provides expertise in constructing DNA libraries, DNA sequencing, fragment analysis, and the analysis of gene expression.

Graduate Course Catalog 2013-2014
UNH GSMC

The UNH Graduate School Manchester Campus

Master of Arts in Teaching

Secondary Education

Master of Education

Elementary Education

Secondary Education

Teacher Leadership

Master of Business Administration

Business Administration

Master of Public Administration

Public Administration

Master of Public Health

Public Health

Master of Science

Information Technology

Master of Social Work

Social Work

Education Specialist

Educational Administration and Supervision

Certificate Programs

Public Health

Software Systems Engineering

Substance Use Disorders

Graduate Course Catalog 2013-2014
Admission and Registration

» http://www.gradschool.unh.edu/

« **Admission and Registration**

In this section you'll find details regarding the University's admission and course registration process. Please contact us at the Graduate School or at the Registrar's Office if you need further clarification. We will be happy to answer your questions regarding University procedures and policy.

Applying for Admission

Persons holding a baccalaureate degree from an accredited college or university may apply for admission to the Graduate School. Admission is both limited and competitive and is based solely upon academic qualifications and potential of the individual.

All application materials become part of the permanent records of the University of New Hampshire and will not be returned. Access to this material is limited under the Family Rights and Privacy Act of 1974. Applicants who are not admitted, or who are admitted and do not register in the Graduate School, do not have access to their application files. Materials received as part of the application process will not be duplicated for personal use by the applicant or forwarded to a third party. Materials received from applicants who do not complete their application, who are not admitted, or who are admitted and do not register are held for two years before being destroyed.

Application procedures, including deadlines and program-specific requirements, are available at the Graduate School site, **http://www.gradschool.unh.edu**

Applicants from Foreign Countries

All applicants from non-English-speaking countries must, in addition to all of the above, provide Test of English as a Foreign Language (TOEFL) scores. A minimum TOEFL score of 550 paper-based (213 computer-based or 80 Internet-based) is required for admission. TOEFL scores are valid for only two years. The International English Language Testing System (IELTS) may be accepted on a case-by-case basis. A financial declaration on official University forms is also required should you be admitted. A four-year baccalaureate degree is normally

the minimum academic certification required for admission.

Applications from residents of foreign countries will be considered only for regular full-time admission.

Application Deadlines

Application deadlines for admission and financial aid vary by program. These are updated on an annual basis and may be found on the Graduate School website.

International applicants who are not currently residing in the United States will be considered for admission for the fall session only and must have their applications completed by April 1. International applicants currently residing in the United States should have their applications completed at least four months prior to the session for which they are applying.

Incomplete Applications

Applications that remain incomplete after the first day of classes of the term for which admission was desired will be placed in an inactive status. A written request is required to reactivate an application.

Application Review

Once an application is complete, it is reviewed by an admissions committee of graduate faculty members, which makes recommendations to the Graduate School. The Graduate School will review these recommendations and make the final decision. While applicants with bachelor's degrees may apply directly to certain doctoral programs, the Graduate School also reserves the right to offer applicants admission at the master's degree level in its place.

Admission Categories

Official offers of admission from the Graduate School are made for a specific term and year in one of the following categories: regular, provisional, or conditional. Applicants who are in the final year of an undergraduate or, in some cases, a graduate degree program are contingent upon the successful completion of that degree program. An official final transcript showing grades and the awarding of the degree must be received by the Graduate School before the student may enroll for the graduate program.

Regular Admission

Regular admission may be offered to applicants whose academic records and supporting documents indicate that they are fully qualified to undertake graduate study in their chosen fields.

Provisional Admission

Provisional admission may be offered to applicants whose academic records and supporting documents indicate that they are qualified to undertake graduate study, but whose undergraduate preparation was not in the intended field of graduate study. Applicants offered provisional admission must meet the specific criteria, usually undergraduate coursework, stated at the time of their admission, before being changed to regular graduate student status.

Conditional Admission

Conditional admission may be offered to applicants whose academic records indicate deficiencies but suggest some promise of success in graduate study. Students offered conditional admission must meet the specific requirements stated at the time of their admission in order to remain in the Graduate School. Conditionally admitted students are not eligible for assistantships and scholarships offered through the Graduate School until the conditional status is removed.

Deferred Admission

Applicants who cannot enroll in the term for which admission was offered may request to have their admission deferred for up to one year. Such requests must be in writing and will be considered only once. Because enrollments are limited and competition for admission may vary from year to year, such requests may not be granted. Applicants who have received approved deferment of their admission cannot register for graduate coursework at the University during the period of deferment.

Accelerated Master's--University of New Hampshire Seniors

Qualified senior students at the University of New Hampshire may be admitted to the Graduate School provided they have followed normal application procedures; they must have been admitted for the semester in which they wish to enroll in courses for graduate credit. A 3.20 cumulative grade-point average is normally required to be considered for admission to the accelerated master's program.

Such seniors are normally admitted prior to the start of their last undergraduate semester, but may be eligible to apply for admission to the first semester of their senior year. Seniors who have been admitted under early admission may register for a maximum of 12 credits of graduate-level courses prior to completing their bachelor's degree. Such courses may upon recommendation of the department and approval of the Graduate School count toward both a

bachelor's and master's degree.

When seniors admitted to the accelerated master's program have registered for graduate courses, they must maintain a grade-point average of 3.20, complete their undergraduate degree as planned, and pass graduate courses taken for credit with a grade of B- or better. If these conditions are not met, admission is withdrawn.

Not all graduate programs participate; each program's faculty retain discretion regarding whether their program admits students under the accelerated master's program, as well as the maximum number of graduate credits permitted (not exceeding 12; e.g., some programs will accept one course, others two). Applicants are strongly encouraged to meet with the graduate coordinator in the program's faculty to discuss specifics.

Dual-credit forms must be completed and approved by the dean of the Graduate School at the beginning of the semester for which dual credit is sought.

Additional Information

Non Degree Students

Individuals holding baccalaureate degrees may register for graduate courses through Continuing Education, or through the Center for Graduate and Professional Studies at the University of New Hampshire in Manchester. These individuals are designated as "non degree students." Non degree students are not required to file an application for admission to the Graduate School and are not candidates for a graduate degree. Non degree students are not normally permitted to register as full-time students (i.e., 9 or more credits). Please note the policy on transfer of credits (internal and external) in academic regulations and degree requirements.

Applicants Not Admitted

Applicants who are denied admission may have their applications reconsidered only if they furnish significant additional material that was not available at the time of the original decision, such as evidence of further academic achievement or more recent and significantly improved GRE or GMAT scores. Reapplication is not encouraged.

Registration

Academic Year

Registration information and the Time and Room Schedule are available at **http://unhinfo.unh.edu/registrar/timeroom/timeandroom.html.**

Continuous Registration Policy

Unless a leave of absence is granted, graduate students are required to maintain

continuous enrollment each semester of the academic year until their degree is formally awarded by registering for course credits, research, or continuing enrollment.

- Master's students must enroll for course credits, thesis credits, Master's Continuing Research (GRAD 900), or Continuing Enrollment (GRAD 800).
- Ed.S. students must enroll for course credits or Continuing Enrollment (GRAD 800).
- Pre-candidacy doctoral students must enroll for course credits, Doctoral Research (999), or Continuing Enrollment (GRAD 800).
- All doctoral candidates must register for Doctoral Research (999) each semester after advancement to candidacy until their degree is conferred, even if the minimum requirement (two semesters) has been met.

Students enrolled in summer-only programs (currently, Math M.S.T., English M.S.T., and College Teaching M.S.T.) are required to enroll in course credit or Continuing Enrollment (GRAD 800) each summer until their degree is formally awarded. Students who do not maintain continuous enrollment will have their degree status discontinued and will need to petition for reinstatement or readmission in order to return to their program.

Master's Continuing Research (Grad 900--Full-time Status, 0 credits)
Master's students who have completed all course requirements and have previously registered for the maximum number of thesis or project credits and are in residence completing their master's program must register for Master's Continuing Research (Grad 900).

Continuing Enrollment (GRAD 800)
All continuing graduate students who are not enrolled for course credits, thesis credits, Doctoral Research (999), or Master's Continuing Research (GRAD 900), and are not in residence, are required to register for GRAD 800 each semester of the academic year (or each summer for students in Math M.S.T, English M.S.T programs, and College Teaching M.S.T.). Students registered for GRAD 800 are considered part-time, 0 credits.

Degree Status Discontinued
Students who do not formally withdraw and do not register and pay for course credits, research, or continuing enrollment by the appropriate registration deadline, or do not return from an approved leave of absence, will have their degree status discontinued. Students are notified by the Graduate School when this administrative action is taken and are required to apply for readmission or reinstatement if they subsequently desire to resume their academic program.

Reinstatement
Students who have their degree status discontinued for failing to maintain

continuous enrollment may petition the Graduate School for reinstatement as long as the term that the degree status was discontinued has not ended. Such a petition requires a reinstatement fee, plus payment of current semester charges and any late fees that may have accrued. If the term in which the student's degree status was discontinued has ended, the student must then petition the Graduate School for readmission. Both forms can be found on the **Graduate School's forms page**.

Full-Time Students

Graduate students registered for 9 or more credits, Master's Continuing Research (Grad 900), or Doctoral Research (999) are classified as full-time students. Students holding assistantship appointments are also considered full time and must register for a minimum of 6 credits, Master's Continuing Research (Grad 900), or Doctoral Research (999) each semester.

Three-Quarter-Time Students

Graduate students not on an assistantship and registered for 7 or 8 credits are classified as three-quarter-time students.

Half-Time Students

Graduate students not on an assistantship and registered for 5 or 6 credits are classified as half-time students.

Maximum Load

The maximum graduate load allowed is 16 credits (12 credits for a student on a full assistantship). Only under unusual circumstances will a student be allowed to exceed these limits, and then only with the recommendation of the student's adviser and graduate program coordinator and the approval of the dean of the Graduate School.

Dropping and Adding Courses

Graduate students may add or drop courses in accordance with the procedures and deadlines published by the Registrar's Office at **www.unh.edu/registrar**.

Auditing Courses

A graduate student may, with the approval of his or her adviser and the faculty member concerned, audit courses. The deadline for requesting an audit is listed on the Registrar's calendar. Subsequent requests for change to audit require a petition form and must be approved by the course faculty member, the student's adviser, graduate program coordinator, and the dean of the Graduate School.

Change of Name or Address

It is the responsibility of the student to complete a change of name or address form whenever a change is made. Change of name/address forms can be found at **http://www.unh.edu/registrar/regforms/registrarforms.html**.

Students are also advised that their UNH e-mail address is the official means of electronic communication with UNH. Billing, registration notices, reminders, as well as the majority of correspondence from the Graduate School will be communicated through the UNH e-mail account.

Summer Session

Although many graduate-level courses are offered during the summer session, the University does not guarantee that any particular course will be offered. The availability of individual faculty members to supervise research or to participate in qualifying examinations and final examinations or defenses during the summer session varies from year to year.

Course information and registration materials may be obtained at **www.learn.unh.edu/**.

Maximum Load

The maximum graduate load allowed is 12 credits for the entire summer session. A student will be allowed to exceed this limit only by petition with the recommendation of the student's adviser, graduate program coordinator, and the approval of the dean of the Graduate School.

Student Load for Veterans Benefits

Graduate students eligible for VA benefits during the summer receive benefits according to the following schedule of average credit registrations: 1/2 credit/week or more = full time; 3/8 credit/week or more = 3/4 time; 1/4 credit/week or more = 1/2 time; less than 1/4 credit/week = tuition and fees only.

Nonregistration

Leave of Absence

Students who, because of extenuating circumstances, are unable to pursue their graduate program may request a leave of absence for a maximum of one calendar year. Such circumstances may include medical reasons, military obligation, family emergencies, or hardship. The procedure for an approved leave of absence requires that students submit a request, available at **www.gradschool.unh.edu/forms.html**, along with appropriate documentation, **prior** to the term for which the leave is requested. The dean of the Graduate School, upon recommendation of the student's adviser and graduate program coordinator, will review the request. If the request for a leave is granted, the time limit for completion of the student's program will be extended appropriately. Students on an approved leave of absence are exempt from paying the continuing enrollment fee. Graduate students who do not return from a leave of absence in the allotted time frame will have their degree status discontinued.

Withdrawal

A student may withdraw from the Graduate School during any semester by obtaining a withdrawal form from the Graduate School. This form should be signed by the student's adviser and the dean of the Graduate School. Students who formally withdraw are required to apply for readmission if they subsequently desire to resume their academic program. Students who are applying for readmission are required to pay an application fee plus, if readmitted, any accumulated continuing enrollment fees for the period during which they have been inactive. Students are not guaranteed readmission and may be evaluated in competition with current applicants to the program.

Administrative Separation for Reasons of Health-Related Behaviors

The dean of students, or the associate dean of the Graduate School, or designee, in consultation with Health Services, and/or Counseling Center, Disability Student Services, Behavioral Intervention Team, and Affirmative Action and Equity Office (ADA Compliance) may temporarily separate a student for reasons relating to seriously impaired mental/physical health when such student's health-related behaviors (1) pose a significant risk of substantial harm to health, safety, or property of him or herself or other members of the University community, (2) and/or when the student's health-related behaviors significantly disrupt the ability of other University community members to fulfill the University's mission.

Examples of such behaviors include but are not limited to (a) continuing disruptive behaviors after being told by a University official to stop (b) behaviors that indicate the student may be out of touch with reality or unaware of the consequences or effects of his or her behaviors, (c) threat of or harm to self or others.

Administrative withdrawal is not intended to be a substitute for other procedures as found in the Code of Conduct or Academic Policies. Such action may not be used as a means of excluding qualified students with disabilities. The dean of students or associate dean of the Graduate School or designee shall provide the student with a written statement of reasons for the temporary separation and invite the student to meet.

The purpose of this meeting shall be to provide the student with an opportunity to challenge the separation and request reconsideration. The dean of students or associate dean of the Graduate School or designee may require documentation of readiness to return from a licensed attending medical authority and/or licensed psychologist, and consult with the appropriate University official(s) before lifting the separation. The student may be accompanied at the meeting by a member of the University community.

The student must schedule a meeting within ten (10) calendar days of receiving the written statement. If the student fails to request a meeting with the dean of students or associate dean of the Graduate School within ten (10) calendar days of beginning the temporary separation, or if the temporary separation is upheld either at the meeting and the student fails to appeal, or upheld upon appeal, the temporary separation shall be changed to an administrative withdrawal.

Within three (3) calendar days of the conclusion of this meeting the dean of students or associate dean of the Graduate School shall send a letter to the student, informing him/her of the outcome. The student may appeal the determination to the vice president for student and academic services, the dean of the Graduate School, or his/her designee. The appeal request must be received by the vice president for student and academic services by no later than five (5) calendar days after the student receives the letter from the dean of students or associate dean of the Graduate School.

Students who withdraw for health reasons, whether voluntarily or are separated by administrative action, must apply for readmission through the Office of Undergraduate Admissions or the Graduate School. Readmission shall be contingent upon receipt by the appropriate director(s) or their agents, of documentation regarding readiness to return from a licensed attending medical authority, and/or licensed psychologist; to the extent the withdrawal was for a condition that requires ongoing treatment, readmission may also be contingent upon documentation of the prescribed treatment course and the plan for implementation thereof. Readmission may also include a personal interview with either the vice president or dean of the Graduate School or his/her designee.

For graduate students, the dean of the Graduate School will make the final decision based on the information received, in consultation with the appropriate University official(s). *(University Senate, April 26, 1976, updated by the dean of students, June 2009.)*

Readmission

Students who withdraw, who have their degree status discontinued, or whose time limit has expired and subsequently desire to resume their academic program, are required to apply for readmission. Readmission forms are available at **www.gradschool.unh.edu/forms.html**. Students who are applying for readmission are required to pay an application fee plus, if readmitted, any accumulated continuing enrollment fees for the period during which they have been inactive. Students are not guaranteed readmission and may be evaluated in competition with current applicants to the program.

Change in Degree

Students who wish to pursue a degree program other than the one for which

admission was originally granted must complete the appropriate application for a change in degree. This includes students enrolled in UNH master's programs who intend to pursue the Ph.D. in the same department in which they were admitted for the master's degree. These forms are available at **www.gradschool.unh.edu/forms.html**. The dean of the Graduate School will notify the student of the decision after consulting with the appropriate departments.

Graduate Course Catalog 2013-2014
Fees and Financial Support

» http://www.gradschool.unh.edu/

« **Fees and Financial Support**

There are many opportunities for financial aid. To ensure that you will benefit, contact us either at the Graduate School or at the Financial Aid Office to talk about what opportunities may be available to you. You can find more details at **http://financialaid.unh.edu**.

Residency

Each graduate student is classified as a resident or nonresident for tuition purposes at the time of admission to the University. The decision, made by the Graduate School, is based upon information furnished by the student's application and any other relevant information. Nonresident undergraduates continuing directly to the Graduate School will be classified as nonresidents.

All applicants claiming New Hampshire residency are required to have been legally domiciled in New Hampshire continuously for at least twelve months immediately prior to registering for the term for which in-state status is claimed.

Students admitted from states other than New Hampshire or from foreign countries are considered nonresident throughout their entire attendance at the University unless they shall have acquired bona fide domicile in New Hampshire. Changes in residency for enrolled students as well as appeals are reviewed by the Registrar's Office and will only occur if the student can clearly establish that his or her residence in New Hampshire is for some purpose other than the temporary one of obtaining an education at the University.

The burden of proof in all cases is upon the applicant. In all cases, the University reserves the right to make the final decision as to resident status for tuition purposes. The University rules governing tuition rates are fully set forth in the application for admission package; all students are bound by them.

New England Regional Student Program

The University of New Hampshire participates in the New England Regional Student Program administered by the New England Board of Higher Education. Under this program, admitted graduate students from New England may qualify for regional tuition rates (New Hampshire resident tuition, plus 50 percent) if the

program to which they are admitted is one that is not available at any of their home state/public institutions. Inquiries and requests for further information may be directed to the Graduate School or to the New England Board of Higher Education, **http://www.nebhe.org**. This tuition rate does not apply to students who are eligible for New Hampshire resident tuition rates.

Tuition and Fees

Tuition and fees are established by a vote of the Board of Trustees. Approval normally occurs between April and July. The current academic year rates are published annually on the **University's website**. Mandatory fees for all students include a Memorial Union fee, which funds the personnel, programs, and maintenance of the building; a health and counseling fee, which funds University Health Services and the Counseling Center; a recreation fee, which funds recreational sports facilities; a technology fee, which funds technology services and support for students and faculty; and a transportation fee, which funds transportation services on the Durham campus. The services and facilities are available to all, and students are required to pay all mandatory fees charged regardless of actual usage of the programs and services. Mandatory fee charges are based on registration status: full- or part-time fees, depending on number of credit hours. Students enrolled in predesignated evening-only programs do not pay the health and counseling fee. Students enrolled in 4 credits or less pay the technology fee only. Please see the **Student Rights, Rules, & Responsibilities Handbook** section 11.2 for more information about Mandatory Fees.

Tuition and fees are due by the published deadline, and students are not considered registered until they have paid. UNH no longer sends bills through the mail; students receive bills through Webcat, a part of MyUNH (Blackboard), the student portal. E-mails are sent to students' UNH-assigned e-mail address when new bills are posted. Payment may be made online or mailed; check, credit card, cash, or wire is accepted. Late fees may be assessed on balances remaining unpaid by mid-semester.

Graduate tuition and fees apply to admitted graduate students enrolling for courses, graduate or undergraduate, at the University during the academic year. Admitted graduate students planning to enroll for UNH courses through weekend or executive programs during the summer session, or through the Graduate School Manchester campus should consult the relevant publications for information regarding tuition and fees.

Mandatory Fees

The University of New Hampshire assesses mandatory fees to support expenses

associated with the participation in an academic community. Mandatory fees are defined as fees that all students are assessed as a prerequisite for registration unless specifically exempt. Mandatory fees are assessed because the services made available through such fees benefit the overall educational experience of the students, including academic, co-curricular, health-related, and recreational programs. It is recognized that not all students will use the benefits and privileges made available by fee-supported activities to an equal extent. The services and facilities supported by fees are available to all. The special circumstances of part-time and graduate students are reflected in the University's fee structure.

Fee Structure

Full mandatory fees are assessed to graduate students (registered for 9 or more credits), national student exchange students, doctoral research, and master's continuing research students. Graduate students registered for 5-8 credits are assessed one-half of the cost. Students registered for 1-4 credits are assessed only the technology fee. Students enrolled in Manchester campus programs pay Manchester mandatory fees. Students enrolled as non-degree full-time special students (13 or more undergraduate credits or 9 or more graduate credits) pay full mandatory fees.

The graduate-student mandatory fees include:

- Memorial Union fee for the use and administration of the student union
- Recreational fee for support of recreational facilities
- Health and counseling fee to provide general health care through University Health Services
- Technology fee to provide electronic tools to students both on and off campus
- Transportation fee to provide student transportation services, including select infrastructure improvements, transit service, pedestrian and bicycle facilities, and ride services
- SHARPP fee to support the University's efforts to address issues of sexual and domestic violence

Students who withdraw or drop to part-time status after classes begin are eligible for a partial refund of fees. (One hundred percent will be refunded before the first day of classes, 75 percent during the first week of the semester, 50 percent after one week and within 30 days, and none thereafter.)

Exceptions

Students enrolled as majors in the Graduate School Manchester Campus are assessed the Manchester mandatory fees.

Students participating in a UNH Study Abroad Program or internship outside the immediate geographic area (50-mile radius) for a semester may petition for a waiver of mandatory fees, with the exception of the technology fee and for undergraduates, the deferred maintenance fee.

Students taking online courses only and who reside outside the immediate geographic area (50 mile radius) may petition for a waiver of mandatory fees, with the exception of the technology fee and for undergraduates, the deferred maintenance fee.

All graduate students are exempt from the student activity fee, athletic fee, and deferred maintenance fee. Graduate students enrolled in weekend/executive programs on the Durham campus are exempt from mandatory fees except the technology fee.

Graduate students enrolled in predesignated evening-only programs, as approved by the provost and vice president for academic affairs or his/her designee, are exempt from the health services and counseling fees.

Doctoral students who have achieved candidacy may petition for a waiver of the mandatory student fees. A waiver will be granted under the following circumstances:

- The student must be advanced to candidacy and enrolled only in 999 prior to the beginning of classes.
- The student cannot be on an assistantship or fellowship, unless such support covers research that is being conducted out of the geographic area (50 miles).
- The student has recently relocated and/or permanently resides out of the immediate geographic area (50 miles) prior to the beginning of classes. The 50-mile radius may be waived if the student is not receiving University support, has met the one-year residency requirement, is working full-time and will only be on campus sporadically to meet with his or her adviser, or if the student has completed all requirements for the degree prior to the end of the drop/add period (end of the third week).
- The student is temporarily out of the region (50 miles) for at least one semester, conducting research related to his or her dissertation.
- The student has a family emergency, illness, or has provided the dean of the Graduate School other information to warrant an exception. (Information will be provided with the petition as appropriate.)
- Students who meet the above conditions and are within the immediate geographic area must confirm in writing that they will not be using the campus services covered by mandatory fees.
- Students must submit petitions each semester to waive fees.

Authority

Any conflicts resulting from this procedure will be adjudicated by the provost and vice president for academic affairs and the vice president for finance and administration or his/her designee.

Special Fees

Differential Tuition

Students majoring in accounting, computer science, economics, and engineering will be charged a tuition differential. Students in these programs who are registered for Doctoral Research (999) or Masters-Continuing Research (GRAD 900) are considered full time and pay the full tuition differential. The current academic year rates are published annually.

Continuing Enrollment Fee

Students registered for Continuing Enrollment (GRAD 800) will pay a continuing enrollment fee. This fee will be waived for students who subsequently register for course credits or research within the semester.

Master's Continuing Research Fee

Master's students registered for Master's Continuing Research (GRAD 900) will pay a continuing research fee plus full mandatory fees.

Doctoral Research Fee

Doctoral students in residence and registered for Doctoral Research (999) will pay a doctoral research fee plus full mandatory fees. Students who register for coursework in addition to Doctoral Research will pay the appropriate additional tuition charges up to the appropriate maximum tuition rate for full-time students. Doctoral candidates not in residence who are conducting their research away from the Durham campus may petition for a waiver of the mandatory fees.

Other Charges and Fees

Overload

Graduate students are charged full tuition plus the appropriate course charge for each credit beyond 16, if registered for more than 16 credits thirty days after the semester has begun. (No refund will be made if a student subsequently drops a course, reducing his or her course load to 16 or fewer credits.) Tuition waivers awarded with assistantships and scholarships do not cover charges for overload.

Zero-Credit Seminars

Seminars for 0 credit are billed as if they were for 1 credit.

Audit

Charges for auditing a course are the same as those for taking it for credit.

Late Fees

A $25 late registration fee is charged to students who register after the last day scheduled for graduate registration. Late fees are also charged for changes in registration as follows: a $25 fee is charged for each course dropped after the third Friday of classes; a $25 fee is charged for each course added after the third Friday of classes. The late-add fee is charged in addition to the reinstatement fee when students register after the third week of classes. A change of section (within the same course) is accomplished by a "drop" of one section and an "add" of another section. The fee will not be assessed for the add portion of a late section change, but the $25 drop fee will still apply for the drop portion of the late section change. Late fees are also charged on accounts remaining unpaid by mid-semester.

Reinstatement Fee

A reinstatement fee is charged to any student who has his or her degree status discontinued and subsequently petitions to be reinstated during the same semester when the action to discontinue the degree status was taken. This fee will not be waived.

Registration Fee

Part-time students (i.e., those registering for 1 to 8 credits) pay a nonrefundable registration fee.

Student Health Benefits Plan

Health insurance is required as a condition of enrollment for full-time degree students at the University of New Hampshire. Students will have the option of waiving this requirement if they present proof of adequate coverage; alternatively, students can acquire an affordable health benefits plan sponsored by the University. The Health Services website has information about the University's Student Health Benefits Plan **http://www.unh.edu/health-services/shbp**. Students with F-1 or J-1 visas are required to enroll in the UNH Student Health Benefits plan. They are not eligible to waive coverage.

Refunds

Tuition and mandatory fees are refundable during the academic year in accordance with the calendar published by the Registrar's Office (UNH Academic Calendar). Students receiving federal financial aid will have their refund calculated in accordance with the U.S. Department of Education regulations in effect at the time of their withdrawal. Specific details regarding the regulations are available in the UNH Financial Aid Office.

Financial Assistance

Several forms of financial assistance are available to graduate students through the Graduate School and individual departments, most of which are awarded for an academic year commencing in the fall. To be eligible for any assistance, the student must first be admitted to the Graduate School. In most cases, the application for admission with supporting documents serves as the application for new graduate students for the scholarship and assistantship programs available to them. In other cases, individual departments have their own application forms. Students are advised to contact individual programs for more information about assistantships and scholarships, and any departmental application forms.

Scholarships and Fellowships

Graduate Scholarships for Merit

The Graduate School awards six scholarships annually to recognize the outstanding contributions of both master's and doctoral students for their teaching and scholarship. Availability and criteria for award of these scholarships are announced annually by the Graduate School.

Scholarships for Full-Time Students

Students who are full-time may be granted full or 1/2 tuition scholarships for the academic year or semester. These awards provide for waiver of tuition and are subject to the maintenance of a high scholastic record in the Graduate School. Application is made to the student's department or program.

Graduate Fellowships

The Graduate School offers a number of fellowships to entering students to assist programs in recruiting a high-quality and diverse student body. Availability and criteria for these fellowships are announced annually by the Graduate School. Students are nominated by their respective program coordinators.

Dissertation Fellowships

Dissertation fellowships for a maximum tenure of one academic year are available on a competitive basis to doctoral students who have been advanced to candidacy. These awards include a stipend and a waiver of the doctoral research and mandatory fees for the period of the award. Application is made to the dean of the Graduate School.

Summer Fellowships for Teaching Assistants

A limited number of summer fellowships are awarded to students who have held graduate assistantships involving teaching during a previous academic year. Application is made to the dean of the Graduate School.

Graduate Appointments 2013-14

The University offers a variety of forms of financial assistance to graduate students in support of their efforts to obtain a graduate degree. Graduate appointments are made to post-baccalaureate students who have been regularly or provisionally admitted to the Graduate School and who have been recommended by the appropriate department or program and approved for appointment by the Graduate School. Appointments are normally for one academic year and may be renewed provided that funds are available and that the student's academic performance, as well as performance in carrying out the responsibilities of the appointment, is satisfactory.

Graduate Assistants: Graduate assistants are students who provide instructional or administrative support as specified by the appointing department and are normally supported by University funds.

Graduate Part-time Lecturers: Graduate part-time lecturers are students who because of their specific expertise are appointed to teach one or two courses per semester and are normally supported by University funds.

Graduate Interns/Trainees: Graduate interns/trainees are students who are assigned to a specific project or subject area to acquire additional learning experiences and are normally supported by external funds.

Graduate Fellows: Graduate fellows are students who have been awarded a fellowship normally through an external grant to the University of New Hampshire or directly to the student. Appointment will normally not exceed one fiscal year and may be renewed in accordance with the terms of the fellowship program.

Graduate Research Assistants: Graduate research assistants are students who are appointed to conduct research on grants supported by the Agricultural Experiment Station or external grants and contracts.

Graduate Supplemental Appointments: U.S. and permanent resident graduate students on appointment in one of the above categories may **petition*** to supplement their regular appointment for up to an average of 10 hours per week when school is in session unless precluded from doing so by the terms of their appointment. **F-1 and J-1 students on full assistantships may not accept additional appointments while school is in session.** All students, including F-1 and J-1, may supplement their regular appointments for up to 20 hours per week when school is not in session (12/16/2013 – 1/17/2014 and 3/10/2014 – 3/14/2014). Such appointments may be processed as stipends or hourly. Assistants who serve as TAs during the January term receive a supplemental appointment if the workload exceeds the 20 hours they are normally expected to work.

***Petition process:** All petitions are reviewed by the associate dean of the Graduate School. Petitions must provide an explanation of the work associated with the supplemental appointment and a rationale that explains how the additional work will have a positive impact on the student's graduate program and will not negatively impact time to degree. The petition requires input from the student's adviser and Graduate program coordinator.

Graduate Stipend-Only Appointments: Graduate stipend-only appointments may be made to students during the academic year under one of the above categories. Students on such appointments have **responsibilities of less** than those of students on regular graduate appointments, have a **workload of less** than those of students on regular graduate appointments, and **receive a lower stipend** than students on regular graduate appointments.

Graduate Hourly Appointments: Graduate hourly appointments are appointments made to students in support of the instructional, administrative, or research activities of the University. Students on such appointments have responsibilities of less than those of students on regular graduate appointments.

Graduate Summer Appointments: Graduate summer appointments are appointments made to students during the summer in one of the above categories. Students on summer appointments may work for up to forty hours per week. Graduate students working full time on research or combined teaching and research for the entire summer earn two thirds of their prior academic year stipend. Appointments for less than the maximum time are prorated.

International students (F-1 and J-1) must consult the Office of International Students & Scholars to confirm employment eligibility.

Stipends: Level 1 - $15,100 all master's students and Ph.D. students with a bachelor's degree who have less than two-years experience as a GA or RA at UNH; **Level 2 - $16,100** Ph.D. students with a master's degree or Ph.D. students with a bachelor's degree who have two-years experience as a GA or RA at UNH; **Level 3 - $17,250** Ph.D. students at candidacy. Departments may pay a higher base stipend for assistants to meet the recruitment needs of the program. Graduate part-time lecturers receive a stipend of no less than the adjunct rate appropriate to their program. Graduate fellows, trainees, and interns receive a stipend in accordance with the terms of their award.

Appointment Dates: The **beginning and ending dates for the 2013-2014 Academic Year** are August 19, 2013 to May 16, 2014. The corresponding semester dates are August 19, 2013 to January 1, 2014; and January 2, 2014 to May 16, 2014. Appointment dates for graduate part-time lecturers hired to teach on a course-by-course basis for a semester or J-term are August 26, 2013 to December 13, 2013; January 2, 2014 to January 17, 2014; and January 21,

2014 to May 16, 2014.

Workload: Students on full assistantships are involved in **assistantship** activities for **twenty hours a week** during the academic year. The workload for students on stipend-only and hourly appointments is specified at the time of appointment. The workload for students in both of these categories is less than 20 hours per week.

Registration: All graduate students holding appointments **must be enrolled** as students in order to hold an appointment during the academic year. Assistants, fellows, or graduate part-time lecturers must register for a minimum of 6 course/thesis credits, Master's Continuing Research, or Doctoral Research during each semester in which they hold their appointments. Interns/trainees must register according to terms specified in their contracts. Students holding a stipend-only or hourly appointment must register for course/thesis credits (no minimum), Master's Continuing Research, or Doctoral Research. **Students registered for Continuing Enrollment (GRAD 800) are not eligible to hold an appointment.** Students holding summer appointments have no required enrollment unless specified by their appointment.

Tuition Waivers: Students appointed as assistants, fellows, and graduate part-time lecturers receive **tuition waivers** in addition to their stipends during the period of their appointment. Waivers will be prorated for students who hold less than a full appointment. Assistants and fellows on AY or spring-only appointments receive **tuition waivers for the January term.** Graduate part-time lecturers receive tuition waivers for the January term only if they are teaching during that term. Students on stipend-only and hourly appointments do not receive a waiver. Such students may be eligible for tuition scholarships. Graduate assistants, research assistants, and fellows receive **tuition waivers for summer courses** offered through the Graduate School (GRAD) related to academic programs in College Teaching and Research Ethics. Summer waivers are prorated for students who had less than a full academic year appointment. Such waivers are provided through the Graduate School. Graduate assistants, research assistants, and fellows may receive tuition waivers for summer courses offered outside of the Graduate School if approved by their funding source. Such waivers are provided by the hiring unit. **Waivers cover only coursework that is directly related to a student's academic program.**

Student Health Benefits Plan (SHBP): Students appointed as assistants, fellows, and graduate part-time lecturers for the full academic year receive a waiver for the University's **Student Health Benefits Plan (SHBP)** during the period of their appointment. Students on a **fall-only** appointment and continuing in the graduate school for the spring semester full time receive a waiver for the **SHBP** for the fall and will be responsible for the spring portion of

the plan costs. Students on a **fall-only** appointment and continuing in the graduate school for the spring semester on a part-time basis receive a waiver for the **SHBP** for the fall, have the option of continuing on the plan for the spring, and will be responsible for the spring portion of the plan costs. Students on a **spring-only** appointment will receive a waiver for the **SHBP** for the spring.

Mandatory Fees: Students appointed as assistants, fellows, and lecturers receive a fee waiver for the technology fee during the period of their appointment. Course fees are also covered by the waiver. The Health Services and Counseling fee, the Memorial Union fee, the Student Recreation fee, and the Transportation fee **are not** covered by waivers, although scholarships maybe awarded to individual students to cover these fees.

FICA taxes will generally be withheld from wages paid to any graduate student registered for less than half time (less than 5 credits per semester during the academic year; or less than 3 credits per session in the summer). Note: Students registered for Doctoral Research (999) or Master's Continuing Research (GRAD 900) are full-time and will not have FICA taxes withheld. In summer students enrolled for 3 or more credits of "899" or "independent study" will generally not have FICA withheld.

Federal income taxes will be withheld from wages paid to graduate students based on information supplied to USNH Payroll on IRS Form W-4. The value of the SHBP waiver is considered a scholarship and may be reportable to the IRS and subject to tax withholding for foreign students. Both wages and scholarships may be exempt from withholding if the student is from a foreign country with tax treaty provisions that exempt these payments. The appropriate IRS Form 8233 or W-8BEN must be on file in USNH Payroll in order for a foreign student to claim these exemptions.

Criminal background checks are conducted for all graduate students appointed as a teaching assistant (TA), research assistant (RA), graduate assistant (GA) or graduate part-time lecturer, graduate fellow, or graduate intern/trainee. Graduate students on stipend-only or hourly appointments may also be required to undergo a background check depending on the nature of their appointment. These investigations are mandated by University policy requiring a pre-employment background review for all appointees who commence their duties after July 1, 2008. A standard background review consists of a criminal history review, sex and violent offender registry review, social security trace and verification; and, if required by the nature of the appointment, a Department of Motor Vehicle record search. International students whose visas and/or authorization to work in the United States were obtained after the Patriot Act was implemented on October 12, 2001 are exempt

from a criminal history check.

REAPPOINTMENT, NON-REAPPOINTMENT, AND TERMINATION

Reappointment: A graduate student who holds a working appointment directly connected with his/her graduate studies may be reappointed for an additional period, provided that funds are available and that the student's academic performance, as well as performance in carrying out the responsibilities of the appointment are satisfactory, and the student's status as a graduate student is maintained.

Non-reappointment: The University, for any reason, may elect not to renew a graduate student's working appointment at the end of the appointment period. No advance notice nor any reason need be given to the graduate student in the case of non-reappointment, and the appeal procedure is not available.

Termination: A hiring unit may recommend to the Graduate School that a graduate student be terminated from a working appointment prior to the end of the appointment. The associate dean of the Graduate School will act on this recommendation. A student who is terminated is entitled to a written statement of the reasons for the termination from the hiring unit. A student who is terminated may initiate an appeal except when the termination is due to the loss of funding for the position; or the termination is due to either a voluntary or involuntary loss of graduate student status. If the graduate student is eligible, and does initiate an appeal using the following procedure, he/she may be placed on leave of absence without pay during the period of time involved in processing the appeal. If the case is found in favor of the student, "back pay" will be awarded.

Step 1: The student should request that the hiring unit making the original recommendation reconsider the decision. The student's request should be written and should contain any information that the student feels warrants a reconsideration of the decision. A copy of the request should be sent to the Graduate dean. As soon as possible after receiving this request, the hiring unit will reconsider the decision and notify the student and the Graduate dean of the results of the deliberations in writing.

Step 2: If the student is not satisfied with the decision reached in Step 1, he/she may request that the Graduate dean review the decision. The student's request should be in writing and must stipulate the reasons for his/her dissatisfaction with the decision reached in Step 1. The Step 2 appeal will be heard by the Student Affairs Committee of the Graduate Council, unless the student requests that the dean or the dean's designee hear the appeal. When the appeal is heard by the dean's designee or the Student Affairs Committee, a recommendation is made to the dean, who will render a decision. The dean's decision will be communicated in writing to the student, the hiring unit and the

hiring unit's College dean, director or vice-president.

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Federal Financial Aid

Graduate students who are enrolled in a degree program at least half time (5 or more credits per semester) and are a U.S. citizen or eligible non-citizen may be considered for Federal Financial Aid. Graduate students are reviewed for loans and work study. There are no federal or University grants or scholarships awarded to graduate students by the UNH Financial Aid Office.

To apply for Federal Financial Aid you must complete the Free Application for Federal Student Aid (FAFSA). You can complete the application on-line at **www.fafsa.ed.gov**. The UNH priority deadline for applying for financial aid is March 1. This is the date by which the FAFSA Application must be received by the federal processor. However, students applying after March 1 will still be considered for the Federal Direct Loan, which is not subject to the priority deadline.

All graduate students applying for financial aid must also complete the Graduate Student Credit and Aid Verification Form. The Graduate Student Credit and Aid Verification Form will show as a requirement on your Webcat account once we have received your FAFSA. This form is completed electronically. Be aware that the Financial Aid Office will make their offer of aid based on your actual tuition charges. If you will be enrolled for less than 9 credits or paying reduced tuition in either semester, your aid package may be adjusted. If you change your status (e.g., from full to part time), receive a scholarship, tuition waiver, or other resource, or correct and/or change the information on the FAFSA, an aid adjustment may result.

Types of aid available:

Federal College Work Study utilizes federal funds to provide employment opportunities to graduate students who file on time and demonstrate financial need.

The Federal Unsubsidized Direct Loan is available to graduate students regardless of financial need.

Federal Direct Graduate PLUS Loan is a loan in the student's name for graduate and professional studies. In order for a graduate or professional student to receive a Federal Direct PLUS Loan they must file the Free Application for Federal Student Aid (FAFSA). Filing the FAFSA enables the student to be considered for the unsubsidized Federal Direct Loan. Approval for the Direct PLUS Loan is based on good credit and the student being enrolled at least half-time in a graduate or professional degree program.

Please feel free to visit the **UNH Financial Aid website** for further information.

Veterans Benefits

Veterans and their dependents should investigate their eligibility for veteran's benefit payments. Questions may be addressed to any local Veterans Administration office, the VA Education Benefits toll-free number: 888-442-4551 (888-GIBill1), the VA website at **www.gibill.va.gov**, or the UNH veterans coordinator, Registrar's Office at (603) 862-2066.

Satisfactory Academic Progress

Satisfactory progress in a course of study must be maintained by all students who receive federal financial aid. The current standards for satisfactory academic progress are available upon request from the **UNH Financial Aid Office**.

Graduate Course Catalog 2013-2014
Research and Scholarship

» http://www.gradschool.unh.edu/

« **Research and Scholarship**

The University is a land-, sea-, and space-grant institution and is ranked among the top 125 research universities. In recent years graduate students at the University have been awarded a number of highly competitive fellowships from EPA, Ford, Fulbright, Merck, NASA, NIH, NOAA, and NSF.

The University's research and scholarly activities range from highly specialized investigations in the physical and biological sciences to broad interdisciplinary studies.

Graduate students are intimately involved in these activities and are expected to be familiar with the policies and procedures that govern their research activities at the University. For more information, visit the **Compliance and Safety pages** of the Research Office website.

Research at UNH

http://www.unh.edu/research/

For an overview of all research news and activities at the University, including resources for graduate students, visit this **website**.

Centers and Institutes

http://www.unh.edu/research/centers-institutes

Research and educational activities are conducted not only in individual departments but also in multidisciplinary research centers and institutes. Visit **this website** for an annotated list of University centers and institutes, which includes links to their individual sites.

Office of the Senior Vice Provost for Research

www.unh.edu/research

The Office of the Senior Vice Provost for Research (Research Office) provides leadership and services to support UNH faculty, students, and staff in their research, scholarship, and creative activities; facilitates cooperation between

UNH and the business community; and communicates and promotes the breadth and depth of UNH research and discovery and its resulting impacts both within and beyond the University. Research is conducted according to ethical principles provided by professional associations and by federal regulations and guidelines. Accordingly, UNH has institutional policies governing the conduct of research and scholarly activities, including but not limited to the use of animal subjects, human subjects, hazardous materials, misconduct, and financial conflict of interest.

The University prides itself on extensive research endeavors and the involvement of graduate students in research projects. The University, therefore, has an obligation to teach and actively promote integrity in research and scholarship. As a graduate student here, it is your responsibility to be familiar with University policies that govern your research activities at the University and to comply with all requirements. For more information, visit the **Compliance and Safety pages** of the Research Office website.

Office for Research and Partnerships and Commercialization

http://www.unh.edu/research/support-units/research-partnerships-commercialization

The University of New Hampshire Office of Research Partnerships and Commercialization advocates for, manages, and promotes UNH's intellectual property; promotes partnerships between UNH and the business community; and is responsible for licensing UNH technologies and creating start-up companies based on innovations created at UNH. ORPC also hosts the N.H. Innovation Research Center.

Graduate Course Catalog 2013-2014
Academic and Support Services

» http://www.gradschool.unh.edu/

« **Academic and Support Services**

Library

www.library.unh.edu

The UNH Library consists of the main Dimond Library and four branch libraries specializing in biological sciences (Kendall Hall), chemistry (Parsons Hall), physics (DeMeritt Hall), and computer science, mathematics, and engineering (Kingsbury Hall). All science libraries have reserve materials, reference and circulating collections, periodicals, and electronic resources specific to their fields.

The Dimond Library offers seating for 1,200, three grand (quiet study) reading rooms, Zeke's Café, and the Dimond Academic Commons (DAC), a "one-stop" shop for information needs including reference assistance, IT help, rich media equipment (with video and audio equipment to borrow), collaborative work spaces, 149 computers including 125 workstations and 24 laptops that can be borrowed for use in the Library. Wi-Fi and data ports are available throughout the building. Nine study rooms can be reserved for groups of four to thirty.

In addition to more than two million volumes and access to 50,000 periodical subscriptions, the library has extensive collections of government documents, maps, sound recordings, CDs, videos, DVDs, and a Special Collections and Archives section with rare books, manuscripts, and University publications and papers. The UNH Library offers extensive electronic resources including Refworks, e-books, digital collections, indexes in many subject areas, statistical data sets, and databases supplying full-text periodical and newspaper articles. Library faculty and staff in all five libraries provide expert service to people seeking information or research assistance. Graduate students have additional privileges including access to recently renovated graduate carrels in room 441 on Level Four (please visit the Circulation Desk for the code) and extended borrowing. Graduate carrels have soft seating, individual study carrels, lockers, and Wi-Fi.

Through the UNH Library's membership in the Boston Library Consortium (BLC), UNH community members are entitled to visit any of the other 17 research

institutions (including MIT, Tufts, Williams, and Wellesley) or request material through a virtual catalog from a combined collection totaling more than 34 million volumes. Requestors will be notified by e-mail when the material arrives. In addition, journal articles and books not available on site or through the BLC can be delivered from libraries worldwide through interlibrary loan. Most journal articles are received within 24 hours. The UNH Library is a member of the Boston Museum of Fine Arts; free passes are available at the Circulation Desk.

For more information on Dimond and the science libraries, visit **www.library.unh.edu**.

Information Technology (IT)

UNH Information Technology (IT)
www.it.unh.edu

Computer Access. UNH has five student computing clusters offering more than 225 computers running Windows, Mac OS X, and Linux. Clusters also provide scanners and paid laser printers. The computers include a suite of productivity and design software, provide access to the Internet, have many course-specific software applications, and give students personal network storage for documents. Spaces specifically designed for group work are available. The clusters are staffed by student consultants who assist with questions or problems. Two locations are available 24 hours a day. For information and cluster hours, visit **clusters.unh.edu**.

Parker Media Lab. The Parker Media Lab in Dimond Library is available for all students to use. The lab includes high-end audio and video editing workstations along with digital editing software and dedicated staff to assist students with course-related and personal projects. The lab also offers a range of camcorders, audio recorders, and associated equipment for students to borrow. Details can be found at **parkerlab.unh.edu**.

Computer Store. The UNH Computer Store offers UNH students, faculty, and staff access to the highest quality, standardized computer products and services, coupled with expert advice and excellent customer service. We carry Apple and Dell notebook and desktop computers; iPads and iPods; laser and ink jet printers and cartridges; heavily discounted software, including Microsoft Office and Adobe Creative Suites; and a variety of other supplies and peripherals at educational pricing. Speak to a live staff member at (603) 862-1328 or visit us online at **computerstore.unh.edu**. We are conveniently located on Level 2 of

the MUB, across from the student mailboxes.

Computer Repair. UNH Computer Repair Services provides UNH students, faculty, and staff warranty service and computer maintenance and repair. A complete list of services is available online at **tps.unh.edu/crs**. The Computer Repair Service Center is conveniently located next to the Computer Store at the MUB, Level 2, East, across from the student mailboxes. For more information, call (603) 862-4242.

Computer Training. Each semester, UNH IT courses are offered on a variety of topics. For more information, call (603) 862-4242.

Technology Support. UNH IT provides UNH students, faculty, and staff with support for telephones, network connectivity, computing accounts, supported software applications, exam scanning, and a wide variety of personal computer issues.

By Phone
IT Service Desk
(603) 862-4242
it.unh.edu/helpdesk

In Person
Dimond Academic Commons AT Support Center
Dimond Library – Level 3 (Main Level)
http://www.library.unh.edu/locations/dimond-library/dimond-academic-commons

On the Web
Fill out a support request form at: **it.unh.edu/contactus**

Web Solutions. Web Solutions designs, develops, and manages websites and web-based applications for the UNH, USNH, and its partners. Web Solutions provides expert development and design services for projects ranging from an enterprise content management system to a custom application. Web Solutions offers consulting and project management for large-scale online projects. For more information or to fill out a request form, visit Web Solutions at **it.unh.edu/websolutions**.

Graduate Student Housing

www.unh.edu/housing

Babcock Hall and Forest Park Apartments

Babcock Hall is a community of 180 graduate, international, and nontraditional students. Five-story Babcock Hall combines social, educational, and cultural opportunities with the convenience of on-campus living. All rooms are single occupancy, simply furnished, and are wired for cable television and Internet access. Each floor has a kitchenette and several study and television lounges available for residents' use. The building has table tennis, a piano, a fireplace, laundry facilities, and mail delivery located on the lobby level.

Family housing at the Forest Park Apartment Complex provides campus housing for married students, students with dependent children, single graduate students, and staff and faculty members (when space allows). The community at Forest Park is diverse, with students and faculty members from all over the world. The three-acre complex is located on the southern edge of campus, within close walking distance of UNH academic and administrative buildings and Durham's shopping and business district. The two- and three-story buildings within Forest Park house 97 apartments. These include studio (efficiency), one-bedroom, and two-bedroom apartments.

Following acceptance to the Graduate School, any student interested in on-campus housing should contact the University's Department of Housing.

Summer Housing

Rooms in Babcock Hall are available to graduate students taking courses during the summer. Students interested in summer accommodations should contact the Department of Housing. Off campus housing is listed on the Web at **www.unhmub.com/housinglist**.

Dining Services

www.unh.edu/dining

UNH Dining Services is committed to providing the highest level of quality food and service at a great value. Offering fresh and healthy food options at three dining halls and eight retail locations, UNH Dining Services can meet the needs of busy graduate students. UNH Dining hall choices include all-day breakfast, sushi, rotisserie selections, brick oven specialties, and afternoon tapas along with local, sustainable, vegan, vegetarian, and gluten-free items. UNH Dining retail locations offer everything from Starbucks® Coffee to inspired salads made with the freshest, local greens grown right on campus. Flexible meal plans and payment options make UNH Dining Services a convenient way to eat while you are here.

Campus Recreation

http://campusrec.unh.edu

The Hamel Student Recreation Center is available to all full-time matriculating students and Recreation Pass holders, seven days a week (excluding UNH holidays and shutdowns).

The center offers participants two multipurpose courts, a group exercise studio, club/martial art studio, a fitness center, basketball/volleyball courts, an indoor track, a lounge, locker rooms, towel and lock service at the equipment room, saunas, a bouldering wall, indoor pool (located in the Field House), and several grass and three synthetic sports fields.

Participants may participate in group exercise classes such as Zumba, cycling, cardio kickboxing, and yoga. Noncredit courses are also offered, including CPR and First Aid..

The intramural sports program consists of 26 different sports and activities offered through co-rec and men's and women's teams. There are also 32 sport club teams.

Ice skating in the Whittemore Center arena is available during specific hours.

During the summer, the Department of Campus Recreation manages a large outdoor recreation facility on Mendum's Pond in Barrington and an outdoor pool located on Edgewood Ave.

Memorial Union Building

www.unhmub.com

The "Heart of Campus" is the Memorial Union Building (MUB). The original building was a gift from UNH alumni and is the official state war memorial. It is the location for lectures, cultural programming, and a large number of free or inexpensive entertainment programs and activities.

The MUB is wireless in all public spaces and meeting rooms. Key areas of the MUB are the Information Center; two state-of-the-art movie theaters, which include 3-D capability; Games Room with both billiards and electronic games; the UNH Copy Center; the UNH Bookstore; the UNH Computer Store; the Ticket Office; and lounge/study space. On the second floor, student mailboxes are available for free for graduate students at Granite Square Station. Close by, mailing and shipping services are also available at Granite Square Shipping. Computing and Information Services provides a computer cluster. The Food Court offers expanded dining options, and limited drinks, candy, and popcorn are also available at The Notch on the third floor. The Graduate Student Senate

has office space in MUB 119E.

The Office of Student Involvement and Leadership (OSIL), a division of the Memorial Union, is a resource center for student organizations and leadership, Greek life, and commuter and non-traditional students There are more than 200 student organizations, most of which are open to graduate students and several of which are graduate-student specific. Student organization, involvement, and leadership information and events can be accessed through **Wildcatlink.unh.edu**. UNH students, staff, and faculty can access all pages by using their UNH IT ID.

Off-Campus and Commuter Services

www.unhmub.com/off-campus

Found within the Office of Student Involvement and Leadership (OSIL), located in the Memorial Union Building, Room 114, UNH Commuter Student Services provides resources, services, and programs for all students living off campus. Resources available include listings for off-campus housing, tenants' rights information, and the UNH Community Guide that has both community and UNH information (available as a PDF on our website). We also host programs such as Commuter and Transfer Survival Day (an orientation program for all new UNH students held before classes begin each semester), Good Morning Commuters, breakfast during Graduate Student Appreciation Week, non-traditional student events, and many others. The Commuter Connection, an e-mail containing UNH events, activities, and programs is a great weekly resource; subscribe at **www.unhmub.com/off-campus/**. In addition, specific programming and support is offered for graduate students, student veterans, and non-traditional students. Visit our website, e-mail **off-campus@unh.edu**, or call (603) 862-0303 for additional information or assistance.

The Office of Student Involvement and Leadership

www.unhmub.com/involvement

Located in Memorial Union Building (MUB), Room 114, the Office of Student Involvement and Leadership is the home of student organizations, leadership development programs, Greek life, and Commuter Student Services. We are the place to help you get involved on campus! Find information ranging from student organizations, fraternities and sororities, sample apartment sublet agreements, staying connected to campus, and much more. Student organization, involvement, and leadership information and events can be accessed through **Wildcatlink.unh.edu**. UNH students, staff, and faculty can access all pages by using their UNH IT ID.

Health Services

The University has a nationally accredited health and wellness program. **www.unh.edu/health-services**

Medical Services

Health Services provides comprehensive, student-focused, primary medical care through a team approach. The clinical staff consists of board-certified physicians, physician assistant, nurse practitioners, nurses, and medical assistants who are committed to prevention and holistic care. Primary medical care is provided for a large variety of common concerns. **http://www.unh.edu/health-services/services**

Office of Health Education and Promotion

The Office of Health Education and Promotion coordinates health promotion activities on campus. Services provided include educational programs/workshops, individual and group health counseling, and support to promote healthy lifestyle choices. **http://www.unh.edu/health-services/ohep**

Student Health Benefits Plan

Health insurance is required as a condition of enrollment for full-time degree students at the University of New Hampshire. Some students have the option of waiving this requirement if they present proof of adequate coverage; alternatively, students can acquire an affordable health benefits plan sponsored by the University. For more information about the University's Student Health Benefits Plan, visit **http://www.unh.edu/health-services/shbp**

Health Record Requirement

In order to provide effective care, Health Services requires that students who have been formally accepted for a graduate program in Durham, and who register for five or more credits, have medical records on file with Health Services. It is the student's responsibility to complete the forms before the beginning of classes. Any student failing to complete these requirements may not be cleared to register for future classes. For more information on the requirements, visit **http://www.unh.edu/health-services/incoming-students**

Counseling Center

www.unhcc.unh.edu

The Counseling Center offers confidential professional consultation, individual and group therapy, and educational workshops for a broad range of emotional, psychological, and interpersonal concerns.

Appointments can be made over the phone or in person. In addition, emergency services are offered, 24 hours a day, seven days a week. All information about a student's visits to the Counseling Center is confidential and cannot be released without the written permission of the student.

The staff comprises licensed psychologists, doctoral interns, postdoctoral fellows, and a consulting psychiatrist. The Counseling Center is fully accredited by the International Association of Counseling Services, Inc. and offers a doctoral internship training program that is accredited by the American Psychological Association.

Center for International Education

www.unh.edu/cie

The Center for International Education's mission is to promote and facilitate global learning and responsible world citizenship. The center helps UNH students, faculty, and New Hampshire citizens gain international knowledge and experience in order to better understand the complexities of world affairs and effectively respond to the global issues affecting their lives and livelihood. International knowledge, intercultural competence, and global preparedness are at the core of CIE's mission. CIE achieves its mission through its support of the *Report of the President's Panel on Internationalizing UNH* and through the following programmatic activities:

- **International Affairs Dual Major**
  To help students of every major develop critical global understanding, foreign language competency, and international experience
- **Study Abroad**
  For a new perspective and valuable first-hand experience in countries around the world
- **Scholarship Opportunities**
  To make direct international learning available to students with financial need
- **N.H. International Seminars**
  By eminent UNH and visiting scholars to engage the community on important international issue
- **Faculty Development**
  To support faculty to explore research and collaborations abroad to enrich classroom teaching and the UNH community

Disability Services for Students

www.unh.edu/disabilityservices

The University of New Hampshire is committed to providing students with documented disabilities a living and learning experience that assures equal access to programs and facilities. The University will make reasonable accommodations, as supported by documentation, to promote maximum independence and access to the full range of college activities at UNH.

All students with disabilities who anticipate the need for academic and nonacademic accommodations and services should self-identify and provide written documentation to **Disability Services for Students** (DSS). Please see the website for the **timeline to request accommodations**. The office is located in Smith Hall, Room 201, (603) 862-2607 (Voice/TTY), or e-mail **disability.office@unh.edu**. Contact DSS as soon as possible after acceptance to assure accommodation of disability and smooth coordination of available services. All disability-related documentation is strictly private and remains in the DSS office.

Inclusive Excellence

http://www.unh.edu/inclusive

Inclusive Excellence Initiatives

Through educational programming, staff training opportunities, and academic research, our goal is to make the University of New Hampshire a more diverse, respectful community, one that communicates to all of its members that they are respected and that their contributions are valued.

Commitment to Diversity and Inclusive Excellence

Diversity is a community value at the University of New Hampshire. We are committed to supporting and sustaining an educational community that is inclusive, diverse, and equitable. The values of diversity, inclusion, and equity are inextricably linked to our mission of teaching and research excellence, and we embrace these values as being critical to development, learning, and success. We expect nothing less than an accessible, multicultural community in which civility and respect are fostered, and discrimination and harassment are not tolerated. We will ensure that underrepresented groups and those who experience systemic inequity will have equal opportunities and feel welcome on our campus. We accept the responsibility of teaching and learning in a diverse democracy where social justice serves as a bridge between a quality liberal education and civic engagement.

International Students and Scholars

www.unh.edu/oiss

The Office of International Students and Scholars (OISS) promotes international education at UNH by facilitating the enrollment and employment of foreign nationals and by providing them with essential support services. The OISS coordinates programs that encourage interaction between the international, campus, and local communities, thereby fostering awareness and appreciation of other cultures. It is the responsibility of the OISS to ensure University compliance with U.S. immigration and employment regulations and to assist international students, exchange scholars, faculty, and staff in the achievement of their academic and professional goals.

The OISS staff provides immigration advising, non-academic counseling, information on University policies, administrative support, and referral services. A variety of social and educational programming activities is offered, including orientation for incoming students, faculty and staff, and others.

All international students are encouraged to maintain contact with the OISS and are required by law to report changes of address, academic program, or source of educational funds.

Office of Multicultural Student Affairs (OMSA)

www.unh.edu/omsa

OMSA creates opportunities for people to participate in an inclusive community and to explore and understand diversity, social justice, inclusion, and equity via educational presentations, workshops, professional development opportunities, retreats, brown-bag discussions, etc. We serve all members of the UNH community through these various opportunities and beyond.

Our work is grounded in an understanding of diversity that includes people of all abilities, ages and ethnicities, genders, nationalities, races, religions/spiritual traditions, socioeconomic classes, and sexual orientations.

Providing support, advising, advocacy, and student development opportunities for African American/Black/African/Caribbean, Hispanic/Latino/a, Native American/First Nations, Asian/Asian American/Pacific Islanders, Multiracial/Biracial, Arab/Middle Eastern, and Lesbian, Gay, Bisexual, Transgender, Queer, and Questioning students, and First Generation College Students and Allies is at the heart of our work.

We are located in the Memorial Union Building (MUB), Room 327. We look forward to serving you.

President's Commissions

Inclusive Excellence and the President's Commissions

For information and resources on ways that UNH invites a diversity of experiences to its learning community, visit the University's Inclusive Excellence website and visit the four President's Commissions websites as listed below. Faculty, staff, and student volunteer commission members are appointed each year by the president to advocate for improvement of UNH policies and practices in access to education and employment.

President's Commission on the Status of Gay, Lesbian, Bisexual, and Transgender Issues
www.unh.edu/glbt
The UNH President's Commission on the Status of Gay, Lesbian, Bisexual, and Transgender Issues facilitates the development of a University community that is equitable and inclusive of all sexual orientations, gender identities, and expressions.

President's Commission on the Status of People of Color
www.unh.edu/cspc
The UNH President's Commission on the Status of People of Color proposes, recommends, and evaluates programs, policies, and services aimed at fostering diversity on campus and ensuring that the environment is supportive of people of under-represented groups.

President's Commission on the Status of People with Disabilities
www.unh.edu/cspd
The President's Commission on the Status of People with Disabilities is to promote empowerment and inclusion of students, faculty, staff, and guests with disabilities. They serve a diverse group that includes individuals with visible and nonvisible disabilities. The commission provides a forum for discussion of disability-related issues relevant for the campus and larger community.

President's Commission on the Status of Women
www.unh.edu/womens-commission
The UNH President's Commission on the Status of Women creates equal employment and educational opportunities, through policy, advocacy, and education, in its promotion of an environment free of sexism and discrimination.

Sexual Harassment and Rape Prevention Program

www.unh.edu/sharpp

The Sexual Harassment and Rape Prevention Program (SHARPP) is a crisis intervention center dedicated to providing free and confidential services for all members of the University community. SHARPP operates a 24-hour support line as well as in-person and online advocacy services to respond to the needs of survivors of sexual assault, sexual harassment, childhood sexual abuse, relationship abuse, and stalking. SHARPP also provides support and crisis services for those who are impacted by abuse experienced by someone they are close to. Additionally, SHARPP presents a wide range of educational programs to the University community and serves as a campus-wide resource on issues relating to sexual and relationship violence. For more information about SHARPP, please visit **www.unh.edu/sharpp**.

UNH Transportation Services

www.unh.edu/transportation

UNH Transportation Services administers visitor parking; parking for faculty, staff, and students; and University mass transit. Other services offered by Transportation Services are Cat Courier, Guaranteed Ride Home, Safe Rides, and the Bike Program.

Wildcat Transit
Wildcat Transit Bus Service provides public transportation from Durham to Dover, Portsmouth, Newmarket, and Rochester, with connections to other local and interstate bus service providers.

Campus Connector is the on-campus bus service.
The Campus Connector provides free service for students and visitors throughout the campus and the town of Durham.

Wildcat Access
Wildcat Access provides rides for people with either permanent or temporary disabilities who cannot access Campus Connector around campus.

University Police

www.unh.edu/upd

The nationally accredited University Police Department's mission is to support the University community in creating a safe environment that is conducive to

higher education by protecting life and property while supporting the rights and dignity of all persons. Specific educational programs are provided by professionally trained police officers including drug and alcohol abuse prevention. Rape Aggression Defense (RAD) is taught to female students, staff, faculty, or community members, and a walking patrol provides escort services for students, faculty, and staff. Sign up for free emergency notifications, crime alerts, and safety bulletins at **https://alert.unh.edu**.

Veterans Information

The UNH veterans coordinator, located in the Registrar's Office, provides counseling on all aspects of veteran's benefits and assistance in procuring and completing the required forms and certifications for veteran's benefits. The veterans coordinator maintains a comprehensive directory to assist veterans in contacting state, local, and University resources. The coordinator also provides a framework for networking among campus veterans. For further information, call (603) 862-2066 or e-mail Lonn Sattler at **UNH.Veterans@unh.edu**.

See the **UNH Veterans webpage** to request benefits, stay up to date on benefits changes, and find out about events.

Graduate Course Catalog 2013-2014
Academic Regulations and Degree Requirements

» http://www.gradschool.unh.edu/

« **Academic Regulations and Degree Requirements**

It is the student's responsibility to become familiar with the academic regulations and degree requirements of the Graduate School as well as the special requirements of his or her own academic program. The general requirements of the Graduate School are found in the catalog. Individual program requirements may be found in the catalog or obtained from the respective department.

Academic Honesty

Academic honesty is a core value at the University of New Hampshire. The members of its academic community both require and expect one another to conduct themselves with integrity. This means that each member will adhere to the principles and rules of the University and pursue academic work in a straightforward and truthful manner, free from deception or fraud. The academic honesty policy can be found in the ***Student Rights, Rules, and Responsibilities*** **handbook**.

Graduate Courses

Graduate credits may be earned in courses numbered from 800 through 999, or under limited circumstances in courses numbered at the 700 level.

The faculty of each graduate program prescribes the courses that make up the degree program. In addition, the Graduate School has general requirements for master's and doctoral degree programs.

800- and 900-Level Courses

These courses are offered for graduate credit only and therefore are open only to admitted graduate students or nondegree students with a minimum of a bachelor's degree. Courses at the 800 level may be colisted and cotaught with advanced-level undergraduate courses.

700-Level Courses

These are advanced undergraduate courses. Graduate credit will not be given for

any courses that have freshmen or sophomores enrolled. The Graduate School monitors those advanced-level undergraduate courses that are colisted and cotaught with 800-level graduate courses to ensure that only advanced-level undergraduates are enrolled. Up to 12 credits earned in 700-level courses may be petitioned for graduate credit by a graduate degree student, provided the credits are taken in a program other than the one in which the student is seeking the degree and provided such courses are approved by the student's adviser, graduate program coordinator, and the dean of the Graduate School. Such courses must be taken for a letter grade. Petition forms are available at **http://www.gradschool.unh.edu/fp.php**.

Graduate Grading

Letter grades: The following grades are used at the University: A (4.0), A- (3.67), B+ (3.33), B (3.0), B- (2.67), C+ (2.33), C (2.0), C- (1.67), D+ (1.33), D (1.0), D- (.67), F (0). Graduate credit is only granted for courses completed with a grade of B- or higher. Individual programs may have stricter requirements, and those are published with their degree program requirements.

AF Grades: An "AF" grade, Administrative F, is assigned for failure to either drop or complete a course. An "AF" is considered the same as an "F."

Credit/Fail Grades: A "CR" grade is assigned for complete, approved theses and dissertations, as well as other approved courses and seminars.

Pass/Fail Grades: Graduate courses cannot be taken pass/fail. A graduate student may petition to take undergraduate courses on a pass/fail basis. Such a petition must be approved by the end of the add period for the term the course is taken. A grade of "C" is the minimum grade in order to receive a "P." Courses at the 700-level approved for graduate credit cannot be taken for pass/fail.

Audit Grades: An "AU" grade is assigned for completion of courses for which an audit was granted. No credit is earned.

Incomplete Grades: An "IC" grade is assigned with the approval of the instructor for excused unfinished work only. The work must be completed and submitted to the instructor by the date agreed to with the instructor, but not later than the last day of classes of the semester immediately following the one in which the incomplete was granted (800- and 900-level courses only; midsemester deadline for 400-, 500-, 600-, and 700-level courses). If extraordinary circumstances arise, a petition requesting additional time may be submitted. The petition, listing a specific deadline for completion, must be approved by the instructor, the student's adviser, and graduate program coordinator before being submitted to the Graduate School. An extension will be granted by the dean only under unusual circumstances and will usually not

exceed one calendar year from the end of the semester in which the course was originally taken. An incomplete grade becomes an "F" if not resolved or if a petition for an extension is not approved within the allotted time period. This policy also applies to students who withdraw from the University or who are on an approved leave of absence.

IA Grades: An "IA" grade is assigned for approved continuing courses such as thesis or doctoral research and remains on the record until the course requirements are completed. In the case of doctoral research, the "IA" grades remain on the official transcript for all semesters prior to the completion of the degree. The "IA" grade for the final term of enrollment will be changed to "CR" to signify successful completion of the dissertation.

W Grades: If a student withdraws from school or drops a course prior to the fifth Friday of the semester, the course(s) will not appear on the student's permanent record. If a student withdraws from school or, for compelling nonacademic reasons, submits an approved petition to drop a course after the fifth Friday of the semester, a notation of "W" will be shown on the student's academic record. If the withdrawal or drop is after the midpoint in the class, a grade of "WP" or "WF" is shown on the record. A "WF" is considered a failing grade and will calculate into the GPA as such. Deadlines for courses scheduled for any time period other than a full semester are apportioned at the same rate as semester courses. The actual dates are determined on a term-by-term basis.

Appeals: Every instructor must be prepared to discuss and explain the basis for her or his evaluation of students. If, after consulting the instructor, a student still believes that he or she was treated unfairly, he or she has the right to seek redress from the chairperson of the department or program in which the course is offered. Under exceptional circumstances, a final appeal may be made to the dean of the college or school in which the program is offered.

Repeated courses: Repeating a course does not remove the original course or grade from the record. If the course numbers and/or titles do not match exactly, graduate students must obtain written permission of their adviser, graduate program coordinator, and the endorsement of the Graduate School dean before the adjustment will be made. Only the most recent grade is included in the cumulative grade-point average; only the most recent credit, if any, is included in the cumulative credits earned. A course may only be repeated once. Only repeated courses taken at UNH will alter the cumulative grade-point average.

UNH Credit Hour Policy

The University of New Hampshire is in compliance with the federal definition of credit hour. For each credit hour, the University requires, at a minimum, the

equivalent of three hours of student academic work each week. Academic work includes, but is not limited to, direct faculty instruction, e-learning, recitation, laboratory work, studio work, fieldwork, performance, internships, and practica. Additional academic activities include, but are not limited to, readings, reflections, essays, reports, inquiry, problem solving, rehearsal, collaborations, theses, and electronic interactions. Student work reflects intended learning outcomes and is verified through evidence of student achievement.

Academic Standards

Graduate students receiving grades below "B-" in 9 or more credits, including undergraduate courses taken while a graduate student, will be dismissed from the Graduate School.*

Graduate students enrolled under the accelerated master's program receiving any grade below "B-" in a graduate course while in dual status can be dismissed and have their admission to the Graduate School withdrawn.

Graduate students will have a maximum of two opportunities to successfully complete final examinations for the master's or Ed.S. degree.

Doctoral students will have a maximum of two opportunities to successfully complete qualifying or final examinations for the Ph.D. degree.

Graduate students admitted on a conditional or provisional basis must meet the conditions or provisions as stated in the letter of admission in order to remain in the Graduate School.

Graduate students MUST have a cumulative GPA of 3.0 or higher in order to graduate.

* Each individual program may set and announce standards for coursework, examinations, and/or research achievement that are more rigorous than the Graduate School standard. Thus, students may be dismissed if they accumulate less than 9 credits of grades below the "B-" level, and/or fail to make adequate progress in other aspects of their graduate program.

Dismissal for Failure to Make Satisfactory Academic Progress

Policy and Appeals Procedure for Graduate Students Dismissed for Failure to Make Satisfactory Academic Progress or Professional, Ethical, or Behavioral Misconduct

The process by which a student can be dismissed for violations of academic standards or violations of professional, ethical, and/or behavioral expectations of the program is outlined below along with the process by which such decisions can be appealed.

Dismissal for Failure to Make Satisfactory Academic Progress

(Note: This procedure is not available to graduate students who have received failing grades in 9 or more credits.)

A department chairperson or a graduate program coordinator, upon the recommendation of the appropriate faculty committee, may recommend dismissal for a student who is failing to make satisfactory academic progress in their program. This recommendation shall be forwarded in writing to the associate dean of the Graduate School with a copy to the affected student. The associate dean of the Graduate School will act on the faculty recommendation and inform the student and the graduate program coordinator or department chair of the action taken. A student disagreeing with the action taken should make every effort to resolve the situation through informal discussions with the individuals involved in the decision. If the recommendation to dismiss is changed at this point, the associate dean will be notified and after review will notify the student of the decision. If the decision to dismiss stands, a student wishing to enter a formal appeal shall follow the procedure outlined below. A student who has been dismissed for failure to make satisfactory academic progress may, with the permission of the dean of the Graduate School, enroll as a special student in courses in his/her program pending a final decision on the appeal.

Dismissal for Professional, Ethical, or Behavioral Misconduct

Graduate students shall conduct themselves in a manner consistent with the norms and practices of their program and/or discipline.

A department chairperson or graduate program coordinator, upon the recommendation of the appropriate faculty committee at the department/program level, may recommend dismissal for a student who is failing to meet the professional, ethical, and behavioral expectations of the program or otherwise fails to act in ways that are consistent with the norms and standards of the profession or discipline. This recommendation shall be forwarded in writing to the associate dean of the Graduate School with a copy to the affected student. The associate dean of the Graduate School shall act on the faculty recommendation and inform the student and the graduate program coordinator or department chair of the action taken. A student disagreeing with the action taken should make every effort to resolve the situation through informal discussions with the individuals involved in the decision. If the recommendation to dismiss is changed at this point, the associate dean will be notified and after review will notify the student of the decision. If the decision to dismiss stands, a student wishing to enter a formal appeal shall follow the procedure outlined below. A student who has been dismissed for professional, ethical, or behavioral misconduct may, with the permission of the dean of the

Graduate School, enroll as a special student in courses in his/her program pending a final decision on the appeal.

Appeals Process for Graduate Students Dismissed for Failure to Make Satisfactory Academic Progress or Professional, Ethical, or Behavioral Misconduct

Step 1: The student shall request that the faculty member or committee making the original recommendation reconsider their decision, generally within 10 working days after the receipt of the official decision from the Graduate School. The student's request shall be written and shall contain any information which the student feels warrants a reconsideration of the decision. A copy of the request shall be sent to the dean of the Graduate School. As soon as possible after receiving this request, the faculty member or committee group will reconsider their decision and notify the student and the dean of the Graduate School of the result of their deliberations in writing. If the original recommendation is reversed at Step 1, the associate dean will review the new material and act on the recommendation and inform all parties involved.

Step 2: If the student is not satisfied with the decision reached in Step 1, he or she may request that the chairperson of the appropriate department or program convene a meeting of all graduate faculty members in the department or program to review the decision. The student's request shall be in writing, and a copy shall be sent to the dean of the Graduate School. After the meeting, the chairperson will provide the student and the dean of the Graduate School with written notification of the decision of the faculty. If the recommendation to dismiss is reversed by the graduate faculty, the associate dean will again review the case, act on the recommendation and inform all parties involved.

Step 3: If the student is dissatisfied with the decision reached in Step 2, he or she may request that the dean of the Graduate School review the decision. The student must request such a review in writing and stipulate the reasons for dissatisfaction with the decisions reached in the earlier steps in the review procedure. Within a reasonable period of time, the dean of the Graduate School will hold separate meetings with the student and the appropriate faculty and the associate dean to discuss the case. After these meetings and after reviewing any other information deemed appropriate, the dean of the Graduate School will inform the college dean about the appeal process to date. In consultation with the Graduate Council, the dean of the Graduate School will then arrive at a final decision, which will be communicated in writing to the student, the department or program faculty, and the college dean.

In Steps 1 and 2, the student may, at the discretion of the faculty body involved in hearing the appeal, be present to state their case during the review of the appeal. A member of the University community may appear with the student, as

an adviser, before the dean of the Graduate School and before any faculty meeting, which the student is permitted to attend. An adviser may be present, but may not directly participate, in any of these proceedings. Students shall not be present during deliberations.

Transfer of Credits

A maximum of 12 credits taken by a student prior to matriculation (internal and external combined) can be applied to a degree program.

External to UNH

Students may request that a maximum of two courses, for up to 8 semester credit hours of resident courses completed on the campus of an accredited institution authorized to grant graduate degrees, be transferred to count toward their graduate program. All courses presented for transfer must have been completed with a grade of B or better and must have been taken for graduate credit. Courses cannot be transferred for credit if used in earning another degree. Transfer of credits must be recommended by the program faculty and approved by the dean of the Graduate School. Students taking courses at another university for transfer after enrolling at UNH should obtain approval of their adviser and the graduate dean prior to enrolling in the course.

Internal to UNH

A maximum of 12 credits completed by a nondegree student in UNH graduate courses (800 or 900 level) at UNH or UNHM may, upon approval of the dean of the Graduate School, be applied to a student's degree program. Each program's faculty retain discretion regarding the maximum number of graduate credits that will be recommended for approval (not exceeding 12).

Continuing Education Units

The Continuing Education Unit (CEU) is a nationally recognized method of quantifying the time spent in the classroom during professional development and training activities. Ten hours of instruction = 1.0 CEU. One hour of instruction = 0.1 CEU. CEUs are not transferable as graduate credit.

Master's Degree Requirements

Dual Degrees

The Graduate School allows UNH students to pursue two degrees at UNH and count credits toward both degrees under the circumstances detailed below. Such credit will be granted only for graded coursework completed with a grade of "B-" or higher. Application of such credit toward a student's program for a second degree is subject to departmental recommendation and approval by the Graduate School. Dual degrees should be interpreted to include separate majors within the same degree, or a combination of two different degrees. Students will receive separate diplomas for each degree program. **Note: No dual degrees will be awarded retroactively.**

1. Accelerated Master's. Qualified senior students at the University of New Hampshire may be admitted to the Graduate School provided they have followed normal application procedures; they must have been admitted for the semester in which they wish to enroll in courses for graduate credit. A 3.20 cumulative grade point average is normally required to be considered for early admission. Such seniors are normally admitted prior to the start of their last undergraduate semester. Seniors who have been admitted under early admission may register for a maximum of 12 credits of graduate-level courses prior to completing their bachelor's degree. Such courses may, upon recommendation of the department and approval of the Graduate School, count toward both a bachelor's and master's degree.

2. Consecutive Master's Degrees. Enrollment in consecutive master's degrees refers to admission and matriculation in a second master's degree program at the University of New Hampshire after the completion of the requirements for a first master's degree earned at the University of New Hampshire. A student may apply up to 12 credits earned in the first master's degree awarded at the University of New Hampshire toward a second master's degree with approval of the student's graduate advisory committee and/or graduate program coordinator in the second master's program. Thesis or research credits from the first program may not be counted toward the requirements of the second program.

3. Concurrent Dual Degrees. Enrollment in concurrent dual degrees occurs when a student is admitted to and matriculated in two graduate degree programs at the University of New Hampshire simultaneously. A student may pursue concurrent degrees only with approval of the appropriate graduate program coordinator(s) and the dean of the Graduate School. With approval of

the student's graduate advisory committee(s) and/or the graduate program coordinator(s), a student may apply up to 12 University of New Hampshire credits earned in one master's degree toward the requirements for a second master's degree. A student must complete the capstone requirements for both programs. Completion of degree requirements for the two programs need not be at the same time.

4. Integrated Dual Degrees. Integrated dual degrees occurs when two graduate programs have formalized a program of study which creates an integrated program linking the two disciplines, while continuing to award separate degrees. Students must be admitted to both programs and complete the requirements for both degrees. Integrated dual degree programs may include a single admissions process, submission of a single thesis or capstone experience, and a single advisory committee composed of members from both programs. The number of required credit hours for integrated dual degrees must not be less than 80 percent of the total minimum hours required to complete each degree separately. Integrated dual degree programs must be approved by the Graduate Council and the dean of the Graduate School.

All standard policies relating to time to degree, residency requirements, academic standards, and minimum GPA required to graduate apply to any dual-degree arrangement.

If the student withdraws from one of the participating programs, the dual-degree arrangement is automatically nullified.

If a student's tuition is funded by one or more units, it is up to the funding unit to decide if tuition may cover courses taken solely for completion of the second program.

Educational Specialist Degree

Requirements for completion of the educational specialist degree (Ed.S.) are found under the program descriptions of the Department of Education. A student can petition to count a maximum of 12 credits, not previously applied to a degree program and taken prior to admission to the Ed.S., toward a Ed.S. program.

All graduate work for the Ed.S. must be completed within six years from the date of matriculation (enrollment after admission) in the program.

Doctoral Degree Requirements

The degree of doctor of philosophy is conferred on qualified candidates who have passed an oral or written examination(s) on the subject matter of their field of study, who have completed an original investigation in this field and

have embodied the results in an acceptable dissertation, and who have passed an oral examination in defense of the dissertation. The degree of doctor of philosophy is essentially a research degree.

Responsible Conduct of Research
As a land-grant institution, the University of New Hampshire (UNH) is accountable to New Hampshire residents and to the University community to ensure the ethical and safe conduct of research and scholarly activity. As an institution of higher education that prides itself on extensive research endeavors and the involvement of undergraduates and graduate students in research projects, UNH has an obligation to teach and actively promote integrity in research and scholarship.

To fulfill its obligations, UNH has embarked on a program on the responsible conduct of research and scholarly activity (RCR) to:

- Raise the consciousness of faculty, staff, and students regarding the ethical and responsible conduct of research and scholarly activity;
- Establish a knowledge base that defines normative and/or professional behavior to assist faculty, staff, and students in making ethical and responsible decisions in the conduct of research and scholarly activity; and
- Foster an institutional culture of integrity in research and scholarly activity.

To support these efforts, the Graduate Council has mandated that all incoming Ph.D. students complete RCR training approved by the Graduate School by the end of their first semester. For more information, visit the **RCR website**.

» **Residency**
» **Credits**
» **Doctoral Research (999)**
» **Guidance Committee**
» **Qualifying Examination**
» **Language/Research Proficiency**
» **Degree Candidacy**
» **Doctoral Committee**
» **Time Limit**
» **Dissertation**
» **Final Defense**
» **Submission of Dissertation**

Graduation

Graduation occurs three times a year in September, December, and May. All students MUST file an intent-to-graduate form by the appropriate deadline specified on the **Graduate School Calendar**. Students must file this form online

through their MyUNH website. More information on this process is available on the Graduate School's website at **http://www.gradschool.unh.edu/graduation.php.**

All coursework completed prior to the official conferral of the degree will be applied only to that degree program. Graduate students MUST have a cumulative GPA of 3.0 or higher in order to graduate.

Commencement

The annual commencement ceremony is held in May. Students who have completed their degree requirements in the preceding September and December are invited to participate in commencement ceremonies in May.

Master's and Ed.S. students who expect to complete their degree program in May, as well as those who expect to complete their programs at the end of the summer term following the commencement ceremony (September), are eligible to participate in May commencement. Students who file their intent-to-graduate online for either May or September by the last deadline for filing for May will be listed in the commencement book.

To participate in the May ceremony, doctoral students must have completed all requirements for the Ph.D. by the published deadlines. Only those candidates who have completed their program are listed in the commencement book.

For more information on how to register for commencement go to **www.unh.edu/presidentialevents/commencement**.

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» http://www.gradschool.unh.edu/

« **Master's Degree Requirements**

Credits

A minimum of 30 graduate credits is required for all master's degrees. Many programs require substantially more than the minimum 30 credits. Individual program requirements are outlined in the program descriptions of this catalog. Graduate credits are normally earned in courses numbered 800-999. Up to 12 credits earned in courses numbered 700-799 may be taken for graduate credit by master's degree students provided the courses are approved by the dean of the Graduate School and given in a department other than the one in which the degree is sought.

Residency

A student will normally spend at least one calendar year, or the equivalent, in satisfying the requirements for the degree.

Capstone Experience

The most appropriate capstone experience(s) for each program is determined by the faculty of each program. Such experiences may include a single integrative course, a performance, an internship or praxis, a portfolio, a scholarly paper or essay, an examination, a research problem, a research project, or a research thesis and are subject to approval of the dean of the Graduate School. All master's degrees at UNH must include a capstone experience.

Capstone – Non-thesis Option

Requirements for non-thesis capstone experiences must be clearly articulated by each program. Capstone experiences, with the exception of capstone courses, must be approved by a committee of at least two faculty members in the student's program and approved by the graduate program coordinator. All capstone experiences must be completed by the end of the final examination period of the graduation date for which the degree is to be conferred.

Capstone-Thesis Option

Students who are in a thesis program are required to conduct research and prepare a scholarly paper under the guidance of a faculty committee for submission to the Graduate School. Guidelines on the purpose, framework, and process for the thesis should be clearly articulated by each program. Students writing a thesis should obtain a copy of the *Thesis and Dissertation Manual* from the Graduate School or at **www.gradschool.unh.edu**. Students in thesis programs may also be required to pass a final examination. The regulations concerning this exam are the same as those in the non-thesis option. The thesis committee will normally also serve as the examining committee.

Thesis Credit

During their degree program, a student completing a thesis must enroll for a minimum of 6 thesis (899) credits and may enroll for a maximum of 10 thesis (899) credits. The exact number of credits within this range to be applied toward the degree will be determined by the faculty of the individual programs. No thesis credit shall be given until the completed thesis has been approved by the thesis committee and accepted by the Graduate School. Satisfactory acceptance of the thesis will be recorded as a credit (CR).

Thesis Committee

A master's thesis must be approved by a committee composed of a regular member of the graduate faculty under whose direction it was written and two other members of the graduate faculty nominated by the department chairperson or graduate program coordinator and appointed by the dean of the Graduate School.

Submission of Thesis

A minimum of two copies of the approved thesis, one ready for binding and one for microfilm, must be submitted to the Graduate School Office by the appropriate deadline as published in the Graduate School calendar. Most programs require one additional copy of the thesis. Binding fees will be paid at the Graduate School and are due upon submission of final copies.

Publication of the thesis by University Microfilms is required, and the student assumes the cost. Students may choose to copyright their thesis at the time of microfilming.

Time Limit

All graduate work for any master's degree must be completed within six years from the date of matriculation (enrollment following admission) in the program.

Progress toward the degree will be carefully monitored by the adviser and the Graduate School to ensure that adequate advancement is made toward the completion of the program and that any deficiencies noted at the time of admission are removed.

Graduate Course Catalog 2013-2014
Academic Regulations and Degree Requirements

» http://www.gradschool.unh.edu/

« **Doctoral Degree Requirements**

The degree of doctor of philosophy is conferred on qualified candidates who have passed an oral or written examination(s) on the subject matter of their field of study, who have completed an original investigation in this field and have embodied the results in an acceptable dissertation, and who have passed an oral examination in defense of the dissertation. The degree of doctor of philosophy is essentially a research degree.

Responsible Conduct of Research

As a land-grant institution, the University of New Hampshire (UNH) is accountable to New Hampshire residents and to the University community to ensure the ethical and safe conduct of research and scholarly activity. As an institution of higher education that prides itself on extensive research endeavors and the involvement of undergraduates and graduate students in research projects, UNH has an obligation to teach and actively promote integrity in research and scholarship.

To fulfill its obligations, UNH has embarked on a program on the responsible conduct of research and scholarly activity (RCR) to:

- Raise the consciousness of faculty, staff, and students regarding the ethical and responsible conduct of research and scholarly activity;
- Establish a knowledge base that defines normative and/or professional behavior to assist faculty, staff, and students in making ethical and responsible decisions in the conduct of research and scholarly activity; and
- Foster an institutional culture of integrity in research and scholarly activity.

To support these efforts, the Graduate Council has mandated that all incoming Ph.D. students complete RCR training approved by the Graduate School by the end of their first semester. For more information, visit the **RCR website**.

Residency

A minimum of three academic years of graduate study is required for the doctorate. Resident graduate work done at other universities may be counted toward the minimum requirement upon approval of the guidance committee and the dean of the Graduate School, but one full academic year must be in

residence at the University of New Hampshire. In individual cases, the major department and the dean of the Graduate School may grant permission to pursue the research for the dissertation at another institution where access to special facilities would be advantageous.

Credits

Each program specifies the number of courses required for the Ph.D. degree.

Doctoral Research (999)

A minimum of two semesters of registration in Doctoral Research is required. However, doctoral students at candidacy must register for 999 each semester during the academic year, even if the minimum requirement has been met.

Guidance Committee

A guidance committee is appointed by the dean of the Graduate School upon the recommendation of the program faculty as soon as possible after a student has begun study for the doctoral degree. The committee assists the student in outlining a program and preparing for the qualifying examination, and administers the examination.

Qualifying Examination

The qualifying examination, which must be taken at UNH, is required and may be written, oral, or both. This examination will test (1) the student's general knowledge in the student's major and minor work and (2) the student's fitness for engaging in research, particularly in the subject proposed for the dissertation. The chairperson of the student's program will communicate the examination results to the Graduate School dean. (See academic standards for details.)

Language/Research Proficiency

Each doctoral program has its own language and/or research proficiency requirements. These requirements can be found in the individual program descriptions.

Degree Candidacy

A doctoral student is advanced to candidacy for the degree by the dean of the Graduate School upon recommendation of the graduate program coordinator after the student has passed the qualifying examination; met the language or proficiency requirements as are deemed desirable by the student's program; and

declared a topic for dissertation research.

Doctoral Committee

After the student has been advanced to candidacy, a doctoral committee will be appointed to supervise and pass on the dissertation and administer the final examination. This committee will be nominated by the department of major concentration and appointed by the dean of the Graduate School. It shall consist of a minimum of five members, usually three from the major department and two from related departments. The dean of the Graduate School is an ex officio member of all doctoral committees.

Time Limit

All graduate work for the doctorate must be completed within eight years of matriculation (enrollment after admission) or within seven years if the student entered with a master's degree in the same field. The student must be advanced to candidacy within five years after matriculation or within four years if the student entered with a master's in the same field.

Dissertation

The dissertation must be a significant contribution to scholarship in the student's discipline, demonstrating the student's ability to conduct independent and original research and to communicate the results of the research through a coherent, integrated, and mature piece of writing.

Final Defense

A copy of the completed dissertation must be made available to the members of the examining committee two weeks before the final examination date.

The final oral examination is conducted by the doctoral committee and is intended to give the candidate an opportunity to defend the dissertation. While it is desirable for all committee members to participate in dissertation defenses, whether in person or through virtual means such as conference calls or video conferencing, outside scholars are not required to be present at the defense. Departments will determine how to obtain meaningful and substantive evaluations from external members in consultation with the Graduate School. A written final examination, on subject matter not covered in the qualifying examination, may also be required. This written examination is conducted by the major department. These final examinations must be completed by the date listed in the Graduate School calendar. After consultation with the major program, the dean of the Graduate School may appoint, for participation in the final oral examination, additional members of the faculty under whom the

student has worked. The doctoral committee alone shall decide on the merits of the candidate's performance by a majority vote.

Submission of Dissertation

A minimum of two copies of the approved dissertation, one ready for binding and one for microfilm, must be submitted to the Graduate School Office by the appropriate deadline as published in the Graduate School calendar. Most departments require one additional copy of the dissertation. Students should consult their advisers concerning dissertation requirements. Binding, microfilming, and copyright fees will be paid at the Graduate School and are due when the final copies are submitted.

Publication of the dissertation by University Microfilms is required, and the student assumes the cost. Students may choose to copyright their dissertation at the time of microfilming. If the dissertation material is further published, it should be designated as having been accepted as a doctoral dissertation by the University of New Hampshire.

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The University will supply information about the employment of its graduates who have graduated from our degree and/or certificate programs. This information may be obtained upon request from the University's Advising and Career Services and is available by university, college, or school to current and prospective students. Information on employment outcomes depends on student self-reporting. The University does not guarantee employment to its graduates. Chances for employment are enhanced if students have begun career planning early in their degree programs.

The University provides information pertaining to the Family Educational Rights and Privacy Act of 1974 (the "Buckley Amendment") in the annual student handbook. Information also is available from the Office of the Vice President for Student & Academic Services and the Office of the Provost and Vice President for Academic Affairs. The annual student publication, ***Student Rights, Rules, and Responsibilities*** (**http://www.unh.edu/student/rights**), also contains University regulations and policies regarding student conduct.

Program descriptions may vary from the actual content or requirements because of advancements in the discipline or the active nature of academic planning and decision making. Accordingly, the University reserves the right to make whatever changes are deemed necessary in schedules, course content, requirements, academic programs (including their termination), calendar, tuition and fees, services, or any other aspect of the University's operations, giving whatever notice thereof is reasonable under the circumstances. Therefore, the provisions of this catalog are not an irrevocable contract between the students and the University. The University is also not responsible for failure to provide or for delay in providing expected services and/or facilities when such failure arises from causes beyond the reasonable control of the University.

All aforementioned publications are available in alternate formats upon request.

Graduate Course Catalog 2013-2014

UNH Affirmative Action and Equity Statement

The University of New Hampshire is a public institution with a long-standing commitment to equal opportunity for all. It does not discriminate on the basis of race, color, religion, sex, national origin, age, veteran's status, gender identity or expression, sexual orientation, marital status, or disability in admission or access to, or treatment or employment in, its programs, services, or activities. Inquiries regarding discriminatory harassment (including sexual harassment) should be directed to Donna Marie Sorrentino, Director & Title IX Coordinator, Affirmative Action and Equity, Room 305, Thompson Hall, 105 Main Street, Durham, NH 03824, phone (603) 862-2930 (Voice), (603) 862-1527 (TTY), fax (603) 862-2936; or to the Office for Civil Rights, U.S. Department of Education, 8th Floor, 5 Post Office Square, Boston, MA 02109-3921, phone (617) 289-0111, fax (617) 289-0150, e-mail **OCR.Boston@ed.gov**.

There are various grievance procedures to provide for the resolution of complaints under this policy. See the **UNH Discrimination and Discriminatory Harassment Policy** and **Grievance and Complaint Procedures** in ***UNH Student Rights, Rules, and Responsibilities***. Further information may be obtained at the Affirmative Action and Equity Office or e-mail **affirmaction.equity@unh.edu**.

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Updated September 2013

University *of* New Hampshire

Graduate School Catalog

2013–2014

Volume II

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Use the **Searchable Class Schedule** or select the course subject below

Quick-find tip: Select course subject. Type Ctrl-F (PC) or Apple-F (Mac) and enter search term. Make sure pop-ups are enabled.

For specific course details, please consult the individual course instructor for your section.

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History (HIST)
Information Technology (IT)
Integrated Applied Mathematics (IAM)
Justice Studies (JUST)
Kinesiology (KIN)
Languages, Literatures, and Cultures (LLC)
Liberal Studies (LS)
Life Sciences and Agriculture (LSA)
Management of Technology (MOT)
Materials Science (MS)
Mathematics and Statistics (MATH)
Mechanical Engineering (ME)
Microbiology (MICR)
Molecular, Cellular, and Biomedical Sciences (MCBS)
Music (MUSI)
Music Education (MUED)
Natural Resources (NR)
Natural Resources and Earth Systems Science (NRES)
Nursing (NURS)
Nutritional Sciences (NUTR)
Occupational Therapy (OT)
Ocean Engineering (OE)
Painting (ARTS)
Physics (PHYS)
Plant Biology (PBIO)
Political Science (POLT)
Psychology (PSYC)
Public Administration (POLT)
Public Health (PHP)
Recreation Management and Policy (RMP)
Resource Administration and Management (RAM)
Social Work (SW)
Sociology (SOC)
Spanish (SPAN)
Systems Design (ENGR)
Zoology (ZOOL)

Accounting and Finance

ACFI 820 - Corporate Taxation
Credits: 3.00
Provides coverage of advanced topics from a strategic viewpoint and an understanding of the history and development of taxation, the role taxes play in financial and managerial decisions, and how taxes motivate people and institutions. The major tax issues inherent in business and financial transactions and their consequences are also explored.

ACFI 830 - Advanced Auditing
Credits: 3.00
This course is designed to establish an advanced competence in auditing theory and practice. Specifically, students will gain an in-depth understanding of current academic auditing research and the philosophy of strategic-systems auditing through readings, presentations, case studies, and a service learning project with a local non-profit organization.

ACFI 844 - Topics in Advanced Accounting
Credits: 3.00
Theory and practice of accounting for corporate acquisitions and mergers and the preparation and presentation of consolidated financial statements. Other topics include multinational consolidations, interim reporting and partnership accounting. Prereq: M.S. in Accounting.

ACFI 850 - Accounting Theory and Research
Credits: 3.00
The objective of this course is to study the role of accounting information both in a decision-making and in a performance-evaluation context. This objective will be achieved by studying various accounting theories and the role that research has played in developing and testing those theories. Prereq: M.S. in Accounting.

ACFI 890 - Accounting Information Systems
Credits: 3.00
Accounting information systems and the use of computers for decision making with emphasis on sources and types of information and the use of analytical tools in solving accounting management problems. Prereq: M.S. in Accounting.

ACFI 895 - Governmental and Non-Profit Accounting
Credits: 3.00
Planning, budgeting, internal and external financial reporting for governmental entities and not for organizations including healthcare and educational institutions. Prereq: M.S. in Accounting.

ACFI 897 - Ethics and Professional Practices
Credits: 3.00
The study of ethics as a significant and worthwhile endeavor that infuses all professional activities. Case work forms an integral part of the course. Analysis of situations of potential and actual ethical conflict and discussion of major ethical theories.

ACFI 898 - Master's Project
Credits: 3.00
Master's paper on a topic approved by the program director. Prereq: M.S. in Accounting.

Animal Sciences

ANSC 801 - Physiology of Reproduction
Credits: 4.00
Comparative aspects of embryology, anatomy, endocrinology, and physiology of reproduction. Lab.

ANSC 808 - Ruminant Nutritional Physiology
Credits: 3.00
Anatomy of the ruminant gastrointestinal tract, physiological factors related to rumen function, and microbial and whole-body metabolism of carbohydrates, protein, and lipids. Prereq: general microbiology or equivalent.

ANSC 810 - Dairy Nutrition
Credits: 4.00
Feeding and related management of dairy cows, nutrients and their use, digestive anatomy, physiology, energy systems, forage quality and conservation methods, metabolic disorders, ration balancing. Prereq: principles of nutrition; nutritional biochemistry or equivalent, permission.
Co-requisites:

ANSC 814 - Research Methods in Endocrinology
Credits: 5.00
Principles of biochemical, cellular and molecular techniques and their applications to research in the endocrine system. Techniques include protein and nucleic acid assays, thin layer chromatography, radioimmunoassay, enzyme-linked immunosorbent assay, agarose and polyacrylamide gel electrophoresis, transfection, restriction analysis, plasmid amplification, RNA extraction, and dot-dot hybridization. Seven lab reports required. Prereq: physiology of reproduction or general biochemistry or endocrinology; permission. Special fee. Lab.

ANSC 815 - Physiology of Lactation
Credits: 4.00
Examines the biological and biochemical influences of the lactation process. Emphasis on the physiological effects of environments, hormones, and nutrition on milk synthesis and secretion, mammary physiology, and maternal response. Prereq: physiology of reproduction, permission.

ANSC 818 - Mammalian Physiology
Credits: 4.00
Advanced study of the systems that control mammalian functions with emphasis on cellular and molecular mechanisms. Includes the nervous, muscular, cardiovascular, renal, gastrointestinal, and endocrine systems. Prereq: at least one semester of animal/human anatomy and physiology, or one semester of anatomy and physiology, or permission.

ANSC 824 - Reproductive Management and Artificial Insemination
Credits: 4.00
Focus on goals and fundamentals of reproductive management of horses, dairy and livestock animals, and, through experience, development of competency in performing modern breeding techniques for equine or bovine reproduction. Permission required. Special fee. Lab.

ANSC 827 - Advanced Dairy Management I
Credits: 4.00

Advanced management evaluation of milking procedures, reproduction, nutrition, mastitis, and calf and heifer management. Prereq: principles of nutrition, permission.

ANSC 828 - Advanced Dairy Management II
Credits: 4.00
Advanced management evaluation of dairy cattle, housing milking equipment, milk quality, record keeping, herd health, financial, personnel management, environmental issues. Visits to farms in the area to provide critical assessments of dairy farm businesses. Prereq: advanced dairy management I, permission. Special fee.

ANSC 853 - Cell Culture
Credits: 5.00
Principles and technical skills fundamental to the culture of animal and plant cells, tissues and organs. Introduction to the techniques of subculturing, establishing primary cultures, karyotyping, serum testing, cloning, growth curves, cryopreservation, hybridoma formation and monoclonal antibody production, and organ cultures. An interdisciplinary course with emphasis on the application of cell culture to contemporary research in the biological sciences. Prereq: general microbiology; permission. (Also offered as MICR 851 and PBIO 851.) Lab.

ANSC 895 - Investigations
Credits: 1.00 to 4.00
Investigations in genetics, nutrition, management, diseases, histology, equestrian management/agribusiness, physiology, cell biology, microbiology, dairy management, or teaching experience. May be repeated up to a maximum of 4 credits. Prereq: permission.

ANSC 899 - Master's Thesis
Credits: 1.00 to 6.00
Master's students must enroll for a total of 6 credits of this course. Students may enroll in 1-6 credits per semester. Permission required. Cr/F.

ANSC 900 - Contemporary Topics in Animal, Nutritional, and Biomedical Sciences
Credits: 1.00
An informal forum for graduate students to gain experience in evaluating the current literature of a contemporary topic. (Also offered as NUTR 900.) May be repeated for a maximum of 2 credits. Offered both fall and spring semesters. Cr/F.

ANSC 902 - Philosophy of Research in the Life Sciences
Credits: 2.00
Designed to acquaint master's and doctoral students (second year and beyond) with the theories and principles for understanding, designing, conducting, and communicating research in the Life Sciences. Readings and class discussions will focus on issues such as: What is research? How is it performed? How is validity determined? How are isolated findings integrated into a coherent system? What is the social context? Offered fall semester.

ANSC 913 - Contemporary Topics in Immunobiology
Credits: 2.00
Topical lectures, seminars, and assigned reading emphasizing recent advances in immunology. May be repeated for a maximum of 4 credits. (Offered in alternate years.)

ANSC 995 - Non-thesis Investigations in Animal Science
Credits: 1.00 to 4.00
Advanced investigations in a research project, exclusive of thesis project. Elective only after consultation

with the instructor. May be repeated for a maximum of 4 credits. Offered both fall and spring semesters.

ANSC 999 - Doctoral Research
Credits:
Cr/F.

Animal Sciences

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Comparative aspects of embryology, anatomy, endocrinology, and physiology of reproduction. Lab.

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Feeding and related management of dairy cows, nutrients and their use, digestive anatomy, physiology, energy systems, forage quality and conservation methods, metabolic disorders, ration balancing. Prereq: principles of nutrition; nutritional biochemistry or equivalent, permission.
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ANSC 895 - Investigations
Credits: 1.00 to 4.00
Investigations in genetics, nutrition, management, diseases, histology, equestrian management/agribusiness, physiology, cell biology, microbiology, dairy management, or teaching experience. May be repeated up to a maximum of 4 credits. Prereq: permission.

ANSC 899 - Master's Thesis
Credits: 1.00 to 6.00
Master's students must enroll for a total of 6 credits of this course. Students may enroll in 1-6 credits per semester. Permission required. Cr/F.

ANSC 900 - Contemporary Topics in Animal, Nutritional, and Biomedical Sciences
Credits: 1.00
An informal forum for graduate students to gain experience in evaluating the current literature of a contemporary topic. (Also offered as NUTR 900.) May be repeated for a maximum of 2 credits. Offered both fall and spring semesters. Cr/F.

ANSC 902 - Philosophy of Research in the Life Sciences
Credits: 2.00
Designed to acquaint master's and doctoral students (second year and beyond) with the theories and principles for understanding, designing, conducting, and communicating research in the Life Sciences. Readings and class discussions will focus on issues such as: What is research? How is it performed? How is validity determined? How are isolated findings integrated into a coherent system? What is the social context? Offered fall semester.

ANSC 913 - Contemporary Topics in Immunobiology
Credits: 2.00
Topical lectures, seminars, and assigned reading emphasizing recent advances in immunology. May be repeated for a maximum of 4 credits. (Offered in alternate years.)

ANSC 995 - Non-thesis Investigations in Animal Science
Credits: 1.00 to 4.00
Advanced investigations in a research project, exclusive of thesis project. Elective only after consultation

with the instructor. May be repeated for a maximum of 4 credits. Offered both fall and spring semesters.

ANSC 999 - Doctoral Research
Credits:
Cr/F.

Biochemistry

BCHM 802 - Endocrinology
Credits: 4.00
Biochemical and molecular structure and function of vertebrate endocrine systems. Influence of endocrine systems on the physiology of vertebrates, with special reference to mammals. Current investigations of the endocrine systems as a regulator and integrator of body functions including such systems as growth, reproduction, metabolism, differentiation, and behavior. Prereq: general biochemistry or principles of biochemistry;/ or permission. (Also offered as ANSC 802.) Special fee.

BCHM 850 - Physical Biochemistry
Credits: 3.00
Structure, interactions, and physical-chemical properties of biomolecules. Thermodynamic, kinetic, and spectroscopic methods for the study of proteins and nucleic acids. Prereq: 2 semesters organic chemistry, 1 semester of calculus;/ or permission.

BCHM 851 - Principles of Biochemistry I
Credits: 4.00
In-depth survey of biochemistry: macromolecule structure; structure and function of proteins, nucleic acids, carbohydrates, and lipids. Prereq: organic chemistry, general biochemistry or permission.

BCHM 852 - Principles of Biochemistry II
Credits: 4.00
Continuation of in-depth survey of biochemistry: metabolism of amino acids, nucleotides, carbohydrates and lipids; macromolecules synthesis and regulation; molecular biology of the eukaryotic cell. Prereq: BCHM 851 or permission.

BCHM 854 - Laboratory in Biochemistry and Molecular Biology of Nucleic Acids
Credits: 5.00
Application of modern techniques to the analysis of biomolecules, with an emphasis on nucleic acids; includes DNA isolation and analysis, cloning and sequencing and analysis of gene products. Prereq: general biochemistry, principles of biochemistry or permission. (Also offered as GEN 854 and PBIO 854.) Special fee.

BCHM 863 - Biochemistry of Cancer
Credits: 3.00
Molecular mechanisms of viral and chemical carcinogenesis; role of ocogenes in normal cell growth, development, and differentiation. Biochemical basis of cancer chemotherapy. Critical reviews of research papers and an advanced research paper required. Prereq: general biochemistry or BCHM 851 or permission. Credit/Fail.

BCHM 883 - Proteomics for Biological Discoveries
Credits: 4.00
Proteomics is a cutting edge area of molecular biology that undertakes a systematic characterization of the entire set of proteins (proteome). This course develops an understanding on key technologies to study the expression levels, posttranslational modifications, cellular localization, three-dimensional structure, protein interactions, and dynamic changes of these properties during cellular processes. Topics to be covered include goals in proteomic analysis, major technology platforms, and pharmaceutical and biomedical

applications. Prereq: BMCB 658 or BMCB 751/851.

BCHM 894 - Protein Structure and Function
Credits: 4.00
Analysis of how the three-dimensional architecture of soluble and membrane proteins contributes to their biochemical function. Topics include methods for determining the structure of proteins, protein folding, protein targeting, and mechanisms of enzyme catalysis. Computer resources will be used for protein modeling and structural prediction. Prereq: general biochemistry or principles of biochemistry.

BCHM 895 - Investigations
Credits: 1.00 to 4.00
Independent study in various areas including but not limited to: genetics, signal transduction, gene regulation, molecular evolution, biochemistry of cancer, biophysics of macromolecules, endocrinology, and glycobiology. May include readings, laboratory work, organized seminars and conferences. Prereq: permission. Not more than 4 total credit hours can be applied to BCHM or major electives.

BCHM 899 - Master's Thesis
Credits: 1.00 to 10.00
May be repeated to a maximum of 10 credits. Cr/F.

BCHM 960 - Advanced Topics in Signal Transduction
Credits: 3.00
Examination of current topics in signal transduction mechanisms. Pathways involving receptor activation, G-protein activation, regulation of effector enzymes, and changes in second messengers covered, along with mechanisms for short- and long-term desensitization of cellular responses.

BCHM 999 - Doctoral Research
Credits:
Cr/F.

Biology

BIOL 802 - Techniques in Plant Physiology and Biochemistry
Credits: 4.00
The course provides hands-on experience with instrumentation and experimental procedures for analysis of plant growth and metabolism. Experiments demonstrate the regulation of plant growth and development in response to environmental and chemical factors, analysis of cellular contents and processes, and use of modern instrumentation for physiological and biochemical studies. The experiments deal with plant water relations, photosynthesis, plant hormones, enzyme kinetics, using spectrophotometry, aseptic procedures, and liquid and thin-layer chromatography. Prereq: BIOL 411, 412 or permission of instructor. Special fee.

BIOL 804 - Plant-Microbe Interactions
Credits: 3.00
This course provides an overview of the molecular, cellular and biochemical factors underlying the interactions of plants with various microbes, including bacterial fungal, oomycete and viral pathogens, and mutualistic symbionts, such as mycorrhizal fungi and rhizobium. Unifying themes underlying disease, resistance, and symbiosis are emphasized. Prereq: BIOL 411 & 412, BMS 503 or GEN 604.

BIOL 811 - Applied Biostatistics II
Credits: 4.00
Design and analysis of biological and ecological research experiments. "Real world" studies used to discuss the identification of hypotheses, appropriate experimental design, and the application of statistical analyses including ANOVA, ANCOVA, correlation and regression, cluster analysis, classification and ordination techniques. Theoretical statistical concepts tailored to consider student's own thesis and dissertation research, allowing statistical problems to be addressed at various stages of the research process. Common computer packages used for analyses. Prereq: BIOL 528; permission.

BIOL 895 - Biology Special Investigations
Credits: 1.00 to 4.00

BIOL 896 - Special Investigations
Credits: 1.00 to 4.00

BIOL 901 - Research Methods
Credits: 2.00
Introduction to the range of research approaches in biology and to the skills needed for success in graduate school and beyond. Topics include scientific writing, graphical methods, library techniques, scientific methods and experimental design, research techniques available, and seminar presentation. Cr/F. Offered every fall.

Administration

ADMN 823 - Topics in Finance
Credits: 3.00
Prereq: financial management.

ADMN 829 - Financial Policy
Credits: 3.00
Analytical tools and practical skills for recognizing and solving complex problems of business finance. A complement to ADMN 930, this course covers the major decision-making areas of managerial finance and some selected topics in financial management such as real options, leasing, mergers and acquisitions, corporate re-organizations, financial planning, and working-capital management.

ADMN 830 - Investments Analysis
Credits: 3.00
Discusses principles for selecting and managing financial assets, including equities, fixed-income securities, and alternative investments. Topics include asset pricing, efficient market hypothesis, arbitage pricing theory, portfolio theory, and risk management.

ADMN 832 - Exploration in Entrepreneurial Management
Credits: 3.00
Examination of the management of change and innovation especially the role of entrepreneur in managing new ventures. Uses case analysis, guest speakers, and business plan preparation to study the characteristic behavioral, organizational, financial, and market problems of entrepreneurs and new enterprises.

ADMN 834 - Private Equity/Venture Capital
Credits: 3.00
Covers the financial aspects of new venture creation. Early stage private equity market and mechanisms available for financing the entrepreneurial venture, from seed and startup financing to initial public offering. Includes financing stages from both entrepreneur's and the investor's perspective. Focus on U.S., Europe, and Asian markets.

ADMN 840 - International Business
Credits: 3.00
Issues and problems confronting managers in the international economy. Emphasis on problems of working across national borders rather than on those encountered within the framework of different national economies, cultures, and institutions. for managers working in a multinational enterprise.

ADMN 841 - International Management
Credits: 3.00
Develops an understanding of international business from the point of view of management and leadership, human resource management, and organizational structure and change. Emphasis on cultural impact on management thinking and business practice and on skills for managing effectively in international and multicultural environments.

ADMN 845 - Supply Chain Management
Credits: 3.00
The purpose of this course is to learn how to design, plan, and operate supply chains for competitive

advantage; to develop an understanding of how the key drivers of supply chain operations (inventory, transportation, information, and facilities) can be used to improve performance; and to develop knowledge of logistics and supply chain methodologies and the managerial context in which they are used.

ADMN 846 - International Financial Management
Credits: 3.00
Financial management problems facing multinational firms. Focus is on identifying and managing foreign exchange rate exposures and making financial decisions in a global context

ADMN 848 - Law: Use and Application in Business
Credits: 3.00
Use and understanding of law as it applies to business judgment and policy decision making; basic legal rules and their application. Contracts, corporations, agencies, partnerships, administrative agencies, commissions, and other related business matters. Case-method teaching with outside research.

ADMN 852 - Marketing Research
Credits: 3.00
Identification, collection, and analysis of data for the marketing process. Strengths, limitations, environment, and evaluation of research in the marketing process.

ADMN 859 - Managing Technological Innovations
Credits: 3.00
This course explores the formulation of technological innovation strategy by using case-based examples and technological frameworks to identify industry- and firm-level patterns of innovation and organizational characteristics that promote innovativeness.

ADMN 864 - New Product Development
Credits: 3.00
Provides a practical introduction to the process of designing and marketing new products. Covers the major phases of market-focused product development from idea to launch, including opportunity identification and market definition, customer research and product concept development, pre-marketing testing and launch marketing. Presents proven approaches and techniques used in new product development. Allows student teams to apply lessons to the development and testing of new product concepts.

ADMN 865 - Total Quality Management
Credits: 3.00
Uses extensive real world examples and written and video cases to develop diagnostic skills and a conceptual framework for designing integrated management systems. Assignments include individual exercises to develop skills in the use of process improvement tools and methods, and team projects to develop leadership skills in the implementation of total quality management initiatives.

ADMN 898 - Topics
Credits: 2.00 to 3.00
Special topics; may be repeated. Prereq: consent of adviser and instructor.

ADMN 900 - Integrative Management Seminar
Credits:
Extends throughout first year of the Executive M.B.A. Program. Material and topics not offered in regular courses are offered here, as are distinguished speakers from business and government, field trips, issues of immediate concern. Cr/F. (Executive M.B.A. program only.) Program fee.

ADMN 902 - MBA Internship
Credits: 3.00
Provides students the opportunity to gain business experience in a professional setting, working for one company eight hours per week. Students explore the relationship between theory and practice and complete a research project. Students with less than two years work experience are required to take this course. Cr/F.

ADMN 905 - Corporate Consulting Project I
Credits: 3.00
Designed to enhance student's field and research experience. Students work with faculty and Corporate Roundtable members on projects that apply and integrate concepts learned in class.

ADMN 906 - Corporate Consulting Project II
Credits: 3.00
Designed to enhance student's field and research experience. Students work with faculty and Corporate Roundtable members on projects that apply and integrate concepts learned in class.

ADMN 912 - Organizational Behavior
Credits: 3.00
Develops an understanding of individual and work group dynamics in relation to personal and group effectiveness in diverse organizations. Includes: individual and group differences; work groups and teams; interpersonal communications; motivation and rewards; influence and empowerment; conflict resolution; management models; and leadership. Taught experientially. Special fee.

ADMN 919 - Management Accounting
Credits: 3.00
An introduction to the preparation and interpretation of financial information, with emphasis on the use of accounting information for management decision-making. It highlights the guiding principles by which accounting reflects the underlying economic events. It also focuses on reporting and measurement issues that help managers make better decisions.

ADMN 920 - Financial Accounting
Credits: 3.00
Introduces students to the accounting discipline and develops financial statement literacy grounded in contemporary business issues. Develops an understanding of how and why economic events are recorded, communicated and evaluated. Consideration is also given to the roles of tax and compensation strategies in the business environment.

ADMN 921 - Managerial Accounting
Credits: 3.00
Builds on material covered in Financial Accounting. Enhances students' ability to acquire, analyze, and interpret decision, control, and financial performance information within a managerial, strategic, and systems framework in the context of rapid global change.

ADMN 926 - Information Systems and Enterprise Integration
Credits: 3.00
Provides students with the background to understand how information systems are developed and used to support the operations and decision making functions within an organization. The course begins with a framework for understanding how these systems are developed and used. It continues with an emphasis on "action learning" where students build enterprise systems using spreadsheets and relational database software. Students develop these systems in groups and make several presentations during the semester.

ADMN 930 - Financial Management
Credits: 3.00
Focuses on financial decision making to maximize shareholder value. Course concepts are integrated into the standard theories of risk and return, valuation of assets and market efficiency and risk management.

ADMN 940 - Technology and Operations Management
Credits: 3.00
Provides a foundation for dealing with managerial decisions about technology and operations issues. Based on the premise that technology and operations can be a significant source of competitive advantage for a firm. Prepares students to identify and implement operating improvements that directly affect firm performance.

ADMN 950 - Managerial Statistics
Credits: 3.00
Examines the role of statistics in the decision-making environment. Application of statistical procedures to practical problems, increasing ability to make and implement better managerial and business decisions. Probability; discrete, continuous distributions; sampling distributions; interval estimation; linear regression; quality control; hypothesis testing.

ADMN 952 - Organizations, Leadership, and Environments
Credits: 3.00
Examines both private and public institutions as open systems whose effectiveness depends on the design of internal structures and cultures to fit external demand, opportunities and threats. Develops students' analytic and diagnostic skills as designers of ethical and socially responsible organizations.

ADMN 953 - The Social Power of Leadership in the 21 Century
Credits: 3.00
The goal of this cross-disciplinary course is to develop students' deep understanding of the dynamic, mutually reinforcing power of leadership follower relations in modern organizations - including both toxic and beneficial processes and outcomes. Readings draw on the literatures from business, social sciences, and philosophy to illuminate the complexities of leading in 21st century corporations, public service organizations, institutions of higher learning, and government agencies. A diverse cross-section of students from doctoral and master level programs across all UNH schools, colleges, and departments participate in the course in order to most broadly examine how the leader-follower relationship can succeed or fail in its pursuit of organizational strategies and objectives. Prereq: permission.

ADMN 955 - Quantitative Business Analysis
Credits: 3.00
The use of quantitative analysis as an aid in the decision making process. A thought process and an approach to the analysis of, and providing recommendations for, a complex decision making situation. Topics include linear programming, forecasting, simulation, and general modeling procedures. The course is a combination of a lecture, class discussion, problem solving, project presentations and "unstructured" decision making problem approach.

ADMN 956 - Managerial Decision Making
Credits: 3.00
The use of quantitative information as an aid in the decision making process. A thought process and an approach to the analysis of, and providing recommendations for, a complex decision making situation. The course is a combination of a lecture, class discussion, problem solving, project presentations and "unstructured" decision making problem approach.

ADMN 960 - Marketing Management

Credits: 3.00
An analytical approach to the study of marketing problems. Examines the influence of the marketplace and the marketing environment on marketing decision making: the determination of the organization's products, prices, channels and communication strategies; and the organization's system for planning and controlling its marketing effort.

ADMN 970 - Economics
Credits: 3.00
A study of economic principles useful to business managers. Microeconomic topics include market behavior, economic costs, and economic decision-making. Macroeconomic topics include macroeconomic performance, financial markets, international trade and finance, and monetary and fiscal policy.

ADMN 982 - Strategic Management: Decision Making
Credits: 3.00
A "capstone" course, focused on industries, companies, and other organizations in operation, and studied through the role of the strategic manager and case examples, with emphasis on integration of materials covered in prior courses.

ADMN 985 - Organizational Structure and Environments
Credits: 3.00
Managerial problem solving and decision making relative to economic, ethical, legal, political, social, and technological aspects of an organization's environment. Develops students' analytical and diagnostic skills as designers of ethical and socially responsible organizations. Case discussion, stakeholder analysis, managerial values and ethics, and social issues management are important course components.

ADMN 992 - Special Projects and Independent Study
Credits: 1.00 to 6.00
Projects, research, and reading programs in areas required for concentration. Sixty days advance approval of the student's plan of study by adviser and by proposed instructor required. Maximum of 6 credit, except by special permission. Variable credit.

Chemical Engineering

CHE 805 - Fossil Fuels and Renewable Energy Sources
Credits: 4.00
Processing and refining of coal, crude oil, natural gas, tar sands and shale oil. Biomass co-combustion, biofuel extraction, impediments to widespread utilization. Exploration of environmental issues with energy generation and consumption. Lab.

CHE 806 - Electrochemical Methods for Energy Applications
Credits: 4.00
Fundamentals and applications of thermodynamics of eletricochemical processes; kinetics of electrochemical reactions; electrocatalysis basics and current technologies for batteries, supercapacitors and fuel cells. Prereq: CHEM 683, 684.

CHE 809 - Fundamentals of Air Pollution and Its Control
Credits: 4.00
The origin and fate of air pollutants. Fundamentals of atmospheric meteorology, chemistry, and dispersion phenomena. Control of air pollutants and the related equipment. Current issues. Lab.

CHE 812 - Introduction to Nuclear Engineering
Credits: 4.00
Development of nuclear reactors; binding-energy; radioactivity; elements of nuclear reactor theory; engineering problems of heat transfer, fluid flow, materials selection, and shielding; environmental impacts. (Not offered every year.)

CHE 822 - Introduction to Microfluidics
Credits: 4.00
Fundamentals and applications of microfluidics; scaling laws; microfabrication technology; hydrodynamics and electrohydrodynamics; interfacial phenomena; capillary effects and diffusion; microvalves; micropumps; lab-on-a-chip systems; biochips. Prereq: fluid mechanics course or permission of instructor.

CHE 844 - Corrosion
Credits: 4.00
Fundamentals of corrosion processes in industrial and environmental settings; thermodynamics, kinetics, and mass transport in local corrosion cells; protection by electrochemical, chemical, surface modification, or barrier methods; instrumental methods in corrosion science. Lab. (Not offered every year.)

CHE 852 - Process Dynamics and Control
Credits: 4.00
Dynamic behavior of chemical engineering processes described by differential equations; feedback control concepts and techniques; stability and analysis. Lab.

CHE 861 - Biochemical Engineering
Credits: 4.00
Immobilized enzyme technology, microbial biomass production, transport phenomena in microbial systems, biological reactor design, process instrumentation and control, applications in separation and purification processes. Lab. (Not offered every year.)

CHE 862 - Biomedical Engineering

Credits: 4.00
Transport phenomena and chemical reactions in physiological systems. Formulation and interactions of biomaterials. Artificial kidney, vascular prothesis, drug delivery, protein and cell adhesion. Introduction to tissue engineering. Lab. (Not offered every year.)

CHE 898 - Chemical Engineering Project
Credits: 3.00
Concluding experience for Master of Engineering Degree. Chemical Engineering majors only.

CHE 899 - Master's Thesis
Credits: 1.00 to 6.00
May be repeated to a maximum of 6 credits. Cr/F.

CHE 900 - Seminar
Credits: 1.00
Topics of interest to graduate students; reports of research ideas, progress, and results; lectures by outside speakers. Continuing course: instructor may assign IA grade (continuous grading) at the end of one semester. Chemical Engineering majors only.

CHE 913 - Advanced Fluid Mechanics
Credits: 3.00
Basic equations describing behavior of static and dynamic fluid systems. The equations of motions and application to laminar and turbulent flow. Momentum and energy equations for advanced problems associated with flow inside conduits. Flow of compressible fluids and boundary layer phenomena.

CHE 915 - Heat Transfer
Credits: 3.00
Steady-state and transient heat conduction in solids; heat convection; analytical solutions, similarity relations, boundary layer methods; radiation.

CHE 916 - Diffusive Mass Transfer
Credits: 3.00
Physical aspects of diffusion; theories of diffusion in dilute gases, dense gases, liquids, and solids; surface diffusion; mixing processes. Simultaneous heat and mass transfer.

CHE 923 - Advanced Chemical Engineering Thermodynamics
Credits: 3.00
The multi-component open system; the volumetric and phase behavior of pure substances and of multi-component systems at physical and chemical equilibrium, fugacity and activity; thermal properties of equilibrium, chemically reacting systems; introduction to statistical thermodynamics

CHE 932 - Advanced Chemical Engineering Kinetics
Credits: 3.00
Specialized applied kinetics problems; catalysis; fast reaction and shock tubes; combustion and detonation processes; non-isothermal kinetics; heat and mass transfer in non-equilibrium, chemically reacting systems.

CHE 996 - Graduate Independent Study
Credits: 1.00 to 4.00
Directed reading or investigation at the advanced level on topics in chemical engineering, including internships for graduate students. Only open to Chemical Engineering majors.

CHE 999 - Doctoral Research
Credits:
Cr/F.

Chemistry

CHEM 800 - Chemistry Teaching Seminar
Credits: 1.00
Introduction for graduate students to their role as chemistry teaching assistants: professional responsibilities, safety, and ethics; theory-based teaching, learning, and assessment; reflective practice. Pre-semester sessions and periodic seminars during semester. Cr/F.

CHEM 808 - Spectroscopic Investigations of Organic Molecules
Credits: 3.00
Identification and structural analysis of chemical compounds by selected instrumental methods. Typical topics include proton and carbon-13 NMR spectroscopy, IR and UV spectroscopy, and mass spectrometry.

CHEM 855 - Advanced Organic Chemistry
Credits: 3.00
An overview of organic chemistry at the intermediate levels. Aspects of synthetic organic chemistry and physical organic chemistry, including stereochemistry, are covered.

CHEM 862 - Instrumental Methods of Chemical Analysis
Credits: 3.00
Theory, instrumentation, and application of methods such as atomic absorption, coulometry, emission spectrography, gas and liquid chromatography, IR and UV-VIS absorption spectrophotometry, and mass spectrometry to chemical analysis. Prereq: quantitative analysis; physical chemistry as a pre- or co requisite;/ or permission.

CHEM 874 - Inorganic Chemistry
Credits: 3.00
Intermediate level overviews of modern inorganic chemistry including structure, bonding, and reactivity. Prereq: organic chemistry; physical chemistry;/ or permission.

CHEM 876 - Physical Chemistry III
Credits: 3.00
Application of quantum theory to atomic electron structure, spectroscopy, and molecular structure.

CHEM 895 - Special Topics
Credits: 2.00 to 4.00
New or specialized topics not covered in regular course offerings. May be repeated. Prereq: permission. Lab. (Not offered every year.)

CHEM 899 - Thesis/Problems
Credits: 1.00 to 10.00
Conferences, library, and experimental work in some field of chemistry. May be repeated to a maximum of 10 credits. Cr/F.

CHEM 902 - Theoretical Organic Chemistry II
Credits: 3.00
A continuation of CHEM 901. (Not offered every year.)

CHEM 903 - Advanced Inorganic Chemistry I

Credits: 3.00
Survey of important advanced topics in concepts of modern inorganic chemistry.

CHEM 904 - Advanced Inorganic Chemistry II
Credits: 3.00
Overview of current trends in inorganic research, including transition metal reactions and mechanisms and organometallic chemistry. (Not offered every year.)

CHEM 905 - Advanced Physical Chemistry I
Credits: 3.00
Introduction to topics in quantum mechanics and group theory, which form the background of all areas of modern chemistry. (Not offered every year.)

CHEM 911 - Synthetic Organic Chemistry I
Credits: 4.00
Fundamentals of synthetic organic methodology and applications in multiple syntheses. Fourth hour recitation session.

CHEM 917 - Special Topics in Organic Chemistry
Credits: 2.00 to 4.00
Advanced courses dealing with specialized sub-disciplines of organic chemistry. (Not offered every year.)

CHEM 918 - Special Topics in Organic Chemistry
Credits: 2.00 to 4.00
Advanced courses dealing with specialized sub-disciplines of organic chemistry. (Not offered every year.)

CHEM 926 - Physical Chemistry of Condensed Phases
Credits: 3.00
Thermodynamics and kinetics of molecules and ions in solution and at interfaces.

CHEM 927 - Chemical Kinetics and Reaction Dynamics
Credits: 3.00
The course reviews macroscopic chemical kinetics, then investigates the microscopic origins of rate laws. Scattering theory. Transition state theory. Unimolecular and bimolecular reactions.

CHEM 930 - Advanced Optical Methods
Credits: 3.00
Techniques of chemical identification and analysis utilizing optical instrumentation from the standpoint of theory and application. Topics include UV-visible absorption, luminescence, atomic spectroscopy, IR, NMR, x-ray methods, and mass spectrometry. Prereq: CHEM 935 or permission. (Not offered every year.)

CHEM 933 - Chemical Separations
Credits: 3.00
The use of various separation techniques prior to analysis; separations as methods of analysis. Prereq: CHEM 934 or permission. (Not offered every year.)

CHEM 934 - Chemical Equilibria
Credits: 3.00
Formulation and solution of chemical equilibrium problems of relevance to analytical chemistry. (Not offered every year.)

CHEM 935 - Electrical Methods of Analysis
Credits: 3.00

Introductory electronics for chemists and electrochemical methods of analysis. The electronics emphasizes how components and circuits affect acquisition, manipulation, and quality of chemical information. Electrochemical methods include potentiometry and voltammetry. Permission required. (Not offered every year.)

CHEM 947 - Inorganic Biochemistry
Credits: 3.00
Introduction to the inorganic chemistry and biochemistry of the interactions of metals with proteins, nucleic acids, and other biomolecules. Relevant small metal complexes (model compounds) and synthetic chelating agents are also covered. Prereq: CHEM 903 or permission. (Offered every other year.)

CHEM 991 - Graduate Presentation Portfolio
Credits: 1.00
A graduate course for Chemistry Master of Science students designed to provide them with expertise in preparing, organizing, and giving research presentations. Cr/F.

CHEM 992 - Graduate Writing Portfolio
Credits: 1.00
A graduate course for Chemistry Master of Science students to acquire and practice appropriate professional data documentation and writing skills. Cr/F.

CHEM 995 - Colloquium
Credits: 1.00 to 4.00
A) Inorganic Chemistry; B) Organic Chemistry; C) Theoretical Organic Chemistry; D) Physical Chemistry; E) Analytical Chemistry; F) Chemical Education. Sections of the course may be taken to a total of 12 credits. (Not offered every year.)

CHEM 996 - Colloquium
Credits: 1.00 to 4.00
A) Inorganic Chemistry; B) Organic Chemistry; C) Theoretical Organic Chemistry; D) Physical Chemistry; E) Analytical Chemistry; F) Chemical Education. Sections of the course may be taken to a total of 12 credits. (Not offered every year.)

CHEM 997 - Seminar
Credits: 1.00
Presentation and discussion of recent investigations in chemistry. Cr/F.

CHEM 998 - Seminar
Credits: 1.00
Presentation and discussion of recent investigations in chemistry. Cr/F.

CHEM 999 - Doctoral Research
Credits:
Cr/F.

Civil Engineering

CIE 821 - Pavement Design
Credits: 3.00
Flexible and rigid pavements and bases for highways, airports, city streets, and industrial floors; pavement selection, construction methods, materials, specifications. Prereq: CIE 665 or permission.

CIE 822 - Properties and Production of Concrete
Credits: 3.00
Basic properties of hydraulic cements and mineral aggregates and their interactions in the properties of plastic and hardened concrete; modifications through admixtures; production handling and placement problems; specifications; quality control and acceptance testing; lightweight, heavyweight, and other special concretes. Prereq: CIE 622 or permission.

CIE 823 - Bituminous Materials and Mixtures
Credits: 3.00
Considerations of major types of bituminous materials, asphalt cements, cutback asphalts, asphalt emulsions, and tars; influence of chemical composition on physical properties; desirable aggregate characteristics for bituminous mixtures; construction techniques; current practices for determining optimum asphalt contents. Prereq: CIE 622 or permission.

CIE 841 - Open Channel Flow
Credits: 3.00
Energy and momentum principles in open channel flow; flow resistance; channel controls and transitions; unsteady flow concepts and dam failure studies. Modeling with HEC programs. Prereq: CIE 642 or permission.

CIE 842 - Solid and Hazardous Waste Engineering
Credits: 3.00
A thorough examination of the problems which exist in hazardous and solid waste management will be presented in terms of the current regulations and engineering approaches used to develop solutions. Topics will include risk-based decision making, transport and fate of contaminants, and the fundamental physical, chemical and biological concepts which make up the basis for technological solutions to these waste management problems. Case studies will be used throughout the course to highlight key concepts and provide real-world examples. Pre- or Coreq: ENE 645 or permission.

CIE 845 - Engineering Hydrology
Credits: 3.00
Hydrologic cycle, probability theory related to hydrology and the design of water resources structures, water flow, flood discharge prediction, hydrograph development, hydraulic and hydrologic river routing, reservoir routing, theory of storage, reservoir operations, hydropower development, modeling of watershed hydrology with program HEC-1, HEC-HMS, multipurpose projects.

CIE 847 - Introduction to Marine Pollution and Control
Credits: 4.00
Introduction to the sources, effects, and control of pollutants in the marine environment. Dynamic and kinetic modeling; ocean disposal of on-shore wastes, shipboard wastes, solid wastes, dredge spoils, and radioactive wastes; and oil spills. Prereq: ENE 645 or permission.

CIE 848 - Solid and Hazardous Waste Design
Credits: 4.00
Selection, design, and evaluation of unit processes employed in the treatment of solid wastes and hazardous wastes will be studied. Topics include design of materials recovery facilities, landfills, waste-to-energy facilities and hazardous waste site remedial technologies. A group term project taken from a real-world project will be required. An oral presentation by the group and preparation of a final written engineering report including alternative evaluation, permits, scheduling and economic analysis will be required from each group. Prereq: ENE 742 or permission.

CIE 849 - Water Chemistry
Credits: 4.00
Emphasizes the use of chemical equilibrium principles and theory, calculations, and applications of ionic equilibrium stresses. Topics include thermodynamics, kinetics, acid/base, complexation, precipitation/dissolution, and redox equilibria. Computer equilibrium modeling is presented. Prereq: general chemistry or equivalent.

CIE 850 - Echohydrology
Credits: 3.00
Introduction to ecohydrological concepts in terrestrial and riverine systems. Topics include the historical practices, resources management impacts, hydrologic variability and the relationships among water and ecology, vegetation, biology, geomorphology, and water quality. Prereq: CIE 845 or ESCI 805; or permission.

CIE 851 - Introduction to Sustainable Engineering
Credits: 3.00
Course begins with exploration of the precept that we live in, and must design engineering works for, a world with a finite supply of natural resources and with limited life support capacity. Tools for sustainability engineering are the major focus of the course, which include life cycle, analysis and life cycle impact analysis, the metrics and mass and energy flow analyses used in the field of industrial ecology, and environmental management systems.

CIE 854 - Transportation Engineering and Planning
Credits: 3.00
Fundamental relationships of traffic speed, density, and flow applied to public and private modes of transport. Principles of demand forecasting and urban systems planning. Prereq: permission.

CIE 855 - Design of Pressurized Water Transmission Systems
Credits: 4.00
Theory developed for individual components to large complex systems. Analysis and designs of components and systems. Topics include steady and unsteady closed conduit flow, valves and meters, pump requirements, pump selection, system planning and layout, water hammer, and system operation and maintenance. Pressure system modeling with program EPANET. Prereq: Fluid mechanics, or permission.

CIE 856 - Environmental Engineering Microbiology
Credits: 4.00
Concepts of environmental engineering microbiology including microbial metabolism, growth kinetics, bioremediation applications, mass transfer kinetics and effects of environmental parameters. Coursework includes reading and discussion of the microbial literature. Laboratories cover microbiological monitoring and biological treatment experiments. Prereq: ENE 645 or permission. Lab.

CIE 857 - Coastal Engineering and Processes

Credits: 3.00
Introduction to small amplitude and finite amplitude wave theories. Wave forecasting by significant wave and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave-structure interaction. Design of coastal structures. Introduction to mathematical and physical modeling. Prereq: CIE 642 or permission. (Also offered as ME 857 and OE 857.)

CIE 858 - Stormwater Management Designs
Credits: 3.00
Historic review of stormwater management leading up to the current regulatory framework. Overview of stormwater management strategies, strategy selection and the targeting of specific contaminants, contaminant removal efficiencies, construction and site selection, and system maintenance. Hydrologic concepts including watershed and storm characteristics, design hydrology (peak flows, storm and treatment volumes), hydrograph routing, and critical review of hydrology and drainage reports. Design and sizing of treatment systems including conventional BMPs, low impact development, and manufactured devices. Rainfall runoff calculations with US SCS TR55 model. Prereq: Fluid mechanics or permission.

CIE 859 - Stream Restoration
Credits: 3.00
Explores the assessment, planning, design, engineering, and monitoring of stream and watershed practices intended to protect and restore the quality and quantity of flowing and surface waters and stream corridors. Lecture topics include hydrology, geomorphology, and ecosystems, with the intent of understanding the variables associated with stream systems and their interplay. Students will measure field variables and then be challenged with actual designs. Examples of stream restoration issues include in-stream flow, dam removal, induced recharge, improvements to fish habitat, and channel stabilization.

CIE 860 - Foundation Design I
Credits: 4.00
Foundation design based on subsurface investigation and characterization using current methods of laboratory and in situ testing. Use of consolidation theory and bearing capacity theory for the design of shallow foundations, including footings and rafts. Basic design of pile foundations. Earth pressure theory applied to design of retaining walls. Slope stability theory and applications. Prereq: CIE 665 or permission.

CIE 861 - Foundation Design II
Credits: 3.00
Advanced pile and pier design under vertical and lateral loads. Slope stability by circular and noncircular arc methods. Design of flexible bulkhead walls and mechanically stabilized walls. Excavation and dewatering. Soil and site improvement. Prereq: CIE 860 or permission.

CIE 862 - Introduction to Geotechnical Earthquake Engineering
Credits: 3.00
Overview of earthquake source mechanisms; magnitude and intensity; seismicity of the U.S.A. Dynamics of simple structures; response spectra. Selection of design parameters; source, magnitude, input records. Measurement of dynamic characteristics of soils; site response, liquefaction, and ground deformation. Prereq: CIE 860 or permission.

CIE 863 - Geological Engineering
Credits: 3.00
Functional classification of rocks and rock masses. Stereographic projection. Engineering properties of rocks. Rock mechanics. The influence of geology in the design of underground excavations, tunneling, foundations, and rock slope engineering. Prereq: ESCI 401 or permission.

CIE 866 - Geo-Environmental Engineering

Credits: 3.00
Soil composition and structure; hydrogeology; attenuation and contaminant transport; containment design including landfills, geosynthetics for liners and covers, leachate collection systems, vertical cutoff walls, and stability analyses; geo-environmental site characterization and investigation using geotechnical and geophysical methods; ground water, soil and gas monitoring, and sampling; remediation including in-situ and ex-situ techniques and treatment methods. Prereq: CIE 665 or permission.

CIE 867 - Engineering Behavior of Soils
Credits: 4.00
Review of stress and strain in soil. Introduction to continuum mechanics. Development of engineering soil properties. Application of soil mechanics to shear strength and stress-strain behavior of soils. Failure states and residual strength. Application of stress paths in engineering problems. Unsaturated soil mechanics. Laboratory exercises using the direct shear test, triaxial test, and soil-water retention measurements. Prereq: Foundation design or equivalent or permission.

CIE 874 - Reinforced Concrete Design
Credits: 4.00
Introduction to the design of reinforced concrete structural members by the strength method and considering deflection performance. Includes loads, approximate analysis, slabs, beams, and columns. Prereq: CIE 622, 681; or permission.

CIE 876 - Structural Design in Masonry
Credits: 3.00
Introduces the design of reinforced masonry structural members by the stress and strength method and considering deflection and other servicability performance criteria. Includes development of wind and seismic load, curtain wall, shear wall, lintels and columns. Prereq: CIE 622, 681; or permission.

CIE 880 - Building Information Modeling
Credits: 3.00
Building Information Modeling (BMI) is the process of generating and managing project data during its life cycle by integrating 3D multidisciplinary drawings with dynamic scheduling and visualization. BIM provides a digital representation of project data to facilitate the exchange of information beyond the standard two dimensional plan set. This course introduces students to the fundamentals of model creation, scheduling, material take-offs, visualizations, and animations that improve the communication of information to potential clients. Prereq: AUTOCAD Experience or by permission.

CIE 881 - Green Building Design
Credits: 3.00
This course gives an overview of green designs ans sustainable practices in building construction. We cover technical topics and requirements of a nationally recognized rating system (LEED), with a specific focus on Green Building Design and Construction. Students are introduced to basic building designs ans systems related to sustainability. Additionally, they learn about green design topics such as site plans, water and energy efficiency, material and resources usage, environmental quality and renewable energy source. As an outcome of the course, students are able to assess and incorporate green technologies and designs into building projects. They are prepared to contribute in building projects that target LEED certifications. Students are also capable to engage in green practices within their existing built environments.

CIE 882 - Timber Design
Credits: 3.00
Introduction to the design of timber structures. Structural properties of wood. Determination of horizontal and vertical loads. Horizontal and vertical load-resisting systems. Design of horizontal diaphragms, shear

walls, beams, and columns. Bolted, screwed, and nailed connections. Prereq: CIE 681 or permission.

CIE 883 - Matrix Structural Analysis and Modeling
Credits: 3.00
Modeling and analysis of determinate and indeterminate structures by matrix computer methods. Creation of matrix elements using compatibility, equilibrium, and consecutive relationships. Plane trusses, beams, frames, and space trusses. Prereq: CIE 681 or permission.

CIE 887 - Dynamics of Structures
Credits: 3.00
Dynamics of single- and multi-story buildings. Response due to earthquakes, blasting, traffic, and mechanical equipment. Analysis in the time domain and through the Fourier Transform. Fundamentals of structural vibration measurement. Prereq: CIE 885 or permission.

CIE 888 - Master's Project Paper
Credits: 3.00
Concluding project paper required of Master's level students who utilize the non-thesis option. Prereq: permission. CIE majors only.

CIE 891 - Pre-stressed Concrete
Credits: 3.00
Analysis and design of pre-stressed and post-tensioned concrete sections in flexure and shear. Strength, deflection, and losses in flexural members. Optimization of section and pre-stressing force selection. Prereq: CIE 874 or permission.

CIE 892 - LRFD Bridge Design
Credits: 3.00
AASHTO LRFD Bridge Design Specifications using SI units. Design objectives, loads, load case analysis and selection, load distributions, static analysis, and design for axial loads, flexure, and shear. Design of slender columns, composite beams, and plate girders. Prereq: senior-level structural design course or permission.
Co-requisites:

CIE 893 - Structural Design in Steel
Credits: 3.00
The design of members and connections: tension, members, columns, beams, plate girders, bolted joints, and welded joints. Introduction to plastic design of beams and frames. Prereq: engineering materials, classical structural analysis or permission.

CIE 895 - Independent Study
Credits: 1.00 to 4.00
A limited number of qualified graduate students will be permitted to pursue independent studies under faculty guidance. May be repeated.

CIE 896 - Special Topics
Credits: 1.00 to 4.00
Advanced or specialized topics not normally covered in regular course offerings. May be repeated, but not in duplicate areas. Prereq: permission.

CIE 897 - Special Topics in Environmental Engineering
Credits: 1.00 to 4.00
Advanced or specialized topics not normally covered in regular course offerings. May be repeated, but not

in duplicate areas. Prereq: permission.

CIE 899 - Master's Thesis
Credits: 1.00 to 6.00
May be repeated up to maximum of 6 credits. Cr/F.

CIE 900 - Masters Student Seminar
Credits: 1.00
Topics of interest to graduate students and staff; reports of research ideas, progress, and results; lectures by outside speakers. Continuing course: instructor may assign IA grade (continuous grading) at the end of one semester. Course held simultaneously with CIE 901.

CIE 901 - Doctoral Student Seminar
Credits: 1.00
Topics of interest to graduate students, faculty, and staff; requires two presentations from doctoral students on their research ideas, progress, and results; lectures by outside speakers. Continuing course: instructor may assign IA grade (continuous grading) at the end of one semester. Course held simultaneously with CIE 900.

CIE 935 - Nonlinear Structural Analysis
Credits: 3.00
This course deals with the theory, implementation, and application of methods of geometric and material nonlinear analysis. Geometric nonlinear analysis entails solving for equillibrium on the deformed configuration on the structure. Material nonlinear analysis involves inelastic behavior of materials. Practical design implications include problems of structural stability and inelastic static/dynamic analysis. Emphasis is on methods applied to frame structures comprised of line-type elements; however, the basic concepts also apply to general finite element methods. Prereq: CIE 783/883 or equivalent.

CIE #942 - River Mechanics
Credits: 3.00
Geomorphic principles, erosion and sediment transport problems, sediment transport mechanics in open channels, sediment measurement techniques, sediment sources and yields, control methods, effects of structures on riverine systems, design of hydraulic structures. Prereq: CIE 642 or permission.

CIE 943 - Advanced Hazardous Waste and Environmental Sampling and Analysis
Credits: 4.00
Laboratory and field techniques for the sampling and analysis of hazardous waste. Lecture covers theory behind techniques. Prereq: general chemistry, ENE 645. Lab.

CIE 944 - Advanced Physicochemical Treatment Design
Credits: 4.00
Selection, design, and evaluation of advanced unit processes employed in physicochemical treatment of waters, wastewaters, and hazardous wastes. Discussion on preparation of alternative designs and economic analysis. Emphasis on treatment schemes based on experimental laboratory or pilot studies. Prereq: undergraduate-level course in water and waste water engineering or water chemistry, or permission. Lab.

CIE 945 - Advanced Groundwater Topics
Credits: 3.00
Review of Darcy's Law for confined and unconfined aquifers, linearization techniques, draw down computations under varying boundary conditions, solutions to the inverse problem, drainage theory, recharge theory, two-phase flow, succession of steady states modeling, and borehole geophysics. Prereq:

ESCI 810.

CIE 946 - Advanced Bioenvironmental Engineering Design
Credits: 4.00
Theoretical and experimental examination of the fundamental parameters used in selection, design, and operation of biological treatment processes for waters, wastewaters, and hazardous wastes. Topics include design and evaluation of aerobic and anaerobic processes, suspended and fixed-film processes, and advanced biological water and wastewater treatment processes. Prereq: environmental engineering microbiology course, or permission

CIE 951 - Statistical Hydrology
Credits: 3.00
Course examines statistical methods used to address water resources planning and management problems involving uncertainty ojectives and hydrologic inputs. Application of statistics and probability to uncertainty in the description, measurement, and analysis of hydrologic variables and processes, including extreme events, error models, simulation, and sampling. Prereq: A hydrology course, basic statistics, or permission.

CIE 955 - Advanced Surface Water Hydrology
Credits: 3.00
Occurence and distribution of water by natural processes including atmospheric thermodynamics, precipitation, runoff, inflitration, water losses, flood routing and catchment characteristics, analysis, and methods of runoff prediction. This course builds from a foundation of fluid mechanics in the environment to address essentials of modern hydrology. An emphasis is placed on fundamental concepts, first principles, and the scientific basis of approximations. Prereq: Calculus and Fluid Mechanics.

CIE 959 - Advanced Stream Restoration Topics
Credits: 3.00
Course focuses on: stream crossing analysis and design, dam removal, and designs for aquatic species passage. Pre- or Coreq: CIE 759 or equivalent.

CIE 960 - Advanced Soil Mechanics
Credits: 4.00
Numerical and physical modeling of the mechanical behavior of soils. Cam-clay and other predictive models. Laboratory studies of mechanical behavior and measurement of input parameters to soil models. Prediction of soil behavior based on laboratory results. Applications to numerical modeling of soil masses. Prereq: soil mechanics, and foundation design, or permission.

CIE 961 - In Situ Geotechnical Testing
Credits: 3.00
In situ geotechnical testing methods for site characterization; theory and practice. Geotechnical testing methods include the piezocone, the pressuremeter, the flat plate dilatometer, the field vane, and the standard penetration test. Includes sampling techniques, geophysical exploration, and recent innovations in site and soil characterization. Prereq: CIE 960 or equivalent.

CIE 995 - Problems
Credits: 2.00 to 4.00
The study and investigation of problems selected to meet the needs of the students.

CIE 999 - Doctoral Research
Credits:
Cr/F.

Graduate School

GRAD 800 - Continuing Enrollment
Credits:
All continuing graduate students who are not enrolled for course credits, thesis credits, Doctoral Research (999) or Master's Continuing Research (GRAD 900), and are not in residence, are required to register for GRAD 800 each semester of the academic year (or each summer for students in MATH M.S.T., and English M.S.T. and College Teaching M.S.T. programs). Students registered for GRAD 800 are considered part-time. Not graded.

GRAD 885 - Graduate Foreign Exchange
Credits: 1.00 to 9.00
Graduate students may spend a semester at participating institutions. Eligibility requirements include United States citizenship, good academic standing, and permission of their graduate program committee. For information contact the Center for International Education. Special fee. May be repeated up to a maximum of 9 credits. Cr/F.

GRAD 890 - UNH Law Exchange
Credits: 1.00 to 3.00
Graduate degree students may enroll for courses at the UNH School of Law that are not offered through the Graduate School and will normally fulfill elective degree requirements in the students major program. Eligibility requirements include good academic standing (3.0 or better), good financial standing, permission of the graduate program committee or advisor and permission of the graduate school. For information contact the Graduate School. May be repeated up to a maximum of 9 credits. Normally no more than one course can be taken at the law school in any one term.

GRAD 900 - Master's Continuing Research
Credits:
Master's students who have completed all course requirements, registered for the maximum number of thesis or project credits, and are in residence completing their master's program must register for Master's Continuing Research. Students registered for GRAD 900 are considered full-time. Not graded.

GRAD 920 - Qualitative Institute
Credits: 2.00
This course explores strategies for navigating crucial junctures in qualitative data analysis. Through focused applications including ethnographic, grounded theory, and/or case study approaches, we examine how the researcher's question(s), theoretical stance, unit of analysis, and case-specific of collective orientation shape analytic options and decisions. Students work with data already in the process of being generated and analyzed. Prior coursework or experience in qualitative research is required.

GRAD 930 - Ethics in Research and Scholarship
Credits: 2.00 or 3.00
Individual, professional, institutional, and social issues related to the ethical conduct of research and scholarship. Uses case studies to demonstrate the application of pertinent regulations, policies, and guidelines. Cr/F.

GRAD 940 - Foundations in College Teaching
Credits: 2.00

Formal consideration of effective teaching approaches. Topics include course design, presentation, and evaluation. Introduction to multiple pedagogies and their application in higher education.

GRAD 945 - Advanced Seminar in College Teaching
Credits: 2.00
Capstone course for experienced faculty. The development and review of a course portfolio that demonstrates the knowledge and application of best teaching practices. Includes a formal examination on the scholarship of teaching and learning. Capstone course for experienced faculty. By permission only.

GRAD 950 - Issues in College Teaching
Credits: 2.00
Issues faced within the classroom including evaluation methods, classroom climate and diversity, instructional approaches, teaching and learning resources, and student behavior. Case studies. Prereq: permission. Cr/F.

GRAD 951 - Teaching with Writing
Credits: 2.00
Examination of the issues, principles, and practices of using writing to enhance learning. Appropriate for all fields and disciplines. Participants design and field test assignments. Seminar requires field work and independent research. Cr/F.

GRAD 952 - College Teaching Mentorship
Credits: 1.00 to 2.00
Individual interaction with a senior professor to develop insights related to college-level teaching. Students observe and analyze instructional approaches based upon the professor's teaching philosophy and teaching traditions within a specific field or discipline. Micro teaching may be required. Prereq: permission. May be repeated for a maximum of 3 credits. Cr/F.

GRAD 959 - Advanced Issues in College Teaching
Credits: 1.00
Advanced seminar examining issues involved in teaching and learning faced within the classroom. Examines the relationship between theory and practice. Prereq: GRAD 950 or permission. May be repeated barring duplication of subject matter. Cr/F.

GRAD 961 - Cognition, Teaching, and Learning
Credits: 2.00
Cognitive theories and their application to classroom instruction. Examination of historical relation between cognition and education as well as current application of cognitive theory in the learning process. Cognitive skills involved in the learning process. Teaching strategies that enhance the use of cognitive skills and improve learning and teaching effectiveness. Prereq: permission.

GRAD 962 - Academic Citizenship
Credits: 2.00
Issues facing professors as a group within today's academic world. Topics include: defining "higher education" in contemporary terms; the variety of American academic institutions, their diverse missions, and associated career paths; the academic ethic; and the status of academic freedom in today's climate. Examination of the rights and responsibilities of the contemporary professor. Prereq: permission.

GRAD 963 - College Students and the Undergraduate Culture
Credits: 2.00
Examination of the cultures for learning and teaching, created by faculty members, administrators, and undergraduates. Consideration of recent research on the relationship of such cultures to the quality of

teaching and learning. Content includes research on the learning needs of students, the importance of cultural artifacts in the classroom, and related topics.

GRAD 965 - Classroom Research and Assessment Methods
Credits: 2.00
Examination of methods used in classroom assessment and classroom research. The focus is on the improvement of teaching and learning in a teacher's own classroom. Research project is required. Prereq: permission.

GRAD 970 - Special Topics in College Teaching
Credits: 2.00 to 4.00
Formal courses in college teaching: A) field studies; B) disciplinary studies, C-Z other. Prereq: permission. May be repeated to a maximum of 10 credits.

GRAD 971 - Teaching and Learning in Science
Credits: 3.00 to 4.00
Issues, activities, and research in science education, including history of curricula, student and teacher knowledge and beliefs, epistemological and cognitive bases of science learning, and related instructional approaches. Extensive reading, writing, discussion, and reflection are included. Not open to all students who have completed CHEM 971. Prereq: permission.

GRAD 978 - Teaching Economics
Credits: 4.00
Analysis of the content, methodology, and pedagogy in college economics courses. Effects upon college students of economics. Exploration of relevance of other social sciences, the humanities, the natural sciences, and mathematics for undergraduate economic education. Not open to students who have taken ECON 898. Prereq: permission.

GRAD 980 - Preparing to Teach a Psychology Course
Credits: 2.00
Preparation for teaching in psychology. Examination of issues and models involving course design and interaction with students. Products from the course will include a complete course syllabus, a preliminary statement of teaching philosophy, and the first three teaching models of a course. An IA (continuous grading) grade may be awarded.

GRAD 990 - College Teaching Praxis
Credits: 3.00 to 4.00
Formal experience in teaching a college level course. Development of a teaching portfolio. Prereq: permission. May be repeated for a maximum of 12 credits.

GRAD 995 - Independent Study
Credits: 1.00 to 4.00
Faculty supervised independent studies in college teaching. Prereq: permission. May be repeated to a maximum of 12 credits.

GRAD 998 - College Teaching Portfolio
Credits: 1.00
An integrative experience for the cognate in college teaching, culminating in an electronic teaching portfolio submitted to the Center for Excellence in Teaching and Learning.

Communication Sci&Disorders

COMM 825 - Cued Speech
Credits: 3.00
This course covers the fundamentals of the Cued Speech system, its applications ans research as well as its relevance to other communication options for children who are deaf or hard of hearing. Various topics are covered, including CS and language development, reading, auditory and speech skill development, auditory processing, bilingualism, Down Syndrome, Autism, cochlear implants and transliteration.

COMM 875 - Advanced Language Acquisition
Credits: 3.00
Careful examination of theoretical perspectives and landmark studies provides the foundation for the exploration of advanced topics in language acquisition. Current approaches to child language research guide students to approach the course context from a scientific perspective. Prereq: COMM 522.

COMM 876 - Ethical and Professional Issues in Communication Sciences and Disorders I
Credits: 1.00
Introduction to ethical and professional issues that professionals will encounter in various work settings including regulatory, billing practices, service delivery models, and the role of advocacy for client services.

COMM 880 - Diagnosis of Speech and Language Disorders
Credits: 3.00
Principles and practice for diagnosis of speech and language disorders; examination procedures and measurement techniques.

COMM 890 - Advanced Audiology for Speech-Language Pathologists
Credits: 3.00
A clinical foundation in diagnostic and rehabilitative information. This course covers foundation materials that apply to both children and adults, and includes recent academic, clinical, and ethical developments in the profession of audiology that impact speech-language pathologists. Prereq: COMM 521, COMM 704, 705, introduction to speech science, and introduction to hearing science. CSD majors only.

COMM 891 - Applied Neurology for Speech-Language Pathology
Credits: 3.00
A foundation in the basic neuroanatomy and physiology of human communication and swallowing. Includes a review of gross anatomy of the central nervous system, sensory, and motor systems, with emphasis on cranial nerves, functional organization of human communication and behavior, and the relationship between CNS dysfunction and disorders of communication, cognition, and swallowing.

COMM 895 - Special Topics
Credits: 1.00 to 3.00
Advanced study in specific areas; involves an independent project. Prereq: permission. May be repeated.

COMM 899 - Master's Thesis
Credits: 1.00 to 6.00
Prereq: permission. May be repeated for a maximum of 6 credits. Cr/F.

COMM 900 - Articulatory and Phonological Disorders in Children
Credits: 3.00

Phonological theories as they relate to analysis and remediation of phonological disorders. Prereq: COMM 524 Clinical Phonetics.

COMM 901 - Dysphagia
Credits: 3.00
This course addresses swallowing problems occurring in the preparatory, oral, and pharyngeal stages of the swallow. Assessment and treatment are discussed. Permission required.

COMM 902 - Stuttering
Credits: 3.00
Theoretical and therapeutic considerations of the stuttering syndrome; emphasis on clinical management.

COMM 903 - Therapy Process
Credits: 2.00
An introduction to the clinical process. Part I emphasizes the theory and practice of intervention. Part II addresses oral and written communication involved in the clinical process, the importance of clinical writing, and common reports/documents. CSD majors only.

COMM 904 - Aphasia in Adults
Credits: 3.00
Principles concerning etiologies, evaluation, classification, and methods of clinical management including the team approach to rehabilitation of aphasia in adults. Prereq: a course in neuro-anatomy or permission.

COMM 905 - Motor Speech Disorders
Credits: 3.00
Neurological bases, diagnosis, and treatment of motor speech disorders including cerebral palsy, acquired dysarthia, and apraxia of speech. Prereq:a course in neuro-anatomy or permission.

COMM 906 - Voice Disorders
Credits: 2.00
Types, causes, and characteristics of functional and organic voice disorders. Specific evaluation of deviant vocal characteristics; treatment techniques for children and adults.

COMM 907 - Advanced Seminar in Aural Rehabilitation
Credits: 3.00
Current issues in therapeutic techniques and management considerations for the hard-of-hearing child. Speech perception by the hearing impaired, use of amplification systems, counseling approaches, and modification of the listening environment and language considerations, and the development of IEPS. Prereq: basic audiology, introduction to auditory perception and aural rehabilitation, speech and hearing science, or equivalent.

COMM 908 - Disorders of Language and Literacy I
Credits: 3.00
Examination of language-based learning disabilities; relation between language and learning; current assessment and treatment strategies. Prereq: permission.

COMM 909 - Disorders of Language and Literacy II
Credits: 3.00
The writing problems commonly observed in children with language disorders are reviewed from the perspective of language: writing relationships, meta-cognition, and memory. Current diagnostic and instructional approaches are discussed. Prereq: permission.

COMM 910 - Clinical Practicum
Credits: 1.00 to 3.00
On-campus practicum provides graduate students with the opportunity to apply advanced theoretical knowledge in clinical setting with clients demonstrating speech, language, hearing, and/or swallowing disorders. Students acquire therapy and diagnostic experience under supervision. A minimum of 3 credits is required for the M.S. degree. May be repeated up to 3 times for a maximum of 3 credits. Variable 1-2 credits. Special fee.

COMM 911 - Externship
Credits: 1.00 to 4.00
Application of advanced theoretical knowledge through clinical work in an off-campus clinical setting. Prereq: COMM 910, On-campus Clinical Practicum with a grade of "B" or above. A minimum of 6 credits is required for the M.S. degree. May be repeated up to 3 times for a maximum of 8 credits. Variable, 1-4 credits.

COMM 912 - Language Disorders Birth to Five
Credits: 3.00
Trans-disciplinary examination of interrelationships between early language, social, and cognitive development, with emphasis on collaborative models of assessment and intervention. Reviews implications for special populations (e.g., mentally retarded, autistic, sensory impaired, and limited English proficiency.)

COMM 913 - Cognitive Communication Disorders
Credits: 3.00
This course addresses the nature of cognitive-communicative impairments in children and adults with acquired brain injury and links theory and practice to community reintegration. Prereq: a course in neuro-anatomy.

COMM 914 - Augmentative and Alternative Communication
Credits: 3.00 to 4.00
An overview of how augmentative and alternative communication systems can be used to foster the participation, interaction, and inclusion of children and adults for whom speech is not a primary mode of communication. Students are exposed to a broad variety of assessment and intervention techniques, some of which involve the use of assistive technology.

COMM 915 - Counseling Clients and Families with Communication Disorders
Credits: 2.00
Course enables learners to understand essential elements of interaction with other human beings with whom they are working, and to apply therapeutic principles in clinical settings with people who have speech, language, and hearing difficulties. Learners are also able to identify which areas of counseling are outside their scope of practice. More specifically, this course is intended to: provide the learner with a broad overview of contemporary counseling approaches and issues; and apply these issues to the speech and hearing clinician. In addition we touch upon family systems and how they are affected by the presence of a communication disorder. The course involves formal lectures and group discussion. The course also offers unstructured time for the class members to use as they see fit. Only open to CSD, CSD: Lang&LitDisabilities, CSD:EarlyChild Intervention majors.

COMM 916 - Autism Spectrum Disorders
Credits: 3.00
This seminar provides an overview of autism spectrum disorders (ASD) from multiple points of view. Participants become acquainted with the perspectives of individuals and their families' through first-hand accounts. Current practices related to the early identification, screening, diagnosis, and possible etiology of autism spectrum disorders, including an overview of medical considerations, are discussed. Evidence-

based practices across the age-span are critically reviewed in the areas of behavior, communication, play, social interactions, sensory-motor, academics, and transition to adult life. Teaming approaches and person-centered planning to support a high quality of life for the individual are presented. Only open to CSD, CSD: Lang&LitDisabilities, CSD:EarlyChild Intervention majors.

COMM 917 - Research Mthds Comm Sci Dis
Credits: 3.00
This course introduces students to concepts, procedures, and application of research methods in communication sciences and disorders. The course covers group, single subject, experimental, quasi-experimental, correlational, and qualitative designs with an emphasis on clinical application. Only open to CSD, CSD: Lang&LitDisabilities, CSD:EarlyChild Intervention majors.

COMM 920 - Graduate Seminar
Credits: 1.00 to 6.00
Current topics, recent investigations, and library research. May be repeated up to 9 credits barring duplication of subject matter. A minimum of 2 credits is required for M.S. degree.

Computer Science

CS 800 - Internship
Credits: 1.00
Provides an opportunity to apply academic experience in settings associated with future professional employment. A written proposal for the internship must be approved by the department chair. The proposal must specify what the student will learn from the internship, why the student is properly prepared for the internship, and what supervision will be available to the student during the internship. A mid-semester report and a final report are required. Permission required. Computer Science majors only. May be repeated up to a maximum of 3 credits. Cr/F.

CS 812 - Compiler Design
Credits: 3.00
Formal languages and formal techniques for syntax analysis and parsing; organization of the compiler and its data structures; code generation. LL and LR parsing; automatic generation of scanners and parsers from high-level descriptions. Implementation of features from imperative and object-oriented languages. Students are required to design and implement a compiler for a simple language. This course is implementation-intensive. Prereq: Machine Organization; Theory of Computation.

CS 818 - Software Systems Engineering Process
Credits: 3.00
Contemporary software-intensive systems are distinguished by their complex intellectual content, evolving and changing requirements, difficult technical and organizational interfaces, multiple stakeholders with differing perspectives on project objectives, integration intensity, and high customer expectations for system robustness. To meet these formidable challenges, this course addresses an interdisciplinary set of processes across the full life-cycle (from concepts to deployment and enhancement) that balances competing technical/management parameters toward a design solution meeting stakeholder needs. Prereq: permission of instructor.

CS 819 - Object-Oriented Design
Credits: 3.00
Object-oriented design issues and techniques. Object-oriented patterns. Object-oriented language features. Prereq: Experience with object-oriented programming.

CS 820 - Operating System Programming
Credits: 3.00
Detailed discussion of operating system concepts and features. Practical examples and exercises that utilize advanced operating system features, including inter-process communication, synchronization, client-server communication, shared memory, threads, remote procedure calls, and device-level I/O. Discussion of POSIX 1003.1 Part I Standards. Prereq: operating system fundamentals or equivalent.

CS 821 - Operating System Kernel Design
Credits: 3.00
Design and implementation of an operating system kernel, using LINUX as an example. Detailed discussion of the data structures and algorithms used in the kernel to handle interrupts, schedule processes, manage memory, access files, deal with network protocols, and perform device-level I/O. The course is project-oriented, and requires the student to make modifications and additions to the LINUX kernel. Prereq: CS 820, or permission.

CS 823 - Performance Evaluation of Computer Systems
Credits: 3.00
This class introduces the main concepts, techniques, and tools needed to evaluate the performance of computer systems under various configurations and workloads. The techniques allow one to perform capacity planning based on quality of service requirements of users and workload characteristics. The course is mainly based on the use of analytic queuing network models of computer systems. The performance techniques are applied to study the performance of centralized, distributed, parallel, and client/server systems. The course also discusses performance measuring tools for operating systems such as Unix and Windows NT. Prereq: operating systems fundamentals or equivalent.

CS 825 - Computer Networks
Credits: 3.00
Introduction to local, metropolitan, and wide area networks using the standard OSI reference model as a framework. Introduction to the Internet protocol suite and to network tools and programming. Discussion of various networking technologies.

CS 830 - Introduction to Artificial Intelligence
Credits: 3.00
In-depth introduction to artificial intelligence concentrating on aspects of intelligent problem-solving. Topics include situated agents, advanced search techniques, knowledge representations, logical reasoning techniques, reasoning under uncertainty, advanced planning and control, and learning. Prereq: data structures.

CS 835 - Introduction to Parallel and Distributed Programming
Credits: 3.00
Programming with multiple processes and threads on distributed and parallel computer systems. Introduces programming tools and techniques for building applications on such platforms. Course requirements consist primarily of programming assignments. Prereq: Undergraduate course in operating systems fundamentals and computer organization; or permission.

CS 845 - Formal Specification and Verification of Software Systems
Credits: 3.00
Course focuses on the formal specification and verification of reactive systems, most notably concurrent and distributed systems. Topics relevant to these systems, such as non-determinism, safety and liveness properties, asynchronous communication or compositional reasoning, are discussed. We rely on a notation (T LA+, the Temporal Logic of Actions) and a support tool (TLC, the TLA+ Model Checker). Prereq: Students are expected to be knowledgeable in logic and to be able to write symbolic proofs in predicate calculus. A basic understanding of the notions of assertion, precondition, and post-condition is also assumed.

CS 851 - System Requirements Engineering
Credits: 3.00
This course focuses on the skills required to identify, analyze, synthesize, and manage system requirements. It addressed the key requirements gathering and analysis tasks throughout the system life cycle. Participants learn about the requirements process, explore what constitutes good requirements, and understand how requirements are documented. A case study provides practice and feedback on key skills of the requirements process. Techniques and models are introduced that must be considered in defining systems that achieve higher customer satisfaction within constraints. Interpersonal skills critical to interacting with stakeholders (e.g., customers and users) are emphasized coequally with technical issues.

CS 852 - Software Architecture Concepts
Credits: 3.00

A software architecture concerns the top-level structures of a software system, the externally visible properties of those structures, and their interrelationships. This course examines the role of architecture in satisfying an organization's business requirements. The hard choices that must be made by the architect to fulfill the often conflicting needs of performance , availability, security, interoperability, and modifiability are highlighted. Other topics include representations of architectures, case studies, and the role of architecture in product lines.

CS 853 - Software Project Management
Credits: 3.00
This course addresses an advanced set of software project management essentials that can affect the bottom line of project technical and business performance. The focus is on larger scale complex projects that a student is likely to encounter in the workplace after 3-5 years of experience. These essentials are termed "best practices, " and those addressed are: formal risk management, agreement on interfaces, metrics based scheduling/tracking, frequent binary completion milestones, incremental development, people aware management style, and change management. The emphasis is on software intensive projects; however, the basic principles are pertinent to a wider class of project domains that involve intellectual product development where problem discovery is a main characteristic.

CS 854 - System/Software Test and Evaluation
Credits: 3.00
This course identifies an integrated software test and evaluation process framework that emphasizes a "systems engineering" approach: the validation and viability of customer/user needs statements, verification of system design, full exercise of developmental testing, system integration/test dovetailing on the prior validations, plus evaluation of system quality attributes. This system engineering approach is intended to contain major problems, including interface issues, to phases preceding system test.

CS 858 - Algorithms
Credits: 3.00
An introduction to important concepts in the design and analysis of algorithms and data structures, including implementation, complexity, analysis, and proofs of correctness. Prereq: understanding of basic data structures, familiarity with proof methods and basic concepts from discrete mathematics and the ability to program with recursion.

CS 860 - Introduction to Human-Computer Interaction
Credits: 3.00
Human-computer interaction is a discipline concerned with the design, evaluation and implementation of interactive computing systems for human use and with the study of major phenomena surrounding them. Prereq: operating systems fundamentals.

CS 867 - Interactive Data Visualization
Credits: 3.00
Detailed discussion of how an understanding of human perception can help us design better interactive displays of data. Topics include: color, space perception, object perception and interactive techniques. Students write interactive programs, give presentations and undertake a project designing and evaluating a novel display technique. Prereq: Introductory level C or C++ programming course. (Also listed as OE 867.)

CS 870 - Computer Graphics
Credits: 3.00
Input-output and representation of pictures from hardware and software points of view; interactive techniques and their applications; three-dimensional image synthesis techniques. Prereq: data structures.

CS 871 - Web Programming Paradigms

Credits: 3.00
In this course you will learn languages to program the Web. Languages integrated into browsers, like Javascript, and languages invoked on the server, like Ruby. You will also learn about frameworks, like Rails, and various techniques used to support the programming process. In addition, you will learn languages you will need to create, modify and process Web documents. Although we will learn how to read and write in these languages, our primary goal will be on understanding how the design of these multi-paradigm dynamic languages support the process of delveoping Web applications. Prereq: programming lnaguage concepts or permission.

CS 875 - Database Systems
Credits: 3.00
Database analysis, design, and implementation. Focus on the relational model. Data description and manipulation languages, schema design and normalization, file and index organizations, data integrity and reliability. Usage of selected DBMS. Prereq: data structures; mathematical proof.

CS 880 - Topics
Credits: 1.00 to 4.00
Material not normally covered in regular course offerings. May be repeated.

CS 898 - Master's Project
Credits: 3.00

CS 899 - Master's Thesis
Credits: 1.00 to 6.00
May be repeated up to a maximum of 6 credits. Cr/F.

CS 900 - Graduate Seminar
Credits: 1.00
Regularly scheduled seminars presented by outside speakers, UNH faculty, and graduate students. Topics include reports of research ideas, progress, and results. Cr/F.

CS 920 - Advanced Operating Systems
Credits: 3.00
This course covers techniques for formally analyzing various fundamental concepts and mechanisms which form the basis of the design of advanced operating systems, including distributed, database, and multiprocessor operating systems. Topics covered include synchronization, mutual exclusion, distributed algorithms, security, fault-tolerance, and distributed resource management. Prereq: operating system fundamentals or equivalent.

CS 925 - Advanced Computer Networks
Credits: 3.00
Design and analysis of computer networks. Modeling and performance evaluation, queuing theory applied to computer networks. Traffic flow management and error control. Routing algorithms and protocols. Switch and router architectures. Selected issues in high-speed network design. Optical networks. Prereq: CS 825 or equivalent.

CS 931 - Combinatorial Search and Heuristic Optimization
Credits: 3.00
The goal of this class is to teach you how to cope with intractable combinatorial optimization problems. Focuses on techniques from artificial intelligence that attempts to combat intractability by exploiting as much available information as possible. Covers concepts and algorithms for solving shortest-path, constraint satisfaction, and combinatorial optimization problems, and their application in areas such as

planning, robotics, and bioinformatics. Emphasis on important or recent papers in the field. Prereq: Introduction to Artificial Intelligence.

CS 980 - Advanced Topics
Credits: 3.00
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CS 981 - Advanced Topics in Database Systems
Credits: 3.00
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CS 986 - Advanced Topics in Formal Specification and Verification
Credits: 3.00
This course explores more thoroughly some of the material introduced in CS 845. It focuses on concurrent and reactive systems and on temporal logics. Topics include safety and liveness properties, asynchronous communication, and compositional reasoning. Support tools, like interactive theorem provers and model-checkers, are presented and used in class. Prereq: introduction to formal specification and verification. May be repeated up to a maximum of 6 credits.

CS 988 - Advanced Topics in Computer Graphics
Credits: 3.00

CS 989 - Advanced Topics in Algorithms
Credits: 3.00

CS 998 - Independent Study
Credits: 1.00 to 6.00

CS 999 - Doctoral Research
Credits:
Cr/F.

Development Policy&Practice

DPP 901 - Integrative Approaches to Development Policy and Practice
Credits: 3.00
This course aims to provide students with a general introduction to the basic core competencies and practical skills required of a "generalist" development practitioner and serves as the foundation course for the MADPP curriculum. Case studies will be used to demonstrate the interconnectedness of natural sciences and engineering, social science, health sciences, and management.

DPP 902 - Economics Analysis for Development
Credits: 3.00
This course provides the practitioner with tools of economic analysis that are necessary for effective development practice. Drawing upon principles of macroeconomics, the course explores how markets, property rights, political institutions, government policies, environmental conditions and cultural values interact to produce development outcomes.

DPP 903 - Global Health
Credits: 3.00
An analysis of the public process, the development of public health policy in developing countries, and a discussion of specific public health policy issues with cross-country comparisons. This course begins with an analytical framework for analyzing a public health system and process. It is followed by a general introduction to effective health policies in developing countries with examples of specific policies and programs that have been effective.

DPP 904 - Environmental Sustainability and Development
Credits: 3.00
Provides students working at a graduate level but lacking specific background in ecology with an applied perspective on challenges at the interface of rural development and environmental science. By the end of the course, students should be conversant in the languages of large-scale ecosystem, ecology, and conservation biology, and should have a basic working knowledge of the science of carbon and climate change, land use change and deforestation, and the impacts of land use on biodiversity and water quantity/quality.

DPP 905 - Fiscal Management for Development Organizations
Credits: 3.00
Budgeting, goal setting, financial planning and financial analysis for development organizations.

DPP 906 - Leadership, Collaboration and Communication
Credits: 3.00
This course examines theories, concepts, research, and practices in collaborative leadership. The course is designed to promote creative and innovative leadership among emerging leaders in both public and private development organizations. Prereq: Project Design.

DPP 907 - Sustainable Engineering for Development Practice
Credits: 3.00
This course begins with the exploration of the precept that we live in a world where we must design and engineer products with a finite supply of natural resources, and with limited life support capacity. Tools for sustainability engineering related to development practice (e.g., health, energy, housing) are the major

focus of the course, which include life cycle analysis and life cycle impact analysis, the metrics and mass and energy flow analysis used in the field of industrial ecology, and environmental management systems.

DPP 908 - Policy Seminar
Credits: 3.00
This seminar will reinforce the multidisciplinary breadth and trans-disciplinary perspective of the masters program, providing students with the opportunity to sharpen critical policy analysis skills. The goal of the course is to help students understand the sources of public policy, that is, why we have various public policies and how to produce professional policy analysis.

DPP 909 - Environmental Sciences and Infrastructure for Sustainable Communities and Development
Credits: 3.00
Achieving sustainability requires that consideration be given to meeting present and future human needs and respecting "triple bottom line" economic, social, and environmental goals. In this course, we provide the necessary background in the environmental sciences so that development practitioners can understand the environmental consequences of development, and moreover, how environmental services directly support human needs. Since communities also need constructed facilities, known as infrastructure, that support and shelter human activities, the course also provides a review of several important types of infrastructure systems, their interactions with the social, economic, natural environments, and how they can be designed and managed to support sustainable development and communities.

DPP 950 - Current Issues in Microfinance and Microenterprise Development
Credits: 3.00
Microfinance (m-f) and micro enterprise (m-e) development are powerful instruments, but they are in many ways only rather distantly connected with one another, and microfinance in particular is the victim of exaggerated expections. This course is designed critically to examine certain vital questions about these two topics, to temper wishful thinking, to identify problems and to generate remedies for them. Prereq: Project Design.

DPP 951 - Nuts and Bolts of Microfinance
Credits: 3.00
This course is designed to provide the participant with an overall understanding of the microfinance institutions including management, planning and monitoring strategies, tools, and systems. Sessions will seek to develop skills and capacity to examine various areas, such as competition, expansion, product development, service devlivery and human resource, marketing, and information management systems. Prereq: Project Design.

DPP 952 - Balancing Resource Management, Land Use, and Development
Credits: 3.00
In this course, we explore how land use, resource management, and development are balanced within the context of three case studies: Africa, Central America, and New England, USA. Students apply the methods and concepts learned in the class to develop a local New Hampshire case study/policy analysis.

DPP 953 - Community Medicine and Epidemiology
Credits: 3.00
Surveys the fundamental principles of epidemiology and its importance as an analytical tool in the fields of public health and policy development to assure the health of populations in the developing world. Emphasis is placed on providing the student with a firm foundation of epidemiological concepts via a historical perspective of the field, meaures of disease occurence and association, practical applications to policy, data sources, and study designs to reduce community health problems. In order for the student to be able to utilize epidemiology as a health management tool, special emphasis will be placed on

understanding and applying descriptive and analytical epidemiologic techniques to assess the health of diverse communities. The student will gain an appreciation for the role epidemiology plays in helping to produce and maintain healthy populations on both a local and global scale.

DPP 954 - Sustainable Agriculture and Food Systems
Credits: 3.00
Reviews the historical, ecological, economic, social and political aspects of agricultural sustainability principles and practices. Examines the sustainability of various agricultural systems and practices. Examines specific commodity chains - vegetables, grains, meat - in comparative global context. Reviews general concepts governing the functioning of tropical agro-ecosystems in relation to resource availability, ecological sustainability, and socio-economic viability.

DPP 956 - Housing Development
Credits: 3.00
This course examines housing development with a focus in emerging economies of the South and parallel contexts from the North. It surveys connections between and among issues related to land, design, finance, legal and regulatory frameworks, construction materials, and state interventions in housing delivery; analyzes the informal land and housing markets and slum upgrade strategies; and examines global housing challenges with reviews of demographic, technological, socio-economic, cultural, legislative, financial and political variables that are responsible for glaring disparities in the quantity and quality of housing stocks in nations of the South and North. Permission required.

DPP 957 - Negotiation Strategies
Credits: 3.00
Course goals are: 1) To review and understand theories related to negotiations, and 2) To develop and sharpen negotiating skills through practice (case studies) and debriefing of the cases. This course helps participants develop a "method" for preparing and carrying out negotiations across a range of community development situations. This course also examines important negotiations issues for the community development practitioner such as: valuing non-financial assets; negotiating with larger, more powerful entities; and, dealing with uncooperative parties. The course focuses on case studies and debriefing as the primary learning technique. Participants examine their assumptions about negotiations and work to improve their negotiating skills. Permission required.

DPP 958 - Financing Development
Credits: 3.00
This course examines the problems faced by development practitioners in financing development activities. The course first focuses on financial markets and the financial needs of development projects and ventures. It will then look at the institutional structures capable of providing development capital in appropriate ways for various development projects. In evaluating institutional structures we focus on a wide variety of institutional management issues including risk assessment, non-traditional underwriting standards, interest rate structure, portfolio management and managing loan delinquency. The final sessions of the course focus on the critical policy issues in the field of development finance. Permission required.

DPP 959 - Wrokforce Development
Credits: 3.00
This course examines changing the global and national economic patterns, restructuring labor markets and institutions, and evolving regional/local workforce development initiatives and itermediaries. The course emphasizes the national and regional public policy implications of these transformations, with a focus on existing and emergent workforce delveopment approaches in the United States. Among the themes to be explored are relationships between workforce development and economic development; opportunities for skills upgrading and life-long learning; and challenges for workers with barriers to employment. The course

uses a mixture of readings, lectures, written assignments, seminar-style discussions, guest lectures, and individual/group exercises.

DPP 960 - Social Enterprise
Credits: 3.00
This course examines innovative organizations that are created to improve people's lives and that contribute to improved social, economic and environmental conditions. These organizations adapt various aspects of the market model emphasizing both financial vaibility and social (including environmental) goals - measuring achievement in all of the areas. Social enterprises are often launched to address problems where government, the private sector and the traditional non-profit sector fail to provide a public good. The course emphasis is on how such organizations are started, the business models they develop, and how they are sustained. We will have a wide range of social entrepreneurs presenting in the class. Permission required.

DPP 980 - Project Design
Credits: 3.00
Project 1:During the first semester, students will identify a community problem or issue, research and analyze the issue in consultation with colleagues and community stakeholders, and design a project. A preliminary design will be submitted at the end of the first semester.

DPP 981 - Project Implementation
Credits: 3.00
Students will begin implementation activties in field placement communities. Regular progress reports and online postings will be required. Prereq: Project Design.

DPP 982 - Project Management
Credits: 3.00
Studies how project plan inputs are accurately gathered, integrated, documented and managed; the tools and techniques used in project management; and the outputs of a project plan to viable stakeholders. Considers the development of project scope, work breakdown structures, and the importance of quality, risk, and contingency management in planning development. Prereq: Project Design.

DPP 983 - Project Monitoring and Evaluation
Credits: 3.00
This semester students will conduct an evaluation of their project and manage closure processes. At the end students will submit a final written report and present it to the faculty and peers. This final project and the final report detailing the project will serve as the capstone course of the program. Prereq: Project Design.

DPP 990 - Independent Study
Credits: 1.00 to 4.00
In order to earn the MADPP degree, students must complete thirteen courses (equivalent to 39 credits). Ten of the thirteen courses are required courses, while the remaining three are elective courses. A maximum of two elective courses may be completed as independent studies, which allow students to study a unqiue topic in-depth that is not offered as a traditional course.

Earth Sciences

ESCI 805 - Principles of Hydrology
Credits: 4.00
Physical principles important in the land phase of the hydrologic cycle, including precipitation, snow melt, infiltration and soil physics, and surface and subsurface flow to streams. Problems of measurement and aspects of statistical treatment of hydrologic data. Field trips. Transportation fee. Prereq: two semesters of calculus required; statistics recommended. Special fee. Lab.

ESCI 810 - Groundwater Hydrology
Credits: 4.00
Principles for fluid flow in porous media with emphasis on occurrence, location, and development of groundwater, but with consideration of groundwater as a transporting medium. Major topics include well hydraulics, regional groundwater flow, exploration techniques, and chemical quality. Laboratory exercises involve use of fluid, electrical, and digital computer models to illustrate key concepts. Prereq: ESCI 805 or permission. Special fee. Lab.

ESCI #815 - Global Atmospheric Chemistry
Credits: 3.00
Introduction to the principles of atmospheric chemistry and their relationship to biogeochemical cycles, climate, and global change. Focus is on understanding the basic physical and chemical processes that determine the trace gas distribution in the global troposphere. An introduction to atmospheric vertical structure and global circulation dynamics provides the foundation. Chemical cycles of important C, S, N molecules are examined, including their possible perturbation by human activities. Basic photochemical processes outlined, particularly with respect to reactive nitrogen hydrocarbons, and the production/destruction of ozone. Prereq: one year college chemistry. (Also offered as EOS 815.)

ESCI #818 - Macro-scale Hydrology II
Credits: 3.00
Students and instructors jointly select a research topic in macro-scale hydrology to be analyzed in depth during the course of the semester. A primary goal is the preparation of a manuscript for publication in a refereed scientific journal. Extensive library research, reading of recent and relevant scientific literature, technical analysis, writing. Course designed to be taken two consecutive semesters (fall and spring). Prereq: macro-scale hydrology I. (Also offered as EOS 818.) (Alternate years only.)

ESCI 826 - Igneous and Metamorphic Petrology
Credits: 4.00
This course focuses on the origin and evolution of igneous and metamorphic rocks from field, petrogrpahic mineral chemistry, experimental, and theoretical studies. Igneous systems include volcanic and plutonic suites, with emphasis on meineralogic records of magma chamber systematics. Metamorphic systems include pelitic, mafic, and calc sillcate rocks, with special emphasis on closed- and open-system reactions, mutl-systems, reaction space, and pressure-temperature-time paths. Prereq: ESCI 614; adequate calculus, chemistry, and physics. Field trips. Special fee. Lab.

ESCI 831 - Geodynamics
Credits: 4.00
Application of quantitative methods to geologically motivated problems, focusing on lithospheric deformation, topography, and fluid flow. Students acquire geophysical and geochemical techniques used to

address dynamics in the Earth system. Includes biweekly recitation sessions for working through problemsets and facilitating discussions of relevant papers from the literature. Prereq: one year each of physics, calculus, chemistry or permission.

ESCI 834 - Geophysics
Credits: 4.00
The structure of the solid Earth, including the continental and oceanic lithosphere and the deep interior as revealed by investigations of seismic waves, the Earth's gravitational and magnetic fields, heat flow, and earthquakes. Prereq: ESCI 401; one year of calculus; one year of college physics;\or permission. Special fee. Lab.

ESCI 835 - Earthquakes and Faulting
Credits: 4.00
This course provides an introduction to the principles of brittle faulting and earthquake mechanics. We discuss classic theory and current topics in earthquake science based on obervations from laboratory experiments, seismology, geodesy, and geology (exhumed faults). Prereq: Structural geology or permission.

ESCI 841 - Geochemistry
Credits: 4.00
Course focuses on the application of chemical principles to solve problems in the Earth sciences. Students learn the chemical tools of thermodynamics and kinetics, element partitioning, conservation of mass, and isotope geochemistry. Explore geochemical properties/processes in the deep Earth and the Earth surface, atmosphere and marine systems, and cosmo-chemistry and investigate the interactions between these components of the Earth system. Lab. Prereq: one year each chemistry, calculus.

ESCI 845 - Isotope Geochemistry
Credits: 4.00
Course focuses on the application of radiogenic, radioactive and stable isotopes to improve students' knowledge about the processes and timescales relevant to the formation of the planet and solar system, the evolution of the Earth system and interactions in the hydrosphere and biosphere. Topics include geochronology, tracer applications, Earth surface applications, as well as applications in the hydrosphere and biosphere. Systems discussed include the classic radiogenic systems (K-Ar, Rb-Sr, Sm-Nd, Lu-Hf and U-Th-Pb), traditional (H, C, N, O) as well as nontraditional (e.g., Mg, Ca, Fe) stable isotope systems, and radioactive isotopes (e.g., radiocarbon). Course consists of lecture, where students are exposed to these applications, and a lab section to work through any questions on the homework assignments, discuss relevant papers from the literature, and carry out a project. Special fee. Lab. Prereq: one year each chemistry and calculus.

ESCI 847 - Aqueous Geochemistry
Credits: 4.00
The chemical processes that determine the composition of aquatic systems such as rivers, lakes, groundwater and the ocean. The goal is to quantitatively understand the behavior of inorganic species such as carbon dioxide, nutrients, trace metals and inorganic pollutants in natural waters. Topics include, acid-based equilibria, carbonate chemistry, reduction-oxidation reactions, organic complexation and mineral precipitation and dissolution. Lab. Prereq: 1 year of college calculus and chemistry or geochemistry.

ESCI 850 - Biological Oceanography
Credits: 4.00
Biological processes of the oceans, including primary and secondary production, trophodynamics, plankton diversity, zooplankton ecology, ecosystems and global ocean dynamics. Field trips on R/V Gulf Challenger

and to the Jackson Estuarine Laboratory. Prereq: one year of biology or permission of instructor. (Also offered as ZOOL 850, EOS 850.) Special fee. Lab. (Not offered every year.)

ESCI 852 - Chemical Oceanography
Credits: 3.00
This course investigates the physical and biogeochemical processes that determine the composition of seawater. Topics include biological effects on chemistry, ocean nutrient cycles, air-sea gas exchange, radiogenic and stable isotopes as tracers of ocean processes, sediment and trace-metal chemistry. Prereq: one year of college chemistry and calculus or permission.

ESCI 854 - Sedimentology
Credits: 4.00
This course focuses on modern sedimentary processes and ancient sedimentary records through the examination, identification, and interpretation of sediments and sedimentary rocks. Topics such as sediment transport mechanisms, depositional environments, and time in sedimentary records will provide a strong framework for any student studying Earth processes and sedimentary systems. Special fee.

ESCI 856 - Geotectonics
Credits: 3.00
The geological record of plate tectonics past and present. The first part of the course focuses on modern tectonic settings with an emphasis on plate geometries, geodynamical processes, and sedimentary products. The second part of the course focuses on reconstructing ancient tectonic settings with an emphasis on methodology (paleomagnetism, basin analysis, provenance) and case studies (e.g. India-Asia collision). Field trip. Prereq: ESCI 614 or ESCI 631 or permission. Special fee.

ESCI 858 - Introduction to Physical Oceanography
Credits: 3.00
Descriptive treatment of atmosphere-ocean interaction; general wind-driven and thermo-haline ocean circulation; waves and tides; continental shelf and near-shore processes; instrumentation and methods used in ocean research. Simplified conceptual models demonstrate the important principles. Prereq: calculus based physics, introduction to oceanography; or permission.

ESCI 859 - Geological Oceanography
Credits: 4.00
Major geological features and processes of the ocean floor; geological and geophysical methods; composition of the earth, sedimentary processes, plate tectonics and paleoceanography.

ESCI 862 - Glacial Geology
Credits: 4.00
Course provides a survey of glacier dynamics and processes, with an emphasis on understanding the origin and significance of glacial deposits and landforms. The first half of the course examines the physics of glaciers, and the second half focuses on glacial geologic processes. Lectures discuss glaciers and ice sheets as key agents of large-scale geomorphic change, as well as their central role in the Earth's past and present climate system. Labs involve analysis of glaciological data, glacial-geologic map interpretation, and short field exercises. Course incorporates one mandatory weekend field trip that explores the glacial landscapes of New England. Special fee. Lab.

ESCI 864 - Data Analysis in Earth System Science
Credits: 4.00
Analytical and numerical methods used to understand geospatial and time series data sets encountered in Earth system science research. Students develop skills in data analysis, primarily through writing and modifying their own computer programs, focused on particular aspects of real data sets. Understanding

various data types, formats, and projections, and how to handle them, are also covered. Prereq: one year calculus, one year chemistry, basic statistics;/or permission. (Also listed as EOS 864.) Special fee.

ESCI 865 - Paleoclimatology
Credits: 3.00
Course reviews the study of past changes in the Earth's climate system. Main discussion topics include astronomical theories of ice ages, Quaternary dating methods, Antarctic and Greenland ice core records, greenhouse gases, marine-based climate proxies, glacial mega-floods, and linkages between ocean circulation and abrupt climate change. Emphasis on climate variability during the Quaternary period (the last approximately 1.8 million years), a time interval dominated by cycles of global glaciation. Lectures include discussion of recent and emerging scientific papers in order to keep pace with the latest findings in paleoclimatic research.

ESCI 866 - Volcanology
Credits: 4.00
Provides a comprehensive overview of volcanic processes and their influences on planetary evolution and modern-day Earth systems. Lectures discuss the generation and properties of magma, tectonic setting of volcanism, eruption styles, volcanic landforms and products, monitoring of active volcanoes, volcanic hazards, and volcanism on other planets. Laboratory topics include modeling volcanic processes, hand-sample observation, topographic map interpretation, volcanographical data analysis, and two afternoon field trips. As volcanology is a rapidly developing field of active research, the course incorporates discussions of recent and emerging scientific papers from the literature and student-led updates of ongoing volcanic activity. Prereq: on year of calculus and one Earth Science course or permission. Special fee. Lab.

ESCI 871 - Geodesy and Positioning for Ocean Mapping
Credits: 4.00
The science and technology of acquiring, managing, and displaying geographically-referenced information; the size and shape of the earth, datums and projections; determination of precise positioning of points on the earth and the sea , including classical terrestrial-based methods and satellite-based methods; shoreline mapping, nautical charting and electronic charts. Prereq: one year of calculus and one year of college physics. (Also offered as OE 871.)

ESCI 872 - Applied Tools for Ocean Mapping
Credits: 2.00
A review course on research tools commonly used in ocean mapping. The course focuses on teaching problem solving skills, note merely the application of tools. The course consists of modules addressing the use of: IVS Fledermaus; GeoMappApp, GIS, Google Earth, Matlab as well as the effective library research and use of Wikis. Prereq: two terms of single variable calculus. Cr/F.

ESCI 874 - Fundamentals of Ocean Mapping I
Credits: 4.00
The first of two courses covering the principles and practices of hydrography and ocean mapping. Methods for the measurement and definition of the configuration of the bottoms and adjacent land areas of oceans, lakes, rivers, estuaries, harbors and other water areas, and the tides or water levels and currents that occur in those bodies of water. In this first course the following topics are covered: Cartographic principles, Geological Oceanography, Physical Oceanography, Fundamentals of acoustics, signal conditioning and filtering, echosounding: Singlebeam, Multibeam and Phase differencing echo sounders, side scan sonar, Systems Selection, Statistical Uncertainty in Ocean Mapping, Data Processing and management and Motion Senors. Prereq: two terms each of college calculus and physics. Pre- or Coreq: MATH 896 Mathematics for mapping or equivalent material.
Co-requisites: ESCI 872

ESCI 875 - Fundamentals of Ocean Mapping II
Credits: 4.00
The second of two courses covering the principles and practices of hydrography and ocean mapping. In this course the following topics are covered: Ancillary Sensor Integration, System Calibration, Verification and Field QA/QC, Water Levels (Tides); Mapping Standards; Survey Planning, Execution and Reporting; Terrain Analysis; Optical Remote Sensing; Data Presentation; Seafloor Characterization; Electronic Navigational Charts; Hydrography for Nautical Charting, Product Liability and Contracts; and the United Nations Common Law of the Sea (UNCLOS). Prereq: OE/ESCI 874. Pre- Coreq: MATH 896 Mathematics for mapping.

ESCI 895 - Topics
Credits: 1.00 to 4.00
Study on an individual or group basis in geologic, hydrologic, or oceanographic problems, under members of the graduate staff. Topics include: geochemistry, geomorphology, geophysics; glaciology; groundwater, structural, and regional geology; crystallography, mineralogy; petrology; thermodynamics; ore deposits; earth resource policy; paleontology; sedimentation; stratigraphy; water resources management; chemical, physical, and geological oceanography; earth systems; earth science teaching methods. Prereq: permission of staff concerned. May be repeated.

ESCI 896 - Topics
Credits: 1.00 to 4.00
Study on an individual or group basis in geologic, hydrologic, or oceanographic problems, under members of the graduate staff. Topics include: geochemistry, geomorphology, geophysics; glaciology; groundwater, structural, and regional geology; crystallography, mineralogy; petrology; thermodynamics; ore deposits; earth resource policy; paleontology; sedimentation; stratigraphy; water resources management; chemical, physical, and geological oceanography; earth systems; earth science teaching methods. Prereq: permission of staff concerned. May be repeated. Special fee on some topics.

ESCI 897 - Colloquium
Credits:
Presentation of recent research in the earth sciences by guest speakers and department faculty. May be taken four times. Cr/F.

ESCI 898 - Directed Research
Credits: 2.00
Research project on a specified topic in the Earth Sciences, guided by a faculty member. Cr/F.

ESCI 899 - Master's Thesis
Credits: 1.00 to 6.00
May be repeated up to a maximum of 6 credits. Cr/F.

ESCI 903 - Groundwater Modeling
Credits: 3.00
Application of numerical techniques to solving groundwater flow and solute transport problems. Emphasis is placed on conceptualizing the hydrologic problem, translating into an appropriate numerical representation, model calibration, parameter estimation and uncertainty, and evaluation of model results. Prereq: computer methods; basic statistics.

ESCI 906 - Advanced Fate and Transport in the Environment
Credits: 3.00
Mathematically rigorous introduction and analysis of the basic processes controlling the migration and transformation of chemicals in the environment at sub-geophysical sacles, including advection, diffusion,

dispersion, and retardation. Examples are drawn from surface water, groundwater, oceans, and the atmosphere, with a focus on rivers and streams. Prereq: Multidimensional calculus.

ESCI 972 - Hydrographic Field Course
Credits: 4.00
A lecture, lab, and field course on the methods and procedures for the acquisition and processing of hydrographic and ocean mapping data. Practical experience in planning and conducting hydrographic surveys. Includes significant time underway (day trips and possible multi-day cruises) aboard survey vessel(s). Prereq: Introduction to Ocean Mapping; Geodesy and Positioning for Ocean Mapping; or permission. (Also listed as OE 972.)

ESCI 973 - Seafloor Characterization
Credits: 3.00
Remote characterization of seafloor properties using acoustic (echo sounders, sub-bottom profilers, side-scan, multi-beam and interferometric sonars) and optical (video and laser linescanner) methods. Models of sound interaction with the seafloor will be explored as well as a range of possible geologic, geotechnical, morphologic, acoustic, and biologic descriptors. Prereq: permission. (Also listed as OE 973.)

ESCI 993 - Advanced Seminar
Credits: 1.00
Focused seminar in a discipline of earth sciences: earth, ocean, atmosphere, or hydrology. May be repeated up to a maximum of 4 credits.

ESCI 994 - Advanced Seminar
Credits: 1.00
Focused seminar in a discipline of earth sciences: earth, ocean, atmosphere, or hydrology. May be repeated up to a maximum of 4 credits.

ESCI 995 - Advanced Topics
Credits: 1.00 to 4.00
Advanced work on an individual or group basis. Prereq: permission. May be repeated.

ESCI 996 - Advanced Topics
Credits: 1.00 to 4.00
Advanced work on an individual or group basis. Prereq: permission. May be repeated.

ESCI 997 - Seminar in Earth Sciences
Credits: 1.00
Readings, discussion, and presentation of recent investigations in the earth sciences. Required of all M.S. students in Earth Sciences. Cr/F.

ESCI 998 - Proposal Development
Credits: 1.00
Introduction to research in the earth sciences and development of thesis and directed research proposals. Required of all M.S. students in Earth Sciences.

ESCI 999 - Doctoral Research
Credits:
Cr/F.

Earth, Oceans, & Space

EOS 807 - Environmental Modeling
Credits: 4.00
Environmental Modeling introduces students to a range of key mathematical and computer modeling concepts and the ways they can be used to address important scientific questions. The course is divided into four topical sections: Population and Community Ecology, Hydrology, Biogeochemistry, and Ecosystems. In each section, modeling concepts and skills are presented together with environmental information to emphasize the linkage between quantitative methods and relevant scientific results. Prereq: MATH 425. (Also listed as NR 807.)

EOS 810 - Introduction to Astrophysics
Credits: 4.00
Review of the sun, stars, Milky Way, external galaxies, and expansion of the universe. Recent discoveries of radio galaxies, quasi-stellar objects, cosmic black-body radiation, x rays, and gamma rays precede a discussion of Newtonian and general relativistic cosmological models, steady-state big-bang theories, and matter-antimatter models. (Also offered as PHYS 810.) (Alternate years only.) Cr/F.

EOS 812 - Introduction to Space Plasma Physics
Credits: 4.00
Introduction to the subject of space plasma physics including solar physics, heliospheric physics, magnetospheric physics, and ionospheric physics. The course provides an overview of the basic phenomena and processes (e.g. particle acceleration and transport, shock formation, magnetic structures and reconnection, wave propagation, wave-particle interactions, instabilities), theoretical techniques (e.g. single-particle orbits, kinetic and fluid descriptions), and experimental techniques. (Also offered as PHYS 812.) (Alternate years only.)

EOS #815 - Global Atmospheric Chemistry
Credits: 3.00
Introduction to the principles of atmospheric chemistry and their relationship to biogeochemical cycles, climate, and global change. Focus is on understanding the basic physical and chemical processes that determine the trace gas distribution in the global troposphere. An introduction to atmospheric vertical structure and global circulation dynamics provides the foundation. Chemical cycles of important C, S, and N molecules examined, including their possible perturbation by human activities. Basic photochemical processes outlined, particularly with respect to reactive nitrogen, hydrocarbons, and the production/destruction of ozone. Prereq: one year college chemistry. (Also offered as ESCI 815.)

EOS 818 - Macro-Scale Hydrology II
Credits: 3.00
A continuation of EOS 817. Students and instructor jointly select a research topic in macro-scale hydrology to be analyzed in-depth during the course of the semester. A primary goal is the preparation of a manuscript for publication in a refereed scientific journal. Extensive library research, reading of recent and relevant scientific literature, technical analysis, writing. Course designed to be taken two consecutive semesters (fall and spring). Prereq: macro-scale hydrology I. (Also offered as ESCI 818.) (Alternate years only.)

EOS 830 - Terrestrial Ecosystems
Credits: 3.00

Processes controlling the energy, water, and nutrient dynamics of terrestrial ecosystems; concepts of study at the ecosystem level, controls on primary production, transpiration, decomposition, hebivory; links to earth system science, acid deposition, agriculture. Prereq: forest ecology; introduction to botany or principles of biology;/ or permission. Lab. (Also offered as NR 830.)

EOS 844 - Biogeochemistry
Credits: 4.00
Examines the influence of biological and physical processes on elemental cycling and geochemical transformations from the molecular to the global scale, involving microorganisms, higher plants and animals and whole ecosystems; factors that regulate element cycles including soils, climate, disturbance and human activities; interactions among the biosphere, hydrosphere, lithosphere, and atmosphere; transformations of C, N, S, and trace elements. Prereq: one semester each of biology and chemistry. (Also offered as NR 844.)

EOS 850 - Biological Oceanography
Credits: 4.00
Biological processes of the oceans, including primary and secondary production, trophodynamics, plankton diversity, zooplankton ecology, ecosystems and global ocean dynamics. Field trips on R/V Gulf Challenger and to the Jackson Estuarine Laboratory. Prereq: one year of biology or permission of instructor. (Also offered as ZOOL 850, ESCI 850.) Special fee. Lab. (Not offered every year.) May be repeated.

EOS 864 - Data Analysis in Earth System Science
Credits: 4.00
An overview of paleoclimate indicators for the last one million years in the context of global teleconnections (atmosphere-lithosphere-hydrosphere-cyrosphere) and mathematical tools developed to interpret and link the different records of climate change. Prereq: one year calculus; one year chemistry; basic statistics;/ or permission. (Also offered as ESCI 864.) Special fee.

EOS 867 - Earth System Science
Credits: 4.00
This course provides an introduction to the study of Earth as an integrated system. It investigates the major components (e.g. atmosphere, biosphere, cryosphere, hydrosphere, and lithosphere), dynamics (e.g., energy balance, water cycle, biogeochemical cycles), and changes within the earth system. Particular emphasis placed on the interactions and feedbacks within the system. The links between components will be presented by examining present day processes and selected events in Earth's history. The lab portion examines these concepts through the development and use of computer models of Earth system processes. Prereq: Calculus. Permission. Lab. (Also offered as NR 867.)

EOS 895 - Topics
Credits: 1.00 to 4.00
Study on an individual or group basis of topics not covered by the other listed courses. Topics may include any area relevant to interest in Earth, ocean, atmospheric, and space studies. (May be repeated.) Lab.

EOS 896 - Topics
Credits: 1.00 to 4.00
Study on an individual or group basis of topics not covered by the other listed courses. Topics may include any area relevant to interest in Earth, ocean, atmospheric, and space studies. (May be repeated.) Lab.

EOS 901 - Seminar
Credits: 1.00
Introduction to the fundamental components of the Earth system, such as the biosphere, cryosphere, hydrosphere, and its environment in space. Basic concepts are presented in a lecture format by selected

EOS faculty according to their research specialization. To familiarize the student with the literature in earth, oceans, and space science and engineering, students are expected to contribute to a discussion of current topics of interest in the literature. Cr/F.

EOS 954 - Heliospheric Physics
Credits: 3.00
The solar wind and its effects on cosmic rays. The basic equations of the solar wind: mass, momentum, angular momentum, and energy balance. Transport processes. Waves, shocks, and instabilities in the solar wind. The basic equations of energetic particle transport. Solar modulation of solar and glacatic cosmic rays. Interaction of energetic particles with shock waves. Salient data are reviewed. (Normally offered every other year.) Also offered as PHYS 954.

EOS 987 - Magnetospheres
Credits: 3.00
Introduces plasma physics of the interaction of solar and stellar winds with planets having magnetic fields, most predominately, the Earth. Both MHD and kinetic descriptions of internal and boundary processes of magnetospheres as well as treatment of the interaction with collisional ionospheres. Flow of mass, momentum, and energy through such systems. Prereq: PHYS 951;/ or permission. (Also offered as PHYS 987.) (Normally offered every other year.)

EOS 995 - Special Topics
Credits: 1.00 to 4.00

EOS 996 - Special Topics
Credits: 3.00 to 4.00
See description for EOS 995.

Economics

ECON 825 - Mathematical Economics
Credits: 3.00
Principal mathematical techniques and their application in economics. Topics covered: matrix algebra, derivatives, unconstrained and constrained optimization, linear and nonlinear programming, game theory, elements of integral calculus.

ECON 847 - Multinational Enterprises
Credits: 3.00
The internationalization of economies. Growth and implications of the multinational corporation at the level of systems. Theories of imperialism, international unity/rivalry; theories of direct investment; the exercise of influence and conflict, technology transfer, bargaining with host country; effects on U.S. economy.

ECON 868 - Seminar in Economic Development
Credits: 3.00
An advanced reading seminar. Topics include methodologies underlying economic development theory, industrialization and post-import substitution, state capitalist development, stabilization policies, appropriate technologies, the capital goods sector, agricultural modernization schemes, and attempts at transition to socialism.

ECON 898 - Economic Problems
Credits: 1.00 to 3.00
Special topics; may be repeated. Prereq: permission of adviser and instructor.

ECON 908 - Environmental Economics: Theory and Policy
Credits: 3.00
Applies microeconomic tools to issues in environmental economics. Considers the role of government, externalities, public goods, property rights, and market failure. Identifies and compares different policy instruments such as administrative regulation, marketable permits, tax incentives, and direct subsidies, along with consideration of complicating factors such as information, uncertainty and risk. These tools are applied to various policy issues such as air pollution, solid waste management, and recycling. Prereq: ECON 926 and 976.

ECON 909 - Environmental Valuation
Credits: 3.00
Focuses on the theory and methods for estimating the economic values of environmental resources and public goods (such as clean air and water, preservation of wetlands or coastal resources, etc.) many of which are not exchanged in established markets and therefore do not have prices associated with them. The valuation of environmental resources is an important component in benefit-cost analyses which are used in policy making. Provides a blend of theory and hands-on applications of methods and real data sets. Prereq: ECON 926, 927, 976.

ECON 926 - Econometrics I
Credits: 3.00
Application and theory of statistical and econometric methods to problems in economics. Topics: basic statistical theory, simple and multiple regression, violations of the basic assumptions, generalized least squares, and introduction to simultaneous equation models. Prereq: undergraduate statistics course.

ECON 927 - Econometrics II
Credits: 3.00
Asymptotic theory, likelihood estimation, simultaneous equations, panel data analysis, binary and mutiple choice models, count data analysis, selection models, survival analysis. Prereq: ECON 926.

ECON 928 - Econometrics III
Credits: 3.00
Basic and advanced time series models with up-to-date empirical techniques with emphasis on the application of econometric tools to economic issues. Selected topics include stationary ARMA models, unit roots and cointegration, VAR, ARCH dynamic panel data models, structural break models, and non-linear time series models. Prereq: ECON 926 and 927 or equivalents.

ECON 941 - Survey of Health Economics
Credits: 3.00
An Introduction to the health care sector of the economy designated to provide students with: an overview of the scope of issues covered in the field; a basic analytical and empirical "tool kit" that will enable them to ask and answer questions as a health economist; and an understanding of the most important institutional features of the United States health care system. Topics include market failures in health care, demand for health, public and private insurance programs, health behaviors, and the relationship between health, income, and inequality. Prereq: ECON 926 and 976 (927 recommended).

ECON 942 - Selected Topics in Health Economics
Credits: 3.00
Covers broad range of health-care-related issues and analytical tools with the aim of helping students to successfully compete for career opportunities in health care education, research, and policy and to initiate possible dissertation essays. Topics vary each year in response to specific student interests and current events may include cost-benefit and cost-effectiveness analysis, comparative health systems (international institutions) and pharmaeconomics. Prereq: ECON 926 and 976 (927 recommended).

ECON 945 - International Trade
Credits: 3.00
Contemporary issues in international economic theory and policy. Analysis of trade theory, dynamics of world trade and exchange, and international commercial policy.

ECON 946 - International Finance
Credits: 3.00
Topics include the marcoeconomics of open economics, balance of payments, international financial markets, exchange rate flutuations and puzzles, currency crises, and exchange rate policy.

ECON 957 - History of Economic Thought
Credits: 3.00
Traces the development of economic thought, with careful examination and critical appraisal of the contributions made by important figures and schools of thought.

ECON 958 - Topics in Economic Thought and Methodology
Credits: 3.00
Advanced seminar in a selected topic in economic thought or methodology.

ECON 970 - Advanced Economic Theory
Credits: 3.00
Advanced topics in both microeconomic and macroeconomic theory. Topics covered may include cooperative and non-cooperative game theory, general equilibrium models, and dynamic optimization.

Prereq: ECON 972 and 976.

ECON 972 - Macroeconomics I
Credits: 3.00
Development of the major macro models and approaches to macroeconomics: classical, Keynes' "General Theory," Keynesian, Monetarists, New Classical, and New Keynesian models and views. Introduction to open economy macro and growth models.

ECON 973 - Macroeconomics II
Credits: 3.00
Theory, empirical specification, and tests of macroeconomic functions. National econometric models. Theories and empirical models of the business cycle and economic growth. Use of models for policy analysis and forecasting. Prereq: ECON 926 and 972.

ECON 976 - Microeconomics I
Credits: 3.00
Survey and applications of modern microeconomic theory. Analysis of households, firms, product and resource markets, and behavior under uncertainty.

ECON 977 - Microeconomics II
Credits: 3.00
Analysis of stability, cooperative and non-cooperative game theory, information economics, exhaustible resources, disequilibrium, public goods, public choice, and input-output analysis. Prereq: ECON 976.

ECON 978 - Teaching Economics
Credits: 4.00
This seminar-style course helps prepare graduate students to become effective teachers of economics at the college level. Emphasis is on teaching at the principles level. Students study and discuss key issues, including the learning process, the objectives of principles classes and of the economic major, hetergeneous learning styles, chalk and talk, vs. active learning, testing and the testing effect, homework, and the role of textbooks. Students also write teaching philosophies, lead discussion sessions, present research on teaching, and deliver short lectures to the class on specific topics at the principles level.

ECON 979 - Research Skills
Credits: 3.00
Aids students in completing their master's paper for which they conduct research on a particular economic problem or issue using the knowledge and skills they have gained from their other classes. While the use of data and econometric analysis are encouraged, students may choose a topic that contains neither, such as a paper on the history of thought or on economic theory. Students meet regularly with their faculty advisor throughout the term. They also present their work at various stages of completion. Presentations of students' topics and final papers are made to the faculty. Prereq: ECON 926, 972 and 976.

ECON 988 - Graduate Economics Seminar
Credits: 2.00 to 12.00
Attend weekly graduate economics seminars; write reviews and critiques of seminar papers; participate in disucssion at seminars. May be repeated up to a maximum of 6 credits for Masters students and up to 12 credits for Ph.D. students

ECON 992 - Field Workshop
Credits: 3.00
Provides a platform for students to become well read in their chosen major field. Students receive a field-specific reading list at the beginning of the term, which they are expected to work through independently.

Students present papers and chapters from their reading lists in class. They also write a literature review on a topic in their chosen field and present this research at various stages of completion. Presentations of students' final papers are made to the faculty. Prereq: One approved field class.

ECON 995 - Independent Study
Credits: 1.00 to 6.00
Prereq: permission of adviser and instructor.

ECON 996 - Research Workshop
Credits: 2.00
Present research papers in the graduate economics seminar series; serve as a discussant for seminar presentations; write reviews and critiques of seminar papers; participate in discussion at seminars. May be repeated up to a maximum of 4 credits for Ph.D. students. Cr/F.

ECON 999 - Doctoral Research
Credits:
Cr/F.

Education

EDUC 800 - Educational Structure and Change

Credits: 4.00

Organization, structure, and function of American schools; historical, political, social, and cross-cultural perspectives; nature and processes of change in education. A) Educational Structure and Change; B) Education in America: Backgrounds, Structure, and Function; C) Governance of American Schools; D) School and Cultural Change; F) Social Perspectives of Conflict in the Schools; G) Nature and Processes of Change in Education; H) What is an Elementary School?; I) Schooling for the Early Adolescent; J) Curriculum Structure and Change; K) Stress and Educational Organizations. Candidates for teacher licensure must take either 4-credit course 800A, or 2 credits each of 800F and 800G. Prereq: EDUC 500.

EDUC 801 - Human Development and Learning: Educational Psychology

Credits: 4.00

Child development through adolescence, learning theory, cognitive psychology, research in teaching and teacher effectiveness, cross-cultural variability, and evaluation--all applied to problems of classroom and individual teaching and learning. A) Human Development and Learning: Educational Psychology; B) Human Development: Educational Psychology; C) Human Learning: Educational Psychology; D) Developmental Bases of Learning and Emotional Problems; E) Learning Theory, Modification of Behavior, and Classroom Management; F) Cognitive and Moral Development; G) Evaluating Classroom Learning; H) Deliberate Psychological Education; I) Sex Role Learning and School Achievement; J) The Development of Thinking. 2- and 4-credit courses are offered each semester. 2-credit courses emphasize either development or learning. Candidates for teacher certification are required to have the full 4-credit EDUC 801A or 2 credits each of EDUC 801B and 801C. Prereq: EDUC 500. 801A has a Special fee when taught in Manchester.

EDUC 803 - Alternative Teaching Models

Credits: 2.00 or 4.00

Basic teaching models, techniques of implementation, and relationships to curricula. A) Alternative Teaching Models; B) Curriculum Planning for Teachers; C) Alternative Strategies for Maintaining Classroom Control; D) Social Studies Methods for Middle and High School Teachers; F) Teaching Elementary School Science; G) Language Arts for Elementary Teachers; H) Experiential Curriculum; I) Children with Special Needs: Teaching Strategies for the Classroom Teacher; K) Writing Across the Curriculum; L) Learning and LOGO; M) Teaching Elementary School Social Studies. 2- and 4-credit courses are offered. Teacher education students should be aware of the specific courses(s) required for their licensure area. EDUC 803F and 803M are required for elementary education candidates. EDUC 803D is required for social studies candidates. EDUC 891 is required for science candidates. For all other secondary education candidates, the appropriate methods course in the department of the major is required. See "The Schoolhouse Book" for specific course listings. Prereq: EDUC 500. 803F has a special fee when taught in Manchester.

EDUC 805 - Alternative Teaching Perspectives on the Nature of Education

Credits: 4.00

Students formulate, develop, and evaluate their own educational principles, standards, and priorities. Alternative philosophies of education; contemporary educational issues. A) Contemporary Educational Perspectives; B) Controversial and Ethical Issues in Education; C) Ethical Issues in Education; D) Concepts of Teaching: Differing Views; E) Curriculum Theory and Development; F) Readings on Educational Perspectives; G) Philosophy of Education; I) Education as a Form of Social Control; K)

Schooling and the Rights of Children; L) Education, Inequality, and Meritocracy; M) Readings in Philosophies of Outdoor Education; N) Alternative Perspectives on the Nature of Education; O) Classrooms: The Social Context; P) Teaching: The Social Context; Q) School and Society. 2- and 4-credit courses are offered. Minimum of 4 credits required for teacher certification. Candidates for teacher licensure must choose either 4-credit course 705A, 705B, or 705Q. Prereq: EDUC 500.

EDUC 806 - Introduction to Reading in the Elementary School
Credits: 4.00
Methods in reading and writing instruction; current procedures and materials; diagnostic techniques. Course satisfies reading/language arts requirement for prospective elementary teachers in the five year teacher education program. Prereq: EDUC 500.

EDUC 807 - Teaching Reading through the Content Areas
Credits: 2.00
Approaches and methods for teaching reading through content materials; coursework includes practical applications through development of instructional strategies and materials. Required for candidates seeking licensure in art, biology, chemistry, earth science, general science, home economics, physical education, physics, or social studies.

EDUC 810A - Concepts of Adult and Occupational Education
Credits: 4.00
Development of occupational education in the U.S.; socio-economic influences responsible for its establishment; federal and state requirements for secondary and postsecondary schools. Coordination of programs with general education and vocational fields. Focus on selected concepts relevant to adult education. Special attention on the adult as a learner, volunteer management, evaluation and accountability, experiential learning, and adult education. Required of all degree candidates in AOE concentrations.

EDUC #810C - Youth Organizations
Credits: 4.00
Organizational Development: advising youth organizations; teaching parliamentary procedure; developing programs and activities; leadership organizations. FFA/SOEP (Future Farmers of America/Supervised Occupational Experience Programs for high school youth). VICA (Vocational Industrial Clubs of America). 4-H (Cooperative Extension Youth Program).

EDUC 810F - Investigations
Credits: 1.00 to 4.00
Topics may include career education, secondary education, post-secondary education, adult education, extension education, exemplary education, cooperative education, disadvantaged and handicapped education, international agriculture, or teaching experience. Student-selected in one of the areas listed. Elective after consultation with instructor. Hours arranged. May be repeated.

EDUC 810G - Seminar in Adult and Occupational Education
Credits: 1.00 to 2.00
Discussion of current issues, problems, and research and development in vocational/technical and adult education. Students, faculty, and other personnel serve as discussion leaders. Required of departmental graduate students. (Fall semester only.)

EDUC 812 - Teaching Multilingual Learners
Credits: 4.00
This course is for people interested in teaching English to speakers of other languages (ESOL) in schools and communities in NH and the U.S. Topics include: theories of first and second language acquisition,

policies and laws affecting language minority students, strategies for teaching academic content in the mainstream classroom, creating classroom/school cultures that invite all students into learning, and the role of advocacy and professional collaboration in ESOL.

EDUC 817 - Growing up Male in America
Credits: 4.00
An integrative view of growing up male in the American culture from birth through adulthood. Analysis of major perspectives on male development and the implications in parenting with specific emphasis on male education. Participants are expected to develop awareness of their own development as a male or alongside males, using current male development perspectives as a guide. They will also create an awareness of how this will affect their behavior toward boys in their classrooms.

EDUC 820 - Integrating Technology into the Classroom
Credits: 4.00
Participants gain practical experience that takes specific advantage of technology to enhance and extend student learning. State academic standards and national technology standards are used to make decisions about curriculum content and to plan technology-based activities. Participants use electronic management tools such as iMovie, Powerpoint, podcast, webcast, Comic Life, Audacity, and Garage Band are featured in this hands-on course.

EDUC 833 - Introduction to the Teaching of Writing
Credits: 4.00
Development of writers, child to adult; ways to respond to writing, and the organization of the classroom for the teaching of writing. Prereq: permission.

EDUC 834 - Children's Literature
Credits: 4.00
Interpretive and critical study of literature for children in preschool and elementary settings. Methods of using literature with children.

EDUC 841 - Exploring Mathematics with Young Children
Credits: 4.00
A laboratory course offering those who teach young children mathematics, and who are interested in children's discovery learning and creative thinking; offers chance to experience exploratory activities with concrete materials, as well as mathematical investigations, on an adult level, that develop the ability to provide children a mathematically rich environment, to ask problem-posing questions, and to establish a rationale for doing so.

EDUC 845 - Math with Technology in Early Education
Credits: 2.00
The primary goal of this course is that students gain knowledge of learning standards and teaching methods for the instruction of mathematics in early education settings with infants through 3rd grade. In addition, participants gain experience in applying their newfound knowledge in the areas of mathematics with technology through a combination of teaching and digital experiences. Prereq: EDUC 500 or graduate student status.

EDUC 850 - Introduction to Exceptionality
Credits: 4.00
A life span perspective of the social, psychological, and physical characteristics of individuals with exceptionalities including intellectual, sensory, motor, health, and communication impairments. Includes implications for educational and human service delivery.

EDUC 851A - Educating Exceptional Learners: Elementary
Credits: 4.00
Foundations of special education and an introduction to a variety of service delivery models with an emphasis on educating all learners in heterogeneous classrooms. Instructional strategies and supports for all students, particularly those with mild and moderate disabilities, will be the primary focus.

EDUC 851B - Educating Exceptional Learners: Secondary
Credits: 4.00
Foundations of special education and an introduction to a variety of service delivery models with an emphasis on educating all learners in heterogeneous classrooms. Instructional strategies and supports for all students, particularly those with mild and moderate disabilities, will be the primary focus. Preparation for students' transitions to post-secondary life will be included.

EDUC 851C - Educating Exceptional Learners: Related Services
Credits: 4.00
An overview of special education and related services in an educational setting. Focus on support services provided to general education and special education teachers, including laws relating to special populations, how related services interact with classroom and special educators, IEPs, and other topics that impact services provided to students with special needs.

EDUC 852 - Contemporary Issues in Learning Disabilities
Credits: 4.00
Critical analysis of current and historical conceptions of learning disability in the areas of definition, supporting theories, assessment practice, and teaching methodologies. Focus will be on contemporary issues in the field that relate to working with students labeled as learning disabled at both elementary and secondary levels.

EDUC 853 - Contemporary Issues in Behavioral Disabilities
Credits: 4.00
Nature and scope of emotional and behavioral disabilities in students from elementary through secondary levels. Theoretical perspectives, characteristics, assessment and educational intervention strategies will be included.

EDUC 854 - Contemporary Issues of Developmental Disabilities
Credits: 4.00
The casual factors, physical and psychological characteristics, and educational and therapeutic implications of mental retardation, cerebral palsy, epilepsy, autism, and related conditions. A life span perspective will be included, with major emphasis on the school age population.

EDUC 855 - Facilitating Social Understanding and Relationships for Students with Disabilities
Credits: 2.00
The course will focus on the classroom and inidividual supports needed by students with intellectual and other developmental disabilities, including autism spectrum disorders, in order to have a wide variety of satisfying social relationships. Participants identify the factors that (a) are essential to the development of shared social understanding between students with and without disabilities; (b) promote reciprocal social relationships; and (c) how to recognize and mitigate barriers to reciprocal relationships.

EDUC 856 - Supporting Families of Individuals with Exceptionalities
Credits: 4.00
An introduction to family system theory and the implications for families having members with exceptionalities. Issues addressed include diagnosis and prognosis, coping strategies, communication and team collaboration, cross-cultural competence, and agency and school delivery of services. Emphasis is

on proactive collaboration with family members.

EDUC 857 - Contemporary Issues in Autism Spectrum Disorders
Credits: 4.00
The goal of this course is to enhance students understanding of contemporary issues related to educating students with autism spectrum disorders (ASD). The course is grounded in a theoretical foundation that values the perspectives of individuals with ASD in academic, research, policy, and clinical endeavors. Learning outcomes focus on strategies for identifying opportunities for learning, communication, literacy, and social relationships in a variety of inclusive environments. May be repeated up to a maximum of 8 credits. Permission required. Prereq: UNH Summer Institute on Autism.

EDUC 860 - Introduction to Young Children with Special Needs
Credits: 4.00
The needs of children (birth to eight years) with developmental problems or who are at risk for disabilities. Strengths and special needs of such children; causes, identification, and treatment; current legislation; parent and family concerns; program models.

EDUC 861 - Inclusive Curriculum for Young Children with Special Needs
Credits: 4.00
Classroom applications of constructivist theory. Curriculum planning and implementation; overview of research and theory related to teaching and learning of specific content areas, with emphasis on integrated approach to early childhood curriculum. Stresses the reciprocal nature of student-teacher relationship. Prereq: permission.

EDUC 862 - Curriculum for Young Children with Special Needs: Evaluation and Program Design
Credits: 4.00
Overview of evaluation and intervention issues relevant to early childhood special education, focusing on ages three through eight. Norm-referenced and criterion-referenced assessment tools. Judgment-based evaluation and observation skills. Translation of evaluation information into goals and objectives for individual education programs. Developing appropriate programs in inclusive settings.

EDUC 867 - Students, Teachers, and the Law
Credits: 4.00
Our public schools play a vital role in our society. What shall be taught and who shall teach our children are perennial questions. This course explores how the law impacts the educational lives of students and teachers, including issues of church-state relations, free speech, dress codes, and search and seizure. (Also offered as JUST 867.)

EDUC 876 - Reading for Learners with Special Needs
Credits: 4.00
Techniques and procedures for teaching reading to learners with special needs. Emphasis is placed on reading instruction in the least restrictive alternative.

EDUC 880 - Belize/New Hampshire Teacher Program
Credits: 4.00
International course involving teams of teachers from Belize and New England. The program will offer teachers in both countries the opportunity to work collaboratively on developing effective teaching practices, develop an understanding of each other's cultural and educational perspectives, extend the experience to other teachers and students upon return. Special fee.

EDUC 881 - Introduction to Statistics: Inquiry, Analysis, and Decision Making
Credits: 4.00

An applied statistics course that covers introductory level approaches to examining quantitative information. Students spend about half of class time in the computer lab analyzing real data from the behavioral and social sciences. An emphasis is placed on the role of statistics in making empirically-based policy decisions.

EDUC 884 - Teacher as Researcher
Credits: 4.00
This course addresses the twofold aim of (a) preparing educational practitioners to conduct sustematic inquiry in their classrooms and/or schools and (b) introducing strategies and criteria for understanding, evaluating, and applying educational research.

EDUC 885 - Educational Assessment
Credits: 4.00
Theory and practice of educational assessment; uses of test results and authentic assessment strategies in classroom teaching.

EDUC 891 - Methods of Teaching Secondary Science
Credits: 4.00
Application of theory and research findings in science education to classroom teaching with emphasis on inquiry learning, developmental levels of children, societal issues, integration of technology, critical evaluation of texts and materials for science teaching, and planning for instruction. Lab.

EDUC 894 - Pro-seminar in Teacher Leadership
Credits: 2.00
This course will help experienced teachers to establish a framework for collaboration and inquiry focused on questions about teaching, learning, and school reform. Students will develop an academic and research agenda tied to their professional development as educators. Coursework will emphasize approaches to action research and the teacher-as-researcher.

EDUC 897 - Special Topics in Education
Credits: 1.00 to 4.00
Issues and problems of special contemporary significance, usually on a subject of recent special study by faculty member(s). Prereq: permission. May be repeated for different topics. Special fee on topic: Picturing Writing, Fostering Literacy through Art.

EDUC 899 - Master's Thesis
Credits: 1.00 to 10.00
Prereq: permission of the department. May be repeated up to a maximum of 10 credits. Cr/F.

EDUC 900A - Internship and Seminar in Teaching
Credits: 3.00 or 6.00
A two semester, full-time, supervised internship consisting of less-than-full-time teaching responsibility in selected educational settings and programs. Weekly seminars and occasional workshops held concurrently with internship. Cr/F.

EDUC 900B - Internship and Seminar in Early Childhood Education
Credits: 3.00
A two semester, supervised internship with a weekly seminar. Admission by Application.

EDUC 900C - Internship and Seminar in Special Education
Credits: 3.00 or 6.00
A two semester, supervised internship with a weekly seminar. Admission by application. Cr/F.

EDUC 900D - Internship and Seminar in Adult and Occupational Education
Credits: 3.00 to 6.00
Internship in a field of vocational/technical and adult education either in methodology of teaching or in technical subject matter. Students may elect internship only after completing the qualifying examinations for the master's degree, with permission of their major adviser. May be repeated up to 6 credits. Cr/F.

EDUC 901A - Internship and Seminar in Teaching
Credits: 3.00 or 6.00
A two semester, full-time, supervised internship consisting of less-than-full-time teaching responsibility in selected educational settings and programs. Weekly seminars and occasional workshops held concurrently with internship. Cr/F.

EDUC 901B - Internship and Seminar in Early Childhood Education
Credits: 3.00
A two semester, supervised internship with a bi-weekly seminar. Admission by Application.

EDUC 901C - Internship and Seminar in Special Education
Credits: 3.00 or 6.00
A two semester, supervised internship with a weekly seminar. Admission by application. Cr/F.

EDUC 902 - Doctoral Pro-seminar
Credits: 4.00
Introduces students to the range of scholarly inquiry undertaken in doctoral programs. Students develop a broad understanding of educational studies and analyze various research paradigms in terms of assumptions, methods, and outcomes. Coursework includes developing a proposal. Matriculated doctoral students only.

EDUC 903 - Normative Inquiry in Education
Credits: 4.00
Introduces the student to a critical study of some of the central ethical concepts, theories, and assumptions that shape contemporary educational theory, policy, and practice. Students read both classical and contemporary ethical theory and undertake to critically appraise these theories while using them to resolve moral problems. Prereq: EDUC 905 or permission.

EDUC 904 - Qualitative Inquiry in Education
Credits: 4.00
Course will offer both a theoretical and practical background for conducting qualitative inquiry in education. Focused efforts toward understanding how the type or tradition of qualitative inquiry shapes the design of the study. Through comparative analysis of different qualitative traditions, students will be prepared to make informed decisions about what approaches to use in their studies and why they are using them. Prereq: permission.

EDUC 905 - Critical Inquiry in Education
Credits: 4.00
Designed for advanced students to study philosophical methods needed for critical inquiry in education. Primary emphasis on practical mastery of: the construction and assessment of cogent argumentation; identification of common fallacies in reasoning; conceptual analysis; the appraisal of definitions, slogans, and metaphors in educational thought; and the disentangling of conceptual, factual, and normative claims associated with practical educational issues. Investigation of the difference between critique and criticism. Prereq: permission.

EDUC 907 - Foundations of Literacy Instruction

Credits: 4.00
Overview of the nature of the reading/writing process and the continuum of instruction from emergent literacy through the primary and intermediate elementary grades. Emphasis is placed on validated instructional practices and issues of classroom organization and management of literacy instruction.

EDUC 908 - Clinical Diagnosis and Remediation of Reading Difficulties and Disabilities
Credits: 4.00
Examination of theories and procedures for the diagnosis and remediation of moderate to severe disabilities in reading and writing through case studies, discussions, demonstrations, and practice. Clinical experience each semester. Prereq: EDUC 907; 910;/or permission.

EDUC 909 - Clinical Diagnosis and Remediation of Reading Difficulties and Disabilities
Credits: 4.00
Examination of theories and procedures for the diagnosis and remediation of moderate to severe disabilities in reading and writing through case studies, discussions, demonstrations, and practice. Clinical experience each semester. Prereq: EDUC 907; 910;/or permission.

EDUC 910 - Reading and Writing Methods in the Middle/Secondary School
Credits: 4.00
Overview of literacy programs in middle/secondary school with emphasis on (1) developing an integrated literacy curriculum and (2) planning and providing literacy instruction in the content areas to improve students' reading and writing skills across the curriculum.

EDUC 913 - Field Practicum in Reading
Credits: 4.00
Field-based experience focusing on roles of the reading and writing specialist in organizing and managing literacy programs in school settings; weekly seminar. Prereq: permission.

EDUC 914 - Seminar in Reading Research
Credits: 4.00
Analysis of qualitative and quantitative research paradigms as the basis for understanding and constructing research in reading and the related language arts. Topical study of current research base in emergent literacy, word analysis, comprehension, elementary and secondary/content reading, and diagnosis/remediation. Prereq: permission.

EDUC 918A - Seminar on Research in Literacy Instruction
Credits: 2.00
The purpose of this seminar is to study the disciplinary traditions that inform contemporary conceptions of literacy instruction both in and out of school. It will draw on research from social and cognitive psychology, literary theory, cultural studies, and feminist epistemology. An emphasis will be placed on preparing doctoral students to meet the needs of students in an increasing pluralistic population.

EDUC 918B - Seminar on Research in Literacy Instruction
Credits: 2.00
The purpose of this seminar is to study the disciplinary traditions that inform contemporary conceptions of literacy instruction both in and out of school. It will draw on research from social and cognitive psychology, literary theory, cultural studies, and feminist epistemology. An emphasis will be placed on preparing doctoral students to meet the needs of students in an increasing pluralistic population.

EDUC 918C - Seminar on Research in Literacy Instruction
Credits: 2.00
The purpose of this seminar is to study the disciplinary traditions that inform contemporary conceptions of

literacy instruction both in and out of school. It will draw on research from social and cognitive psychology, literary theory, cultural studies, and feminist epistemology. An emphasis will be placed on preparing doctoral students to meet the needs of students in an increasing pluralistic population.

EDUC 918D - Seminar on Research in Literacy Instruction
Credits: 2.00
The purpose of this seminar is to study the disciplinary traditions that inform contemporary conceptions of literacy instruction both in and out of school. It will draw on research from social and cognitive psychology, literary theory, cultural studies, and feminist epistemology. An emphasis will be placed on preparing doctoral students to meet the needs of students in an increasing pluralistic population.

EDUC 919 - Counseling Practicum: Professional and Ethical Orientation
Credits: 4.00
Introduction to the field of counseling and development of foundational counseling skills. Includes a skills-based practicum and seminars addressing contemporary professional issues. Legal and ethical responsibilities of counselors are examined.

EDUC 920 - Counseling Theory and Practice
Credits: 4.00
Provides a survey of major contemporary theories and techniques of counseling. The counseling process, various theoretical approaches, and an introduction to professional issues in counseling diverse populations are examined.

EDUC 921 - Psychology of Career and Personal Development
Credits: 4.00
Examines the interrelationship between career and personal development. An overview of theories, tools, and research that underlie career assessment is provided. Individual and group career counseling processes and skills are applied to career education models.

EDUC 922 - Assessment in Counseling
Credits: 4.00
Surveys evaluative instruments and methods that have particular use in counseling. Explores systematic procedures for measuring human behavior and statistical concepts that underlie psychological testing. Assessment is viewed from the perspectives of its use in the counseling process as well as in providing accountability for diagnosis and treatment planning.

EDUC 923 - Group Counseling
Credits: 4.00
Reviews theoretical and applied processes of group counseling. Class includes a laboratory experience to examine interactive behavior as a group member and facilitator. Pre- or Coreq: EDUC 919 or 920.

EDUC 924 - Psychological Disorders: Variations in Human Development
Credits: 4.00
Examines the development of effective and ineffective human functioning. Behavior patterns that pose the most common problems encountered by counselors are reviewed, with an emphasis on the concepts and processes of adaptation. Pre- or Coreq: EDUC 920.

EDUC 925 - Counseling Internship I
Credits: 4.00
Seminar accompanies supervised field experience at approved field site. Orientation to the diverse roles and functions of counselors in school and agency settings. Discussion and educational supervision of students' counseling and consultation activities at field site. Pre- or Coreq: EDUC 919, 920, 923, 924.

EDUC 926 - Counseling Internship II
Credits: 4.00
Seminar accompanies supervised field experience at approved internship site. Small group format uses audio-taped samples of counseling sessions, providing critiques and educational supervision of counseling and consulting activities. Prereq: EDUC 925.

EDUC 927 - Human Growth & Development: Personality Theory
Credits: 4.00
Examines the structure of personality and the dimensions along which individuals may vary. Considers implications of personality variables for the counseling process.

EDUC 929 - Advanced Counseling Internship
Credits: 4.00
Seminar accompanies supervised field experience at approved internship site. Weekly critiques of audio-taped samples of counseling sessions emphasize self-awareness and the application of advanced skills in counseling and consultation. Students provide layered supervision to first year GPC graduates. Prereq: EDUC 926.

EDUC 930 - Research in Counseling
Credits: 4.00
Provides an overview of research design and methodology in social and behavioral sciences. Emphasis on the responsibility of counselors as critical consumers of published research. Students develop research projects to enhance professional knowledge in educational or community settings. Prereq: EDUC 922.

EDUC #931 - Clinical Diagnosis and Treatment Planning in Counseling
Credits: 4.00
Reviews assessment and treatment planning strategies for major DSM-IV diagnostic classifications. Class discussion of benefits and limitations of various diagnostic systems. Best practices and brief treatment models are examined in assigned readings, lectures, and case vignettes. Pre - or Coreq: EDUC 922, 924.

EDUC 932 - Society and Culture: Contemporary Issues in Counseling
Credits: 4.00
Examines the current social and cultural contexts of counseling. Emphasis on preparing counselors to address the needs of a pluralistic population characterized by diverse racial/ethnic membership as well as gender, sexual orientation, and physical ability.

EDUC 933 - Developmental Models of Comprehensive School Guidance
Credits: 4.00
Course includes a supervised field experience. Provides a review of child and adolescent psychosocial development as a foundation for learning and high level functioning. Students are expected to develop awareness of their own psychosocial adaptations. State and national guidelines provide a framework for teaching pro-social skills models. Prereq: EDUC 919, 920, 925.

EDUC 935A - Seminar and Practicum in Teaching
Credits: 4.00
For new graduate students admitted to the M.Ed. or M.A.T. program in the Department of Education. In-school experiences to develop introductory skills in observation and teaching. On-site seminars for analysis and evaluation. Assessment and advising related to teaching as a career. Prerequisite for further work toward a teacher licensure. Minimum of 7 hours a week, plus travel time, required. Prereq: permission. Cr/F.

EDUC 935B - Seminar and Practicum in Teaching

Credits: 4.00
An exploratory practicum, which is an integrated part of the Live, Learn, & Teach (LLT) Summer Program. Designed to explore teaching as a career and to prepare, eventually, for a teaching internship. LLT includes preparation in curriculum and instruction; practical and theoretical approaches to experiential education; interpersonal and group skill development, approaches to classroom management; and exploration of the many aspects of teaching and learning. Students develop and co-teach summer classes for children or adolescents with advisement from experienced educators. Prereq: admission to Live, Learn, and Teach Summer Program. Cr/F.

EDUC 938 - Advanced Seminar in Special Education
Credits: 4.00
Weekly seminar on current and/or controversial topics related to special education services. Possible topics include service delivery systems, classification and labeling, assessment, instructional techniques, classroom management, consultation, and the special educator as researcher. Prereq: matriculated student or permission.

EDUC 939 - Assessment and Teaching of Children with Learning Difficulties
Credits: 4.00
A two-semester course to develop teacher competency to analyze learners and learning environments; specify learner characteristics; and design, implement, and evaluate appropriate educational interventions in the areas of language, mathematics, reading, behavior, and social skills. Focus on children with mild and moderate learning difficulties in regular classrooms. Prereq: EDUC 850; 851 and permission.

EDUC 940 - Assessment and Teaching of Children with Learning Difficulties
Credits: 4.00
A two-semester course to develop teacher competency to analyze learners and learning environments; specify learner characteristics; and design, implement, and evaluate appropriate educational interventions in the areas of language, mathematics, reading, behavior, and social skills. Focus on children with mild and moderate learning difficulties in regular classrooms. Prereq: EDUC 850; 851 and permission.

EDUC 941 - Diversity and Child Development
Credits: 4.00
Focus on typical child development from birth to age eight. Considers theories of child development and assessment from historical and contemporary perspectives, with emphasis on observation during naturally occurring activities as a means of learning about child development. Includes child study. Prereq: permission.

EDUC 942 - Socio-cultural Perspectives on Teaching and Learning
Credits: 4.00
Considers the growing body of knowledge on the role of play in children's development; includes examination of contemporary constructive theory. Organized around theme of teacher researcher. Assignments include research review and student-designed study of child development issue. Prereq: EDUC 941 or permission.

EDUC #943 - Changing Contexts in Early Education
Credits: 4.00
Forum for exchange of knowledge on developmentally appropriate environments for young children. Considers interface between characteristics of the environment (physical and social as well as organizational) and children being served. Includes field visits to settings appropriate for typically developing children as well as those with special needs. Prereq: EDUC 941 or permission.

EDUC 948 - Leadership and Advocacy in Early Childhood Education

Credits: 4.00
Examination of roles and responsibilities of early childhood professionals, with emphasis on action research skills, analysis of contemporary problems, strategies for advocacy, and program leadership skills.

EDUC 950 - Research in Culture, Behavior, and Development
Credits: 4.00
Study of child development from comparative perspective, considering race, gender, and disabling conditions as dimensions of diversity. Cross-cultural research examined as challenge to contemporary theories of child development. Ethno-psychology of child development. Use of anthropological methods in study of child development. Implications for educational theory and practice. Prereq: permission.

EDUC 951 - Laws and Regulations Affecting the Education of Students with Disabilities
Credits: 4.00
Analysis of current federal and state policies affecting students with disabilities. Focus on Section 504 and IDEA. The role of policy making and constitutional and ethical issues discussed.

EDUC 952 - Inclusive Assessment, Curriculum, Instruction, and Communication Supports
Credits: 4.00
One of sequence of courses that leads to New Hampshire certification in Mental Retardation. Meets some of the requirements for certification of the Council for Exceptional Children. This advanced course provides knowledge and skills in assessment, curriculum development/modification, and instruction. It is also expected that graduate students will use their knowledge of alternative/augmentative communication in developing assessment and instructional activities for students with significant special needs.

EDUC 953 - Seminar in Curriculum Study
Credits: 4.00
Analysis of recent trends in public school curriculum; structures, philosophy, development, change, and evaluation. Primarily for experienced teachers and administrators. Prereq: teaching experience.

EDUC 954 - Leadership and Systems Change in Inclusive Education
Credits: 2.00
One of a sequence of courses that leads to New Hampshire certification in Mental Retardation. Meets some of the requirements for certification of the Council for Exceptional Children. Leadership and advocacy are vital skills for teachers of students with significant disabilities. This course provides the knowledge and skills for graduates to begin to initiate change processes within schools to benefit students with and without disabilities.

EDUC 956 - Learning to Listen: Developing Positive Behavior Supports for Students with Challenging Behaviors
Credits: 4.00
One of a sequence of courses that leads to New Hampshire certification in Mental Retardation. Meets some of the requirements for certification of the Council for Exceptional Children. Behavioral challenges are the most frequent reason students with significant disabilities are excluded from inclusive settings in schools and communities. Course provides knowledge and skills in behavior as communication, utilization of functional assessments, and development of strategies to support students who experience challenging behaviors.

EDUC 957 - Collaborative Models of Teaching, Learning, and Leading
Credits: 4.00
Building professional communities that nurture and support learning across the career span is a complex process that includes building productive relationships with co-workers who hold a variety of positions in schools: teachers, administrators, counselors, specialist, interns and paraprofessionals. This course

examines a range of collaborative practices in schools including mentoring, co-teaching, and collaborative supervision. The central question is, "How do collaborative versus noncollaborative environments affect teaching and learning for students, teachers and administrators?"

EDUC 958 - Analysis of Teaching
Credits: 4.00
Examination of and reflection on the nature of teaching will serve as the basis for analysis. A variety of strategies for analysis of teaching will be explored and implemented. Student-initiated inquiry into specific aspects of teaching will provide practical application of course material. Prereq: teaching experience.

EDUC 961 - Public School Administration
Credits: 4.00
Introductory course to school leadership; major issues and trends in policy making, theories in school management, personnel, public relations, finance, decision making, ethics, and research in school administration.

EDUC 962 - Educational Finance and Business Management
Credits: 4.00
Principles of financing education, budgetary procedures, computer simulations, and business management. Analysis of N.H. school funding system. Handling practical school finance problems is part of the project work.

EDUC 964 - Human Resources in Education
Credits: 4.00
Problems arising from the communications process. Implications of group problem-solving processes. Interpersonal relations and group dynamics among students, faculty, staff, administration, and the community. Application of theories.

EDUC 965 - Educational Supervision and Evaluation
Credits: 4.00
Theoretical foundations and practical applications of supervisory and instructional practices and procedures; consideration of observation instruments and techniques. Teacher evaluation and supervision reviewed. Each student conducts a field supervision project. Prereq: teaching experience or permission.

EDUC 967 - School Law
Credits: 4.00
Relationship of law to public education. Emphasis on federal constitution, New Hampshire statutes, and case law related to public interests served by elementary and secondary education. Special topics: church-state relationship, due process, desegregation, teacher employment, discrimination, negotiations, student rights, tort liability.

EDUC 968 - Collective Bargaining in Public Education
Credits: 4.00
An examination of collective bargaining as practiced by school boards, administrators, and teacher organizations. Consideration is given to collective bargaining statutes, case law, employee relations boards, unit determinations, exclusive representation, union security provisions, scope of bargaining, good faith, grievance procedures, bargaining strategies, strikes, public interest, mediation, fact finding, arbitration, and the administration of the negotiated contract.

EDUC 969 - Practicum in Educational Administration
Credits: 4.00
Supervised practical experience in planning and implementing graduate student-initiated field projects in

school administration. Prereq: all core requirements.

EDUC 970 - Foundations for Leadership in Higher Education
Credits: 4.00
Seminar for master's and doctoral level students in education and related fields. Focus on the organization, structure, function, and dynamics of institutions of higher education, and the corollary roles and responsibilities of leaders in academic and student affairs. Intended for those currently in or planning to enter into leadership roles in a college or university.

EDUC 971 - School Facilities Management
Credits: 4.00
Techniques and procedures involved in the long-range planning of school facilities: for example, school population projections, characteristics of the present and future educational programs, space requirements, evaluation of existing facilities, future use of existing buildings, analysis of financial resources available, identification of reasonable alternatives, and an examination of the probable consequences of such alternatives.

EDUC 972 - Educational Program Evaluation
Credits: 4.00
Selected models for educational program evaluation; rationale underlying these models examined and compared; practical applications developed. Program and student assessment techniques reviewed. Prereq: EDUC 953; 961;/ or permission.

EDUC 973 - Policy, Politics, and Planning in Education
Credits: 4.00
Policy systems and fundamental values shaping the development and enactment of education policy at the federal, state, and local levels.

EDUC 974 - Administrative Internship and Field Project
Credits: 4.00
Field-based internship. Administrative experience in one or several educational and community agencies. Participation in administrative and supervisory work of the agencies. Each intern completes a major field project requiring analysis and action appropriate for resolution of a significant administrative problem at the intern site. Supervision by university faculty. Prereq: permission of graduate adviser. A grade of credit (CR) is given upon successful completion of the internship and field project. Cr/F.

EDUC 975 - Administrative Internship and Field Project
Credits: 4.00
See description for EDUC 974. Cr/F.

EDUC 976 - Policy and Governance in Higher Education
Credits: 4.00
Seminar for master's and doctoral level students in Education and related fields. Examination of federal and state policies and regulations affecting two-year and four-year colleges and universities, and governance practices necessary to achieve institutional mission. Consideration of rationales for public oversight and financing of higher education, controversial topics (e.g., affirmative action, accreditation, proprietary institutions, distance learning), and strategies for effective shared governance are included.

EDUC 977 - Leadership: The District Level Administrator
Credits: 4.00
Examines the school superintendency and other district level positions of leadership that comprise the administrative team, focusing on the complexity of the current role and relationships, the critical issues

facing school leaders, and the skills necessary for success as an educational leader in today's climate. Students analyze contemporary issues of school governance and examine problems of practice to understand the role of school superintendent and other district level administrators from a theoretical, political, and contemporary perspective.

EDUC 978 - Applied Regression Analysis in Educational Research
Credits: 4.00
This course introduces students to simple and multiple regression analysis, specifically as the methods are applied to research questions in educational research. Students learn about the linear regression model and its assumptions, how to use SPSS to fit the model to data, and how to interpret results. Students will also learn how to: evaluate the tenability of the model's assumptions; conduct thoughtful model building; model the effects of categorical predictors and statistical interactions; and handle multi-collinearity. The use of statistical techniques are modeled in class and then students apply these new techniques to datasets of educational relevance from a variety of sources, including educational surveys, observational studies, and randomized experiments. Students learn how to interpret the outcomes of their analyses thoughtfully and meaningfully and are asked to communicate these interpretations clearly and concisely in writing. Prereq: EDUC 881 or equivalent.

EDUC 979 - Applied Multilevel Modeling
Credits: 4.00
This applied course in multilevel modeling is designed for graduate students in education and the social sciences who are interested in conducting statistical analysis to answer questions about (1) contextual effects on individual outcomes, and (2) individual change over time. Topics addressed include exploratory analyses of multilevel data, conditional and unconditional models, fixed and random effects, model assumptions, model fit, non-linear change, discontinuous change, time-varying predictors, unequally spaced measurement occasions, and three-level multilevel models. Prereq: EDUC 978 or the equivalent.

EDUC 980 - Research in the Teaching of Writing
Credits: 4.00
Review of research in writing instruction, focusing on trends in design, research procedures, the contributions of linguistics, cognitive and developmental psychology, with a view to the conduct of research by participants. Prereq: permission.

EDUC 981 - Quantitative Inquiry: Methods and Techniques of Educational Research
Credits: 4.00
Conceptual aspects and practical realities of the research process applied to problems in education and human service disciplines. Develops skills necessary to use, as well as conduct, research.

EDUC 982 - Issues and Methods in Ethnographic Research in Education
Credits: 4.00
Provides theoretical grounding and field experience in ethnography as a deliberate inquiry process. Examines the application of ethnographic fieldwork to educational research.

EDUC 983 - Advanced Psychology of Human Learning
Credits: 4.00
Review and integration of learning theory, teacher effectiveness, motivation theory, and development through adolescence; application of these to teaching generally and to the areas of specialization of the participants. Prereq: EDUC 801 or equivalent.

EDUC 985 - Contemporary Issues and Theories in Human Learning and Development
Credits: 4.00
This course explores the human drive to know one's world. Although the primary focus is on traditional

school-aged learners, views of the learner both in and out of school and across the life-span are considered as well. Theoretical positions will include: cognitive developmental theory; an analysis of positions implicit in traditional and innovative schooling practices; and theories about the social organization of knowledge. Attention will be given to educational applications of recent advances in contemporary theories of learning and development, as well as changes in pedagogy and assessment. Prereq: EDUC 801, or equivalent introduction to human development and/or educational psychology;/ or permission.

EDUC 986 - Philosophy of Education
Credits: 4.00
Seminar in comparative analysis of educational theories and the philosophical foundations upon which they are based. Application of theoretical criteria for evaluating educational practices and for developing one's own philosophy of education. Prereq: permission.

EDUC 990 - Developmental Perspectives on Adulthood
Credits: 4.00
Research and theory about critical life issues; developmental tasks of the life cycle; periods of transition; stages of intellectual, moral, and personality development of the adult; and the design of significant learning experiences for adults within a variety of educational settings and institutions. Prereq: permission.

EDUC 991 - Curriculum Theory I
Credits: 4.00
Explores models of curriculum theorizing, the relationship between curriculum and theory and society and school practice, and current curriculum issues and reform initiatives.

EDUC 992 - Curriculum Theory II
Credits: 4.00
The purpose of this course is (a.) to critically examine the various methodological approaches for conducting educational research within the broader field of transnational curriculum studies and (b.) to appraise the tension between a range of disciplinary frameworks that inform curriculum theory, government policy, and its respective implementation both inside and outside the classroom. Studies include analysis of alternative curricular arrangements within global, national, and local contexts. Curriculum Theory I is recommended, but not required.

EDUC #993 - Epistemology and Education
Credits: 4.00
This course addresses epistemological problems in their general form, and also explores these issues with an eye to their implications for educational theories and practices. Topics include: What is knowledge? How do we justify knowledge claims? What is the relation between knowledge and emotion, values, experience, situatedness? Is truth invisibly and ubiquitously shaped by power? Is there an epistemological justification for multicultural education? Prereq: EDUC 905 or equivalent; permission.

EDUC 995 - Independent Study
Credits: 1.00 to 4.00
Opportunity for intensive investigation of a special problem or issue in the field of education. Prereq: permission. May be repeated to a maximum of 8 credits.

EDUC 998 - Special Topics
Credits: 1.00 to 4.00
Study of a particular theoretical, methodological, or policy issue. May be offered off campus as professional development.

EDUC 999 - Doctoral Research
Credits:
Cr/F.

Electrical&Comp Engineering

ECE 804 - Electromagnetic Fields and Waves II
Credits: 4.00
Loop antennas; aperture and cylindrical antennas; self and mutual impedance; receiving antennas and antenna arrays; bounded plane waves; rectangular and cylindrical waveguides; waveguide discontinuities and impedance matching; solid state microwave sources.

ECE 811 - Digital Systems
Credits: 4.00
Principles and procedures and tools related to the design, implementation and testing of microprocessor-based embedded systems. Students prototype a complete embedded system using CAD tools, application specific integrated circuits, printed circuit board technology, and modern diagnostic/testing procedures and tools. Projects are designed to introduce diverse digital technologies. Lab.

ECE 814 - Introduction to Digital Signal Processing
Credits: 4.00
Introduction to digital signal processing theory and practice, including coverage of discrete time signals and systems, frequency domain transforms and practical spectral analysis, digital filter terminology and design, and sampling and reconstruction of continuous time signals. Laboratory component providing an introduction to DSP design tools and real-time algorithm implementation. Lab.

ECE 815 - Introduction to VLSI
Credits: 4.00
Principles of VLSI (Very Large Integration) systems at the physical level. CMOS circuit and logic design, CAD tools, CMOS systems case studies. Students exercise the whole development cycle of a VLSI chip: design, layout, and testing. Design and layout performed during semester I. The chips are fabricated off campus and returned during semester II, when they are tested by students. An IA (continuous grading) grade is given at the end of semester I

ECE 817 - Introduction to Digital Image Processing
Credits: 4.00
Digital image representation; elements of digital processing systems; multidimensional sampling and quantization; image perception by humans, image transformations including the Fourier, the Walsh, and the Hough Transforms; image enhancement techniques including image smoothing, sharpening, histogram equalization, and pseudo color processing; image restoration fundamentals; image compression techniques, image segmentation and use of descriptors for image representation and classification. Lab

ECE 834 - Network Data Communications
Credits: 4.00
Introduces the basic concepts related to data transmission equipment and physical interfaces, data communication protocols, and the Open Systems Interconnection (OSI) Reference Model. Course material focuses on the physical, layer hardware, signaling schemes, protocol packets, computer interfaces, error detection, and signal integrity. Data transmission protocols relative to both wired and wireless networks. An introduction to both local and wide-area networks, and how a networking system is constructed, tested, and managed. Network design and testing exercises reinforce the material presented in course lectures. Lab.

ECE 857 - Fundamentals of Communication Systems
Credits: 4.00
Spectra of deterministic and random signals, baseband and bandpass digital and analog signaling techniques, transmitter and receiver architectures, performing analysis of digital and analog signaling in additive noise channels, carrier and symbol timing synchronization methods. Lab.

ECE 858 - Communication System Design
Credits: 4.00
System and circuit level design and implementation of communication hardware including: mixers, RF amplifiers, filters, oscillators and frequency synthesizers, modulators and detectors, carrier and symbol timing recovery subsystems. Issues in software-defined radio transmitter and receiver implementation. Communication link engineering including antenna selection and channel impairment effects. Lab.

ECE 860 - Introduction to Fiber Optics
Credits: 4.00
Basic physical and geometric optics; solution of Maxwell's equations for slab waveguides and cylindrical waveguides, of both step index and graded index profiles; modes of propagation and cutoff; polarization effects; ground and phase velocity; ray analysis; losses; fabrication; sources; detectors; couplers; splicing; cabling; applications; system design. Lab.

ECE 872 - Control Systems
Credits: 4.00
Development of advanced control system design concepts such as Nyquist analysis, lead-lag compensation; state feedback; parameter sensitivity; controllability; observability; introduction to non-linear and modern control. Includes interactive computer-aided design and real-time digital control. (Also offered as ME 872.) Lab.

ECE 875 - Applications of Integrated Circuits
Credits: 4.00
Design and construction of linear and nonlinear electronic circuits using existing integrated circuits. Limitations and use of operational amplifiers. Laboratory course in practical applications of non-digital integrated circuit devices. Lab.

ECE 877 - Collaborative Engineering I
Credits: 4.00
Study of processes in which engineers from diverse disciplines cooperate to specify, design, manufacture, test, market, and maintain a product. Classes are organized in both technical and nontechnical flexible modules. Technical topics are advanced and relevant to project being developed, such as related research, technology, design methodology, and CAD tools. Nontechnical topics include ISO9000 quality system, engineering management, budget considerations, team building, communication and leadership skills, and concurrent engineering principles. The course utilizes collaborative engineering by team development of an engineering project, often a research oriented proof-of-concept prototype. Lab.

ECE 881 - Physical Instrumentation
Credits: 4.00
Analysis and design of instrumentation systems. Sensors, circuits, and devices for measurement and control. Elements of probability and statistics as applied to instrument design and data analysis. Transmission, display, storage, and processing of information. The design, implementation, testing, and evaluation of a relevant instrument system is an integral part of this course. (Also offered as OE 881.) Lab.

ECE 884 - Biomedical Instrumentation
Credits: 4.00

Principles of physiological and biological instrumentation design including transducers, signal conditioning, recording equipment, and patient safety. Laboratory includes the design and use of instrumentation for monitoring of electrocardiogram, electromyogram, electroencephalogram, pulse, and temperature. Current research topics, such as biotelemetry, ultrasonic diagnosis, and computer applications. Lab.

ECE 896 - Special Topics in Electrical or Computer Engineering
Credits: 1.00 to 4.00
New or specialized courses and/or independent study. Some sections may use credit/fail grading.

ECE 899 - Master's Thesis
Credits: 1.00 to 6.00
May be repeated up to a maximum of 6 credits. Cr/F.

ECE 900 - Seminar
Credits: 2.00
This seminar course exposes students to advances in various fields of science and technology. Researchers and practitioners from industry and academia present their work. May be repeated up to a maximum of 4 credits.

ECE 901 - Electromagnetic Wave Theory I
Credits: 3.00
Maxwell's equations; plane wave propagation; reflection and refraction; guided wave propagation; waveguides; simple resonators; elements of microwave circuits, linear and aperture antennas, arrays of dipoles; receiving antennas

ECE 902 - Electromagnetic Wave Theory II
Credits: 3.00
Selected advanced topics in electromagnetic wave theory taken from such areas as antennas, propagation in various media, diffraction and scattering, microwave generation, and waveguide propagation.

ECE 903 - Antennas
Credits: 3.00
This course covers the fundamentals of antenna theory, and how to use and understand a contemporary computer modeling tool to analyze and design antennas or other types of microwave devices. Participants in the class are expected to complete a radiation-related project, whether it be a modeling project or a project involving the construction and analysis of an actual antenna (team efforts are encouraged as well).

ECE 915 - Advanced Active Circuits
Credits: 3.00
Investigation of devices and techniques used in advanced circuit design using discrete solid-state devices and integrated circuits. Oscillators, phase-lock systems, low noise techniques, etc.

ECE 920 - Wireless Communication Systems
Credits: 3.00
Principles of wireless communication systems including analysis of radio wave propagation and modeling, large scale and small scale signal fading, cellular communication architectures, multi-access systems, advanced modulation techniques, signal diversity systems, multiple antenna communications, cognitive radio, and software defined radio.

ECE 939 - Statistical Theory of Communications
Credits: 3.00
Introduction to probability theory and random waveforms leading to a discussion of optimum receiver

principles. Topics include random variables, random processes, correlation, power spectral density, sampling theory, and optimum decision rules.

ECE 940 - Information Theory
Credits: 3.00
Introduction to information theory concepts. Topics include message sources, entropy, channel capacity, fundamentals of encoding, Shannon's theorems. Prereq: ECE 939 or permission.

ECE 941 - Digital Signal Processing
Credits: 3.00
Discrete-time stochastic signals, signal modeling, parameter estimation, optimal filtering and decision making, with application to adaptive filters, echo cancellation, channel equalization and parametric spectral estimation. Requires prior coursework in discrete-time LTI systems, analysis and design of recursive and non-recursive linear digital filters, and Fournier based spectral estimation.

ECE 944 - Nonlinear Control Systems
Credits: 4.00
Analysis and design of nonlinear control systems from the classical and modern viewpoints. Liapunov's stability theory, phase space methods, linearization techniques, simulation, frequency response methods, generalized describing functions, transient analysis utilizing functional analysis, and decoupling of multivariable systems. (Also offered as ME 944.)

ECE 951 - Advanced Control Systems I
Credits: 3.00
State-space representation of multivariable systems, analysis using state transition matrix. Controllability and observability, pole placement using state and output feedback, Luenberger observers. Introduction to computer-controlled systems (sampling, discrete state representation, hybrid systems), nonlinear analysis (Liapunov, Popov, describing function). (Also offered as ME 951.)

ECE 952 - Advanced Control Systems II
Credits: 3.00
Special topics in control theory: continuous and discrete systems; optimal control systems, including calculus of variations, maximum principle, dynamic programming, Weiner and Kalman filtering techniques, stochastic systems, and adaptive control systems. (Also offered as ME 952.)

ECE 955 - Estimation and Filtering
Credits: 3.00
Stochastic systems course with application to control and communications. Topics include random variables, noise in linear systems, Bayesian and minimum variance estimation theory, optimal state estimators, Weiner and Kalman filters, combined estimation and control, prediction, parameter identification, and nonlinear filtering. (Also offered as ME 955.)

ECE 960 - Computer Architecture
Credits: 3.00
Advanced topics in computer organization. Parallel and pipeline processing, associative and stack computers, microprogramming, virtual memory, current topics.

ECE 961 - Test Engineering and Testable Design
Credits: 3.00
Circuit failures, fault models, test pattern generation, logic and fault simulation. Parametric, structural, and functional characterization of components and subsystems. Test methods, strategies, planning, and economics. Design for testability, scan design, test interfaces, design for built-in self-test (BIST), and

design for manufacturability. Test equipment hardware and software. Lab

ECE 992 - Advanced Topics in Electrical Engineering
Credits: 1.00 to 3.00
Example of a recent topic: analog VLSI design. May be repeated.

ECE 993 - Advanced Topics in Computer Engineering
Credits: 1.00 to 3.00
Example of recent topic: wireless communication networks. May be repeated.

ECE 994 - Advanced Topics in Systems Engineering
Credits: 1.00 to 3.00
Examples of recent topics: neural networks, advanced digital telecommunications. May be repeated.

ECE 998 - Independent Study
Credits: 1.00 to 3.00
Independent theoretical and/or experimental investigation of an electrical engineering problem under the guidance of a faculty member.

ECE 999 - Doctoral Research
Credits:
Cr/F.

English

ENGL 800 - Studies in Literature
Credits: 4.00
Students in the MAT, MEd, and MST programs, as well as non-degree students, can register for graduate course work in English under this number. The precise topics and focus of each section vary. Topics include Old English Literature, Medieval Literature, 16th century, 17th century, 18th century, English Romantic Period, Victorian Period, 20th and 21st Century, Drama, Novel, Poetry, Fiction, Nonfiction, A Literary Problem, Literature of the Renaissance, Postcolonial Literature, 20th to 21st Century American Literature. Barring duplication of subject, may be repeated for credit. Note: Students in the MA and PhD programs in English may not take English 800 for credit toward their degrees. English 800 will only be offered on the Manchester campus.

ENGL 803 - Travel Writing
Credits: 4.00
A graduate workshop devoted to reading and writing narratives of place. Travel writing requires the author to research and reflect, exploring both the external--the place--and the internal--the author's experience. Students write multiple travel pieces and read widley essays of place by writers such as Tom Bissell, John Steinbeck, Pico Iyer, Stephanie Grist, and Eliza Griswold. Course may be repeated for credit with permission.
Co-requisites: INCO 589

ENGL 804 - Advanced Nonfiction Writing
Credits: 4.00
A workshop discussion of research-based creative nonfiction. Students write multiple pieces, read widely, and submit queries to literary journals and magazines. Individual conferences with instructor. Written permission of the instructor required for registration. May be repeated for credit with the approval of the department chairperson.

ENGL 805 - Advanced Poetry Workshop
Credits: 4.00
Workshop discussion of advanced writing problems and submitted poems. Individual conferences with instructor. Prereq: writing poetry or equivalent. Written permission of instructor required for registration. May be repeated for credit with the approval of the department chairperson.

ENGL 806 - The Art of Research for Creative Writers
Credits: 4.00
Many writers think that the heart of creative nonfiction is style, but in truth, the genre's soul is in its content. This course covers tools such as intimate reporting, periodicals, the Internet, and first-hand observation to research people, places, issues, and history. The skills learned will serve graduate students of all kinds of writing, from fiction to academic. Permission of instructor required. Special fee.

ENGL 807 - Fiction: Form and Technique
Credits: 4.00
A writer's view of the forms, techniques, and theories of fiction. The novels, short stories, and works of criticism studied vary, depending on the instructor.

ENGL 808 - Nonfiction: Form and Technique

Credits: 4.00
A writer's view of contemporary nonfiction, emphasizing the choices the writer faces in the process of research and writing.

ENGL 809 - Poetry: Form and Technique
Credits: 4.00
A writer's view of the problems, traditions, and structures of poetry.

ENGL 810 - Teaching Writing
Credits: 1.00 to 6.00
An introduction to various methods of teaching writing. Combines a review of theories, methods, and texts with direct observation of teaching practice.

ENGL 811 - Editing
Credits: 4.00
A survey of newspaper editing. Intended primarily for students in the graduate nonfiction writing program, the course will cover copy editing, content editing, coaching writers, writing headlines, and ethical and legal issues in journalism. Students will complete editing assignments and act as coaches for undergraduate students in ENGL 621: Newswriting. While much work in the course will involve newspapers, principles applicable to magazine and nonfiction book editing will also be covered. Written permission of the instructor required for registration. Special fee.

ENGL 812 - Writing the Creative Nonfiction Book
Credits: 4.00
In this course, students learn to flesh out an idea for a book of creative nonfiction, which could either be literary journalism - a tale based on reportage - or memoir. Students focus on pulling multiple themes together in a strong narrative. By semester's end, students have written a book proposal and a first chapter. Students are asked to arrive at the first class with a topic researched enough to begin the book process. Permission of instructor required. May be repeated for credit up to 8 credits.

ENGL 814 - Literary Theory
Credits: 4.00
Major theoretical approaches to literature and its contexts; a range of works from ancient Greece to the present. Questions addressed include: What is literature? What methods might one use to analyze literary texts? What role might cultural and social conditions play in our understanding of literature? How have traditional answers to these and other questions about literature been contested? Lecture-discussion format.

ENGL 815 - Teaching English as a Second Language: Theory and Methods
Credits: 4.00
A study of how linguistic, psychological, sociological, and neurological theory influences or determines the choice of methods of language teaching. Research on second language acquisition and bilingualism, language aptitude, and the cultural context of language acquisition. Includes an introduction to standard and exotic methods of language teaching.

ENGL 816 - Curriculum, Materials and Assessment in English as a Second Language
Credits: 4.00
A study of the problems in designing an effective teaching program for various types of ESL students. An introduction to competence and aptitude testing and to the choosing and adapting of materials for ESL classes.

ENGL 819 - Sociolinguistics Survey

Credits: 4.00
How language varies according to the characteristics of its speakers: age, sex, ethnicity, attitude, time, and class. Quantitative analysis methods; relationship to theoretical linguistics. Focus is on English, but some other languages are examined. Prereq: introduction to linguistics or permission.

ENGL 827 - Issues in Second Language Writing
Credits: 4.00
Study of various issues in second language writing theory, research, instruction and administration. Topics include the characteristics and needs of second language writers, second language writing processes, contrastive rhetoric, grammar instruction, teacher and peer feedback, assessment, course design and placement.

ENGL 829 - Spec Top/Composition Studies
Credits: 4.00
Advanced course on a topic chosen by the instructor. Precise topics and methods of each section vary. Possible topics include: alternative discourses and rhetorics; contrastive rhetoric; electronic discourse and digital rhetoric; women's rhetorics and feminist pedagogies; Montaigne and the essay tradition; theories of literacy; theories of persuasive writing; theories of transactional writing; and written discourse analysis. Barring duplication of subject, may be repeated for credit. For details see the course descriptions available in the English Department.

ENGL 830 - Practicum in Teaching English and the Language Arts
Credits: 1.00 to 6.00
A site-based course for practicing teachers that features in-class observations and demonstrations, individual consultation, and group meetings in the schools. Prereq: permission. May be repeated to a maximum of 8 credits.

ENGL 838 - Topics in Asian American Studies
Credits: 4.00
Study of literature, history, scholarship, and current thought by and about Asian America. Representative works from among Japanese Americans, Chinese Americans, Korean Americans, Southeast Asian Americans, South Asian Americans.

ENGL 845 - Contemporary American Literature
Credits: 4.00
A gathering of forms, figures, and movements since 1945. Individual works and cultural background. (Not offered every year.)

ENGL 846 - Studies in American Drama
Credits: 4.00
Topics vary from year to year. Examples: 20th-century American drama; contemporary playwrights; theatricality in American life. May be repeated for credit, barring duplication of topic. (Not offered every year.)

ENGL 847 - Studies in American Poetry
Credits: 4.00
Topics vary from year to year. Examples: poets of the road; Pound and his followers; major American poets; contemporary American poetry. May be repeated for credit, barring duplication of topic. (Not offered every year.)

ENGL 848 - Studies in American Fiction
Credits: 4.00

Topics vary from year to year. Examples: the romance in America; the short story; realism and naturalism; the city novel; fiction of the thirties. May be repeated for credit, barring duplication of topic. (Not offered every year.)

ENGL 850 - Special Studies in American Literature
Credits: 4.00
Topics vary from year to year. Examples: the Puritan heritage; ethnic literatures in America; landscapes in American literature; five American lives; pragmatism; American humor; transcendentalism; women regionalists. May be repeated for credit, barring duplication of topic.

ENGL #851 - Medieval Epic and Romance
Credits: 4.00
Two major types of medieval narrative; comparative study of works from England, France, Germany, and Iceland, including "Beowulf", "Song of Roland", "Nibelungenlied", Gottfried's "Tristan", Njal's "Saga", and Malory's "Morte d'Arthur". All works read in modern English translations. (Not offered every year.)

ENGL 852 - History of the English Language
Credits: 4.00
Evolution of English from the Anglo-Saxon period to the present day. Relations between linguistic change and literary style.

ENGL 853 - Old English
Credits: 4.00
Introduction to Old English language and literature through readings of selected poetry and prose.

ENGL 858 - Shakespeare
Credits: 4.00
A few plays studied intensively. Live and filmed performances included as available.

ENGL 869 - English Romantic Period
Credits: 4.00
Major literary trends and authors, 1798 to 1832. Focus on poetry but attention also to prose works and critical theories. Wordsworth, Coleridge, Lamb, Hazlitt, DeQuincy. (Not offered every year.)

ENGL 873 - British Literature of the 20th Century
Credits: 4.00
Poets and novelists of the modernist and postmodernist periods. W.B. Yeats, James Joyce, Virginia Woolf, E.M. Forster, D.H. Lawrence, and other modernists. (Not offered every year.)

ENGL 879 - Linguistic Field Methods
Credits: 4.00
Devoted to the study, with use of an informant, of some non-Indo-European language that is unfamiliar to both the students and the instructor at the beginning of the class. The primary aim of the course is to give students a practical introduction to linguistic analysis without the support of a text. Theoretical concepts are introduced as needed. Special fee.

ENGL 880 - English Drama to 1640
Credits: 4.00
Development of the drama through the Renaissance, emphasizing the Elizabethan and Jacobean dramatists. (Not offered every year.)

ENGL 881 - English Drama from 1660 to 1800

Credits: 4.00
Study of selected plays, their performance and their publication. Works by such figures as William Wycherley, Thomas Otway, Mary Pix, George Lillo, Susanna Centlivre, Richard Sheridan, and Elizabeth Inchbald. Special attention to the new prominence of women in the drama of this period, changes in theater architecture, forms of non-dramatic spectacle, and the political and social significance of drama. (Not offered every year.)

ENGL 883 - English Novel of the 18th Century
Credits: 4.00
Study of the rise and development of the novel in the eighteenth century. Works by such figures as Daniel Defoe, Eliza Haywood, Samuel Richardson, Henry Fielding, Charlotte Lennox, Laurence Sterne, Frances Burney, and Jane Austen. Focus on writers who published their work in England but with examples from the colonial world and the continent (in translation) when appropriate. (Not offered every year.)

ENGL 885 - Major Women Writers
Credits: 4.00
Intensive study of one or more women writers. Selections vary from year to year. May be repeated for credit, barring duplication of topic.

ENGL 889 - Special Topics in English Teaching
Credits: 4.00
Advanced theories and practices course on English Teaching. Topics such as A) Teaching Young Adult Literature, C) Teaching English in Diverse Contexts, D) Teaching Drama, N) Teaching Nonfiction, R) Engish Teachers as Researchers, and T) Alternate Literacies and Teaching Technologies. Barring duplication of subject, course may be repeated for credit. For details see course descriptions available in the English department.

ENGL 890 - Special Topics in Linguistics
Credits: 4.00
An advanced course on a topic to be chosen by the instructor. Inquire at the English department office for a full course description each time the course is offered. Topics such as word formation, dialectology, linguistic theory and language acquisition, language and culture, cross-disciplinary studies relating to linguistics. Barring duplication of subject, may be repeated for credit. (Not offered every year.)

ENGL 891 - English Grammar
Credits: 4.00
A survey of the grammar of English (pronunciation, vocabulary, sentence structure, punctuation, dialect variation, historical change) with special attention to the distinction between descriptive and prescriptive grammar and to the problems students have with formal expository writing.

ENGL 892 - Teaching Literature and Literacy
Credits: 4.00
This course introduces theories and practices of teaching literature and literacy, including teaching reading and writing as well as teaching literary analysis at the secondary level. Students also learn to plan lessons, choose texts, and create learning activities for speaking, listening, and viewing in grade five through twelve. The course is designed for students who are interested in teaching as a possible career.

ENGL 893 - Phonetics and Phonology
Credits: 4.00
The sounds and sound systems of English in the context of linguistic theory: comparisons of English to other languages. Prereq: a basic linguistic course or permission. (Not offered every year.)

ENGL 894 - Syntax and Semantic Theory
Credits: 4.00
The relationship of grammar and meaning as viewed from the standpoint of modern linguistic theory. Emphasis on the syntax and semantics of English, with special attention to the construction of arguments for or against particular analyses. Prereq: a basic linguistic course or permission.

ENGL 897 - Special Studies in Literature
Credits: 4.00
A) Old English Literature; B) Medieval Literature; C) 16th Century; D) 17th Century; E) 18th Century; F) English Romantic Period; G) Victorian Period; H) 20th Century; I) Drama; J) Novel; K) Poetry; L) Nonfiction; M) American Literature; N) A Literary Problem; O) Literature of the Renaissance. The precise topics and methods of each section vary. barring duplication of subject, may be repeated for credit. For details, see the course descriptions available in the English department.

ENGL 898 - Special Studies in Creative Writing
Credits: 4.00
Courses offered under this number focus on topics within creative writing, such as poetic influences, the short story form, and writing the novel. The precise topics and methods of each section vary. Barring duplication of subject, course may be repeated for credit. For details, see the course descriptions available in the English Department.

ENGL 899 - Master of Fine Arts in Writing Thesis
Credits: 1.00 to 8.00
Eight credits required, that can be taken in any combination during the student's academic coursework. Maximum of 8 credits. IA (Continuous grading). Cr/F.

ENGL 901 - Advanced Writing of Fiction
Credits: 4.00
Workshop discussion of advanced writing problems and readings of students' fiction. Individual conferences with instructor. Prereq: writing fiction or equivalent. Written permission of the instructor required for registration. May be repeated for credit with the approval of the department chairperson.

ENGL 902 - Master Fiction Workshop
Credits: 4.00
A fiction workshop for third-year M.F.A. students to refine the drafts of their book-length M.F.A. thesis. Completion drafts will be workshopped and revised. Various directed readings. May be repeated for credit up to 8 hours. Special fee.

ENGL 903 - Advanced Memoir Writing
Credits: 4.00
Workshop of essays/chapters in memoir, and discussion of current models of the form. Individual conferences with instructor. Written permission of instructor required for registration. May be repeated for credit with the approval of the department chairperson.

ENGL 910 - Practicum in Teaching College Composition
Credits: 6.00
Seminar focuses on composition practical and theortical issues of significance to the teaching writing to first-year students. A mentorship component creates opportunities for close supervision and support by experienced teachers in the writing program. Open only to teachers in the First-year Writing program.

ENGL 911 - Writing for Teachers
Credits: 4.00

Opportunity for teachers of composition to work intensively on their writing, to read as writers, and to discover the principles appropriate to the writing genre they are teaching. Because of its special focus, this course may not be applied to the M.A. in English/writing option. Topics may vary.

ENGL 912 - Historical and Theoretical Studies in Rhetoric
Credits: 4.00
The rhetorical tradition in Western culture, with a special focus on three critical periods: the classical period (Aristotle, Cicero, Quintillian), the eighteenth century (Blair and Campbell), and the modern era (Burke, Booth, Perelman, Ong, Weaver).

ENGL 913 - Theory and Practice of Composition
Credits: 4.00
Examination of major theoretical and pedagogical works in the field of composition. To include works on the writing process, writing development, response to writing, and other topics.

ENGL 914 - Special Topics in Composition and Rhetoric
Credits: 4.00
Topics chosen by instructor may include: A) Political, Philosophical, and Ethical Issues in Composition; B) Gender and Writing; C) Cognition and Composition; and D) Ethnographics of Literacy. May be repeated for credit, barring duplication of topic.

ENGL 916 - History of Composition
Credits: 4.00
Composition teaching and theory in American colleges and academics from the 18th century to the present.

ENGL 918 - Research Methods in Composition
Credits: 4.00
Overview of major research approaches including historical, case study, ethnographic, and textual; special emphasis on research design.

ENGL 919 - Teaching the Writing Process
Credits: 1.00 to 6.00
Focus both on the writing of the participants and on the teaching of writing in grades K-12. Special attention is given to strategies for prewriting, revision, evaluation, and conducting writing conferences. May be repeated to a maximum of 8 credits.

ENGL 920 - Issues in Teaching English and the Language Arts
Credits: 1.00 to 6.00
Special topics in the teaching of English and the language arts. Inquire at the English department to see what topics in the teaching of reading, writing, literature, or language arts may be scheduled. Open only to graduate students with a professional interest in teaching or to practicing teachers. 1-6 credits depending on the specific course.

ENGL 921 - Practicum in Teaching English and the Language Arts
Credits: 1.00 to 6.00
A site-based course for practicing teachers that features in-class observations and demonstrations, individual consultation, and group meetings in the schools. Prereq: permission. May be repeated to a maximum of 8 credits.

ENGL 922 - Advanced Topics in Literacy Instruction
Credits: 1.00 to 6.00

Specialized study of literacy topics that may include: A) Nature Journaling; B) Gender and Literacy; C) Digital Storytelling; D) Multigenre Writing; E) Assessment; F) Capstone Project; and G) Literacy Problem.

ENGL 923 - Advanced Essay Writing
Credits: 4.00
Writing and reading course in which students are encouraged to experiment with a variety of styles and forms. Discusses outside reading by focusing on techniques that the student might want to apply to his or her own material. Prereq: permission.

ENGL 924 - Professional Preparation
Credits: 2.00
This 2-credit course, offered in alternate years, is designed primarily to help doctoral students prepare to enter the profession. It takes up such topics as writing a resume or curriculum vitae, presenting a conference paper, submitting an article, applying for a job, and interviewing. Cr/F.

ENGL 925 - Graduate Study of Literature
Credits: 4.00
Techniques, resources, and purposes of literary study: close reading; practical criticism; critical theories and their values; pertinence of intellectual and historical backgrounds. Approaches applied to a specific area of literary study, which varies from year to year.

ENGL 926 - Seminar: Literary Theory
Credits: 4.00
Major questions and topics in the current theories about literature and contexts. What is literature? What method might one use to analyze literary texts? What role might cultural and social conditions play in our understanding of literature? How have traditional answers to these and other questions about literature been contested? May be repeated.

ENGL 927 - Seminar: Feminist Criticism Theory and Practice
Credits: 4.00
May be repeated.

ENGL 932 - Seminar: Folklore and Folklife
Credits: 4.00
May be repeated.

ENGL 935 - Seminar: Studies in American Literature
Credits: 4.00
May be repeated.

ENGL 936 - Seminar: Literature of Early America
Credits: 4.00
May be repeated.

ENGL 937 - Seminar: Studies in 19th Century American Literature
Credits: 4.00
May be repeated.

ENGL 938 - Seminar: Studies in 20th Century American Literature
Credits: 4.00
May be repeated.

ENGL 953 - Seminar: Studies in Old English

Credits: 4.00
May be repeated.

ENGL 956 - Seminar: Studies in Medieval Literature
Credits: 4.00
May be repeated.

ENGL 958 - Seminar: Studies in Shakespeare
Credits: 4.00
May be repeated.

ENGL 959 - Seminar: Studies in Milton
Credits: 4.00
May be repeated.

ENGL 960 - Seminar: Studies in English Drama
Credits: 4.00
May be repeated.

ENGL 964 - Seminar: Studies in 16th Century Literature
Credits: 4.00
May be repeated.

ENGL 965 - Seminar: Studies in Early 17th Century Literature
Credits: 4.00
May be repeated.

ENGL 968 - Seminar: Studies in 18th Century Literature
Credits: 4.00
May be repeated.

ENGL 970 - Seminar: Studies in the Romantic Period
Credits: 4.00
May be repeated.

ENGL 971 - Seminar: Studies in the Victorian Period
Credits: 4.00
May be repeated.

ENGL 974 - Seminar: Studies in 20th Century British Literature
Credits: 4.00
May be repeated.

ENGL 981 - Seminar: Studies in Post-Colonial Literatures in English
Credits: 4.00
May be repeated.

ENGL 990 - Seminar in Linguistics
Credits: 4.00
May be repeated.

ENGL 994 - Practicum in Teaching English to Speakers of Other Languages
Credits: 2.00 to 6.00

Students have an opportunity to observe and discuss ESL classes and to design and carry out their own lessons, with follow-up evaluation. Cr/F.

ENGL 995 - Independent Study
Credits: 1.00 to 8.00
To be elected only with permission of the director of graduate studies and of the supervising faculty member.

ENGL 996 - Reading and Research
Credits: 2.00 to 8.00
Cr/F.

ENGL 998 - Master's Paper
Credits: 4.00
Cr/F. IA (Continuous grading).

ENGL 999 - Doctoral Research
Credits:
Cr/F.

Environmental Education

ENED 890 - Environmental Education Summer Institute: Field Ecology, Human Communities, and Curriculum
Credits: 8.00
An intensive, team-taught experience that immerses students in a process of inquiry explicitly designed to connect and integrate work in the Environmental Education Program's three focus areas: Pedagogy, Environmental Science, and Environmental Values, Policy, and Planning. A four week program, meeting four days/weeks for six-eight hours/day, with out-of-class assignments make it a full-time commitment for students. Classroom and field-based activities help students experience the interdisciplinary nature of environmental education firsthand, while giving students the opportunity to explore materials, research methods, and instructional approaches appropriate to their specific educational context. Prereq: a minimum of two prior life or physical science courses. Permission required.

ENED 900 - Seminar and Practicum in Environmental Education
Credits: 4.00
This course is the capstone experience for students in the MA Program in Environmental Education. It combines a field placement in environment education with a Practicum Seminar to give students the opportunity to put what they have learned into practice in a context that is appropriate for their professional development and career goals. The Practicum also provides students with support in completing the Program Portfolio requirement for the master's degree.

Family Studies

FS 807 - Practicum
Credits: 1.00 to 6.00
Supervised in-depth experience in teaching, research, or advocacy in a professional setting to increase the student's understanding of children, families, or consumer issues. A) Child; B) Family; C) Consumer Studies. Prereq: permission. Special fee. Cr/F.

FS 808 - Child and Family Center Internship
Credits: 1.00 to 6.00
Supervised positions within the UNH Child and Family Center nursery school programs. A) videotape assistant; B) assessment assistant; C) toddler assistant; D) 3-5 year old assistant. Can be repeated up to a total of 9 credits. Prereq: permission. Special fee. Cr/F.

FS 809 - Child Study and Development Center Internship
Credits: 1.00 to 6.00
Supervised positions within the UNH Child Study and Development Center child care programs. A) videotape assistant; B) assessment assistant; C) infant assistant; D) toddler assistant; E) 3-5 year old assistant; F) kindergarten assistant; G) health issues assistant. May be repeated up to a total of 9 credits. Prereq: human development, developmental perspectives on infancy and early childhood, teaching/learning in social constructivist classrooms, permission. Special fee. Cr/F.

FS 833 - Supervising Programs for Young Children
Credits: 4.00
Philosophical bases and theoretical rationales of various programs for young children; program alternatives and resources; issues in administration including supervision, finances, and regulations. Prereq: permission. (Fall semester only.)

FS 834 - Curriculum for Young Children
Credits: 4.00
Designing and implementing developmentally appropriate activities for young children; assessing the effectiveness of activities; evaluating materials and equipment. Prereq: FS 833; permission. (Spring semester only.)

FS 841 - Marital and Family Therapy
Credits: 4.00
Introduction to the theory and practice of marital and family therapy; major approaches to be examined include strategic, trans-generational, structural, experiential/humanistic, and behavioral. Prereq: family relations or equivalent; permission.

FS 843 - Families, Schools, and Community
Credits: 4.00
Emphasis on the critical value of effective family-school-community partnerships in enhancing the education of young children. The literature assessing the interactive nature of the parent and school resources with cultural influences examined. Current models of family-school-community partnerships explored. Students required to participate in parent/school/community activities within early childhood education centers and schools. Prereq: permission. (Fall semester only.)

FS 846 - Human Sexuality

Credits: 4.00
Investigations of physiological, psychological, and sociological aspects of human sexuality. Particular attention to various social practices, policies, and programs that affect sexual attitudes and behaviors.

FS 857 - Race, Class, Gender, and Families
Credits: 4.00
Explores the intersection of race, class, and gender in family life in the United States. Theory, research and other relevant literature used to examine the variety of family configurations in our society today and the diverse experiences that families have as the result of existing social, political, and economic institutions. The strengths various family types considered, as well as the particular challenges these families may encounter in contemporary society. Prereq: permission.

FS 860 - Family Programs and Policies
Credits: 4.00
Analysis of the connection between family support programs and family policy. Program planning, implementation and evaluation are stressed. The research, theory, history, and current status of model family programs are examined.

FS 871 - Observation and Assessment of Young Children
Credits: 4.00
A comprehensive view of various observation techniques for determining children's strengths and emerging skills. Exploration of issues regarding the use of formal assessments and testing with young children, retention and transitional placements, and the parent's role in testing. Prereq: human development, developmental perspectives on infancy and early childhood, teaching/learning in early childhood settings, permission. (Fall semester only.)

FS 872 - International Approaches to Child Advocacy
Credits: 4.00
Investigation into the rationales for advocacy, types of advocacy, advocacy techniques and strategies, and current domestic and international advocacy issues and approaches. Prereq: permission.

FS 873 - International Perspectives on Children and Families
Credits: 4.00
Investigation of historical and modern conceptions of children and families in selected African, Asian, European, and Latin countries. Emphasis placed on the contribution of these populations to the changing ethnic portrait of America. Prereq: permission.

FS 876 - Children, Adolescents and the Law
Credits: 4.00
This course is designed to familiarize students with the specialized laws and adjudicative systems that govern children, adolescents and families and reflect society's effort to balance competing interests and goals. It provides the chance to explore laws and processes that affect children and adolescents as they interact with their caregivers, families and society at large; permission.

FS 894 - Families and the Law
Credits: 4.00
Exploration of laws that affect families as members interact with each other and with society in general. Prereq: management and decision making; family relations; and permission.

FS 897 - Special Topics
Credits: 1.00 to 4.00
Highly focused examination of a particular theoretical, methodological, or policy issue. Prereq: permission.

FS 898 - Marriage and Family Therapy Practicum
Credits: 1.00 to 8.00
Clinical experience under direct faculty supervision. Trainees develop competency in treating individuals in the context of their families and larger systems. Prereq: permission. May be repeated. Special fee.

FS 899 - Master's Thesis
Credits: 1.00 to 6.00
May be repeated up to a maximum of 10 credits. Cr/F.

FS 911 - Graduate Internship
Credits: 2.00 to 8.00
Advanced, supervised internships in professional setting. A) Child Development; B) Adolescent Development; C) Child Advocacy and Family Policy. May be repeated to up to a total of 8 credits. Prereq: instructor's permission. Cr/F.

FS 930 - Child Development in Context
Credits: 4.00
Theory and research on social, cultural, and developmental issues of early childhood with a particular emphasis on ecological and social constructivist frameworks. Prereq: instructor's permission.

FS 942 - Advanced Systems of Marital and Family Therapy
Credits: 4.00
Critical analysis and integration of selected systems of marital and family therapy. Prereq: FS 841; permission.

FS 945 - Family Therapy Practice I
Credits: 4.00
Designed to develop beginning practice skills in structural, strategic, systematic family therapies; and assessment and treatment skills necessary to manage specialized problems (e.g., divorce, remarriage, substance abuse, suicidal behavior) encountered in practice. Prereq: permission.

FS 946 - Critical Problems in Family Life
Credits: 4.00
Evaluation of the needs and resources of families with critical problems; maturational and situational sources of stress influencing the contemporary American family; students demonstrate mastery of theoretical concepts by developing self-help strategies to be used by families experiencing stress. Prereq: permission.

FS 947 - Family Therapy Practice II
Credits: 4.00
Designed to develop advanced skills in integrating structural, strategic, and systematic family therapies; sensitivity to gender differences and cultural diversity; and assessment and treatment skills necessary to manage specialized problems (e.g., physical, emotional, and sexual abuse; sexual dysfunction) encountered in practice. Prereq: permission.

FS 950 - Contemporary Issues in Adolescent Development
Credits: 4.00
This course is a graduate-level seminar that focuses on contemporary issues faced by youth, adolescents, and emerging adults in our society. Focus is also on the social ecology of adolescent development, which means understanding adolescents within the contexts of families, peers, schools, communities, and the broader culture. This course also emphasizes the positive youth development perspective and approaches aimed at enhancing the lives of youth, adolescents, and emerging adults.

FS 952 - Clinical Interventions in Couples Therapy
Credits: 4.00
This course will explore interventions that target problems faced by couples at various ages and stages of their relationship. The focus will be on developing and implementing effective strategies for enhancing attachments as well as approaches for improving communication and problem-solving skills in Couples Therapy. The format will be interactive with illustrative demonstration. Only open to FS: Marriage & Family Therapy, Social Work, and Cert: Ldrship Chld Health majors.

FS 954 - Human Sexuality, The Treatment of Sexual Problems, and the Clinical Applications of Sexual Therapy
Credits: 4.00
This course begins preparing graduate student therapists to address sexual topics with clients. Using a foundation grounded in the physiology, psychology, and sociology of human sexual development, this course explores problems in sexual interaction and treatment options available through sex therapy, focusing on the integration of sex therapy with couples therapy. Students are encouraged to examine their own attitudes, values, and beliefs regarding sexuality, and will deconstruct "sexual dysfunction".

FS 991 - Professional Issues for Family Specialists
Credits: 4.00
Exploration of major ethical, legal, and professional issues facing child, family, and consumer specialists. Focus on ethical decision making, values clarification, and development of professional identity. Prereq: permission.

FS 993 - Theoretical Approaches to Family Studies
Credits: 4.00
Scientific knowledge and the scientific method, the relationship between theory and research as it applies to family studies; why and how theories change; major theories in historical context. Prereq: permission.

FS 994 - Research Seminar
Credits: 4.00
Introduction to social science research methods; analysis of research reports and other professional papers in family and consumer studies; development and evaluation of research proposals. Prereq: FS 993 and permission.

FS 995 - Seminar and Special Problems
Credits: 2.00 to 4.00
A) Consumer Research; B) Family Relations; C) Education; D) Family Resource Management; and E) Human Development. The student contributes to a selective review and critical evaluation of the research and current literature and an examination of issues and trends. Independent projects may be a part of the experience. These seminars are open to graduate students with sufficient background and are not scheduled every semester. One or more semesters, maximum of 4 credits in one area. Prereq: permission.

FS 997 - Advanced Research Seminar
Credits: 4.00
Interdisciplinary approach to research in child, family, and consumer studies. Emphasis on the multidimensionality of family problems, appropriate research strategies, and critical analysis of current literature. Prereq: permission.

Genetics

GEN 804 - Genetics of Prokaryotic Microbes
Credits: 5.00
Study of the maintenance, exchange, and expression of genetic material in bacteria and their viruses. Combines a historical overview on the important role microbial genetics played in the development of modern molecular biology with a contemporary perspective on the methods used to understand the function of genes. Particular emphasis is placed on current experimental applications to basic science, biomedical research, and biotechnology. Prereq: BMCB 658 and BMS 503. Lab. Special fee.

GEN 805 - Population and Quantitative Genetics
Credits: 4.00
An introduction to the theory and application of population and quantitative genetics. Exploration of the forces (mutation, selection, random drift, inbreeding, assortative mating) affecting the frequency and distribution of allelic variation in natural populations. Quantifying the structure of populations. Analysis of continuous variation in populations simultaneously at multiple loci, interactions between genes and their environment underlying phenotypic variation. Methods of analysis for theoretical and practical applications. Prereq: GEN 6 04; one semester of statistics and calculus recommended. Lab. (Not offered every year.)

GEN 806 - Human Genetics
Credits: 3.00
The genetic basis of human traits and diseases. New understanding added by molecular genetic approaches. Human genome project, gene therapy. Discussion of genetic components of quantitative and behavioral traits in human evolution. Prereq: GEN 604 or ANSC 612.

GEN 811 - Genomics and Bioinformatics
Credits: 4.00
The methods, applications, and implications of genomics--the analysis of whole genomes. Microbial, plant and animal genomics are addressed, as well as medical, ethical and legal implications. The lab provides exposure and experience of a range of bioinformatics approaches--the computer applications used in genome analysis. Prereq: BIOL 604 or equivalent. Lab. (Also listed as BCHM 811.)

GEN 812 - Introduction to Perl programming for Bioinformatics
Credits: 4.00
Introductory course in PERL programming designed to enable students in the life sciences to solve fundamental biological questions of simple to moderate complexity that require the use of computers to automate repetitive tasks and handle query results efficiently, including: computer values of important parameters of biological sequence data, writing pattern search and motif discovery scripts, accessing, querying, manipulating, retrieving, parsing, analyzing, and saving data from local and remote databases. Prereq: GEN 604 or permission. Lab.

GEN 813 - Microbial Ecology and Evolution
Credits: 4.00
Functional roles of microorganisms, their population dynamics and interactions, and their mechanisms of evolutionary change in natural communities, laboratory experiments, and simple mathematical models. Special emphasis on the tempo and mode of prokaryotic adaptation, the evolution of virulence, and the origin of new pathogens. Prereq: General Microbiology or permission. (Also listed as MICR 813.) Special fee. Lab.

GEN 815 - Molecular Evolution
Credits: 4.00
Rates and patterns of evolutionary change in biomolecules. Forces affecting the size and structure of genomes. Molecular mechanisms of organismal evolution. Emphasis on integrating evidence from biochemistry, molecular genetics and organismal studies. Methods for reconstructing phylogeny from molecular sequences. Prereq: BIOL 604 or equivalent; some knowledge of statistics is recommended. Special fee. Lab.

GEN 817 - Molecular Microbiology
Credits: 5.00
Fundamental physiological and metabolic processes of archaea bacteria and fungi with a strong emphasis on prokaryotes. Literature-based course. Topics include regulation and coordination of microbial metabolism, bacterial cell cycle, global control of gene expression, diversity of energy metabolism, and microbial cell differentiation. Prereq: general microbiology; principles of genetics; permission. Special fee. Lab.

GEN 871 - Molecular Genetics
Credits: 4.00
Structure, organization, replication, dynamics, and expression of genetic information in eukaryotes. Focus on molecular genetic mechanisms of gene expression and its control; molecular genetics methods; molecular genetic control of cell division and differentiation during development. Prereq: BCHM 658/659 or 751; BIOL 604 or equivalent;/or permission. (Also offered as BCHM 871.)

GEN 872 - Evolutionary Genetics of Plants
Credits: 4.00
Mechanisms of genetic change in plant evolution, domestication, breeding, and genetic engineering. Topics include Darwinian theory; speciation and hybridization; origins and co-evolution of nuclear and organelle genomes; gene and genome evolution; transposable elements, chromosome rearrangements, polypliody. Lab: bioinformatics, phylogenetics, writing and presentation skills. Prereq: GEN 604 or equivalent. Lab. Special fee. (Not offered every year.)

GEN 874 - Techniques in Plant Genetic Engineering and Biotechnology
Credits: 4.00
Hands-on experience with techniques used in plant genetic engineering, including cell and tissue culture, gene cloning, and analysis of foriegn gene expression. Theory behind these techniques and discussion about: role of plant biotechnology in sustainable agriculture and climate change; modifying plants for better nutrition and stress response, for environmental remediation, and for production of pharmaceuticals; controversies associated with this technology. Special fee.

GEN 895 - Special Topics
Credits: 2.00 to 4.00
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GEN 899 - Master's Thesis
Credits: 1.00 to 10.00
May be repeated up to a maximum of 10 credits. Cr/F.

GEN 995 - Special Topics
Credits: 2.00 to 4.00
Intended for study in specialty areas not ordinarily included in other courses. May involve formal classes, discussions, or independent investigations. Prereq: permission.

GEN 996 - Special Topics
Credits: 2.00 to 4.00
Intended for study in specialty areas not ordinarily included in other courses. May involve formal classes, discussions, or independent investigations. Prereq: permission.

GEN 999 - Doctoral Research
Credits:
Cr/F.

Geospatial Science

GSS 800 - Elements of Geospatial Science

Credits: 4.00

This on-line course lays the foundation for Geospatial Science (GSS) thinking by exploring the definition, methods, data types, data sources, software, and equipment used within the field of GSS. The importance and structure of the regional GSS industry is discussed with emphasis on how GSS is used across multiple disciplines. Course includes some guest lectures from industry professionals. Lectures and tests are conducted on-line. Students are required to download and install some software and data to complete assignments.

GSS 805 - Applied Geographic Information Systems for Research

Credits: 4.00

This course teaches concepts and applied techniques of Geographic Information System tools and technologies to solve real world Geospatial Science problems across multiple disciplines. Technical topics covered include geospatial data collection, quality, conversion, management, analysis, visualization, and dissemination. Students hands-on-lab and independent exercises use the latest version of ArcGIS software. Development and implementation of a project proposal and an independent project are completed by students to forward individual interests.

GSS 896 - Special Topics

Credits: 4.00

Special topics in geospatial technologies including by not limited to geographic information system, global positioning system, remote sensing, spatial analysis, statistics, crowdsource mapping, geodesy, and surveying.

Health & Human Services

HHS 898 - Special Topics
Credits: 1.00 to 8.00
Special fee on some topics.

History

HIST 800 - Advanced Explorations
Credits: 1.00 to 4.00
See department listings for semester topic. Barring duplication of subject, may be repeated for credit up to 12 credits.

HIST 801 - Seminar in Historical Explorations
Credits: 4.00
A seminar for advanced undergraduates and graduate students on a selected topic. Topics will vary by semester. This course will be discussion-based and meet once a week. There are no prerequisites for this course, but students should expect to be assigned substantial reading and writing.

HIST 802 - Holocaust: The War on Europe's Jews
Credits: 4.00
The attempted destruction of European Jewry during the Third Reich is one of the pivotal events in the history of modern Western Civilization. This course explores the circumstances and behavior of the Jews (as victims, resistors, survivors), the perpetrators (German and non-German), bystanders (German, European, and American), and rescuers (German and non-German). Attention is also given to such post-1945 matters as justice, compensation, and memory.

HIST 803 - European Conquest of North America
Credits: 4.00
A study of the social consequences of colonization, migration, and war in America, 1500-1775. Emphasis on the interaction of British colonists with competing European cultures (French, Dutch, Portuguese, and Spanish), with Native Americans, and with African and Afro-American slaves.

HIST 804 - History of Medicine in the United States
Credits: 4.00
Have you been a patient, a nurse, or a holder of insurance? Almost everyone in the United States has a role in health care. We study the growth and development of the field of American medicine from colonial times to the present, examining the changing relationships between patients, health care professionals, technology, government, and others. The focus will be shifts in responsibility and authority over time from patients, to doctors, and even to businesses.

HIST 805 - Revolutionary America, 1750-1788
Credits: 4.00
Examines the social, political, and cultural transformation of thirteen British colonies into the United States, up to the adoption of the Constitution.

HIST 806 - History of the Early Republic
Credits: 4.00
Explorations in the histories of people and institutions that transformed the new United States from a coastal republic of largely independent freeholders to a transcontinental democracy increasingly driven by class. Topics include slavery, the family, reform movements, and the formulations of national identity.

HIST 809 - United States Legal History Special Topics
Credits: 4.00
In-depth thematic exploration of the role of law in American life. Topics include Race and Equality in

American Law; Community, Pluralism, and American Law; Property, Liberty, and Law; Gender and Law. May be repeated for credit with instructor's permission. Consult department listing for topics.

HIST 811 - Civil War Era
Credits: 4.00
A survey of the period from the presidency of Andrew Jackson to the end of the Reconstruction, focusing on the causes, course, and consequences of the Civil War. Topics include slavery in the Old South, antebellum reform movements, creation and breakdown of the Second Party System, social and economic (as well as military) events during the war, and major developments during Reconstruction after the war.

HIST 812 - Emergence of Industrial America
Credits: 4.00
Investigates the economic transformation of 19th-century America from a rural, agricultural to an urban, industrial society. Explores the sweeping economic changes, focusing on such topics as changes in work and leisure, westward expansion and its effects on native Americans, shifts in gender roles, growth of a consumer culture, rise of labor unions and populism, immigration, movements for reform and regulation, growth of American imperialism, and intellectual developments.

HIST 813 - American Ways of War
Credits: 4.00
"Is there an American way of war?" This commonly asked question will be the focal point of the course. To answer that we will study the interactions of both war and society in the United States from the Civil War onwards, addressing such issues as the causes, courses, diplomacy, homefront, legacy, and the art of the great and small wars.

HIST 815 - United States Progressivism to the New Deal
Credits: 4.00
United States from 1900 to 1941; cultural, political, and social factors causing major changes in American life.

HIST 816 - United States Since World War II
Credits: 4.00
United States since 1941; cultural, political, and social factors causing major changes in American life.

HIST 817 - Vietnam War
Credits: 4.00
An advanced interdisciplinary study of the American experience in Vietnam which uses fiction, film, music, and historical analysis to examine such matters as how and why the United States became involved in Vietnam, went to war there, and failed to win, as well as the consequences and legacies of that fateful conflict. It is strongly suggested that students first complete courses in modern American history.

HIST 818 - American Environmental History
Credits: 4.00
This course examines how nature has been a factor in American history and how Americans have wrestled with the concepts of nature and culture. Topics include industrialization, evolution, conservationism, environmentalism, and environmental diplomacy.

HIST 819 - Foreign Relations of the United States
Credits: 4.00
The history of American diplomacy from the colonial era to the present, with the dividing point at 1900. The focus will be on both the foreign and domestic influences that shaped American diplomacy.

HIST 820 - Foreign Relations of the United States
Credits: 4.00
The history of American diplomacy from the colonial era to the present, with the dividing point at 1900. The focus will be on both the foreign and domestic influences that shaped American diplomacy.

HIST 821 - History of American Thought
Credits: 4.00
Advanced study in the history of American thought. Significant American thinkers considered in their social context. 1600-1860.

HIST 822 - History of American Thought
Credits: 4.00
Advanced study in the history of American thought. Significant American thinkers considered in their social context. 1860-present.

HIST 824 - Topics in Modern United States Social History
Credits: 4.00
Advanced study of topics in U.S. social history since the Age of Jackson. Topics will vary; and may include such examples as slavery and the antebellum South; reform movements in U.S. history; family history; labor history; the impact of war on American society; race in recent U.S. history. May be repeated as topics change.

HIST 825 - Southern History and Literature since the Civil War
Credits: 4.00
Equal focus on the history and literature of the South since the Civil War. Topics include reconstruction, the age of segregation, and the Civil Rights Movement. Literary focus is on the period since 1920, including the "Southern Renaissance"; authors include William Faulkner, Robert Penn Warren, Flannery O'Connor, and Zora Neale Hurston.

HIST 832 - Topics in Latin American History
Credits: 4.00
Topics vary (see department listing for current semester). Seminar involves reading, discussion, and research on literature and documents related to the selected topic. It provides students with the opportunity to do research under close direction.

HIST 833 - Medieval England 800-1300
Credits: 4.00
The purpose of this course is to provide students with an opportunity to gain an in-depth understanding of the history of medieval England from the beginning of the period of consolidation under the Wessex dynasty in the ninth-century through the end of the thirteenth century. In addition to obtaining a large corpus of information through the reading of significant monographs dealing with England during this period, students will be challenged to develop the critical analytical skills necessary for the thorough understanding and practice of historical methodologies, with a particular focus on the practice of historical method in writing medieval history. Finally, students will be given the opportunity to improve their communication skills through extensive class discussions dealing with the scholarly works read for this course, and in writing assignments.

HIST 834 - Medieval Empires
Credits: 4.00
This course will explore the intellectual and political foundations of imperial rule in the Middle Ages with a particular focus on the Carolingian, German, and Byzantine empires of the early and high Middles Ages. The course will begin with the development of the idea of empire under Alexander the Great and then

during the Roman empire. The course will then turn to an examination of how the rulers of the three great empires of the western Middle Ages adapted the classical ideas and practices of empire for their purposes. The course focuses on sources. Background material will be provided in short lectures.

HIST 840 - Holy War in the Holy Land: The Medieval Crusades
Credits: 4.00
Survey of medieval military expeditions organized by Christians to secure the Holy Land during the 12th and 13th centuries. Topics considered include the formulation of a "just war" theory, political, intellectual, religious, and military interactions between Christians, Jews, and Muslims; the Crusader State of Jerusalem; and the histories of individual crusades.

HIST 841 - Europe After the Black Death
Credits: 4.00
Explores the dramatic changes that characterized Western Europe as it rebounded in the fifteenth through the seventeenth centuries from the ravages of the Black Death of 1348. Examines the social, political, and artistic developments in late medieval and Renaissance Italy before "crossing the Alps" to trace the expansion of Renaissance culture in Northern Europe. Topics covered in the course include the humanist movement, new patterns of social organization, the revival of classical antiquity in the arts, architecture, religion and political theory, the effects on European society of the encounter with the "New World," shifting roles for men and women in early modern European societies, and religious war and conflict.

HIST 842 - Saints, Sinners, and Heretics: Europe in the Age of Religious Reform
Credits: 4.00
Examines the history of Western Christendom from roughly 1400 to 1600, a period od tumultuous religious change throughout Europe. We begin in the Middle Ages where the seeds of religious division were sown. We then tackle Martin Luther's challenge to the Catholic church, trace the diffusion of his message throughout Europe, and address the Catholic response to the evangelizing movements that he inspired. Finally we investigate some of the regional varieties of Protestantism that developed in the latter half of the sixteenth century with a particular focus on Switzerland, Germany, England, Scotland, France, and the Netherlands.

HIST 844 - Victorian Britain
Credits: 4.00
The Victorian Era was a time of contrasts. Upon the throne sat Queen Victoria, a monarch known for her moral uprightness, sexual probity and rigid sense of decorum. The streets of London, however, teemed with prostitutes, pickpockets and impoverished Irish immigrants whose lives seemed untouched by either the prosperity or moral stringency that characterized the age. In this class we will explore the varieties of Victorian experience both at home and in the global empire Britain had amassed during the nineteenth century. Examining sources such as the novels of Charles Dickens, the decorative arts of William Morris, and the scientific writings of Charles Darwin, we will attempt to uncover the many-faceted culture, society and political life of Victorian Britain. The instructor will place a strong emphasis on reading, class participation and writing.

HIST 845 - 19th Century European Great Powers - Diplomacy and International Law
Credits: 4.00
In this lecture and discussion class, we will study Europe during the apogee of that region's strength, emphasizing events such as the creation of Italy, the Scramble for Africa, and the Hague Convention efforts to limit war. To do so, we will focus on those who wielded power, including deal-makers, deal-breakers, manipulators, and idealists like Napoleon, Bismark, and Gladstone. Examining the interactions of these people and events illuminates international law as well as traditional diplomacy.

HIST #847 - Early Modern France

Credits: 4.00
An exploration of the culture and politics of early modern French society. Popular culture, religion, gender relations, the family, state-building, political theory, and revolution will be emphasized. Primary documents in translation will be read and discussion encouraged.

HIST 848 - Modern France
Credits: 4.00
Advanced study of French society from Napoleon to Mitterand, including the Revolution of 1848 and the Paris Commune; world wars and the Vichy regime; existentialism, DeGaulle, and the revolt of May-June 1968.

HIST 849 - Comparative Topics in the History of Early Modern Europe
Credits: 4.00
Topics will vary, but may include enlightenment and revolution; the peasantry; gender and the family; crime and deviance; science and society. May be repeated for a maximum of 8 credits.

HIST 851 - Topics in European Intellectual History
Credits: 4.00
Explores major developments such as the Enlightenment, Russian intellectual history, ancient world views and cosmologies, and the relationship between gender and intellectual history. Includes topics up to the Scientific Revolution. Because topics may vary, students should check the department newsletter or office for course theme in any given term. May be repeated for credit as topics change.

HIST 852 - Topics in European Intellectual History
Credits: 4.00
Explores major developments such as the Enlightenment, Russian intellectual history, ancient world views and cosmologies, and the relationship between gender and intellectual history. Includes topics since the Renaissance. Because topics vary, students should check the department newsletter or office for course themes in any given term. May be repeated for credit as topics change.

HIST 854 - Topics in History of Science
Credits: 4.00
Study of a selected topic in the history of European science since the Renaissance.

HIST 856 - 20th Century Europe
Credits: 4.00
Advanced study of 20th-century Europe. World War I, European totalitarianism, World War II, the loss of European primacy, and the search for a new Europe.

HIST 862 - England in the Tudor and Stuart Periods
Credits: 4.00
Advanced study of England during the Tudor and Stuart periods. Political, religious, socioeconomic, and intellectual forces for change at work in England from the accession of Henry VII to the revolution of 1688-89.

HIST 864 - Russia: Modernization through Soviet Empire
Credits: 4.00
The challenges of modernization; experience and legacy of Leninist and Stalinist revolutions; Soviet consolidation and decline through the Gorbachev era.

HIST 865 - Themes in Women's History
Credits: 4.00

In-depth examination of a selected topic in women's history, such as women and health, women in modern European political theory, comparative history of women and revolution. See "Time and Room Schedule" or department for specific topic. May be repeated for credit with permission of instructor.

HIST 866 - Environmental History of Northwest Atlantic Commercial Fisheries
Credits: 4.00
After centuries of ground-fishing humans have radically transformed the northwest Atlantic marine ecosystem, creating a tragedy for both fish and fisherman. This marine environmental history course considers the changing technology, ecology, and sociology of the commercial fishery off New England and the Canadian maritime from 1500 to the present.

HIST 869 - Germany from 1918 to Present
Credits: 4.00
Begins with the revolution of 1918 and then explores the political, social, and intellectual character of the Weimar Republic, the rise and nature of Nazism, the Holocaust, the foundation of both the German Democratic Republic and Federal Republic and their evolution in the shadow of the Cold War, and concludes with the unification of Germany after the fall of the Berlin Wall in 1989.

HIST 871 - Museum Studies
Credits: 4.00
Introduction to theory, methods, and practice of museum studies. Examination of various museum functions, as well as historical controversies. Prereq: graduate students only.

HIST 872 - Studies in Regional Material Culture
Credits: 4.00
An introduction to the theory and methodology of material culture, that is, the study of history through the analysis of buildings, human-created landscapes, and artifacts made and used in the United States, particularly in New England. May be repeated for credit with the permission of the graduate director.

HIST 873 - Early History of Ancient Greece
Credits: 4.00
Greek history from the Minoan and Mycenaean eras through the Persian Wars of the early fifth century. Emphasis on original sources including the Homeric epics, Plutarch, Sappho, and Herodotus. Examination of the distinctive developments of political systems in Sparta, Athens, as well as issues of colonization, diplomacy, religion and culture. Through discussion of types of available evidence and their integration into historical understanding.

HIST 874 - Historiography
Credits: 4.00
Analysis of ancient and modern historians. (Not offered every year.)

HIST 875 - Historical Methods
Credits: 4.00
Introduction to contemporary historical methods. Required of all entering Ph.D. candidates; open to undergraduates with permission.

HIST 876 - Classical and Hellenistic Greek Worlds
Credits: 4.00
Greek History from the Persian Wars of the early fifth century through the life of Alexander the Great and the creation of the Hellenistic world. Emphasis on original sources including Herodotus, Thucydides, the Athenian playwrights, and Plato. Examination of the transformation from city-state political organization to large Hellenistic kingdoms, as well as discussion of Greek historiography, intellectual life, and social theory.

Thorough discussion of types of available evidence and their integration into historical understanding.

HIST 877 - Roman Republic
Credits: 4.00
Covers pre-Roman Italy, the Etruscans, and the foundation of the Republic. Rome's expansion through the Punic Wars, and relations with the Hellenistic kingdoms. Disintegration and final collapse of the Republic. Includes discussion of Roman art, engineering, and political theory. Emphasis on Latin sources in philosophy, history, and literature.

HIST 878 - Roman Empire
Credits: 4.00
Collapse of the Roman Republic and creation of the Augustan principate through the division of the empire, with discussion of the fall of Rome in the west, and the eastern empire through Justinian. Discussion of Roman art, literature, philosophy, religious developments such as the proliferation of mystery religions and the rise of Christianity.

HIST 879 - Workshop in History and Historical Methods
Credits: 1.00 to 6.00
Workshop for teachers in History. Intensive work designed to introduce teachers to advanced current work in history. Topics vary. May be repeated with permission of the instructor or the graduate director in the history department.

HIST 880 - Special Topics in Museum Studies/Material Culture
Credits: 4.00
Study of a selected topic related to museum studies or material culture. May be repeated for course credit with permission of the graduate director.

HIST 881 - Topics History of Modern China
Credits: 4.00
Problems in modern Chinese history from 1800 to the present. Topics may vary. Students will read translated primary sources, analyze literary works, and write critical essays and a research paper.

HIST 884 - History of Southern Africa since 1652
Credits: 4.00
Struggle for political and economic control in the only region of Africa where European groups remain in power. Impact of European imperialism, European nationalism, racial conflict, economic competition and industrialization, apartheid, and assimilation with special attention to the development of European hegemony.

HIST 888 - African Religions
Credits: 4.00
Introduction to the basic principles of African religions. Exploration of historical and recent developments in the study of religion in Africa. Taking an interdisciplinary approach, the course focuses on the place of religion in African societies. The interrelatedness of religion with issues such as myth, ritual, gender, economics, social process, illness and healing the kingship and power, will be examined. Particular attention will be paid to the experience and expressions of African religions in the Americas, as well as the history and impact of Islam and Christianity in Africa. The course is aimed at helping students to understand what is typical about religion, and special about African religion, while appreciating the role of religion in non-Western societies. Slides, films, maps and other visual aids will be used to supplement the readings and provoke further discussion.

HIST 892 - Seminar in the History of Science

Credits: 4.00
In-depth examination of a selected topic in the history of science. Subjects vary. No special background in science required.

HIST 897 - Colloquium
Credits: 4.00
Selected topics in American, European, and non-Western history. Required of history majors. Students must elect section in the department office at the time of registration. Prereq: Intro to Historical Thinking.

HIST 898 - Internship in Museum Studies
Credits: 4.00
Supervised position with a museum, historical society, archive, or other history related site. May be repeated for a total of 16 credits. Prereq: permission. Credit/Fail.

HIST 899 - Master's Thesis
Credits: 1.00 to 6.00
May be repeated up to a maximum of 6 credits. Cr/F.

HIST 939 - Readings in Early American History
Credits: 3.00
Introduces the chief themes and issues in the secondary literature of early American history from European settlement through the Early Republic. Students write a series of short analytical papers. Expected of all graduate students preparing a field in Early America.

HIST 940 - Readings in Modern American History
Credits: 3.00
An introduction to major historians and historiographical issues in the history of the U.S. since 1820. Intended to serve as a foundation for research in the field and as preparation for graduate examinations.

HIST 949 - Colloquium in United States History
Credits: 3.00
Topics include 1) Early American Society; 2) Early American Culture; 3) Revolutionary Period; 4) 19th Century; 5) 20th Century. Focuses on existing historical literature on a given topic, such as American slavery. Students normally read extensively, discuss major issues and the literature in class meetings, and write essays that examine the literature critically.

HIST 951 - Colloquium in European History
Credits: 3.00
Topics include 1) Medieval; 2) Early Modern; and 3) Modern. The course focuses on the existing historical literature on a given topic, such as the French Revolution. Students normally read extensively, discuss major issues and the literature in class meetings, and write essays that examine the literature critically. May be repeated if a different topic is selected.

HIST 952 - Colloquium in Comparative History
Credits: 3.00
Intensive reading in comparative studies of U.S. history. Compares the experience of the United States and that of some other area or nation. For example, comparing legal history of Britain and the U.S.; the impact of colonization on native peoples in North and South America; the nature of slavery in the U.S., the Caribbean, and Brazil; or the experience of women in Europe and America. Topics vary and may be repeated with permission.

HIST 953 - Colloquium in African, Asian, Latin American History

Credits: 3.00
Topics include 1) African; 2) Asian; 3) Latin American; 4) Middle Eastern. Focuses on the existing scholarly historical literature on a given topic, such as nationalism or slavery. Students normally read extensively, discuss major issues and the literature in class meetings, and write essays that examine the literature critically.

HIST 970 - Graduate Seminar in Teaching History
Credits: 1.00
Introduction of fundamental issues in the teaching of history at the college level. Topics include basic pedagogical issues, such as leading effective discussions, evaluating students' work, and lesson planning, and also concerns related to history teaching, e.g., developing students' historical consciousness, use of media, and so forth. Required of all entering Ph.D. students and applicable to the Cognate in College Teaching. Course to be taken in the Fall and then repeated in Spring for a total of two credits. (Also offered as GRAD 981.) Cr/F.

HIST 989 - Research Seminar in American History
Credits: 3.00
1) Early American Society; 2) Early American Culture; 3) Revolutionary Period; 4) 19th Century; 5) 20th Century. Focuses on original research on a given topic using primary materials supplemented by secondary works. The objective is to produce a major research paper that might serve as the basis for a publishable article. May be repeated with a different topic.

HIST 990 - Research Seminar in American History
Credits: 3.00
1) Early American Society; 2) Early American Culture; 3) Revolutionary Period; 4) 19th Century; 5) 20th Century. Focuses on original research on a given topic using primary materials supplemented by secondary works. The objective is to produce a major research paper that might serve as the basis for a publishable article. May be repeated with a different topic.

HIST 991 - Research Seminar in European History
Credits: 3.00
1) Medieval; 2) Early Modern; 3) Modern. Focuses on original research on a given topic using primary materials supplemented by secondary works. The objective is to produce a major research paper that might serve as the basis for a publishable article. May be repeated with a different topic.

HIST 992 - Research Seminar in Comparative History
Credits: 3.00
Comparative studies of U.S. history, emphasizing primary research. Colloquium compares the experience of the United States and that of some other area or nation. For example, comparing the legal histories of Britain and the U.S.; the impact of colonization on native peoples in North and South America; the nature of slavery in the U.S., the Caribbean, and Brazil, or the experiences of women in Europe and America. Topics vary, and the course may be repeated for credit.

HIST 993 - Research Seminar in African, Asian, Latin American History
Credits: 3.00
1) African; 2) Asian; 3) Latin American; 4) Middle East. Focuses on original research on a given topic using primary materials supplemented by secondary works. The objective is to produce a major research paper that might serve as the basis for a publishable article. May be repeated with a different topic.

HIST 994 - Research Seminar in African, Asian, Latin American History
Credits: 3.00
1) African; 2) Asian; 3) Latin American; 4) Middle East. Focuses on original research on a given topic using

primary materials supplemented by secondary works. The objective is to produce a major research paper that might serve as the basis for a publishable article. May be repeated with a different topic.

HIST 995 - Tutorial Reading and Research
Credits: 1.00 to 6.00
A) Early American History; B) American National History; C) Canada; D) Latin America; E) Medieval History; F) Early Modern Europe; G) Modern European History; H) Ancient History; I) Far East and India; J) Near East and Africa; K) European Historiography; L) American Historiography; M) Russia; N) World History; O) English History; P) New Hampshire History; Q) Historical Methodology; R) Irish History; S) History of Science; T) Maritime; U) Museum Studies. May be repeated up to a maximum of 12 credits. Prereq: permission.

HIST 997 - Directed Readings in Early American History
Credits: 1.00 to 6.00
Directed readings in Early American History. Supervised readings for students preparing for the Ph.D. examinations in Early American History.

HIST 998 - Directed Readings in Modern United States History
Credits: 1.00 to 6.00
Supervised readings for students preparing for Ph.D. examinations in Modern U.S. History.

HIST 999 - Doctoral Research
Credits:
Cr/F.

Health Management & Policy

HMP #810 - Financial Management for Clinicians

Credits: 3.00

Includes basic elements of health care financial management and cost accounting, including cost concepts and product costing, budgeting, and variance analysis with an emphasis on the departmental level of health care organizations. Contains an overview of basic principles of accounting, focusing on the balance sheet and statement of revenues and expenses to include their analysis using the tools of ratio analysis. Concludes with the basic concepts of capital project analysis and health care reimbursement. Prereq: enrollment in nursing master's program; HMP majors and MBA students not allowed. Permission.

HMP 975 - Praxis

Credits: 1.00 to 3.00

An applied experience consisting of field study and the development of management or policy case studies and supporting analysis to explore the relationship between theory and professional practice. Cr/F. IA (Continuous grading).

HMP 995 - Independent Study

Credits: 1.00 to 3.00

Directed readings and other activities to explore a specific topic related to health management and policy. May be repeated to a maximum of 12 credits. Prereq: permission.

Computing Technology

COMP 805 - Web Application Development
Credits: 3.00
Students work in teams and implement, test, document, demonstrate, and deploy web systems that solve organizational needs expressed by real clients. Emphasis is on advanced server-side and client-side programming and integration of web applications with database and web server applications. Free and open source development and communication tools are used to carry out the course project

COMP 815 - Information Security
Credits: 3.00
Topics include general security principles and practices, network and system security, access control methodology, and cryptography. Students develop a basic cryptographic system based on sound mathematical principles, elaborate on its features and refine it, and experiment with various ways to attack it. Some programming required.

COMP 825 - Networking Technologies
Credits: 3.00
Introduces advanced topics in computer networks. The focus is on principles, architectures, and protocols used in modern networked systems, such as routing, quality of service, wireless and mobile networks, large-scale peer-to-peer systems, virtualization, and cloud computing. Students analyze tradeoffs in large and complex networks and design and evaluate networked systems. Concrete experiences of these learning activities are provided through lab and online exercises.

COMP 830 - Object-Oriented Software Development
Credits: 3.00
Presents an iterative methodology for developing software systems. Development activities include requirements elicitation and analysis, system and object design, implementation and testing, project and configuration management, infrastructure maintenance, and system deployment to the end user. Students work in teams, assume developer roles, build models of a real-world system, and produce proof-of-concepts, prototypes, or system upgrades.

COMP 831 - Systems Integration and Architecture
Credits: 3.00
Students work in teams to explore and practice various system integration techniques to address requirements, software and hardware acquisitions, integration issues, and acceptance testing. Specific focus is given to diagnosing and troubleshooting systems interoperability and interface integration issues. Students develop project plans and study the influence of business processes and culture on system architecture decisions. Studied techniques are compared and contrasted to derive lessons learned, best practices, and critical success factors.

COMP 835 - Networking Technologies
Credits: 3.00
Introduces advanced topics in computer networks. The focus is on principles, architectures, and protocols used in modern networked systems, such as routing, quality of service, wireless and mobile networks, large-scale peer-to-peer systems, virtualization, and cloud computing. Students analyze tradeoffs in large and complex networks and design and evaluate networked systems. Concrete experiences of these learning activities are provided through lab and online exercises.

COMP 851 - Systems Integration and Architecture
Credits: 3.00
Students work in teams to explore and practice various system integration techniques to address requirements, software and hardware acquisitions, integration issues, and acceptance testing. Specific focus is given to diagnosing and troubleshooting systems interoperability and interface integration issues. Students develop project plans and study the influence of business processes and culture on system architecture decisions. Studied techniques are compared and contrasted to derive lessons learned, best practices, and critical success factors.

COMP 890 - Internship
Credits: 1.00 to 3.00
The internship experience enhances the student's academic achievements with real-world, professional IT projects through placement at business, industry, and other sponsoring organizations. The student is expected to apply knowledge and skills acquired through other coursework in the major to address and solve new, authentic problems identified by the internship employer. Under the direction of a faculty advisor and workplace supervisor, the student is expected to contribute to the information technology products, processes, or services of the organization. May be repeated for a maximum of 6 credits. Permission required. Cr/F.

COMP 895 - Independent Study
Credits: 1.00 to 3.00
Advanced individual study under the direction of a faculty mentor. Content area to be determined in consultation with faculty mentor. Prereq: permission. May be repeated.

COMP 898 - Master's Project
Credits: 3.00
Guided project on a topic which has been approved as a suitable subject for a master's project. Supervision and advising by faculty in the Computing Technology program. Completion of 24 credits in the major.

COMP 899 - Master's Thesis
Credits: 1.00 to 6.00
Guided research on a topic which has been approved as a suitable subject for a master's thesis. Supervision and advising by faculty of the Computing Technology program. Cr/F.

Integrated Applied Mathematics

IAM 830 - Graduate Ordinary Differential Equations
Credits: 3.00
Course is a graduate-level course on ordinary differential equations. It is designed to be accessible to first-year graduate students from math, science or engineering backgrounds who have had a first undergraduate course in differential equations, along with a standard calculus sequence. The course is designed to begin with an intensive review of undergraduate differential equations and then will proceed to handle more advanced concepts, starting with multi-dimensional coupled systems of ordinary differential equations, exponential matrix solutions, using coordinate transformations for conversion to standard forms, nonlinear systems and transform-based solutions, using coordinate tranformations for conversion to standard forms, nonlinear systems and transform-based techniques. The course will have an interdisciplinary and applied style and will cover the following topics: Intense review of undergraduate differential equations, Power Series and Fourier Series solutions, Multi-dimensional D.E.s, eigenvectors and Jordan forms, Numerical Methods, Nonlinear D.E.s Dynamical Systems and Chaos.

IAM 851 - Introduction to High-Performance Computing
Credits: 3.00
Course gives an introduction to select areas of high-performance computing, providing a basis for writing and working with high-performance simulation codes. The three main topics are: 1) basic software engineering, 2) high-performance and parallel programming, and 3) performance analysis and modeling. Additional topics may include hetergeneous architectures like GPUs and data analysis/visualization. Prereq: Enrollment in a CEPS graduate program, MATH 753, working knowledge of a programming language (C or Fortran), or by permission of instructor.

IAM 932 - Graduate Partial Differential Equations
Credits: 3.00
Graduate level introduction to the analysis of linear and nonlinear partial differential equations. topics include: seperation of variables, Fourier series, weak and strong solutions, eigenfunction expansions, the Strum-Liouville problem, Green's functions and fundamental solutions, method of characteristics, and conservation laws. Prereq: Ordinary Differential Equations and Linear Algebra.

IAM 933 - Applied Functional Analysis
Credits: 3.00
Introduction to rigorous mathematical analysis from the perspective of applications. Topics include: metric and normed spaces; convergence; completeness; continuity; Lebesgue measure theory; convergence theorems; Banach, Hilbert, Lp, and Sobolev spaces; orthogonality, bases, and projections; Sturm-Liouville theory; spectral theory; distributions; and weak solutions. Applications including to differential and integral equations, are presented throughout. Prereq: real analysis or graduate introductory courses in mathematical physics or applied mathematics.

IAM 940 - Asymptotic and Perturbation Methods
Credits: 3.00
Introduction to the asymptotic analysis of linear and nonlinear algebraic equations, ODEs, and PDEs and the to asymptotic approximation of integrals arising as transform solutions to ODEs/PDEs. Topics include: algebraic equations and dominant balance; asymptotic approximations; complex variable theory and the asymptotic evaluation of integrals via Laplace's method, stationary phase, and steepest descents; the method of matched asymptotic expansions (boundary-layer theory), coordinate straining, multiple scales,

averaging, homogenization theory, and WKBJ analysis for singularly perturbed ODEs and PDEs. Prereq: MATH 527, 528, 644 or equivalent. Pre- or Coreq: PHYS 931.

IAM 950 - Spatiotemporal and Turbulent Dynamics
Credits: 3.00
Advanced graduate course on the dynamics od spatitotemporal patterns in nonlinear time-dependent PDEs. Topics include nonlinear pattern formation, bifurcationsa ans symmetry, nonlinear WKB analysis, phase diffusion/amplitude modulation theory, unstable coherent structures in turbulence, and periodic orbit theory. Example systems include 1d and 2d Swift-Hohenberg equation, the 1d Kuramoto-Sivashinsky equation, Rayleigh-Benard convection, and Navier-Stokes in plane Couette and pipe flows. Prereq: MATH 847 and IAM 932, or equivalent; or permission.

IAM 961 - Numerical Analysis I: Numerical Linear Algebra
Credits: 3.00
Introduction to numerical analysis and computational methods for linear systems. Topics include: IEEE floating point arithmetic; vector norms and induced norms; conditioning; projectors; LU decompositions; pivoting; Cholesky factorization; QR decompositions; Gram-Schmidt orthogonalization; Householder triangularization; Singular Value decompositions; least squares problems; stability; eigenvalue problems; power iterations; QR alogorithm; Krylov methods; Arnoldi iteration; GMRES; Lanczos iteration; Conjugate gradient algorithms; and Preconditioning. Prereq: scientific programming and linear algebra.

IAM 962 - Numerical Partial Differential Equations
Credits: 3.00
Numerical analysis applied to partial differential equations. Initial topics include the implementation of finite difference and spectral methods applied to the heat equation, wave equation, Burger's equation, and other model equations. The remainder of the course treats numerical analysis, starting with a brief review of function spaces. The primary topics include approximation theory for Sobolov spaces, projection operators, completeness, convergence, and error estimates. Prereq: IAM 961 or permission.

Justice Studies

JUST 830 - Theories of Justice
Credits: 4.00
The idea of justice is central to social, political, and legal theory. Considerations of justice are appealed to in assessing the legitimacy of governments, the fair distributions of goods and opportunities both with nation-states and globally, and to address specific social concerns such as racial or gender discrimination or access to health care. Course examines both historical sources and contemporary debates about the nature of justice.

JUST 865 - Special Topics
Credits: 4.00
New or specialized courses are presented under this listing. Staff present material not normally covered by the course offerings. Cross-listed courses. May be repeated but not duplicate content.

JUST 897 - Culminating Project
Credits: 4.00
Students conduct a project related to their internship under the supervision of a faculty member. Projects might include an evaluation of a community policing program, interviews with battered women in a shelter, or a survey of corporal punishment. Prereq: JUST 901, 905 or 906, 907. May be repeated up to a maximum of 4 credits. Cr/F.

JUST 899 - Masters Thesis
Credits: 1.00 to 8.00
Students conduct a masters thesis under the supervision of three graduate faculty members. Thesis projects might include an intervention study to reduce delinquency, a study of immigration law in the 1920s, or a survey of hate crimes. Prereq: JUST 901, 905 or 906, 907. May be repeated up to a maximum of 8 credits. Cr/F.

JUST 901 - Pro-seminar: Introduction to Justice Studies
Credits: 4.00
Provides students with an introduction to Justice Studies and its faculty. Interdisciplinary study of informal and formal social organization and conflict resolution. Emphasis on law in practice and how individuals operate within and against the system of law. Topics include social order, crime and punishment, security and surveillance, and sharing/assessing risk.

JUST 905 - Quantitative Research Methods
Credits: 4.00
Introduction to the major quantitative methods used by criminologists and justice researchers. Focuses on methods which illuminate causes of crime and justice. Covers all aspects of the research process including conceptualization, design, sampling, data analysis, and dissemination of results. Does not assume prior statistical knowledge.

JUST 907 - Applied Research Methods
Credits: 4.00
This is the second course in the Justice Studies graduate program sequence on research methods and it focuses on how to conduct applied research in the Justice Studies field including how to use quantitative methods in more applied settings and specific research tools frequently used in applied settings (e.g.

qualitative methods and program evaluation). Students will work on a class research project as well as their own individual projects.

JUST 950 - Internship
Credits: 4.00
Field experience internships in a variety of justice settings including courts, law enforcement and victim services. Includes weekly seminar. Prereq: JUST 901. Cr/F.

JUST 951 - Research Internship
Credits: 4.00
Research experience internships in research centers on campus such as Justiceworks, Crimes Against Children, and Family Research Lab or with individual researchers on campus who conduct justice-related research. Cr/F.

JUST 965 - Special Topics
Credits: 4.00
New or specialized courses are presented under this listing. Staff present material not normally covered by the course offerings. Cross-listed courses. May be repeated for a maximum of 16 credits, but not duplicate content.

JUST 995 - Reading and Research
Credits: 1.00 to 4.00
A) Criminology; B) Law and Society; C) Law and Psychology; D) Philosophy of Law; E) Courts. The students does independent work under the supervision od a faculty member. The student may plan (1) broad reading in an area; (2) intensive investigation of a special problem; or 3) empirical testing on a particular question. May be taken for 1-4 credits. This course is by permission only and requires a signed agreement/proposal prior to registration. Prereq: JUST 901.

Kinesiology

KIN 804 - Electrocardiography
Credits: 4.00
This course is designed to provide students exposure regarding basic interpretation and identification of electrocardiograms (ECGs). Included in this is detailed heart anatomy, coronary circulation, cardiac conduction system, electrocardiogram development, and all aspects pertaining to normal and abnormal ECGs. Open to Kinesiology majors only.

KIN 805 - Topics in Applied Physiology
Credits: 4.00
Advanced exercise physiology course dealing with topics both current and relevant to exercise science majors. Includes: genetics, environmental influences, immune system, detraining and over-training, epidemiology, ergogenic aids and the influence of age and gender. Special fee.

KIN 806 - Neurology
Credits: 4.00
A detailed study of the development, morphology, internal configuration, physiology, histology, function, and pathology of the human nervous system. Labs consist of clinical case studies, brain dissections, and videos/slides to enhance the understanding of material. Prereq: human anatomy and physiology. Special fee. Lab.
Co-requisites: KIN 807

KIN 807 - Neurology Lab
Credits: 2.00
Basic histology, neuroanatomy and neurophysiology of the human nervous system. Use of brain specimens, videos and pathology case studies to elucidate cell structure, sensory and motor systems, and spinal cord, brainstem, and cortical organization and anatomy. Prereq: ZOOL 507-508 or COMM 521 or equivalent. Cr/F.
Co-requisites: KIN 806

KIN 824 - Exercise Metabolism: Acute and Chronic Adaptations
Credits: 4.00
An overview of the metabolic processes that occur during exercise and metabolic changes that occur as a result of exercise training. Topics covered include glycogenolysis and glycolysis in muscle, cellular oxidation of pyruvate, lipid metabolism, metabolism of proteins and amino acids, neural and endocrine control of metabolism, and fatigue during muscular exercise. Prereq: physiology of exercise and general chemistry.

KIN 831 - Inclusive Teaching Through Sport
Credits: 4.00
This course examines the use sports, including disability sports such as boccia, sit-volleyball, goalball and wheelchair basketball as a program of instruction for individuals of all abilities. The course adopts a holistic approach to inclusion that examines best practices within sepcific contexts. The medical, social, and relational models of disability are used as a format for discussion and the inclusion spectrum is adopted as the underlying format for instruction.

KIN 836 - Fitness and Graded Exercise Test and Prescription

Credits: 4.00
This course is designed to provide students exposure to the knowledge and practical experience necessary for establishing exercise programs in apparently healthy populations. Topics include fitness testing, test interpretation, and exercise prescription. Prereq: KIN: Exercise Science major. Special fee.

KIN 840 - Athletic Administration
Credits: 4.00
Introduces basic management components and processes used in the successful administration of school and college athletic programs. Topics include planning, organizing, and managing sports programs, personnel and policies; game scheduling; finances and facilities; equipment and event management; student services; and key legal issues. Prereq: permission.

KIN 841 - Social Issues in Contemporary Sports
Credits: 4.00
An investigation into interrelationships among sport, culture, and society in an attempt to understand better the role and function of sport in contemporary society. Broad overview of selected socio-cultural factors that influence participation and result from participation in sports. Prereq: introduction to sociology or permission.

KIN 842 - PE Practicum for Students with Disabilities
Credits: 4.00
This experience is part of the required coursework for the Adapted Physical Education (PE/APE) certificate through the Graduate School. As a bi-weekly seminar intergrates the field experience with general physical education (GPE) and adapted physical education (PE/APE) concepts through class discussion, exercises, readings, and written assignments. The seminar format provides an opportunity for refinement and continued development of teacher skills and attributes for working with students with disabilities. Students learn to instruct effectively, to participate in the Individual Education Plan (IEP) process, and to manage their time.

KIN 843 - Sport Marketing
Credits: 4.00
A survey of concepts and processes used in the successful marketing of sport programs and events. Special emphasis placed on the unique or unusual aspects of sport products, markets, and consumers. Prereq: survey of marketing and methods or permission.

KIN 865 - Advanced Topics in Coaching
Credits: 4.00
This course goes beyond the basic principles of coaching and addresses advanced topics in coaching (talent identification, talent development) from both the science and the art of coaching technique and strategies. This course is structured as an upper division course in Sports Studies. Content includes topics related to the development of the field of coaching. The class makes extensive use of case studies and analysis of practical coaching situations for the betterment of coach development. This course combines lecture, small group discussion and practical application of material. Prereq: KIN 565.

KIN 880 - Psychological Factors in Sport
Credits: 4.00
Factors of outstanding athletic achievement; psychological variables in competition; the actions and interactions of sport, spectator, and athlete. Special attention to directed to strategies for coaches, teachers, and athletic trainers to utilize sport psychology in their professional practice. Prereq: introduction to psychology.

KIN 881 - Inclusion in Physical Education

Credits: 4.00
Overview of special physical education. Addresses modifying instruction, expectations, and learning environment to accommodate physical and motor behaviors of students with disabilities. Prereq: KIN P.E. Pedagogy majors. Lab.

KIN 882 - Therapeutic Applications of Adventure Programming
Credits: 4.00
A study of theory, practice, and research of adventure experiences in therapeutic settings. Incorporates theoretical seminars and associated practical experiences. Prereq: KIN 787. (Also listed as SW 882.)

KIN 883 - Pysch Factors of Adventure Ed
Credits: 4.00
Adventure educators are often called to work with people facing short-term psychological challenges like being effective in a group or managing fear and discomfort in a vigorous learning environment. Because the adventure environment can be pyschologically demanding, an understanding of basic psychology is an advantage both for effective practice and research. Course emphasizes the history of psychological research to provide a foundation for the adventure educator's work leading, designing and evaluating adventure-based programs.

KIN 884 - Foundations of Adventure Education
Credits: 4.00
Students study the foundational ideas in adventure education and discuss their historical applications to the field. Contemporary perspectives on adventure education are also examined, and students forecast future directions for inquiry and practice. Topics include human learning and development, social theory, critical perspectives.

KIN 885 - Program Models and Evaluation in Outdoor Education
Credits: 4.00
Provides an understanding of the major outdoor education program models currently being used. Students also analyze the principles underlying program development and examine current trends and program evaluation approaches. Topics include research methods, evidenced-based practices, and ethics.

KIN 886 - Organization and Administration of Outdoor Education Programs
Credits: 4.00
Study of administration of outdoor education programs using a variety of organizational models. Students use simulated exercises and work with outdoor agencies on special projects to learn the key factors necessary to manage a program. Field experience. Special fee.

KIN 887 - Theory of Adventure Education
Credits: 4.00
Provides an in-depth investigation of the theories that underpin professional practice and research in Adventure Education. Students examine program applications in different settings, analyze pertinent outdoor education and social science research, and independently complete a research or applied project. Special fee.

KIN 895 - Advanced Studies
Credits: 2.00 to 4.00
Independent study problems. Prereq: permission of graduate adviser. May be repeated up to 8 credits.

KIN 896 - Advanced Research in Exercise Science
Credits: 6.00
Students design and conduct original research that culminates in a paper of publishable quality.

Completion of either this course or KIN 899 satisfies the department's research requirement for the master's degree. May be taken for 3 credits per semester in each of two semesters or 6 credits in one semester. Maximum 6 credits. Kinesiology majors only. Cr/F. IA (continuous grading).

KIN 897 - Advanced Research in Outdoor Education
Credits: 3.00 or 6.00
Students design and conduct original research that culminates in a paper of publishable quality. Completion of either this course or KIN 899 satisfies the department's research requirement for the master's degree. May be taken for 3 credits per semester in each of two semesters or 6 credits in one semester. Maximum 6 credits. Kinesiology majors only. Cr/F. IA (continous grading).

KIN 898 - Special Topics
Credits: 1.00 to 4.00
New or specialized courses not normally covered in regular course offerings. Prereq: permission. May be repeated up to 8 credits. Special fee on some sections.

KIN 899 - Master's Thesis
Credits: 1.00 to 6.00
May be repeated up to a maximum of 6 credits. Cr/F.

KIN 901 - Analysis of Professional Literature
Credits: 4.00
Critical interpretation of professional literature. This course focuses on the appropriate use of research methodologies and techniques.

KIN 902 - Colloquium
Credits: 1.00 to 2.00
Seminar format with readings, discussions, laboratory tutorials, and presentations of current research topics. A) exercise science; B) outdoor education; C) special physical education; D) sport studies. May be repeated up to a maximum of 8 credits. Cr/F.

KIN 909 - PE Practicum for Students with Disabilities
Credits: 2.00 to 4.00
This experience is part of the required coursework for the Adapted Physical Education (PE/APE) certificate through the Graduate School. Students are expected to accumulate30 hours of teaching experience in the schools for every two credits. In addition, attendance at a bi-weekly seminar integrates the field experience with general physical education (GPE) and adapted physical education (PE/APE) concepts through class discussion, exercises, readings, and written assignments. The seminar format provides an opportunity for refinement and continued development of teacher skills and attributes for wokring with student with disabilities. Students learn to instruct effectively, to participate in the individual Education Plan (IEP) process, and to manage their time.

KIN 910 - Curricular Issues in Health Pedagogy
Credits: 4.00
Examines health education and various health promotion programs in school settings using an ecological framework.

KIN 950 - Internship
Credits: 2.00 to 4.00
Experiential learning in a setting appropriate to the student's objectives. A 4-credit internship requires a minimum of 300 hours experience. Fewer credits require proportionally fewer hours. A) Exercise Science. Clinical work, normally in a hospital or laboratory setting, involving exercise physiology, graded exercise

testing, exercise prescription, and/or cardiac rehabilitation. Must have completed all required coursework except thesis. B) Special Physical Education C) Sport Studies. Cr/F.

KIN 998 - Special Topics
Credits: 2.00 to 4.00
Occasional, new, or experimental courses for graduate students in both KIN: Sport Studies and RMP. Prereq: permission. May be repeated for different topics up to a total of 8 credits.

Languages,Literatures&Cultures

LLC 842 - Theory and Practice of Translation

Credits: 3.00

This course is designed both as an introduction to various theories and philosophies of translation and as an intensive workshop on different types of translation (literary, technical, professional, business, and health related, etc.). Translation is both a simple matter of transferring content and an intensely complex process of adapting linguistic, tonal, and cultural components of communication. The course works extensively on the craft of translation while developing detailed analyses of the theoretical and philosophical implications of choices made. Students complete various translation exercises and develop a significant final project. It is open to students at different levels of language ability but requires at least an itermediate competency. Students work at their own level. Taught in English. Prereq: Intermediate language or permission. Special fee.

LLC 891 - Methods of Foreign Language Teaching

Credits: 3.00

Objectives, methods and techniques in teaching foreign languages from elementary grades through college. Discussion, demonstration, preparation of instructional materials, microteaching of the language skills, including developments in computer-assisted instruction. Special fee.

Liberal Studies

LS 800 - Core Seminar
Credits: 4.00
An introductory seminar specially designed for and limited to students within the LS program. Core seminars are interdisciplinary explorations of significant issues, topics, themes, or perspectives in human life in general an the contemporary world in particular. Topics may change from semester to semester. The seminar must be taken within the first year of a student's matriculation in the program, preferably in the first semester.

LS 845 - Special Topics
Credits: 2.00 to 4.00
New or specialized courses not normally covered in regular course offerings. Prereq: permission. May be repeated to a maximum of 8 credits.

LS 846 - Special Topics
Credits: 2.00 to 4.00
New or specialized courses not normally covered in regular course offerings. Prereq: permission. May be repeated to a maximum of 8 credits.

LS 895 - Independent Study
Credits: 1.00 to 6.00
Independent study for graduate students in LS as part of their concentration. Prereq: permission. May be repeated to a maximum of 8 credits.

LS 896 - Independent Study
Credits: 1.00 to 6.00
See description for LS 895.

LS 898 - Master's Project
Credits: 1.00 to 6.00
For LS students to work out a final project consistent with concentration and interests. May be repeated up to a maximum of 6 credits. Prereq: LS students only; permission. Cr/F.

LS 899 - Master's Thesis
Credits: 1.00 to 6.00
For LS students to work out a final thesis consistent with their concentration and interests. May be repeated up to a maximum of 6 credits. Prereq: LS students only; permission. Cr/F.

Life Sciences & Agriculture

LSA 900 - College Teaching

Credits: 2.00

An overview of teaching strategies identified at the college level. The planning, execution, and evaluation of instruction for meeting the teaching needs of undergraduate students. Recommended for those who want to teach in a college setting. (Also listed as GRAD 975.) Cr/F.

LSA 950 - Scientific Communication

Credits: 2.00

Professional success in science depdends on the ability to communicate, both by publishing in professional journals and by explaining the implications of research to a broad audience. This course covers a wide range of topics related to scientific communication. Students work on multiple forms of communication, practice communicating science to the public, strengthen peer reviewing skills, explore online scientific communities, and enhance awareness of relevant economic, legal, and ethical issues.

Management of Technology

MOT 898 - Advanced Topics
Credits: 3.00
Provides participants an opportunity to discuss the current research associated with emerging technologies. Emphasis on relevant technologies with case examples drawn from participants' own backgrounds. Program fee.

MOT 931 - Accounting and Finance for Technical Managers
Credits: 3.00
For technical managers who are charged with directing, planning, and controlling operations and/or major projects and making a variety of management decisions. Students learn how to extract vital information from the accounting system and how to make financial decisions within the organization. Program fee.

MOT 934 - Management of Technology and Innovation
Credits: 3.00
This introductory course provides the foundation for preparing students to manage in a turbulent, high technology environment. The course is taught from a practical, applied perspective using current readings and case studies. Program fee.

MOT 935 - Quantitative Methods
Credits: 3.00
Familiarization with concepts and analytical methods useful in understanding the management of firms' operations, including materials, information technology, and people. Helps develop an understanding of process flow, inventory management, capacity planning, quality resource management, operations strategy and quantitative decision-making. Will introduce students to DOX (design of experiments) and its applications. Helps to establish a framework to identify, define, analyze and propose workable solutions to operating problems. Program fee.

MOT 936 - Leadership and Team Management
Credits: 3.00
Provides students with the skills necessary for leading upwards (managing superiors) as well as laterally (e.g., in project teams) and downwards (subordinates). Students will learn how to manage and facilitate group processes in a way that evokes leadership behaviors on the part of all team members. Program fee.

MOT 939 - Information Systems/Management of Enterprise Systems
Credits: 3.00
Develops an understanding of the importance of information systems in organizations and how to use it to support strategic decisions. Demonstrates computer based systems can assist in the management of projects and programs. Develops a framework to understand the unique MIS, EIS, and DSS information needs of projects and project managers. Will focus on Make vs. Buy (outsourcing) decision models and foster a better understanding of the detection and prevention of system security and emerging technologies. The critical issue of enterprise wide systems planning and implementation. Program fee.

MOT 941 - Product Development and Marketing
Credits: 3.00
Examines the process of developing and commercializing a technology based product. Provides insight into how customer wants and needs are transformed into marketing strategies and tactics. Uses case

studies to introduce key marketing concepts and vocabulary and introduces the critical questions to ask in developing a marketing plan. Examines the importance of marketing information to the company and outlines steps in the marketing research process. Program fee.

MOT 942 - Project Management
Credits: 3.00
Focuses on both the science of project management and the art of managing projects, and provides a comprehensive, integrative understanding of the project management process. Program fee.

MOT 945 - Supply Chain Management and Procurement
Credits: 3.00
Focuses on the managerial aspects of Supply Chain Management (SCM) within the context of an SCM strategy. The emphasis is on development of an understanding of concepts, methodologies, techniques and enabling technologies, which can be effectively applied to the design, analysis, and management of supply chains. Program fee.

MOT 946 - Strategic Management of Technology
Credits: 3.00
Examines how strategic leaders transform and position their organizations to exploit technological change for competitive advantage. Provides an understanding of the issues surrounding the formulation and implementation of technology based strategies, and the framework for managing in a technology-based economy. Program fee.

MOT 947 - Managing Emerging Technologies
Credits: 3.00
Explores several topics of importance to the management of technology. Three categories are explored: intellectual property, ethics, and public policy. Program fee.

MOT 948 - Business Planning and Program Management
Credits: 3.00
Introduces a variety of traditional and time proven market research concepts, techniques and tools. Explores new methodologies for conducting market research. Case studies explore interpreting market research data in an emerging technology environment. Understanding organizational change and transformation needed to successfully manage a project or program. Explores different change and transformation processes as well as the attributes and causes of both incremental (first order) and radical (second order) change. Will help identify agents of change and the sources of resistance in individual, group and institutions. Program fee.

Materials Science

MS 830 - Mechanical Behavior Materials
Credits: 4.00
Elastic and inelastic behavior of materials in terms of micro- and macro-mechanics. Stress, strain and constitutive relations related to recent developments in dislocation theory and other phenomena on the atomic scale and to the continuum mechanics on the macroscopic scale. Elasticity, plasticity, viscoelasticity, creep, fracture, and damping. Anisotropic and heterogeneous materials. Prereq: Mechanics II, Introduction to Materials Science; or permission. Lab.

MS 831 - Fracture and Fatigue Engineering Materials
Credits: 4.00
Review of fundamentals of linear elastic fracture mechanics and strain energy release rate analysis. Discusses basic methods of design for prevention of failure by fast fracture and fatigue for metals, ceramics, and polymers with attention to the effect of material properties and subsequent property modification on each design approach. Prereq: Mechanics II, Introduction to Materials Science; or permission. Lab.

MS #844 - Corrosion
Credits: 4.00
The course is split into three parts. The first part reviews and develops the basic concepts of electrochemistry, kinetics, and measurement methods. The second part covers the details of specific corrosion mechanisms and phenomena including passivity, galvanic corrosion, concentration cell corrosion, pitting and crevice corrosion, and environmentally induced cracking. The third part focuses on the effects of metallurgical structure on corrosion, corrosion in selected environments, corrosion prevention methods, and materials selection and design. Prereq: General Chemistry (CHEM 403-404 or 405), Introduction to Materials Science; or permission. Lab. Lab. (Also offered as OE 844.)

MS 860 - Thermodynamics and Kinetics of Materials I
Credits: 3.00
Classical and statistical thermodynamics are used to establish the conditions of equilibrium for simple and multi-component, heterogeneous materials. Additionally, the thermodynamics of phase diagrams, miscibility, interfaces, and defects are explored. Examples and problems apply these concepts to various types of materials, including metals, ceramics, and polymers. Permission of instructor required.

MS 861 - Diffraction and Imaging Methods in Materials Science
Credits: 4.00
Introduction to x-ray diffraction and electron microscopy. Basic crystallography; reciprocal lattice; x-ray and electron diffraction, x-ray methods; transmission and scanning electron microscopy. Prereq: General Chemistry, General Physics II, or permission. Lab.

MS 862 - Electronic Materials Science
Credits: 4.00
This course provides engineering and science students with a foundation in the materials science of modern electronic devices. Topics include bonding and structure of solids, electrical and thermal conduction, elements of quantum mechanics, band theory of electrons in solids, semiconductors, magnetism, dielectrics and superconductors. Examples of applications are taken primarly from the fields of semiconductor electronics and nanotechnology, and illustrate how the electrical and optical properties of

devices are obtained from their compositions, crystal structures and microstructures. Permission of instructor required.

MS 863 - Thin Film Science and Technology
Credits: 4.00
The processing, structure and properties of solid thin films. Vacuum technology, deposition methods, film formation mechanisms, characterization of thin films, and thin-film reactions. Mechanical, electrical and optical properties of thin films. Lab. Prereq: Introduction to Materials Science, or permission.

MS 895 - Special Topics
Credits: 2.00 to 4.00
New or specialized courses and/or independent study. May be repeated for credit.

MS 898 - Master's Project
Credits: 3.00 to 4.00
The student works with a faculty member during one or two semesters on a well-defined research and/or original design problem. A written report and seminar are presented. IA (continuous grading) Cr/F.

MS 899 - Master's Thesis
Credits: 1.00 to 6.00
Cr/F.

MS 900 - Seminar
Credits: 1.00
Topics of interest to graduate students and faculty; reports of research ideas, progress, and results; lectures by outside speakers. Continuing course: instructor may assign IA (continuous grading) grade at the end of one semester.

MS 905 - Macromolecular Synthesis
Credits: 3.00
Fundamentals of polymerization reaction mechanisms, kinetics, and chain structures as they are developed from the different chemistries available. Detailed discussions of the chemical mechanisms of step, free radical, ionic, and ring opening polymerizations. Treatment of the reaction parameters that control the rate of polymerization, molecular weight and chemical composition of the polymer chains. Introduction to stereo-chemical and catalytic polymerizations. Considerations of bulk, solution, and dispersion polymerization systems. Permission of instructor required. Open to Biochemsitry, Chemical Engineering, Engineering: Chemical, Chemistry, Mechanical Engineering, Engineering: Mechanical, Materials Science, Engineering: Mat Science, and Physics majors only.

MS 910 - Macromolecular Characterization
Credits: 3.00
Molecular characterization of synthetic and natural macromolecules in solution and in the solid state. Emphasis on the principles of various analytical techniques designed to provide information on the chemical composition, polymer chain size and structure in solution and in the dry state. Extension to methods that measure the interaction and association between polymer molecules. Interpretations of data from important characterization techniques including liquid chromatography (GPC), spectroscopy (FTIR, NMR, MS), microscopy (TEM, AFM, Confocal Raman), thermal analysis (DSC), light scattering, sedimentation, and x-ray diffraction. Permission of instructor required. (Also listed as BCHM 950). Open to Biochemsitry, Chemical Engineering, Engineering: Chemical, Chemistry, Chem: Chemistry Education, Mechanical Engineering, Materials Science, Engineering: Mat Science, and Physics majors only.

MS 961 - Thermodynamics and Kinetics of Materials II

Credits: 3.00
Introduction to diffusion and phase transformations in materials, and detailed descriptions of interfacial regions. Mechanisms of phase separation by spinodal decomposition and homogeneous nucleation. Kinetic processes leading to changes in phase structure driven by chemical reaction, temperature and diffusive processes (e.g. Ostwald ripening) are treated quantitatively. Applications to metals, ceramics and polymers. Prereq: Thermodynamics and Kinetics of Materials I.

MS 965 - Advanced Surface and Thin Film Characterization
Credits: 4.00
Fundamentals of modern analytical techniques used to analyze the surface region of materials. Prereq: Introduction to Materials, or permission.

MS 995 - Graduate Special Topics
Credits: 2.00 to 4.00
Investigation of graduate-level problems or topics in Materials Science.

MS 999 - Doctoral Research
Credits:
Cr/F.

Mathematics

MATH 801 - Exploring Mathematics for Teachers I
Credits: 3.00
Provides prospective elementary teachers with the opportunity to explore and master concepts involving number systems and operations, data analysis and probability. Additional topics may include geometry, measurement, and algebraic thinking. Mathematical reasoning, problem solving, and the use of appropriate manipulatives and technology are integrated throughout the course. Readings, class discussions, and assignments focus on mathematics content as well as applicable theories of learning, curriculum resources, and state and national recommendations. The course models instructional techniques that can be adapted to the elementary curricula. Prereq: EDUC 500 or EUDC 935; or permission. Credit offered only to M.Ed. and M.A.T., certificate students, and in-service teachers. (Not offered for credit if credit is received for MATH 821 or 823.)

MATH 802 - Exploring Math for Teachers II
Credits: 3.00
Provides prospective elementary teachers with the opportunity to explore and master concepts involving geometry, measurement, and algebraic thinking. Mathematical reasoning, problem solving, and the use of appropriate manipulatives and technology are integrated throughout the course. Readings, class discussions, and assignments focus on mathematics content as well as applicable theories of learning, curriculum resources, and state and national recommendations. The course models instructional techniques that can be adapted to the elementary curricula. Credit offered only to M.Ed. and M.A.T. , certificate-only students and in-service teachers. Prereq: EDUC 500 or EDUC 935; or permission. (Not offered for credit if credit is received for MATH 821, 822.)

MATH 821 - Number Systems for Teachers
Credits: 3.00
Problem solving; counting and set concepts, number systems (whole numbers, integers, rational, and real numbers); number theory; estimation and mental calculation techniques; and applications requiring calculators and computers. Manipulatives and models are used in a lab setting to illustrate the concepts and properties of the number systems. Credit offered only to M.Ed. and M.A.T., certificate students , and in-service teachers. Prereq: permission. Offered in alternate years in the fall semester.

MATH 822 - Geometry for Teachers
Credits: 3.00
Properties of two- and three-dimensional figures; tessellations; symmerty; nonstandard, English, and metric units of measure; area and perimeter; volume and surface area; estimations and approximations of measurements; constructions; cogruence and smilarity mappings; problem solving using geometric and algebraic skills; and applications requiring calculators and computers. Manipulatives and models are used in a lab setting to illustrate concepts and properties of geometry. Credit only to M.Ed. and M.A.T., certificate only students, and in-service teachers. Prereq: MATH 821 or permission. Offered in alternate years in the spring semester following MATH 821.

MATH 823 - Top Mathematics for Teachers
Credits: 3.00
Logic (vaild and invalid forms of reasoning); descriptive statistics (graphs, measures of central tendency, measures of variation); inferential statistics (samplings, distributions, measures of relative standing, simulations); probability (experimental, geometrical, and theoretical); permutations and combinations;

problem solving using skills from statistics and probability; mathematical connections using computer software; and applications requiring calculators and computers. Credit offered only to M.Ed. and M.A.T., certificate-only students and in-service teachers. Prereq: MATH 821 or permission. Offered in alternate years in the fall semester following MATH 822.

MATH 831 - Mathematics for Geodesy
Credits: 3.00
A survey of topics from undergraduate mathematics designed for graduate students in engineering and science interested in applications to geodesy and Earth Sciences. Topics include essential elements from analytic geometry, geometry of surfaces, linear algebra and statistics, Fourier analysis, discrete Fourier transforms and software, filtering applications to tidal data. Prereq: MATH 645, or the equivalent; MATH majors not allowed.

MATH 835 - Statistical Methods for Research
Credits: 3.00
This course provides a solid grounding in modern applications of statistics to a wide range of disciplines by providing an overview of the fundamental concepts of statistical inference and analysis, including t-tests and confidence intervals. Additional topics include: ANOVA, multiple linear regression, analysis of cross classified categorical data, logistic regression, nonparameteric statistics and data mining using CART. The use of statistical software, such as JMP. S PLUS, or R, is fully integrated into the course.

MATH 836 - Advanced Statistical Methods for Research
Credits: 3.00
An introduction to multivariate statistical methods, including principal components, discriminant analysis, cluster analysis, factor analysis, multidimensional scaling, and MANOVA. Additional topics include generalized linear models, general additive models, depending on the interests of class participants. This course completes a solid grounding in modern applications of statistics used in most research applications. The use of statistical software, such as JMP, S PLUS, or R, is fully integrated into the course. Prereq: MATH 835 or MATH 839.

MATH 837 - Statistical Methods For Quality Improvement
Credits: 3.00
Introduces scientific data collection and analysis with an emphasis on industrial and service provider applications. Topics include descriptive and graphical statistical methods, confidence intervals and hypothesis testing, regression, ANOVA, statistical process control (SPC), failure modes and effects analysis (FMEA), Six-Sigma concepts and methods, introduction to reliability, quality tools, MSA, and process capability studies, introduction to Lean methodology, such as 5S, Kaizen, and VSM. Use of a statistical software package is an integral part of the course. Prereq: basic introductory statistics.

MATH 839 - Applied Regression Analysis
Credits: 3.00
Statistical methods for the analysis of relationships between response and input variables: simple linear regression, multiple regression analysis, residual analysis model selection, multi-collinearity, nonlinear curve fitting, categorical predictors, introduction to analysis of variance, analysis of covariance, examination of validity of underlying assumptions, logistic regression analysis. Emphasizes real applications with use of statistical software. Prereq: basic introductory statistics.

MATH 840 - Design of Experiments I
Credits: 3.00
First course in design of experiments with applications to quality improvement in industrial manufacturing, engineering research and development, or research in physical and biological sciences. Experimental factor identification, statistical analysis and modeling of experimental results, randomization and blocking,

full factorial designs, random and mixed effects models, replication and sub-sampling strategies, fractional factorial designs, response surface methods, mixture designs, and screening designs. Focuses on various treatment structures for designed experimentation and the associated statistical analyses. Use of statistical software. Prereq: basic introductory statistics; permission.

MATH 841 - Survival Analysis
Credits: 3.00
Explorations of models and data-analytic methods used in medical, biological, and reliability studies. Event-time data, censored data, reliability models and methods, Kaplan-Meier estimator, proportional hazards, Poisson models, loglinear models. The use of statisical software, such as SAS, JMP, or R, is fully integrated into the course. Prereq: MATH 839. (Offered in alternate years.)

MATH 843 - Time Series Analysis
Credits: 3.00
An introduction to univariate time series models and associated methods of data analysis and inference in the time domain and frequency domain. Topics include: Auto regressive (AR), moving average (MA), ARMA and ARIMA processes, stationary and non-stationary processes, seasonal ARIMA processes, auto-correlation and partial auto-correlation functions, identification of models, estimation of parameters, diagnostic checking of fitted models, forecasting, spectral density function, periodogram and discrete Fourier transform, linear filters. parametric spectral estimation, dynamic Fourier analysis. Additional topics may include wavelets and long memory processes (FARIMA) and GARCH Models. The use of statistical software, such as JMP, or R, is fully integrated in to the course. Prereq: MATH 835 or MATH 839. Offered in alternate years in the spring.

MATH 844 - Design of Experiments II
Credits: 3.00
Second course in design of experiments, with applications in quality improvement and industrial manufacturing, engineering research and development, research in physical and biological sciences. Covers experimental design strategies and issues that are often encountered in practice complete and incomplete blocking, partially balanced incomplete blocking (PBIB), partial confounding, intra and inter block information, split plotting and strip plotting, repeated measures, crossover designs, Latin squares and rectangles, Youden squares, crossed and nested treatment structures, variance components, mixed effects models, analysis of covariance, optimizations, space filling designs, and modern screening design strategies. Prereq: MATH 840; or permission.

MATH 845 - Foundations of Applied Mathematics I
Credits: 3.00
An introduction to Partial Differential Equations (PDEs) and associated mathematical methods and the analytical foundation for applied mathematics. Topics include: PDE classification, superposition, separation of variables, orthonormal functions, completeness, convergence, Fourier Series, Sturm-Liouville eigenvalue problems, and eigenfunctions. Methods are introduced for the analysis and solution of boundary value problems, in particular, the Heat, Wave, and Laplace equations. Prereq: Multi-dimensional calculus and ordinary differential equations.

MATH 846 - Foundations of Applied Mathematics II
Credits: 3.00
An introduction to special functions, asymptotic analysis, and transform methods applied to partial differential equations. Topics include: Boundary value problems in cylindrical coordinates, the Bessel equation and Bessel functions, Fourier-Bessel expansions in cylindrically symmetric spatial domains, the Fourier Transform, the Hilbert Transform, Cosine and Sine Transforms, problems on semi-infinite intervals, and Asymptotic Analysis. Prereq: Multi-dimensional calculus and ordinary differential equations.

MATH 847 - Introduction to Nonlinear Dynamics and Chaos
Credits: 3.00
An introduction to the mathematics of chaos and nonlinear dynamics. Topics include: linear and nonlinear systems of ordinary differential equations; discrete maps; chaos; phase plane analysis; bifurcations; and computer simulations. Prereq: elementary differential equations; linear algebra; and multidimensional calculus. (Not offered every year.)

MATH 853 - Introduction to Numerical Methods
Credits: 3.00
Introduction to mathematical algorithms and methods of approximation. A wide survey of approximation methods are examined including, but not limited to, polynomial interpolation, root finding, numerical integration, approximation of differential equations, and techniques used in conjunction with linear systems. Included in each case is a study of the accuracy and stability of a given technique, as well as its efficiency and complexity. It is assumed that the student is familiar and comfortable with programming a high-level computer language. (Also offered as CS 853.)

MATH 855 - Probability with Applications
Credits: 3.00
Introduces the theory, methods, and applications of randomness and random processes. Probability concepts, random variable, expectation, discrete and continuous probability distributions, joint distributions, conditional distributions; moment-generating functions, convergence of random variables.

MATH 856 - Principles of Statistical Inference
Credits: 3.00
Introduces the basic principles and methods of statistical estimation and model fitting. One- and two-sample procedures, consistency and efficiency, likelihood methods, confidence regions, significance testing, Bayesian inference, nonparametric and re-sampling methods, decision theory. Prereq: MATH 855; or permission.

MATH 861 - Abstract Algebra
Credits: 3.00
Basic properties of groups, rings, fields, and their homomorphisms.

MATH 862 - Linear Algebra
Credits: 3.00
Abstract vector spaces, linear transformations, and matrices. Determinants, eigenvalues, and eigenvectors. Prereq: MATH 861.

MATH 867 - One-Dimensional Real Analysis
Credits: 3.00
Theory of limits, continuity, differentiability, integrability.

MATH 876 - Logic
Credits: 3.00
Induction and recursion; sentential logic; first-order logic; completeness, consistency, and decidability; recursive function. (Not offered every year.)

MATH 883 - Set Theory
Credits: 3.00
Axiomatic set theory, including its history, Zermelo-Fraenkel axioms, ordinal and cardinal numbers, consistency, independence, and undecidability. (Not offered every year.)

MATH 884 - Topology
Credits: 3.00
Open sets, closure, base, and continuous functions. Connectedness, compactness, separation axioms, and metrizability.

MATH 888 - Complex Analysis
Credits: 3.00
Complex functions, sequences, limits, differentiability and Cauchy-Riemann equations, elementary functions, Cauchy's theorem and formula, Taylor's and Laurent's series, residues, conformal mapping. Prereq: MATH 867.

MATH 896 - Topics in Mathematics and Statistics
Credits: 1.00 to 4.00
New or specialized courses not covered in regular course offerings. Prereq: permission of instructor. May be repeated.

MATH 898 - Master's Project
Credits: 1.00 to 6.00
May be repeated to a maximum of 6 credits. IA (continuous grading). Cr/F.

MATH 899 - Master's Thesis
Credits: 1.00 to 6.00
May be repeated up to a maximum of 6 credits. Cr/F.

MATH 900 - Bridges from the Classroom to Mathematics
Credits: 1.00
An introduction to the goals of the MST program. Students have the opportunity to explore mathematical problems; to complete activities that make connections between several areas of mathematics, including the mathematical content in the MST degree program and the secondary school mathematics classroom; and to participate in readings/on-line discussion on the nature of mathematics. Permission required. Cr/F.

MATH 902 - Classroom Mathematics Practicum
Credits: 1.00
A follow-up course to the six core mathematics content courses of the MST degree program. During the course, students choose a mathematical topic and/or set of concepts learned in one of the core MST courses and develop and teach a unit based on these concepts at the middle school or secondary school level. Permission required. Cr/F.

MATH 903 - Algebraic Structures
Credits: 3.00
An exploration of the structural similarities between and among seemingly disparate number systems, beginning with counting numbers, and progressing to integers, the rational numbers, the real numbers, and the complex numbers; and leading to a discussion of polynomials as an ineteger analogue and to fields as polynomial "quotients" through the basic concepts of splitting fields and Galois Theory. Permission required.

MATH 905 - Euclidean and non-Euclidean Geometries from a Synthetic Perspective
Credits: 3.00
An axiomatic development of geometry, beginning with finite geometries; emphasis is given to the fundamental concepts of Euclidean and non-Euclidean geometries from a synthetic perspective. Permission required.

MATH 906 - Analytic and Transformational Geometry
Credits: 3.00
Fundamental concepts of transformational, projective geometry, and inversive geometry, including properties of conics and quadratic surfaces. Permission required.

MATH 907 - Real Analysis
Credits: 3.00
An introduction to the fundamental concepts in real analysis that provide the mathematical foundation for calculus. Content focuses on properties of sequences and series; properties of functions, including continuity, the derivative and the Riemann integral. Permission required.

MATH 909 - Probability and Statistics for Teachers
Credits: 3.00
Permutations and combinations; finite sample spaces; random variables; binomial distributions; statistical applications.

MATH 910 - Selected Topics in Mathematics Education for Teachers
Credits: 1.00 to 4.00
Current developments and issues in mathematics education; content, curricula, methods, and psychology of teaching mathematics. Can be repeated for credit.

MATH 913 - Graph Theory and Topics in Discrete Mathematics
Credits: 3.00
Key theoretical and computational aspects of graph theory and related areas of discrete mathematics. Applications of graph theory as well as current "open" problems are explored. Permission required.

MATH 915 - Algebraic Structures
Credits: 3.00
An exploration of the structural similarities between and among seemingly disparate number systems, beginning with counting numbers, and progressing to integers, the rational numbers, the real numbers, and the complex numbers; and leading to a discussion of polynomials as an ineteger analogue and to fields as polynomial "quotients" through the basic concepts of splitting fields and Galois Theory. Permission required.

MATH 916 - Theory of Numbers for Teachers
Credits: 3.00
Divisibility and primes; congruences; quadratic reciprocity; number theoretic functions; Diophantine equations; perfect and amicable numbers.

MATH 917 - Mathematical Proof and Problem Solving
Credits: 3.00
Introduction to abstract mathematics with an emphasis on problem solving and proof structure, methods and techniques. Content includes logic, set theory and basic number theory.

MATH 918 - Analysis of Real Numbers
Credits: 3.00
An introduction to the fundamental concepts in real analysis that provide the mathematical foundation for calculus. Content focuses on properties of sequences and series; properties of functions, including continuity, the derivative and the Riemann integral. Permission required.

MATH 920 - History of Mathematics
Credits: 3.00

A problem-study approach to mathematical problems from the period of Greek mathematics until the modern era.

MATH 925 - Problem Solving Seminar
Credits: 3.00
A study of variety of problem solving strategies and techniques in the context of solving mathematical problems. Problems will emphasize the connections between the core areas of algebra, geometry and analysis. Other mathematical topics may be included. Typically taken in conjunction with the Concluding Experience Problem Set. Cr/F

MATH 928 - Selected Topics in Mathematics for Teachers
Credits: 1.00 to 3.00
New or specialized topics not covered in the regular course offerings. May be repeated for credit.

MATH 929 - Directed Reading
Credits: 1.00 to 3.00
A directed reading project on a selected topic in mathematics or mathematics education, planned in collaboration with a faculty member. May be repeated up to 6 credits.

MATH 931 - Mathematical Physics
Credits: 3.00
Complex variables, differential equations, asymptotic methods, integral transforms, special functions, linear vector spaces and matrices, Green's functions, and additional topics selected from integral equations, variational methods, numerical methods, tensor analysis, and group theory. Prereq: differential equations; linear algebra; multidimensional calculus. (Also offered as PHYS 931.)

MATH 941 - Bayesian and Computational Statistics
Credits: 3.00
Current approaches to Bayesian modeling and data analysis and related statistical methodology based on computational simulation. Fundamentals of Bayesian estimation and hypothesis testing. Multi-level and hierarchical Bayesian modeling for correlated data. Introduction to Markov chain Monte Carlo based estimation approaches such as the Gibbs sampler and the Metropolis-Hastings alogorithm. Prereq: knowledge of intermediate statistics: distributions, discrete and continuous random variables, transformation of variables (calculus based), bivariate and multivariate normal distribution, maximum likelihood estimation; working knowledge of linear regression and analysis of variance; basic linear algebra: vectors and matrices, linear spaces, matrix multiplication, inverse of a matrix, positive definiteness. Matrix-vector notation for linear regression and ANOVA.

MATH 944 - Spatial Statistics
Credits: 3.00
Frequentist and Bayesian methods for estimation of characteristics measured in space (usually 2-dimensional Euclidean space). Spatial averaging. Spatial point processes: models for clustering and inhibition. Cluster detection. Point referenced data: varigram estimation, Kriging, spatial regression. Lattice based data: spatial auto-regression, Markov random field models. Spatial regression models. Non-Gaussian response variables. Hierarchical Bayesian spatial models and Markov chain Monte Carlo methods. Multivariable spatial models. Prereq: Intermediate statistics including basics of maximum likelihood estimation; linear regression modeling including familiarity with matrix notation, basic concepts of calculus including partial derivatives.

MATH 951 - Algebra I
Credits: 3.00
Groups and their homomorphisms, products and sums, structure of groups; rings and their

homomorphisms, ideals, factorization properties. Prereq: MATH 861.

MATH 952 - Algebra II
Credits: 3.00
Field extensions; Galois theory; module theory. Prereq: MATH 951.

MATH 953 - Analysis I
Credits: 3.00
Measurable spaces and functions, measures, Lebesgue integrals, convergence theorems. Prereq: MATH 867.

MATH 954 - Analysis II
Credits: 3.00
Cauchy theory and local properties of analytic functions, Riemann mapping theorem, representation theorems, harmonic functions. Prereq: MATH 888.

MATH 955 - Topology I
Credits: 3.00
Subspace, product, and quotient topologies; embedding; separation and countability axioms; connectedness; compactness and compactifications; paracompactness, metrization, and metric completions. Prereq: MATH 884.

MATH 956 - Topology II
Credits: 3.00
Chain complexes; homology of simplicial complexes, singular homology and cohomology; axiomatic homology; cup and cap products. Prereq: MATH 861 and 884.

MATH 958 - Foundations of Math Education
Credits: 3.00
Topics will include: major issues, trends, and programs in mathematics education research, the research process, theoretical perspectives to guide research, the profession and infrastructure of mathematics education, cultural and historical aspects of mathematics education, and the research-practice interface. Examples span the K-16 spectrum. Prereq: permission.

MATH 961 - Topics in Algebra I
Credits: 3.00
An introduction to topics chosen from algebra and number theory. Prereq: MATH 951-952. May be repeated.

MATH #963 - Functional Analysis
Credits: 3.00
Banach and Hilbert spaces, Hahn-Banach theorem, open mapping and closed graph theorems, dual spaces, topological vector spaces. Prereq: MATH 953.

MATH 964 - Topics in Analysis I
Credits: 3.00
An introduction to topics in analysis. Prereq: permission. May be repeated.

MATH 965 - Topics in General Topology I
Credits: 3.00
An introduction to topics in general topology. Prereq: MATH 955. May be repeated.

MATH 966 - Topics in Algebraic Topology I

Credits: 3.00
An introduction to topics in algebraic topology. Prereq: MATH 956. May be repeated.

MATH 967 - Topics in Applied Mathematics I
Credits: 3.00
An introduction to topics in applied mathematics. Prereq: permission. May be repeated.

MATH 968 - Topics in Mathematics Education I
Credits: 3.00
A) The Teaching and Learning of Mathematics; B) Curriculum and History in Mathematics Education. Topics selected from: epistemologies of knowledge applied to mathematics; theories of learning and teaching mathematics; theoretical perspectives in research; mathematics education research programs K-16; research methods for studying mathematics teaching, learning, and curricula; theoretical frameworks for curriculum development, implementation of new curricula, and research on curricula; historical perspectives of research in mathematics education; the evolution and history or K-16 mathematics curricula both in United States and internationally. Versions A and B offered alternately. Prereq: MATH 958 or permission. May be repeated

MATH 969 - Topics in Probability and Statistics I
Credits: 3.00
Selected advanced topics from one or several of the following areas: probability, stochastic processes, design of experiments, biostatistics, Bayesian theory and methods, spatial and spatio-temporal statistics, time series analysis, nonparametric statistics. Prereq: permission. May be repeated.

MATH 971 - Topics in Algebra II
Credits: 3.00
An introduction to advanced topics chosen from algebra and number theory. Prereq: MATH 951-952; permission. May be repeated.

MATH 973 - Topics in Operator Theory
Credits: 3.00
Selected topics in operator theory. Prereq: MATH 963. May be repeated.

MATH 977 - Topics in Applied Mathematics II
Credits: 3.00
An exploration of an area of research in applied mathematics. Prereq: permission. May be repeated.

MATH 978 - Topics in Mathematics Education II
Credits: 3.00
An exploration of an area of research in mathematics education. Prereq: permission. May be repeated.

MATH 979 - Research Topics in Statistics
Credits: 3.00
An exploration of the main statistical issues and computational methods associated with research problems from such areas as survival analysis, reliability, latitudinal data, categorical data, spatio-temporal data, and industrial processes. Student term projects require: literature searches, presentation, use of modern statistical software, and written reports. Prereq: permission. May be repeated.

MATH 998 - Reading Courses
Credits: 1.00 to 6.00
A) Algebra; B) Analysis; C) Operator Theory; D) Geometry; E) General Topology; F) Algebraic Topology; G) Applied Mathematics; H) Mathematics Education; I) Probability and Statistics. Prereq: permission.

MATH 999 - Doctoral Research
Credits:
Cr/F.

Mechanical Engineering

ME 807 - Analytical Fluid Dynamics
Credits: 4.00
Kinematics of flow; constitutive relationships; development of the Navier-Stokes equations; vorticity theorems; potential flow. Prereq: fluid dynamics.

ME 809 - Computational Fluid Dynamics
Credits: 3.00
Review of matrix methods, basics of finite differences, basics of spectral methods, stability, accuracy, Navier-Stokes solvers. Prereq: heat transfer or permission.

ME 812 - Waves in Fluids
Credits: 3.00
Linear and nonlinear dynamics of hyperbolic and dispersive wave systems with application to acoustic waves, surface and internal gravity waves, Rossby waves, and capillary waves. Key physical concepts include wave-generation mechanisms, wavelength and amplitude dispersion, group velocity and energy propagation, steady streaming, and mode interactions. Prereq: fluid dynamics; or permission.

ME 824 - Vibrations Theory and Applications
Credits: 4.00
Discrete vibrating systems. Linear system concepts; single-degree-of-freedom systems with general excitation. Matrix theory and eigenvalue problems. Many degrees of freedom, normal mode theory for free and forced vibration. Numerical methods; introduction to continuous systems; applications to structural and mechanical systems. Prereq: statics; dynamics or permission.

ME 827 - Advanced Mechanics of Solids
Credits: 4.00
Stress, strain, stress-strain relations, anisotropic behavior, introduction to elasticity, plane stress/strain, bending and torsion of members with general cross-sections, introduction to thin plates and shells, energy methods. Prereq: strength of materials or permission.

ME 835 - Mechanics of Composite Materials
Credits: 4.00
Classification of composites - Anisotropy of composite materials. Micromechanical predictions of elastic and hygrothermal properties. Strength and failure of composite materials. Analysis of laminates. Experimental methods for characterization of composites. Prereq: strength of materials or permission.

ME 843 - Satellite Systems, Dynamics, and Control
Credits: 3.00
General satellite systems with emphasis on spacecraft dynamics and control. Course topics include general satellite information such as types of satellites, missions, and orbits, as well as satellite subsystems. Basic spacecraft dynamics and orbital mechanics topics are covered. Advanced topics will include attitude and orbit estimation, and automatic attitude control. Prereq: systems modeling or permission.

ME 860 - Physical Metallurgy I
Credits: 4.00
Introduction to physical metallurgy: dislocations, thermodynamics of materials, diffusion, phase

transformations, and strengthening mechanisms in solids. Prereq: introduction to materials science or permission. Lab

ME 870 - Design with Microprocessors
Credits: 4.00
Basic operation of microprocessors and microcontrollers explained, and interfacing these devices to sensors, displays and mechanical systems explored. Topics include: number systems, architecture, registers, memory mapping, interrupts and interfacing for system design. Methods of programming and interfacing with mechanical/electrical systems are covered and then implemented in lab. Prereq: introduction to electrical engineering. Lab.

ME 872 - Control Systems
Credits: 4.00
Development of advanced control systems design concepts such as Nyquist analysis; lead-lag compensation; state feedback; parameter sensitivity; controllability; observability; introduction to nonlinear and modern control. Includes interactive computer-aided design and real-time digital control. Prereq: permission. (Also offered as ECE 872.) Lab.

ME 873 - Electromechanical Analysis and Design
Credits: 4.00
Analysis and design of electromechanical systems using lumped parameter models and magnetic finite element analysis (FEA).Electrostatic and magnetic field equations discussed and used to derive magnetic and electric lumped model elements. A brushless dc motor analyzed using lumped models and FEA. Various drive types discussed and the motor system analyzed to obtain torque-speed curves. Design principles given and utilized in a design project. Prereq: systems modeling, simulation, and control or permission.

ME 876 - Product Design
Credits: 4.00
Provides a thorough overview of the steps in the engineering design process. Topics include product planning, need identification, specification formulation, benchmarking, concept generation and selection, design for manufacture, assembly and environment. Students will develop a product as part of a team. Prereq: computer aided design; manufacturing skills; or permission.

ME 877 - Computer Aided Engineering
Credits: 4.00
In this course, modules of Solid Works (beyond its basic solid modeling capabilities) and other software is used to demonstrate how computer based tools can be used in engineering practice, in particular design analysis and optimization. Emphasis placed on using knowledge from past engineering courses to obtain theoretical calculations to compare with the results from the computer software package. Prereq: Strength of Materials; Mechanics III; Heat Transfer; and Fluid Dynamics (or equivalent); or permission.

ME 885 - Solid Mechanics in Manufacturing
Credits: 4.00
Characterization of material properties will be studied with emphasis on plastic deformation. Also, numerical approaches to solve for the forces, stresses, and strains in manufacturing processes will be covered. In particular, two prominant mass production manufacturing areas, metal forming and cutting, will be examined. Prereq: introduction to materials science, dynamics.

ME 886 - Introduction to Finite Element Analysis
Credits: 4.00
Topics include basic matrix theory, potential energy approach, direct stiffness method, calculus of

variations, development of finite element theory, and modeling techniques. Applications in solid mechanics, heat transfer, fluids, and electromagnetic devices, via both commercially available codes and student written codes. Prereq: Stregnth of materials or permission. Special fee. Lab.

ME 895 - Special Topics
Credits: 1.00 to 4.00
New or specialized courses and/or independent study. May be repeated for credit.

ME 899 - Master's Thesis
Credits: 1.00 to 8.00
May be repeated up to a maximum of 8 credits. Cr/F.

ME 906 - Convection Heat Transfer
Credits: 4.00
An analytical study of heat transfer to laminar and turbulent boundary layers of compressible and incompressible fluids. Basic differential equations governing the heat transfer are derived and analytical solutions are obtained where possible and checked with experimental results.

ME 909 - Viscous Flow
Credits: 3.00
Exact solutions of the Navier-Stokes equations; laminar boundary layers; wakes and jets; Stoke's flow; stability of parallel flows and boundary layers; transition to turbulence. Prereq: analytical fluid dynamics or permission.

ME 910 - Turbulence
Credits: 3.00
Modern analysis of turbulent flow: the governing equations; stationary random functions and the various averaging techniques; empirical results on turbulence; homogenous turbulence; the Kolmogorov theory for isotropic turbulence; upper bound theory; turbulence in the atmosphere and oceans; applications to problems in science and engineering. Prereq: ME 807 or permission.

ME #911 - Theory of Hydrodynamic Stability
Credits: 3.00
Equations of hydrodynamics in general coordinates; general instabilities caused by gravitational, surface tension, and hydromagnetic influences; instability of parallel viscous flows including the Orr-Sommerfeld equation and Tollmein-Schlicting waves; instability of free-surface waves; instability of stratified flows; instabilities in porous media. Prereq: analytical fluid dynamics or permission.

ME 927 - Theory of Plasticity
Credits: 4.00
Analysis of stress and deformation in inelastic solids; general development of stress invariants, variational principles, constitutive relations, and yield and loading functions. Special emphasis on ideal plasticity, strain-hardening, creep, limit analysis, and limit design.

ME 944 - Nonlinear Control Systems
Credits: 4.00
Analysis and design of nonlinear control systems from the classical and modern viewpoints are discussed. Liapunov's stability theory; phase space methods; linearization techniques; simulation; frequency response methods; generalized describing functions; transient analysis utilizing functional analysis; and decoupling of multivariable systems. Prereq: advanced control systems I. (Also offered as ECE 944.)

ME 951 - Advanced Control Systems I

Credits: 3.00
State-space representation of multivariable systems; analysis using state transition matrix. Controllability and observability; pole placement using state and output feedback; Luenberger observers. Introduction to computer-controlled systems (sampling, discrete state representation, hybrid systems): nonlinear analysis (Liapunov, Popov, describing function). Prereq: control systems. (Also offered as ECE 951.)

ME 952 - Advanced Control Systems II
Credits: 3.00
Special topics in control theory: continuous and discrete systems: optimal control systems, including calculus of variations, maximum principle, dynamic programming, Weiner and Kalman filtering techniques, stochastic systems, adaptive control systems. Prereq: advanced control systems I. (Also offered as ECE 952.)

ME 955 - Estimation and Filtering
Credits: 3.00
Stochastic systems course with application to control and communications. Topics include random variables, noise in linear systems, Bayesian and minimum variance estimation theory, optimal state estimators, Weiner and Kalman filters, combined estimation and control, prediction, parameter identification, and nonlinear filtering. Prereq: ME or ECE 951; MATH 835 or equivalent. (Also offered as ECE 955.)

ME 986 - Advanced Finite Element Analysis
Credits: 4.00
Topics include introduction to dynamics, treatment of nonlinear material behavior, and plate and shell element technology. Emphasis given to problems in solid mechanics and heat transfer. Prereq: finite element analysis or equivalent.

ME 992 - Master's Project
Credits: 4.00
The student works with a faculty member during one or two semesters on a well-defined research and/or original design problem. A written report and seminar are presented. IA (continuous grading). Cr/F.

ME 995 - Graduate Special Topics
Credits: 1.00 to 4.00
Investigations of graduate-level problems or topics in mechanical engineering.

ME 999 - Doctoral Research
Credits:
Cr/F.

Microbiology

MICR 805 - Immunology
Credits: 3.00
Introduction to the major cellular and molecular components of the immune system; examination of their development wand production, their interactions with each other and with other systems in the body, and their regulation; exploration of their role in beneficial and harmful immune responses in humans and animals. Prereq: general microbiology. Prereq: MICR 503.

MICR 806 - Virology
Credits: 3.00
Principles of animal and, in selected instances, plant and bacterial virology in relation to infection and disease. Emphasis on the molecular biology of viruses, viral replication, isolation, propagation, assay, pathogenesis, diagnosis, detection, epidemiology, and control. Prereq: BMS 503.
Co-requisites:

MICR 808 - Virology Laboratory
Credits: 2.00
Principles and practices of animal, selected plants, and bacterial virological methods for the propagation, detection, and enumeration of viruses. Prereq: BMS 503. Special fee.
Co-requisites: BMS 806

MICR 815 - Immunology Laboratory
Credits: 2.00
Introduction to major components of the immune system; principles and applications for cellular and antibody based immunological techniques. Prereq: MICR 503. Special fee.
Co-requisites:

MICR 895 - Special Topics
Credits: 1.00 to 4.00
Advanced studies in specific areas. Prereq: permission. May be repeated to a maximum of 8 credits.

MICR 899 - Master's Thesis
Credits: 1.00 to 10.00
May be repeated up to a maximum of 10 credits. Cr/F.

MICR 999 - Doctoral Research
Credits:
Cr/F.

Molecular,Cellular,Biomedical

MCBS 901 - Introduction to Research in the Life Sciences
Credits: 2.00
This two-credit graduate course is designed to acquaint first-year master's and doctoral students with facilities and tools for designing, conducting, and communicating research. Topics include: acquiring proper background information; the art of oral presentation; effective writing; data analysis and graphics using computers; ethics in science; and issues in research.

MCBS 905 - Contemporary Topics in Molecular, Cellular and Biomedical Sciences
Credits: 1.00
Presentation, discussion, and critical evaluation of currnt research literature in molecular/cellular life sciences and in biomedical sciences. Topics will vary each semester. May be repeated for a maximum of 5 credits. Cr/F.

MCBS 913 - Applied Bioinformatics
Credits: 3.00
Genome-enabled biology is the exploration of basic biological questions by combining high-throughput data gathering approaches, such as DNA sequencing, with computational skills in the area of Bioinformatics. Course is designed to provide an opportunity for graduate students in the life sciences to develop sophisticated methods of data analysis by participating in a collaborative project. May be repeated for a maximum of 6 credits.

MCBS 995 - Special Topics
Credits: 1.00 to 4.00
Special topics course.

MCBS 996 - Special Topics
Credits: 1.00 to 4.00
Special topics course.

MCBS 997 - Seminar
Credits: 1.00
Graduate student and faculty presentations on current topics in the molecular life sciences and biomedical sciences. Graduate students are expected to present one seminar per year and attend all seminars each semester. May be repeated. Cr/F. (Offered both fall and spring).

Music

MUSI 803 - Music of the Renaissance
Credits: 3.00
Works of the 15th- and 16th-century composers from Dunstable to Palestrina.

MUSI 805 - Music of the Baroque
Credits: 3.00
Music of Europe from de Rore to Bach.

MUSI 807 - Music of the Classical Period
Credits: 3.00
Growth of musical styles and forms from early classicism through the high classicism of Haydn, Mozart, and the young Beethoven.

MUSI 809 - Music of the Romantic Period
Credits: 3.00
A survey of Romanticism in music from Beethoven's late period to the end of the 19th century. The works of Schubert, Berlioz, Schumann, Mendelssohn, Chopin, Wagner, Verdi, Brahms, Austrian symphonists, French pre-impressionists, and national styles in European music.

MUSI 811 - Music of the 20th and 21st Centuries
Credits: 3.00
Styles and techniques of composers from Debussy to the present. Special emphasis on tonal music before World War I; neoclassical trends; the emergence of atonality and serial techniques; electronic music.

MUSI #813 - Art Song
Credits: 3.00
History and literature of the solo song with piano accompaniment. Survey of national styles of the 19th and 20th centuries and deeper study of the central core of the art song--the German Lied.

MUSI 815 - Survey of Opera
Credits: 3.00
History of the genre from Monteverdi to the present.

MUSI 831 - Advanced Instrumental Conducting
Credits: 2.00
Physical aspects, equipment of conductor, fundamental gestures and beats, baton techniques. Reading and analysis of full and condensed scores, study of transposition, psychology of rehearsal. Prereq: advanced music theory. May be repeated for a maximum of 12 credits. Special fee.

MUSI 832 - Advanced Choral Conducting
Credits: 2.00
Physical aspects, equipment of conductor, fundamental gestures and beats, baton techniques. Reading and analysis of full and condensed scores, study of transposition, psychology of rehearsal. Prereq: advanced music theory. May be repeated for a maximum of 12 credits.

MUSI 836 - Graduate Early Wind Instruments
Credits: 1.00 to 4.00

Private instruction in Renaissance and Baroque wind instruments. May be repeated. Special fee.

MUSI 841 - Graduate Piano
Credits: 1.00 to 4.00
Private instruction in piano. May be repeated. Special fee for non-majors.

MUSI 845 - Graduate Voice
Credits: 1.00 to 4.00
Private instruction in voice. May be repeated. Special fee for non-majors.

MUSI 846 - Graduate Violin
Credits: 1.00 to 4.00
Private instruction in violin. May be repeated. Special fee for non-majors.

MUSI 847 - Graduate Viola
Credits: 1.00 to 4.00
Private instruction in viola. May be repeated. Special fee for non-majors.

MUSI 848 - Graduate Cello
Credits: 1.00 to 4.00
Private instruction in cello. May be repeated. Special fee for non-majors.

MUSI 849 - Graduate Bass
Credits: 1.00 to 4.00
Private instruction in bass. May be repeated. Special fee for non-majors.

MUSI 851 - Graduate Flute
Credits: 1.00 to 4.00
Private instruction in flute. May be repeated. Special fee for non-majors.

MUSI 852 - Graduate Clarinet
Credits: 1.00 to 4.00
Private instruction in clarinet. May be repeated. Special fee for non-majors.

MUSI 853 - Graduate Saxophone
Credits: 1.00 to 4.00
Private instruction in saxophone. May be repeated. Special fee for non-majors.

MUSI 854 - Graduate Oboe
Credits: 1.00 to 4.00
Private instruction in oboe. May be repeated. Special fee for non-majors.

MUSI 855 - Graduate Bassoon
Credits: 1.00 to 4.00
Private instruction in bassoon. May be repeated. Special fee for non-majors.

MUSI 856 - Graduate French Horn
Credits: 1.00 to 4.00
Private instruction in French horn. May be repeated. Special fee for non-majors.

MUSI 857 - Graduate Trumpet
Credits: 1.00 to 4.00
Private instruction in trumpet. May be repeated. Special fee for non-majors.

MUSI 858 - Graduate Trombone
Credits: 1.00 to 4.00
Private instruction in trombone. May be repeated. Special fee for non-majors.

MUSI 859 - Graduate Euphonium
Credits: 1.00 to 4.00
Private instruction in euphonium. May be repeated. Special fee for non-majors.

MUSI 860 - Graduate Tuba
Credits: 1.00 to 4.00
Private instruction in tuba. May be repeated. Special fee for non-majors.

MUSI 861 - Graduate Percussion
Credits: 1.00 to 4.00
Private instruction in percussion. May be repeated. Special fee for non-majors.

MUSI 862 - Graduate Keyboards
Credits: 1.00 to 4.00
Private instruction in jazz piano. May be repeated. Special fee for non-majors. Permission required.

MUSI 863 - Graduate Jazz Guitar
Credits: 1.00 to 4.00
Private instruction in jazz guitar. May be repeated. Special fee for non-majors.

MUSI 864 - Graduate Drum Set
Credits: 1.00 to 4.00
Private instruction in drum set. May be repeated. Special fee for non-majors.

MUSI 871 - Counterpoint
Credits: 3.00
Contrapuntal techniques of tonal music. Melodic construction and dissonance treatment through work in species counterpoint and studies in harmonic elaboration and prolongation. Analysis of selected compositions emphasizes the connection between fundamental contrapuntal techniques and the voice-leading of composition. Prereq: permission.

MUSI 875 - Composition
Credits: 1.00 to 4.00
Construction of phrases, periods, and short compositions following classical models. Problems of text-setting. Prereq: permission.

MUSI 876 - Composition
Credits: 1.00 to 4.00
Construction of phrases, periods, and short compositions following classical models. Problems of text-setting. Prereq: MUSI 875 and permission.

MUSI 877 - Advanced Composition
Credits: 1.00 to 4.00
Continuation of MUSI 876. Individual compositional projects. Prereq: MUSI 876 and permission. May be repeated for credit.

MUSI 879 - Orchestration
Credits: 3.00

Characteristics of band and orchestral instruments both individually and in small (homogeneous) and large (mixed) groupings. Students study scores, write arrangements, and have arrangements performed if at all possible. Prereq: permission.

MUSI 881 - Analysis: Form and Structure
Credits: 3.00
An introduction to analytical techniques through the study of representative masterworks; formal and structural elements and their interrelationships. Analysis of 18th- and 19th-century works. Prereq: permission.

MUSI 882 - Analysis: Form and Structure
Credits: 3.00
An introduction to analytical techniques through the study of representative masterworks; formal and structural elements and their interrelationships. Analysis of 20th and 21st century works. Prereq: permission.

MUSI 895 - Special Studies
Credits: 1.00 to 4.00
A) J.S. Bach; B) Franz Schubert; C) Debussy and Ravel; D) the world of jazz; E) piano literature; F) 19th century French music; G) advanced analysis; H) advanced study in electronic music; I) composition through computer-generated sound; J) woodwind literature; K) brass literature; L) string literature; M) medieval performance practice; N) renaissance performance practice; O) baroque performance practice; P) classical performance practice; Q) 19th century performance practice; R) 20th century performance practice; S) woodwind repair; T) string repair; U) advanced jazz improvisation; V) advanced piano pedagogy; W) advanced accompanying; X) advanced conducting; Y) independent study. Prereq: permission. May be repeated for credit with permission.

MUSI 955 - Introduction to Bibliography
Credits: 3.00
An intensive survey of basic reference works, music periodicals, collected editions, series, treatises, books on musical instruments and performance practice, and the important monographs on major composers from Machaut to Schoenberg. A reading knowledge of German and French is very useful.

MUSI 956 - Readings in Music History: Antiquity to 1600
Credits: 3.00
An opportunity to read and study in detail a restricted number of monographs and editions.

MUSI 957 - Readings in Music History: 1600 to 1820
Credits: 3.00
An opportunity to read and study in detail a restricted number of monographs and editions.

MUSI 958 - Readings in Music History: 1820 to the Present
Credits: 3.00
An opportunity to read and study in detail a restricted number of monographs and editions.

MUSI 991 - Research Seminar
Credits: 1.00 to 4.00
Guidance on individual research projects. Prereq: permission.

MUSI 994 - Theory Seminar
Credits: 3.00
Study of representative masterworks. Score analysis. Prereq: permission.

MUSI 995 - Independent Study in the History and Theory of Music
Credits: 1.00 to 4.00
Opportunity for especially qualified students to investigate, with guidance, specific areas of their scholarly concern. Prereq: permission.

Music Education

MUED 841 - Techniques and Methods in Choral Music
Credits: 2.00
Problems in the organization and performance of high school, college, and community choruses. Techniques of choral conducting and rehearsal, repertory, and materials.

MUED 843 - Materials and Methods in Piano Music
Credits: 2.00
Gives potential piano teachers a coherent but flexible approach to the instruction of students of different ages and levels of talent through evaluation of methods and materials and discussion of the role of the private teacher.

MUED 845 - Techniques and Methods in String Instruments
Credits: 2.00
Class and individual instruction. Intensive training on the violin, viola, cello, and double bass. Classroom procedures, establishment of string programs, and evaluation of available methods materials. Permission required.

MUED 846 - Techniques and Methods in String Instruments
Credits: 2.00
Class and individual instruction. Intensive training on the violin, viola, cello, and double bass. Classroom procedures, establishment of string programs, and evaluation of available methods materials. Permission required.

MUED 847 - Techniques and Methods in Woodwind Instruments
Credits: 3.00
Basic course in embouchure formation, tone production, tonguing, fingering and instrument care as applied to each of the woodwinds: flute, oboe, clarinet, bassoon and saxophone. Methods, studies, solos and ensembles most useful with school players of woodwind instruments.

MUED 849 - Techniques and Methods in Brass Instruments
Credits: 2.00
Basic course in embouchure formation, tone, tonguing, fingering, flexibility, accuracy, and range development as applied to the trumpet, French horn, trombone, euphonium, and tuba; methods, studies, solos, and ensembles most likely to be useful with school players of brass instruments. Permission required.

MUED 851 - Techniques and Methods in Percussion Instruments
Credits: 2.00
Basic performance skills on snare drum, timpani, mallet instruments, and other percussion instruments used in bands and orchestras. Materials and methods of instruction.

MUED 855 - Vocal Pedagogy
Credits: 2.00
A study of vocal anatomy, vocal function, and teaching methods, with an emphasis on application for singers and voice teachers.

MUED 865 - Instrumental Music Methods

Credits: 2.00
Organization and delivery of instruction to groups of instrumental music students. Examination of appropriate curricula and materials, application of instrumental and conducting techniques, structure of rehearsals, assessment of student progress.

MUED 871 - Marching Band Methods
Credits: 2.00
Role of marching bands in the school music program. Design and execution of field shows and parade marching. Understanding of marching percussion and auxiliary units. Examination of appropriate music.

MUED 890 - Teaching Elementary School Music
Credits: 3.00
Experiential approach toward learning creative strategies for teaching elementary school music. Includes various curricula and methods; philosophy and psychology of music; demonstration of materials and instruments. Observation and teaching in schools. Prereq: piano proficiency.

MUED 891 - Teaching Secondary School Music
Credits: 3.00
Assembling, managing, and teaching junior/senior high school music curriculum. Academic issues of philosophy, curriculum building, application of learning theories, administration, evaluation, motivation, and classroom management combined with field experience in lesson planning and teaching/rehearsal techniques. Prereq: piano proficiency; conducting methods.

MUED 895 - Special Studies
Credits: 1.00 to 4.00
Allows upper-level students to explore individually or in groups areas related to their specific professional interests. Prereq: permission.

MUED 983 - Instrumental Literature and Its Performance
Credits: 3.00
Exploration of representative solo and ensemble music for string, wind, and percussion instruments. Typical literature from each period of music is studied. As much as possible, live performance is included; recordings are used as required. Detailed attention given to interpretation. Project required.

MUED 995 - Special Projects
Credits: 1.00 to 4.00
Independent study, investigation, or research in music education. Creative projects may be included. Prereq: permission.

MUED 996 - Foundations and Perspectives of Music Education
Credits: 4.00
Philosophical, sociological, and psychological foundations and principles of music education and the relationship of these principles to music learning and teaching.

Natural Resources

NR 801 - Ecological Sustainability and Values
Credits: 4.00
Deeper more fundamental philosophical questions, including spiritual values questions, are being asked concerning the ecological/environmental challenge of our time; its causes and resolution. Aspects of this challenge--environmental education, energy, food, agriculture, and natural resources--analyzed with ethics and values approaches. Students develop ways of responding to problem identification and resolution.

NR 802 - Workshops
Credits: 1.00 to 4.00
Short-term courses (generally a few days to two weeks) offered off campus, covering a broad variety of environmental and natural resource topics. May be repeated. Special fee required depending on topic. Prereq: permission required.

NR 803 - Watershed Water Quality Management
Credits: 4.00
Principles of land use as they relate to water quality and quantity. Lectures focus on biogeochemical cycles and the watershed approach to land and water resource management. Labs and field trips focus on methods of water sampling and analysis. One year of chemistry is recommended. Prereq: freshwater resources or watershed hydrology, or permission. Special fee. Lab/field trips.

NR 806 - Soil Ecology
Credits: 4.00
Examines the ecological relationships between soil microorganisms and their biotic and abiotic environment, with emphasis on the role of soil microorganisms in biogeochemical cycling. Specific objectives are to examine the biodiversity present in soil systems, factors controlling microbial community composition and diversity, and linkages between soil microbial communities, soil physical properties, and soil organic matter and nutrient cycling dynamics. Prereq: Introduction to principles of biology, general chemistry or equivalent, or permission. Lab. Special fee.

NR 807 - Environmental Modeling
Credits: 4.00
Environmental Modeling introduces students to a range of key mathematical and computer modeling concepts and the ways they can be used to address important scientific questions. The course is divided into four topical sections: Population and Community Ecology, Hydrology, Biogeochemistry, and Ecosystems. In each section, modeling concepts and skills are presented together with environmental information to emphasize the linkage between quantitative methods and relevant scientific results. Prereq: MATH 425. (Also listed as EOS 807.)

NR 810 - Endangered Species Seminar
Credits: 2.00
This seminar provides students with an interactive class of student presentations and guest lectures by endangered-species biologists. Emphasis is placed on biological, sociological, economic, and political factors that influence endangered-species policy. Prereq: basic ecology/biology; permission. Special fee.

NR 811 - Wetland Ecology and Management
Credits: 4.00

Analysis of the natural resources of coastal and inland wetlands and environmental problems caused by human use and misuse of these ecosystems. Groups will collect field data to summarize the structure and function of four wetland types within a management context. Special fee. Lab. Prereq: general ecology; watershed water quality management;/ or permission. Special fee. Lab/field trips.

NR 812 - Mammalogy
Credits: 4.00
Evolution, ecology, behavior, physiology and diversity of mammals. The focus of the course is on conceptual issues, such as the relation of structure, function, physiology and ecology of species; reproductive physiology and life history strategies; and the evolution of mating systems and social structure. Familiarity of mammalian groups to the family level and identification of local fauna to species will be required. Prereq: BIOL 411-412 or equivalent. Lab. (Not offered every year.)

NR 816 - Wetland Delineation
Credits: 4.00
Examination of the soils, vegetation, and hydraulic functions of coastal and central New England wetlands. Students are responsible for the collection and identification of aquatic plant species, description of wetland soils, and delineation of wetland boundaries. Lectures and fieldwork. For graduate students and professionals. Special fee. Lab. (Offered summer session only.)

NR 818 - Law of Natural Resources and Environment
Credits: 3.00
Federal and state environmental statutory and administrative law, its application, strengths and weaknesses, and options for future amendment.

NR 819 - Wetlands Restoration and Mitigation
Credits: 3.00
Assesses the problems of wetlands loss and learning how to repair the damage. Asks what steps can be take. Does restoration work, can habitat value be replaced, what constitutes equivalent mitigation? Field experience and theoretical background in restoring marine and freshwater environments. First half of course involves field trips to visit and sample mitigation and restoration sites. Second half focuses on student projects using the scientific method to address wetland issues. Prereq: NR 811 or permission. Special fee. Lab/field trips. (Not offered every year.)

NR 820 - International Environmental Politics and Policies for the 21st Century
Credits: 4.00
Students examine policies for managing human activities to sustain the health of regional ecosystems and planetary life-support systems. Selected problems of the international commons (oceans, marine resources, atmosphere, migratory species); global and regional carrying capacity (population, resource consumption), internationally shared ecosystems (trans-boundary watersheds, water-bodies, tropical forests); and the relevant international institutions and politics for policy formation, conflict resolution, and implementation. Using a policy-analytic framework, students develop case studies to assess international policies and institutional arrangements to achieve the objectives of Agenda 21--Earth Summit Strategy to Save the Planet. Prereq: permission.

NR 824 - Resolving Environmental Conflicts
Credits: 4.00
Theories and practices of environmental dispute settlement. Roles of public, non-governmental and governmental organizations. Effectiveness of public participation initiatives in influencing public policy decisions and/or resolving environmental conflicts. Alternative approaches to consensus (policy dialogues, joint problem solving; strategic planning; negotiation, mediation) as well as litigation. Specific cases are critiqued and evaluated; conflict resolution skills are developed. Students observe and/or participate in

ongoing local decision processes. Prereq: permission. Lab. Special fee.

NR 829 - Silviculture
Credits: 4.00
The science and art of establishing, growing, and tending forests to meet multiple objectives. Basics of forest stand dynamics applied to the problems of timber management, wildlife habitat, water quality, and carbon sequestration. Prereq: NR 425 and NR 527 or permission. Special fee.

NR 830 - Terrestrial Ecosystems
Credits: 4.00
Processes controlling the energy, water, and nutrient dynamics of terrestrial ecosystems; concepts of study at the ecosystem level, controls on primary production, transpiration, decomposition, herbivory; links to Earth-system science, acid deposition, agriculture. Prereq: forest ecology and introduction to botany or principles of biology, or permission.

NR 834 - Tropical Ecology
Credits: 4.00
This course introduces students to the ecology of different tropical ecosystems, and involves students in analyzing and interpreting ecological field data and remotely sensed data. An important emphasis is to understand patterns and processes across scales - from individual plants to ecosystems and landscapes. The also addresses important global issues in the tropics, including climate change, land use change, diverse ecosystem services, and sustainable resource management.

NR 835 - Land Conservation Principles and Practices
Credits: 4.00
Students gain practical knowledge, understanding and experience in land conservation planning and implementation of options for land protection based on current practice in New Hampshire. By interacting with practitioners, students learn what it takes to implement successful land conservation projects, and conservation stewardship requirements and practices. Permission. Special fee. Lab.

NR 838 - Wildlife Policy and Management
Credits: 4.00
Local, regional, and national issues and strategies in policy and administration. Contemporary issues including land management, commercialization of wildlife, overpopulation, endangered species, wildlife diseases, and professionalism. Prereq: permission. Special fee. Lab.

NR 840 - Inventory and Montoring of Ecological Communities
Credits: 4.00
Provides an introduction to the major concepts associated with monitoring change in ecological communities. Students develop an appreciation for such issues as: identification of appropriate baselines for comparison; use of indicator species; the tools used to inventory common, rare, and secretive species; how trend data are analyzed; and the implications of failing to detect an indicator species. Restricted to senior wildlife majors others by premission. Special fee. Lab.

NR 844 - Biogeochemistry
Credits: 4.00
Examines the influence of biological and physical processes on elemental cycling and geochemical transformations from the molecular to the global scale, involving microorganisms, higher plants and animals and whole ecosystems; factors that regulate element cycles including soils, climate, disturbance and human activities; interactions among the biosphere, hydrosphere, lithosphere, and atmosphere; transformations of C, N, S, and trace elements. Prereq: one semester biology and two semesters chemistry or permission. (Also offered as EOS 844.)

NR 845 - Forest Management
Credits: 4.00
Forest land ownership; management objectives; forest inventory regulation and policy; forest administration; professional responsibilities and opportunities. Restricted to Natural Resources majors. Lab. Special fee.

NR 849 - Forest Inventory and Modeling
Credits: 4.00
Applied sampling and statistical techniques for assessing current forest conditions and predicting future growth, yield, and structure. Topics include plot and point sampling, ecological inventory, and evaluation of site quality and stand density. Prereq: MATH 420 and BIOL 528. Special fee.

NR 851 - Aquatic Ecosystems
Credits: 4.00
Energy flow and nutrient cycling in streams, rivers and lakes, with an emphasis on understanding the control of primary productivity, decomposition and community structure by both hydrologic and biotic drivers. Role of aquatic ecosystems in carbon and nitrogen budgets at watershed, regional, and global scales. Impacts of environmental changes such as global climate change and suburbanization on aquatic ecosystems. Lab. Prereq: General Ecology.

NR 857 - Remote Sensing of the Environment
Credits: 4.00
Practical and conceptual presentation of the use of remote sensing and other geospatial technologies for mapping and monitoring the environment. This course begins with the use of aerial photographs (photogrammerty, and photo interpretation) and includes measures of photo scale and area, parallax and stereo viewing, object heights, flight planning, photo geometry, the electromagnetic spectrum, camera systems and vegitation/land cover mapping. The course concludes with an introduction to other geospatial technologies including digital image analysis, global positioning (GPS), and geographic information systems (GIS). Conceptual lectures are augmented with practical homework assignments and hands-on lab exercises. Prereq: algebra. Special fee. Lab.

NR 859 - Digital Image Processing for Natural Resources
Credits: 4.00
Introduction to digital remote sensing, including multispectral scanners (Landsat and SPOT) radar, and thermal imagery. Hands-on image processing including filtering, image display, ratios, classification, registration, and accuracy assessment. GIS as it applies to image processing. Discussion of practical applications. Use of ERDAS image-processing software. Knowledge of PCs required. Prereq: NR 857 or equivalent and permission.

NR 860 - Geographic Information Systems in Natural Resources
Credits: 4.00
Theory, concepts, and applications of geographic information systems (GIS) for use in natural resources and related fields. Discussion of database structures, sources of data, spatial data manipulation/analysis/modeling, data quality standards and assessment, and data display/map production including many examples and practical applications. Hands-on lab exercises using ArcGIS 8.x software. Permission. Lab.

NR 861 - Environmental Soil Chemistry
Credits: 4.00
Chemical transformations in soils are the basis for soil fertility and plant productivity in natural and managed ecosystems, and also infuence key ecosystem processes including soil organic matter turnover

and soil-atmosphere exchange of trace gases. This class will explore soil chemistry processes and transformations related to soil nutrient cycling, plant nutrient acquisition, and other critical environmental services. Prereq: a course in soil sicence or instructor permission.

NR 867 - Earth System Science
Credits: 4.00
This course provides an introduction to the study of Earth as an integrated system. It investigates the major components (e.g. atmosphere, biosphere, cryosphere, hydrosphere, and lithosphere), dynamics (e.g., energy balance, water cycle, biogeochemical cycles), and changes within the earth system. Particular emphasis placed on the interactions and feedbacks within the system. The links between components will be presented by examining present day processes and selected events in Earth's history. The lab portion examines these concepts through the development and use of computer models of Earth system processes. Prereq: MATH 424B; MATH 425; or permission. Lab. (Also offered as EOS 867.)

NR 882 - Monitoring Forest Health
Credits: 4.00
Course provides the field and remote sensing tools and experience needed by students to assess forest conditions at the individual tree and stand levels, as well as to conduct independent research projects on specific topics of interest. Such topics may include assessing change-over-time, landscape-level impacts of urban development, severe weather events, and other natural and anthropogenic perturbations affecting the health of forests. Forest damage due to insects, air pollution (primarily ground-level ozone), drought, the 1998 ice storm, and others will be investigated. Lab. Special fee. Permission.

NR 883 - Forest Communities of New Hampshire
Credits: 4.00
A hands-on field course designed to introduce students to the diverse forest community types of New Hampshire. Topics include: 1) field identification of forest types using different classification systems and keys; 2) identification of characteristic plant and animal species; 3) the roles of climate, geology, soils, natural disturbance, forest management, and biotic factors in determining forest community type; 4) primary and secondary succession, including old-growth. Prereq: One course in ecology or environmental biology or permission. Special fee.

NR 884 - Sustainable Living
Credits: 4.00
Concepts of sustainability are explored in a learning-community format. The importance of human communication, sense of place and time, and the health and longevity of the human species as part of natural systems is emphasized. Students develop measures for sustainable living, including ecological foot-printing, and gain an understanding of system conditions necessary to move toward sustainable living. Two required field trips. Special fee.

NR 885 - Systems Thinking for Sustainable Living
Credits: 4.00
Introduction to systems thinking from a sustainable living perspective. The course is a collaborative inquiry using a problem-solving approach. After studying different types of systems and learning a variety of tools useful in systems analysis, we ask "In what ways can systems thinking be employed to understand and begin to resolve the complex problems that face us as we move toward living within limits of natural systems?"

NR 897 - Special Topics
Credits: 1.00 to 4.00
An experimental course for the purpose of introducing a new course or teaching a special topic for a semester in an area of specialization in natural resources. Permission required. Special fee on some

sections.

NR 899 - Master's Thesis
Credits: 1.00 to 10.00
Usually 6 credits, but up to 10 credits when the problem warrants. Cr/F.

NR 902 - Ecological Ethics and Values
Credits: 4.00
Increasingly fundamental philosophical questions, including spiritual values questions, are posited concerning the ecological/environmental challenge of our time, its causes, and its resolution. Examination of these questions, put forth with ethics and values approaches. Students work to develop responses to both problem identification and resolution.

NR 903 - Approach to Research
Credits: 2.00
Provides incoming graduate students with an overview of the scientific method, peer review, and various research approaches and methods. Ethics, institutional and individual responsibilities, and effective communication are also addressed in a seminar and discussion format. Cr/F.

NR 904 - Survey Research Methods
Credits: 2.00
Theoretical foundations and practical considerations in conducting survey research. Methods for obatining high-quality responses using current technology. Topics include questionnaire design, survey implementation, and strategies for reducing errors encountered in the conduct of surveys.

NR 905 - Contaminant Fate and Transport in the Subsurface
Credits: 2.00
The ability to secure financial support for research and outreach activities is becoming increasingly important. This course is intended for graduate and post-graduate level students who need to write proposals for their graduate work or to gain external funding from government agencies. Students will gain in-depth understanding of the proposal writing process through class discussions, insights shared by UNH faculty, and by writing a research proposal following the entire process.

NR 909 - Analysis of Ecological Communities and Complex Data
Credits: 4.00
This course introduces you to a suite of tools appropriate for analyzing and interpreting multivariate data arising from agroecological (and other ecological) research. In this course we cover a variety of multivariate analyses, including clustering, orindation (principle components analysis, nonmetric mutlidimensional scaling, correspondence analysis), group comparisions (multi-repsonse permutation procedures, PerMANOVA, indicator species analysis, discrimminant analysis, mantel test), and other hyppothesis-driven techniques, including structural equation modeling.

NR 910 - Forest Stand Dynamics
Credits: 4.00
Discussion and presentation on forest dynamics to include soil-site quality evaluation, individual tree growth, stand growth and yield, stand and forest management, and related resource politics. (Not offered every year.)

NR 912 - Sampling Techniques
Credits: 2.00 to 4.00
Techniques of sampling finite populations in environmental sciences; choice of sampling unit and frame, estimation of sample size, confidence limits, and comparisons of sample designs. Prereq: Applied statistics

or equivalent. (Not offered every year.)

NR 913 - Quantitative Ecology
Credits: 4.00
Applied quantitative techniques: basic concepts in probability and statistics applied to ecological systems; population dynamics; spatial patterns; species abundance and diversity; classification and ordination; production; and energy and nutrient flow. Prereq: calculus, statistics, and ecology. (Not offered every year.)

NR 915 - Coastal Challenges Sci-Policy
Credits: 2.00
This seminar introduces TIDES students to the environment in which they will develop an understanding of the organization and workings of NOAA's Estuarine Research Reserve System, how this system serves the research needs of coastal communities and how the NERRS colloborate with other coastal and estuarine programs (e.g. Coastal Zone Management, National Estuarine Program), and develop strategies to solve coastal problems. The course involves field work at NERRS and other coastal aeras in ME, NH and MA. Permission.

NR 916 - Linking Decision-making and Coastal Ecosystem Science
Credits: 4.00
Integrating coastal ecosystem science, policy and management is the focus of this course, designed as an inquiry-based collaborative learning laboratory, with both classroom and field components. Students explore ways to effectively link knowledge to action(s) designed to address comlpex coastal and related watershed problems, including those related to climate change. We examine both theories and practices that are more likely to foster the production and use of salient, credible and legitimate knowledge that is trusted by scientists/technical experts, citizens and decision-makers and thus likely to meet the needs of and be used by the decision-makers. In addition to developing an understanding of criteria used to judge the adequacy of ecosystem-based knowledge and its relevance to support decisions, students are exposed to a range of models for analyzing complex problems, including the process of joint fact finding and other collaborative problem solving mechanisms. These are examined and tested by the students. Students develop specific problem assessment, communication, and process skills, and examine and evaluate a range of specific cases through in class simulations and practical applications relevant to real world initiatives. Original case studies of specific current coastal issues are undertaken to test their models. Permission required.

NR 917 - Coastal Ecosystem Science Policy and Management Internship
Credits: 6.00
TIDES Program Internship is served at a National Estuarine Research Reserve, Coastal Community or NEP where TIDES program graduate student interns help facilitate collaborative learning and problem solving with scientists, decision-makers and coastal resource users, assist with information transfer, and help coastal communities plan for and protect coastal and estuarine related resources. TIDES M.S. students only.

NR 947 - Current Issues in Ecosystem Ecology
Credits: 2.00
Examines current issues in ecosystem ecology and biogeochemistry by weekly discussion of primary research articles. Topics covered include elemental interactions in biogeochemical processes, mechanisms regulating nitrogen losses from terrestrial ecosystems, and hydrologic-chemical interactions in streams and groundwater. Cr/F.

NR 965 - Community Ecology
Credits: 4.00
This course inevstigates how community properties -- species richness, and abundance distribution -- are

influenced by evolutionary history, landscape phrnomena such as dispersal and migration, and local factors such as the physical environment, disturbance, competition, predation, and positive interactions. Mechanistic models of community dynamics, including succession, are discussed. The influence of species diversity on ecosystem function is discussed, and all aspects of the course are related to conservation science.

NR 993 - Natural and Environmental Resources Seminar
Credits: 1.00 or 2.00
Presentation and discussion of recent research, literature, and policy problems in the natural and social sciences influencing resource use. Cr/F.

NR 995 - Investigations
Credits: 1.00 to 4.00
Investigations in Natural Resources may include topics in environmental conservation, forestry, soil science, water resources, and wildlife management. Permission required.

NR 996 - Natural Resource Education
Credits: 1.00
Responsibilities include set-up, teaching, and grading of one lab section per week or equivalent lecture experience. Required of all M.S. degree students in the department. Cr/F

NR 997 - Special Topics
Credits: 1.00 to 4.00
An experimental course for the purpose of introducing a new course or teaching a special topic for a semester in an area of specialization in natural resources. Permission required. Special fee on some sections.

NR 998 - Directed Research
Credits: 1.00 to 4.00
Student designs and conducts original research that culminates in a paper of publishable quality. Alternative to NR 899 for those choosing non-thesis degree option. Cr/F. IA (continuous grading). May be repeated up to a maximum of 4 credits.

Natural Resrcs&EarthSystemsSci

NRES 995 - Independent Study
Credits: 1.00 to 4.00

NRES 997 - Interdisciplinary Research in Natural Resources and Earth Environmental Sciences
Credits: 1.00
This course provides NRESS students opportunities to build a peer network, discuss the nature of interdisciplinary/transdisciplinary research, and read papers from Natural Resources and Earth Systems primary literature. This weekly student-led disucssion of classic, comprehensive review or new investigations papers cut across disciplinary boundaries. Facilitated by two NRESS faculty; one whose primary research focus is the natural sciences and the other in social sciences. Required for incoming NRESS students; current students highly encouraged. Only open to Earth:Environmental Sci, EES: Geology, EES: Oceanography, and Nat Resources & Envirrn Stdy majors.

NRES 999 - Doctoral Research
Credits:
Cr/F.

Nursing

NURS 806 - Clinical Inquiry
Credits: 4.00
Theory course focuses on identifying problems and the role of the nurse in decision-making situations in nursing practice. Emphasizes using decision-making theories, patient education theories and practice, critical thinking, ethical concepts in decision-making, tools for organizing nursing information, and applying evidence based practice. In addition, learners are introduced to information management and nursing informatics as they apply to planning and delivery of nursing care. Nursing majors only. Special fee.
Co-requisites: NURS 807, NURS 813, NURS 825, NURS 900

NURS 807 - Pathophysiology and Pharmacology
Credits: 4.00
Theory course focuses on concepts of human pathophysiology and pharmacology relevant to professional nursing practice. Physiologic response and manifestations of alterations in normal body functioning are analyzed. Pharmacological agents used for these alterations are examined. Application of concepts across the lifespan are incorporated through the discussion of pathophysiology and pharmacology. Provides the foundation foe the clinical decision-making and management of care. In addition, learners are introduced to the professional nurse's responsibility for educating clients about basic pathophysiology and pharmacology issues. Nursing majors only
Co-requisites: NURS 806, NURS 813, NURS 825, NURS 900

NURS 810 - Families in Health and Illness
Credits: 3.00
Seminar focusing on the family environment as a context for the experience of health and illness. Current middle-range theories and research from nursing and other disciplines analyzed for their application to family health. Public policy initiatives related to family health will be explored.

NURS 813 - Health Assessment and Clinical Nursing Theory
Credits: 3.00
This course is designed to provide the student with evidence-based knowledge related to acquiring the psychomotor and assessment skills required for the safe delivery of nursing care to the adult client. Students develop foundational skills applicable to achieving program outcomes. The focus of the course will be on developing beginning health assessment, and clinical nursing skills while implementing critical thinking, and application of the nursing process, highlighting fundamental nursing concepts as they pertain to proving and improving client care. Prereq: majors only. Special fee.
Co-requisites: NURS 813C

NURS 813C - Health Assessment and Clinical Nursing
Credits: 2.00
Care of the adult clnical is designed toprovide the student with the opportunities to apply the nursing process and clinical judgment within an acute care setting to clients with commonly occuring diease states and those undergoing surgery. The experience focuses on the application of knowledge and skills, evidence-based practice, clinical judgment and relationship-centered care. Prereq: majors only
Co-requisites: NURS 813

NURS 825 - Collaborative Care I: Care of Older Adult
Credits: 3.00

Theory course focuses on care outcomes for major functional and health transitions of older adults across health settings. Emphasizes nurse's advocacy in facilitating care collaboration based on informed practice utilizing current research and best practice models of care. Learners incorporate theories from nursing and other disciplines to achieve a broad perspective and understanding of the aging experience and cultural implications for nursing practice. Open to Nursing majors only.
Co-requisites:

NURS 826 - Caring for People with Severe and Persistent Mental Illness
Credits: 2.00
This theory course is designed to provide an understanding of the neurobiological and psyco-social concepts of mental health and illness, factors influencing human behavior and interaction, current somatotherapies, and the role of the psychiatric nurse as part of the interdisciplinary team. Previous course knowledge and communication skills provide a theoretical foundation in explaining, guiding, and predicting nursing action. Prereq: majors only.
Co-requisites: NURS 826C

NURS 826C - Caring doe People with Severe and Persistent Mental Illness Clinical
Credits: 2.00
This clinical course provides students with the opportunity to participate in collaborative and interdependent health care relationships with professional and paraprofessional mental health partners. A special focus is placed on the integration of personal knowledge. therapeutic use of self, and professional communication skills inherent in nurse-client relationships. Prereq: Majors only.

NURS 827 - Collaborative Care II: Managing Acute and Complex Care of Individuals
Credits: 6.00
In this combined theory and clinical course students develop the knowledge base to refine their clinical judgment and decision-making skills in care of individuals from diverse populations with acute, critical, and chronic illnesses. Focuses on illness management, health restoration, and risk reduction in prototypic health care problems. Focuses on nurses' ability to use leadership skills and concepts of care collaboration with clients, families, peers, and members of the health care team to maximize client outcomes. Care experiences primarily center on the acute care environment. Prereq: NURS 806, NURS 807, NURS 813, NURS 825, NURS 900.
Co-requisites: NURS 826

NURS 828 - Public Health Nursing
Credits: 5.00
This theory and clinical course prepares the student for community and population focused practice. Emphasis placed on the synthesis of concepts, theories, knowledge and practice from nursing, and public health sciences. The concepts of community as client, community assessment, health promotion, health protection, illness prevention, and vulnerability are examined from a public health nursing perspective. Prereq: NURS 826, NURS 827, NURS 953.
Co-requisites: NURS 829A, NURS 829B, NURS 829C, NURS 908, NURS 951

NURS 829A - Collaborative Care III: Childbearing Families
Credits: 2.00
This theory course focuses on providing competent nursing care for young families throughout the childbearing period. Healthy transitions and physical alterations occurring during the childbearing period are examined. The health needs of the young family are discussed in terms of major morbidity/mortality and contemporary issues. This course integrates the experience in the discipline that builds on theories of growth and development, pathophysiology and use of decision making models to provide opportunities for the development of the nurse generalist role. Prereq: NURS 826, NURS 827, NURS 953.
Co-requisites: NURS 828, NURS 829B, NURS 829C, NURS 908, NURS 951

NURS 829B - Collaborative Care III: Childrearing Families
Credits: 2.00
This theory focuses on providing competent nursing care for young families throughout the child-rearing periods. Healthy transitions and physical alterations occurring from infancy through adolescence are examined. The health needs of the young family are discussed in terms of major morbidity/mortality and contemporary issues. This course integrates experience in the discipline through seminars that build on theories of growth and development, pathophysiology and use of decision making models to provide opportunities for the development of the nurse generalist role. Prereq: NURS 826, NURS 827, NURS 953; Nursing majors only.
Co-requisites: NURS 828, NURS 829A, NURS 829C, NURS 908, NURS 951

NURS 829C - Collaborative Care III: Clinical
Credits: 2.00
This clinical course focuses on providing competent nursing care for young families throughout pregnancy, birth, and child-rearing periods. Healthy transitions and physical alterations occurring from conception through adolescence are examined. The health needs of the young family are discussed in terms of major morbidity/mortality and contemporary issues. This experience integrates real-world experience in the discipline through clinical opportunities in a variety of acute and community clinical settings that build on theories of growth and development, pathophysiology and use of decision making models to provide opportunities for the development of the nurse generalist role. Prereq: NURS 826, NURS 827, NURS 953. Special fee.
Co-requisites: NURS 828, NURS 829A, NURS 829B, NURS 908, NURS 951

NURS 830 - Collaborative Care II: Childbearing and Childrearing Families
Credits: 4.00
This theory focuses on nursing care for young families throughout the childbearing and childrearing period. Health transitions and physical alterations are examined. The health needs of the young family are discussed in terms of major morbidity/mortality and contemporary issues. This course integrates theories of growth and development, pathophysiology and use of decision making models. Prereq: Majors only.
Co-requisites: NURS 830C

NURS 830C - Collaborative Care II: Childbearing and Childrearing Families Clinical
Credits: 2.00
This clinical focuses on nursing care for young families throughout pregnancy, birth, and child-rearing periods. Healthy transitions and physical alteration occurring from conception through adolescence are examined. This course integrates clinical opportunities ina variety of clinical settings provide opportunities for the development of the nurse generalist role. Prereq: majors only. Special fee.
Co-requisites: NURS 830

NURS 894 - Special Topics
Credits: 1.00 to 4.00
Formal course given on selected topics or special interest subjects. Several topics may be taught in one year or semester. Prereq: permission. May be repeated. Special fee on some sections.

NURS 899 - Master's Thesis
Credits: 1.00 to 6.00
Prereq: permission. May be repeated up to a maximum of 6 credits. Cr/F.

NURS 900 - Discipline of Nursing
Credits: 3.00
Nursing as a discipline with a focus on paradigms for nursing science, patterns of knowing, concept

analysis, and nursing theory. Emphasis on concepts fundamental to nursing practice, including advocacy, caring, power, and collaboration; analysis of nursing theories in relation to practice and research. Prereq: permission.

NURS 901 - Health Policy
Credits: 3.00
Emphasizes identification of emerging issues that have an impact on the health care system and nursing in prodiving leadership to address theses issues. Students analyze problems and process solutions from a nursing perspective with reasoned approach to their resolution. Prereq: majors only.

NURS 905 - Research
Credits: 3.00
Provides overview of current state-of-the-art research in nursing. Emphasis on critique of research findings and application of research to clinical practice. Prepares student to work collaboratively with expert researchers in either academic or clinical settings. Discusses types of research designs and qualitative and quantitative methods. Critique process focuses on individual components of research study, including the theory, purpose, sample, data collection procedures, and analysis. Includes ethical issues of scientific fraud and misconduct and issues of human subjects. Prereq: permission.

NURS 907 - Advanced Pharmacology
Credits: 3.00
Principles of pharmacodynamics and pharmacokinetics relevant to primary care practice. Focuses on major classes of drugs with an emphasis on knowledge necessary for prescriptive authority. Prereq: permission.

NURS 908 - Advanced Clinical Application of Human Physiology
Credits: 3.00
Examines human physiologic function and interaction of selected body systems in maintaining health. Clinical correlation strategies used to examine implications of recent advances in selected areas of human physiology to better understand the human body and its functioning in health and illness. Stresses application of course materials to advanced nursing practice in a variety of settings. Prereq: permission.

NURS 909 - Advanced Health and Illness Appraisal
Credits: 3.00
Advanced health assessment including communication strategies, functional health pattern assessment, advanced physical assessment, screening diagnostic tests, developmental evaluation, and clinical decision making. Lab and clinical component. Pre- or Coreq: NURS 900; 905; 907; 908. Special fee.

NURS 925 - Health Care Systems and Leadership
Credits: 3.00
This theory course emphasizes the use of systems thinking and systems theory as a guide for analyzing and improving health systems. Careful consideration is given to the complex challenges of achieving quality care delivery and quality health outcomes for aggregates within specific environments. Course contents include systems theory, health systems analysis, shaping care delivery, research utilization, ethics, and leadership. Course fosters student integration of knowledge in preparation for clinical nursing leadership responsibilities. Prereq: NURS 900, NURS 905, NURS 908. Only open to Nursing majors.

NURS 935 - Primary Care Families I
Credits: 3.00
Lecture/discussion course covering the primary care management of healthy adults through the lifespan with a focus on health maintenance and disease prevention. Focuses on evaluation and management of common acute and chronic adult health care problems. Major causes of adult morbidity are covered.

Prereq: NURS 908; 909. Pre- or Co-req: NURS 907; 936 Special fee. Only open to Nursing and Cert:AdultNursePractitioner majors.

NURS 936 - Practicum in the Primary Care Families I
Credits: 3.00
Supervised clinical experience in the primary care management of adults through the lifespan, including assessment and management of common acute and chronic clinical problems. Focuses on the clinical application of knowledge of health maintenance, disease prevention, and the evaluation and management of major causes of adult morbidity and mortality. Prereq: NURS 908; 909. Pre- or Coreq: NURS 907; 935. Special fee.

NURS 937 - Primary Care of Families II
Credits: 3.00
Lecture/discussion course covering the primary care management of children across the health-illness continuum, including assessment and management of common acute and chronic clinical problems. A developmental perspective is taken to examine child-health evaluation and maintenance from infancy through adolescence. Prereq: NURS 935; 936. Only open to Nursing and Cert:AdultNursePractitioner majors.
Co-requisites: NURS 938

NURS 938 - Practicum in the Primary Care of Families II
Credits: 3.00
Supervised clinical experience in the primary care management of the child and adolescent, including assessment and management of common acute and chronic clinical problems. A family-centered developmental perspective is taken to provide child-health services from infancy through adolescence. Nursing care, family, and rehabilitation issues related to various health problems are investigated in practice. Prereq: NURS 935; 936. Only open to Nursing and Cert:AdultNursePractitioner majors.
Co-requisites: NURS 937

NURS 939 - Seminar and Practicum in the Primary Care of Families III
Credits: 6.00
Final integrative clinical course that allows for intensive application of primary care knowledge and skills in practice. Seminar allows for in-depth analysis of various clinical problems and role issues. Students are actively involved in a primary care setting appropriate to their area of study. Extensive clinical experience under the guidance of a preceptor. Prereq: NURS 935; 936; 937; 938. Special fee. Only open to Nursing and Cert:AdultNursePractitioner majors.

NURS 944 - Population Health Promotion and Risk Reduction
Credits: 3.00
Students examine the theoretical and empirical bases for health promotion and risk reduction assessment and interventions to improve population health outcomes. International and national health objectives provide the organizing framework for the consideration of health behaviors. Health promotion and risk reduction are examined within an ecological perspective, including critical social, political, racial/ethnic, cultural and economic environments. Students examine issues that impact individual, family, and community wellness throughout the lifespan. Only open to Nursing and Cert:AdultNursePractitioner majors.

NURS 950 - Reading and Research in Advanced Nursing
Credits: 2.00 to 8.00
Through a process of selective review and critical evaluation, students examine the current literature and explore the issues and trends in their topic area. Students prepared by education and experience to do independent work under the guidance of a professor may register for one or more of these sections. Topics include: oncology, women's health, community nursing, case management, geriatric nursing, nursing care

of children and families, nursing those with disabilities, quality improvement, special topics. Hours and credits to be arranged. May be repeated up to a maximum of 8 credits. Pre- or Coreq: NURS 900, 901, 905.

NURS 951 - Clinical Epidemiology and Decision Analysis
Credits: 3.00
This theory course provides an in-depth study and application of methods and tools used to guide clinical nursing leader's decision-making under conditions of uncertainty. Only open to Nursing majors.

NURS 952 - Clinical Nursing Leadership I
Credits: 8.00 or 10.00
This clinical and seminar course focuses on the integration of systems thinking when engaging in clinical nursing leadership and the application of systems theory in analyzing dynamic health systems. Emphasizes the developing leadership role at the micro-system level and with an aggregate focus (e.g., long term care; community/public health agencies; ambulatory care clinics; health centers; schools; and acute care settings). Seminars focus student reflection on leadership experiences and emerging issues in health systems, professional development and collegiality. Special fee.

NURS 953 - Promoting Quality Management
Credits: 2.00
In this seminar course, students work with agency preceptor and faculty mentor to develop a proposal for a quality improvement project. Concepts of clinical micro-systems are explored. Prereq: NURS 900, NURS 905, NURS 908. Nursing majors only.

NURS 955 - Practicum in Advanced Nursing Practice
Credits: 3.00 to 12.00
Students acquire the specialty knowledge and skills required in the area of their master's study. Students work with their faculty mentor to propose performance competencies, learning activities, settings, and resource persons for this supervised practicum. Practicum must include a minimum of 112 hours of supervised practice. May be repeated. Must hold RN license in state of practicum. Special fee.
Co-requisites: NURS 956

NURS 956 - Capstone Project Seminar
Credits: 3.00
This seminar course requires students to focus on nursing practice issues and to work as individuals or groups to develop solutions. As the capstone course for the clinical nurse leader and evidence-based nursing tracks, the students are required to complete this scholarship project under the direction of a faculty member. Must hold RN license in state of project. Prereq: NURS 905 Pre- or Coreq: NURS 901. Coreq; NURS 954 or 955.

NURS 958 - Clinical Nurse Leader Capstone
Credits: 6.00
As the capstone course for the Clinical Nurse Leader track, students work with preceptor in the clinical agency and a faculty member to complete a scholarly project that defines and/or implements strategies that address/resolve a subtantive nursing practice issue that impacts the quality and safety of patients. Prereq: NURS 952. Special fee. Cr/F.

NURS 960 - Trans Research Evid Based Prac
Credits: 3.00
Students focus on translating research from nursing and related disciplines as a tool for improving nursing practice. Course emphasizes the purpose of evidence-based practice and its ethical application in nursing practice. Students distinguish the purpose, process, application and outcomes among research, quality

improvement and PCIO as elements of evidence based practice. By identifying clinical problems, generating clinical questions, conducting systematic literature reviews, and evaluating research literature, students begin to translate research and scholarship as a foundation for clinical decision-making. Prereq: NURS 951. Only open to Nursing majors.

NURS 961 - Evolution of the Doctor of Nursing Practice
Credits: 1.00
This course provides the background of the evolution of the DNP role and the four role components of practictioner, educator, clinical scientist, and clinical manager. The essentials of DNP practice are examined for an understanding of the expectations and resources required for DNP practice.

NURS 962 - Science of Advanced Nursing Practice
Credits: 3.00
This course engages the students in the analysis of philosophical and theoretical perspectives of the discipline of nursing. Paradigms in nursing are examined in relation to advanced nursing practice. Through critical inquiry, theories and empirical evidence are synthesized in order to translate, integrate and disseminate knowledge across diciplines. Advanced nursing practice is studied in the context of complex, clinical, business, ethical and systems issues.

NURS 963 - Advanced Epidemiology
Credits: 3.00
Epidemiologic research and concepts are synthesized and applied to clinical and population based health to identify and analyze the determinants of health, health promotion and risk reduction strategies, and to evaluate the distribution of health conditions. Epidemiological and biostatistical approaches are used to analyze population data to better understand determinants of health and illness

NURS 964 - Technology and Health Care
Credits: 3.00
This course provides students with essential knowledge and skills to utilize information systems/technology to improve and transform health care systems. Students analyze information requirements, design system alternatives, and consider the management of resources. The evaluation of the effectiveness of clinical and/or management information systems in health care is considered. The course examines the resources and methods required to apply technology to enhance health care delivery and provide leadership within health care systems.

NURS 965 - The Social Power of Leadership in the 21st Century
Credits: 3.00
The goal of this cross-disciplinary course is to develop students' deep understanding of the dynamic reinforcing power of leadership follower relations in moden organizations - including both toxic and beneficial processess and outcomes. Readings draw on the literatures from business, social sciences, and philosophy to illuminate the complexities of leading in 21st century corporations, public service organizations, institutions of higher learning, and government agencies. A diverse cross-section of students from doctoral and master level programs across all UNH schools, colleges, and departments participate in the course in order to most broadly examine how the leader-follower relationship can succeed or fail in its pursuit of organizational strategies and objectives. Prereq: majors only or permission. Only open to Nursing majors.

NURS 966 - Theoretical and Practical Applications in Higher Education
Credits: 3.00
This course explores the foundations and applications of education and evaluation stragegies for teaching and learning in academic, clinical, research, and organizational settings. Scholarly evidence from a variety of sources is used to develop educational prcoesses, products, and evaluation strategies. Students acquire

knowledge to support professional development and employ research skills as educators in diverse teaching environments with diverse learners.

NURS 967 - Evidence Synthesis
Credits: 3.00
This course engages the student in the analysis of sources of evidence available for clinical decision making. Guidelines and systematic reviews are developed and examined for application to advanced nursing practice. Prereq: graduate level course in research.

NURS 968 - Nurs Science/Evid Based Prac
Credits: 3.00
This course focuses on knowledge acquisition of nursing science, nursing theorists, borrowed theorists, and the use of evidence knowledge. Through a process of selective review and critical evaluation, students examine the current literature and explore the issues and trends in the current research in the discipline of nursing. Emphasis is on the critique of research findings and application of research to clinical practice and advanced nursing knowledge. Learners analyze conceptual and theoretical perspectives specific to advancing nursing practice. The processes of creating theory based practice guidelines will be explored. Emphasis on creating strategies for making theory based practice a reality. Prereq: majors only.

NURS 971 - Data Analysis I: Qualitative Methods
Credits: 1.00
This course includes the application of qualitative data analysis to advanced clinical practice, including skill building in thematic analysis. Selected qualitative research designs are presented and the philosophical underpinnings and specific data collection and analysis methods associated with each design are identified, discussed, compared, contrasted and analyzed. Students identify a method of qualitative analysis to interpret focus group data.

NURS 972 - Data Analysis II: Quantitative Methods
Credits: 3.00
This course includes the application of quantitative data analysis to advanced clinical practice. Topics include descriptive and graphical statistical methods, confidence intervals, hypothesis testing, regression, ANOVA, statistical process control, failure modes and effects analysis, Six-Sigma concepts and methods, quality tools, process capability studies, Lean methodology and measurement system analysis. Use of a statistical software package is an integral part of the course. Prereq: graduate level statistics course.

NURS 973 - Health Care Quality
Credits: 3.00
This course prepares the advanced practice nurse with the knowledge, theory and organizational science concepts necessary to design and evaluate performance improvement in health care organizations related to quality and safety. The role and requisite competencies of the DNP in leading innovative quality and safety initiatives are addressed.

NURS 974 - Organizational Behavior
Credits: 3.00
This course is an exploration of organizational behavior theories and applications designed to improve the student's understanding of human behavior in organizations. The focus is on the development of strategies for managing behavior in ways that serve both employee and organizational goals while promoting health care concerns.

NURS 980 - Doctoral Seminar I
Credits: 3.00
This course focuses on the application of models and methods of research translation in nursing, including

synthesis of evidence, program planning and evaluation, and preparation of an evidence-based research proposal. Students lay the foundation for their practice dissertation. Prereq: Successful achievement of candidacy.

NURS 981 - Doctoral Seminar II
Credits: 3.00
This course encourages further exploration and analysis of the selected client, population, and/or system. Students use their own evidence-based analysis and data from either clinical practice and/or epidemiological studies to guide the design and implementation of the practice dissertation including human subjects review, intervention and analysis. The course includes a clinical practice immersion in the DNP role. Prereq: NURS 980.

NURS 982 - Doctoral Seminar III
Credits: 1.00
This course focuses on advanced scholarly writing across the discipline allowing students to develop and refine their skills in writing, editing and preparing manuscripts for publication. The process of writing a manuscript from the initial idea to submission of a publishable manuscript will be included. The course emphasizes the legal and ethical aspects of authorship and scientific publishing, identification of journal and correspondence with editors and reviewers. Prereq: NURS 981.

NURS 983 - Doctoral Seminar IV
Credits: 3.00
This course focuses on interpretation and presentation of the practice dissertation findings. A clinical practicum immersion allows the students to implement practice dissertation findings into practice and allows the students to implement DNP role components. Prereq: NURS 982.

NURS 996 - Independent Study
Credits: 1.00 to 3.00
Opportunity for study and/or practice in an area of choice. Objectives are developed by students and must be approved by faculty. May be repeated. Prereq: permission.

Nutrition

NUTR 840 - Nutrition for Children with Special Needs
Credits: 4.00
Nutritional assessment and care of children with special needs resulting in feeding difficulties requiring medical nutrition therapy. Prereq: NUTR 400.

NUTR 850 - Nutritional Biochemistry
Credits: 4.00
Study of digestion, absorption, transport, and utilization of food nutrients from a biochemical perspective. Emphasis on the role of macro- and micronutrients as substrates and catalysts for metabolic pathways, and the role of these pathways in maintaining human health at the cellular, organ, and whole body levels. Prereq: general biochemistry. (Also offered as ANSC 850.)

NUTR 851 - Nutritional Biochemistry of Micronutrients
Credits: 4.00
Investigation of the biochemical and clinical aspects of micronutrient metabolism. All of the essential vitamins and minerals are explored in depth. Some representative phyto-nutrients and qausi-nutrients are also explored. The nutrients are examined for their molecular, cellular, and biomedical functions and intermediary metabolism, as well as the biochemical and clinical consequences of their deficiency or excess. Prereq: Nutritional biochemistry (NUTR 750/850 or equivalent.) Spring semester only.

NUTR 855 - Treatment of Adult Obesity
Credits: 4.00
Overview of the risk factors associated with obesity; evidence-based recommendations for assessment and treatment of obesity. Counseling skills important to successful weight management and non-diet approaches are also explored. Special fee.

NUTR 870 - Nutrition and Gender Based Health Concerns
Credits: 4.00
An online hybrid course that includes weekly lectures offered online and a two hour recitation each week. This course offers a comprehensive review of nutrition related health issues facing adult men and women today. Students read and evaluate the current literature fostering critical thinking skills and group discussion. Also included in the course is the opportunity to present a topic of interest in a professional presentation to the class. Prereq: NUTR 400 and BMS 507, 508, ANSC 511 or 512.

NUTR 873 - Clinical Nutrition
Credits: 4.00
Principles of normal nutrition and physiology applied to clinical problems; altered nutrient requirements in human disease. Prereq: basic nutrition, anatomy and physiology, and biochemistry. Nutrition majors only or by permission. (Fall semester only.)
Co-requisites:

NUTR 880 - Critical Issues in Nutrition
Credits: 4.00
Critical review and analysis of controversial topics in nutrition; emphasis on developing oral and written communications skills and analytical reasoning skills. Prereq: permission. (Spring semester only.)

NUTR 895 - Investigations

Credits: 1.00 to 4.00
Prereq: permission.

NUTR 898 - Nutrition Research Experience
Credits: 4.00
Students develop a project of interest and identify a mentor within the department to advise them throughout the project. Students prepare a project proposal for review. Final paper and presentation. May be repeated up to a maximum of 4 credits.

NUTR 899 - Master's Thesis
Credits: 1.00 to 6.00
Graduate students must enroll for a total of 6 credits for this course. Students may enroll in 1-6 credits per semester. Permission required. Cr/F.

NUTR 900 - Contemporary Topics in Animal, Nutritional, and Biomedical Sciences
Credits: 1.00
An informal forum for graduate students to gain experiences in evaluating the current literature of a contemporary topic. (Also offered as ANSC 900.) May be repeated for a maximum of 2 credits. Offered both fall and spring semesters. Cr/F.

NUTR 929 - Dietetics: Principles and Practices
Credits: 4.00
Course provides an orientation to those graduate students enrolled in the dietetic internship program that encompasses community, food service and clinical nutrition topics. Concepts to be explored include, but are not limited to, an orientation to the profession, ethical standards of the American Dietetic Association, counseling theory, basic nutrition assessments, evidence-based medicine, food safety, research, and emotional intelligence. In addition to the didactic instruction over 175 hours of practicum based experiential learning is integrated via hands on dietetics work which includes but is not limited to long term care facilities, camp based food service and health promotion initatives, food service operations and sustainable food planning and production experiences, and research. Prereq: Graduate level Dietetic Interns only.

NUTR 930 - Dietetics: Foodservice, Community and Research
Credits: 6.00
This course is designed to enhance pre-professional work experiences with continued examination and application of theory and practice in the dietetic profession. Concepts explored include foodservice management topics such as facility and human resources management, translation of nutrition into foods/menus, procurement, distribution and service within delivery systems, and food safety and sanitation. Community nutrition topics include: nutrition screening and assessment, nutrition counseling and education, food secuirty ans sustainability, program development and evaluation as well as an exploration of health promotion and disease prevention theory and application. A group based research project is identified that investigates a dietetics based hypothesis Weekly seminars, assignments and supplemental readings reinforce practicuum experiences. In addition to the didactic instruction between 500-600 hours of practicuum experience is integrated into the course design. Prereq: Permission required; Graduate level Dietetic Interns only. Special fee.

NUTR 931 - Dietetics: Clinical Theory and Practice
Credits: 6.00
This course is designed to integrate clinical theory and practice in dietetics care. Bi-weekly seminars, weekly on-line assignments and supplemental readings serve to provide a mechanism to examine the nutritional basis of diet and disease relationships and consider appropriate nutritional interventions. Between 500-600 of clinical rotations are planned and provide interns with the opportunity to explore the application of nutritional science principles and practices within inpatient and outpatient environments.

Staff, relief, coupled with an in-depth case study presentation of a current patient with multiple nutrition risk factors will serve as the capstone practicuum project. Prereq: Graduate level Dietetic Interns Only; Permission required. Special fee.

NUTR 955 - Topics in Human Obesity
Credits: 4.00
Various topics related to obesity are discussed from year to year. Topics include: neurregulatory and hormonal mechanisms; role of diet, exercise and energy metabolism, fat as an endocrine organ; obesity, iummune function and chronic disease.

NUTR 995 - Non-thesis Investigations
Credits: 1.00 to 4.00
Advanced investigations in a research project, exclusive of thesis project. Elective only after consultation with the instructor. May be repeated for a maximum of 4 credits. (Offered both fall and spring semesters.)

Occupational Therapy

OT 810 - OT Practice and Professional Roles
Credits: 3.00
Students are introduced to foundation knowledge, values and philosophy of occupational therapy practice. Students learn skills to apply professional behaviors and skills required to be ethical practitioners. They learn about various practice settings and systems within which occupational therapists practice to prepare them to begin to make decisions regarding their fieldwork site selections. They are introduced to models of OT practice. Only open to OT majors. Special fee.

OT 822 - Introduction to Assistive Technology
Credits: 4.00
This hands on course will provide participants with an overview of the application of assistive technology in all life settings for individuals affected by physical, sensory, or cognitive limitations. Methods, materials, and resources for obtaining and providing assistive technology services will also be discussed. Special fee.

OT 824 - Assistive Technology and Physical Disabilities
Credits: 4.00
An advanced course that focuses on the specialized assistive technology needs of persons with physical impairments. Topics include: seating and positioning needs; prosthetic devices; manual and powered mobility devices; ergonomics and computer access. Special fee.

OT 826 - Assistive Technology and Sensory, Communicative, and Cognitive Disabilities
Credits: 4.00
Explores the application of various technologies for individuals with visual, auditory, cognitive and communication impairments. Included are: Blind and low vision aides, assistive listening devices, alternative and augmentative communication devices, memory aides, and prompting aides. Special fee.

OT 830 - Assistive Technology for Enhancing Occupational Performance
Credits: 3.00
This course provides instruction on how occupational therapy practitioners use and apply assistive technology in the context of client evaluation and intervention, to improve quality of life and fuctional capacities. Students learn and apply clinical reasoning skills related to te selection, procurement, modification and training in the use of assistive technology solutions.
Co-requisites: OT 830L

OT 830L - Assistive Technology for Enhancing Occupational Performance Lab
Credits: 2.00
Co-Requisite Laboratory for OT 730/830 Assistive Technology for Enhancing Occupational Performance. Students are provided hands-on learning experiences regarding the fabrication, identification, adaptation and training in the use of assistive technology for individuals with functional problems associated with disability or impairment. OT evaluation and interventions related to the application of assistive technology are addressed.
Co-requisites: OT 830

OT 841 - Human Occupation
Credits: 4.00
This course introduces students to the broad concept of occupation by exploring ways people acquire skills

for occupational performance. Students develop an understanding of the relations between health and occupation, disability and occupation, and explore how humans find meaning in their lives, through occupational engagement. This course is writing intensive.

OT 845 - Administration and Policy for Occupational Therapy Practice
Credits: 3.00
This course aims to increase the student's understanding of systems of practice, and to business fundamentals associated with occupational therapy service delivery. Specific topics covered include and analysis of practice settings, reimbursement, supervision of professional and non-professional staff, program evaluation methods, ethics, OT management practices, marketing, health policy including medicare, Human Rights and Education Legislation, and the impact of policy decisions for the delivery of OT services. OT and OT Asst Tech Certificate majors only.

OT 846 - Transitions: Student to Professional
Credits: 2.00
This course is designed to help occupational therapy students explore role changes involved in leaving the academic world and entering the larger realm of professional and practice settings. Research on professional development indicates this transition is easier when students are prepared in both personal and institutional domains. Through lecture, presentations, small group work, readings, and written assignments students are given opportunities to analyze factors that contribute to successful professional development and ethical practice. Students use the results of their analyses to plan their individual transitions to fieldwork and entry-level practice. Prereq: OT 892; second semester standing in first year of MS program.

OT 851 - Mind Body Systems/Neurologically-based Function and Dysfunction
Credits: 3.00
Students study most significant occupational-related disorders commonly seen by occupational therapists. A self-directed method is used to examine the perceptual, cognitive, biopsychosocial basis of these disorders. A basic overview of human body-mind systems is provided with an emphasis on pathology, the recognition of symptoms, their causes and the occupational implications of the disorders. The course is a prerequisits for courses in specific occupational therapy assessment and intervention.

OT 852 - Human Movement and Environmental Effects on Everyday Occupations
Credits: 3.00
Students will integrate their prerequisite knowledge of occupation. The course will develop skills required for interpretation of biomechanical analysis for creating successful occupational performance for individuals with varied musculoskeletal, cardiac, and respiratory dysfunction. Integration of the occupational therapy clinical reasoning process and the use of occupations as a therapeutic mechanism for change will be emphasized. The analysis of environment as it relates to human movement and participation in desired occupations will be explored. Special fee.
Co-requisites: OT 852L

OT 852L - Human Movement and Environmental Effects on Everyday Occupations Lab
Credits: 1.00
Lab. OT majors only. Special fee. Cr/F.**Co-requisites:** OT 852

OT 854 - Level II Fieldwork, I
Credits: 8.00
This course is a 12-week, full-time internship that takes place after completion of the first graduate year, either in the summer or the fall. Level II fieldwork provides students with opportunities to: experience in-depth delivery of occupational therapy services to clients; focus on the application of purposeful and meaningful occupation and/or research, administration and management of occupational therapy services.

Level II fieldwork is designed to promote clinical reasoning and reflective practice, to transmit values and beliefs that promote ethical practice and to develop professionalism and competence as career responsibilities. OT majors only. Cr/F.
Co-requisites: OT 855

OT 855 - Level II Fieldwork Discussion
Credits: 1.00
OT 855 Level II Fieldwork, I, online discussion is a co-requisite course that accompanies OT 854 and 856: Level II Fieldwork. Students respond to instructor-lead discussion prompts as well as to postings of their classmates. The online discussion provides the opportunity for students to relate fieldwork experiential learning to all areas of UNH coursework including: mind-body systems, health-and-human systems of care; assessment; intervention; documentation; evidence-based practice; client-centered and occupation-centered practice; and application of research to practice. Students engage in on-going discussion about professional identity and the transition from student to professional as they describe and discuss fieldwork challenges and successes across a variety of practice settings. Cr/F.
Co-requisites: OT 854

OT 856 - Level II Fieldwork, II
Credits: 8.00
This course is the second 12-week, full-time internship. It takes place after two semesters in the second graduate year. OT 856 provides students with opportunities to evaluate, develop and implement in-depth delivery of occupational therapy services in population-based practice and to focus on research and/or administration and management of occupational therapy services. OT majors only. Cr/F.

OT 860 - Psychosocial Evaluation and Intervention
Credits: 3.00
Examines the evaluation of psychosocial and psycho-emotional areas of occupational performance and the planning and implementation of occupation-based interventions across domains of practice and client populations. Course addresses developing a client's occupational profile, narrative reasoning and therapeutic use of self, behavioral change, illness representation, and adjustment to chronic disorders. A specific focus of the course is evaluation of and intervention for clients' presenting with mental health disorders. Open to OT majors only.
Co-requisites: OT 860L

OT 860L - Psychosocial Evaluation and Intervention Lab
Credits: 1.00
This is the co-requisite lab for OT 860. Lab provides hands-on experiences regarding the evaluation and intervention of psychological and psycho-emotional areas of occupational performance. Course focuses on the evaluation and intervention for clients presenting with mental health disorders and also addresses narrative reasoning, therapeutic use of self, behavioral change, illness representation and adjustment to chronic disorders. Special fee. Cr/F.
Co-requisites: OT 860

OT 862 - OT Evaulation and Intervention for Children
Credits: 3.00
Students will gain foundation knowledge of OT evaluation intervention process. Students apply the clinical reasoning process for the evaluation and treatment of children with various conditions, and across age groups. Students learn common assessment tools used by occupational therapists, and how to select and critique evaluation methods. Select cases will be used for the application of knowledge, interventions, and frames of reference used with children.
Co-requisites: OT 862L

OT 862L - OT Evaluation and Intervention for Children - Lab
Credits: 1.00
This is the corequiste lab for OT 862, Evaulation and Intervention for Children. Students develop technical skills in administering evaluation tools, methods and procedures, in making clinical decisions about intervention planning and implementation. Students learn, practice and demonstrate many intervention techniques used with children, and complete a number of clinical case studies. OT majors only. Special fee.
Co-requisites: OT 862

OT 863 - Occupational Therapy Intervention
Credits: 3.00
Students gain foundation knowledge of the OT evaluation and intervention process with adults with neurological and orthopedic conditions. Students apply the clinical reasoning process to clinical practice with adults with various types of medical conditions. Students learn about common assessment tools available to occupational therapists for adults, where, when, and how to apply them. Students develop technical skills in administering selected evaulation tools, in integrating assessment data, and demonstrate clinical decisions about intervention planning and implementation. Selected cases are used for application of knowledge, and the course covers the application of common intervention strategies used by occupational therapists with adults.
Co-requisites: OT 863L

OT 863L - Occupational Therapy Evaluation and Intervention for Adults - Lab
Credits: 1.00
Students develop technical skills in administering selected evaluation tools, in integrating assessment data, and demonstrate clnicial decisions about intervention planning and implementation. OT majors only. Special fee.
Co-requisites: OT 863

OT 865 - Occupational Therapy Practice and Professional Reasoning
Credits: 3.00
Develops professional reasoning by building upon level II fieldwork experiences. Students develop a population-based intervention plan, explore occupational therapy in an emerging or specialized practice setting, and implement a plan for continuing professional development. Students prepare for their OT board certification examination, and complete a culminating capstone experience.

OT 871 - Enabling Participation in Community Groups
Credits: 3.00
Students will work in an organization, learn about the people served by this organization, conduct therapeutic groups within the organization. Emphasis of content includes group process, clinical documentation, intervention planning and OT services with adults with cognitive impairments.
Co-requisites: OT 871L

OT 871L - Enabling Participation in Community Groups Lab
Credits: 2.00
Students will work in an organization, learn about the people served by this organization and conduct therapeutic groups. This lab serves as a Level I Fieldwork placement. OT and OT Asst Tech Certificate majors only.
Co-requisites: OT 871

OT 875 - Leadership in Occupational Therapy Systems of Practice
Credits: 3.00
Students will integrate concepts, principles, and strategies that are fundamental to the provision of

occupational therapy services in the changing U.S. health care system. This course links system management, reimbursement mechanisms, and public policy found in occupational therapy practice settings to the populations served. Knowledge of leadership, management, ethics and marketing principles that are necessary for success in today's health care industry are emphasized.

OT 885 - Research Methods and Application to Practice
Credits: 3.00
Students engage in activities of systematic inquiry. Research methods from qualitative, quantitative, and mixed perspectives are introduced and applied to relevant research questions in occupational therapy. Students critically analyze research articles, bodies of evidence, and are expected to synthesize information for practical application and evidence-based OT practice.

OT 886 - Engagement in Research
Credits: 3.00
Students engage in activities of systematic inquiry and research under the mentorship of a research-active faculty mentor. Students gain experience with aspects of the research process, which may include conducting a literature review, developing a research proposal, data collection, data analysis, writing a research paper, and the presentation of research findings. Students also apply ethics for the use of human participation in research, and learn about funding avenues for different areas of research. OT and OT Asst Tech Certificate majors only.

OT 887 - Upper Extremity Rehabilitation and Splinting
Credits: 4.00
This graduate course is designated to expose students to the specialized area of upper extermity rehabilitation including a detailed, working knowledge of hand anatomy, biomechanics, kinesiology, surgical techniques, and splinting in oder to effectively treat upper extremity clinical problems. Students also learn about the common diganoses seen in upper extremity rehabilitation, critically analyze treatment protocols, and precautions for these common diagnoses, and develop splinting and other evaluation and intervention techniques for this population. OT majors only. Special fee.

OT 890 - Occupational Therapy and Sensory Integration
Credits: 4.00
This course presents, inegrates and applies Ayres sensory integration (SI) theory in the context of occupational therapy for children. Content related to the theoretical constructs upon which sensory integration functions is emphasized. Current views related to sensory processing disorders, diagnostic considerations, patterns of sensory integration dysfunction, and SI deficits commonly associated with disorders such as autism and attention disorders are covered. Intervention planning and implementation are covered through video case studies, and observation and analysis of occupational therapy sessions using SI strategies. Students apply their understanding of normal and abnormal child development, and clinical reasoning skills for providing OT services for children with sensory integration problems in clinical, early intervention and school-based settings. Prereq: OT 862 and OT 862L. OT majors only.

OT 891 - Erogonomics for Occupational Therapy
Credits: 4.00
This course explores the definition , concepts, and application of ergonomics, within OT evaluation and intervention, with the emphasis on work-related occupations. Students learn about the numerous components of ergonomics, evaluation and intervention techniques, current research, advanced educational opportunities and the relationship it has to the field of occupational therapy. Students also have the opportunity to apply their knowledge with the UNH community in performing job-site evaluations. OT majors only.

OT 892 - Level I Fieldwork

Credits: 1.00
During a two-week fieldwork, students observe an occupational therapist and participate in the planning and implementation of the occupational therapy evaluation and intervention process for a client. The Level I Fieldwork placement is scheduled between fall and spring of their first graduate year. OT majors only. Cr/F.

OT 893 - Special Topics
Credits: 2.00 to 4.00
Formal courses given on selected topics or special interest subjects. Work may be directed in one of the following areas: A) Administration; B) Clinical Education; C) Pediatrics; D) Physical Disabilities; E) Mental Health; F) Gerontology/Geriatrics; G) School-based Practice, and others. Prereq: permission. May be repeated to a maximum of 12 credits. Special fee on some topics.

OT 895 - Readings and Research in Occupational Therapy
Credits: 1.00 to 6.00
Independent work under the guidance of an instructor. Work may be directed in one of the following areas: A) Administration; B) Clinical Education; C) Pediatrics; D) Physical Disabilities; E) Mental Health; F) Gerontology/Geriatrics; G) School-based Practice, and others. Prereq: permission. May be repeated to a maximum of 8 credits.

Ocean Engineering

OE 810 - Ocean Measurements Laboratory
Credits: 4.00
Measurements of fundamental ocean processes and parameters. Emphasis on understanding typical offshore measurements, their applications, and the use of the acquired data. The latter is in terms of the effects on structures and processes in the ocean.

OE #844 - Corrosion
Credits: 4.00
The course is split into three parts: (1) reviews and develops basic concepts of electrochemistry, kinetics, and measurement methods; (2) covers the details of specific corrosion mechanisms and phenomena including passivity, galvanic corrosion, concentration cell corrosion, pitting and cervice corrosion, and environmentally induced cracking; and (3) focuses on the effects of metallurgical structure on corrosion, corrosion in selected environments, corrosion prevention methods, and materials selection and design. Prereq: general chemistry, introduction to materials science or permission. (Also offered as MS 844.) Lab.

OE #853 - Ocean Hydrodynamics
Credits: 3.00
Fundamental concepts of fluid mechanics as applied to the ocean; continuity; Euler and Navier-Stokes equations; Bernoulli equation; stream function, potential function; momentum theorem; turbulence and boundary layers are developed with ocean applications. Prereq: permission.

OE 854 - Ocean Waves and Tides
Credits: 4.00
Introduction to waves: small-amplitude, linear wave theory, standing and propagating waves, transformation in shallow water, energy and forces on structures, generation by wind and specification of a random sea, long waves with rotation, and internal waves. Introduction to tides: description of tides in ocean tidal generation forces, equilibrium tide, and tidal analysis. Lab/project: field and lab measurements with computer analysis. Prereq: general physics; differential equations;/ or permission. Lab

OE 856 - Principles of Naval Architecture and Model Testing
Credits: 4.00
Fundamentals of naval architecture presented including hydrostatics, basics of resistance and propulsion, sea keeping and scaling. Concepts applied in experiments utilizing the tow/wave tank and associated instrumentation. Prereq: fluid dynamics, mechanics III, or equivalent. Lab.

OE 857 - Coastal Engineering and Processes
Credits: 3.00
Introduction to small-amplitude and finite-amplitude wave theories. Wave forecasting by significant wave method and wave spectrum method. Coastal processes and shoreline protection. Wave forces and wave structure interaction. Introduction to mathematical and physical modeling. Prereq: fluid dynamics or permission. (Also offered as CIE 857 and ME 857.)

OE 865 - Underwater Acoustics
Credits: 3.00
An introduction to acoustics in the ocean. Fundamental acoustic concepts including the simple harmonic oscillator, waves on strings, and the acoustic wave equation; the sonar equation; sound generation and

reception by underwater acoustic transducers and arrays; basics of sound propagation; reflection and scattering from ocean boundaries. Spring semester; offered every year; satisfies core course requirement in Ocean Engineering. Prereq: General physics and differential equations.

OE 867 - Interactive Data Visualization
Credits: 3.00
Detailed discussion of how an understanding of human perception can help us design better interactive displays of data. Topics include: color, space perception, object perception and interactive techniques. Students write interactive programs, give presentations and undertake a project designing and evaluating a novel display technique. Prereq: Introductory level C or C++ programming course. (Also listed as CS 867.)

OE 871 - Geodesy and Positioning for Ocean Mapping
Credits: 4.00
The science and technology of acquiring, managing, and displaying geographically referenced information; the size and shape of the earth, datums and projections; determination of precise positioning of points on the earth and the sea, including classical terrestrial-based methods and satellite-based methods; shoreline mapping, nautical charting and electronic charts. Prereq: one year of calculus and one year of college physics. (Also listed as ESCI 871.)

OE 872 - Applied Tools for Ocean Mapping
Credits: 2.00
A review course on research tools commonly used in ocean mapping. The course focuses on teaching problem solving skills, note merely the application of tools. The course consists of modules addressing the use of: IVS Fledermaus; GeoMappApp, GIS, Google Earth, Matlab as well as the effective library research and use of Wikis. Prereq: two terms of single variable calculus. Cr/F.

OE 874 - Fundamentals of Ocean Mapping I
Credits: 4.00
The first of two courses covering the principles and practices of hydrography and ocean mapping. Methods for the measurement and definition of the configuration of the bottoms and adjacent land areas of oceans, lakes, rivers, estuaries, harbors and other water areas, and the tides or water levels and currents that occur in those bodies of water. In this first course the following topics are covered: Cartographic principles, Geological Oceanography, Physical Oceanography, Fundamentals of acoustics, signal conditioning and filtering, echosounding: Singlebeam, Multibeam and Phase differencing echo sounders, side scan sonar, Systems Selection, Statistical Uncertainty in Ocean Mapping, Data Processing and management and Motion Senors. Prereq: two terms each of college calculus and physics. Pre- or Coreq: MATH 896 Mathematics for mapping or equivalent material.

OE 875 - Fundamentals of Ocean Mapping II
Credits: 4.00
The second of two courses covering the principles and practices of hydrography and ocean mapping. In this course the following topics are covered: Ancillary Sensor Integration, System Calibration, Verification and Field QA/QC, Water Levels (Tides); Mapping Standards; Survey Planning, Execution and Reporting; Terrain Analysis; Optical Remote Sensing; Data Presentation; Seafloor Characterization; Electronic Navigational Charts; Hydrography for Nautical Charting, Product Liability and Contracts; and the United Nations Common Law of the Sea (UNCLOS). Prereq: OE/ESCI 874. Pre- Coreq: MATH 896 Mathematics for mapping.

OE 895 - Special Topics
Credits: 1.00 to 4.00
New or specialized courses and/or independent study. May be repeated for credit.

OE 899 - Master's Thesis
Credits: 1.00 to 6.00
May be repeated up to a maximum of 6 credits. Cr/F.

OE 965 - Advanced Underwater Acoustics
Credits: 3.00
Focused topics varying from year to year depending on student interests and need. Topics may include one or more of the following: sonar systems engineering; underwater acoustic transducers; volume and surface scattering; underwater acoustic propagation; fisheries acoustics. Spring semester; offered every other year. Prereq: Underwater acoustics or permission.

OE 972 - Hydrographic Field Course
Credits: 4.00
A lecture, lab, and field course on the methods and procedures for the acquisition and processing of hydrographic and ocean mapping data. Practical experience in planning and conducting hydrographic surveys. Includes significant time underway (day trips and possible multi-day cruises) aboard survey vessel(s). Prereq: Fundamentals of Ocean Mapping, Geodesy and Positioning for Ocean Mapping; or permission. (Also listed as ESCI 972.)

OE 973 - Seafloor Characterization
Credits: 3.00
Remote characterization of seafloor properties using acoustic (echo sounders, sub-bottom profilers, side-scan, multi-beam and interferometric sonars) and optical (video and laser line-scanner) methods. Models of sound interaction with the seafloor will be explored as well as a range of possible geologic, geotechnical, morphologic, acoustic, and biologic descriptors. Prereq: permission. (Also listed as ESCI 973.)

OE 990 - Ocean Seminars I
Credits: 1.00
Various topics, including marine systems design, marine vehicle operation, data collecting and processing, and marine law. Cr/F.

OE 991 - Ocean Seminars II
Credits: 1.00
Various topics, including marine systems design, marine vehicle operation, data collecting and processing, and marine law. Cr/F.

OE 995 - Graduate Special Topics
Credits: 3.00
Investigation of graduate-level problems or topics in ocean engineering. May be repeated for a maximum of 16 credits.

OE 998 - Independent Study
Credits: 1.00 to 4.00
Independent theoretical and/or experimental investigation of an ocean engineering problem under the guidance of a faculty member.

OE 999 - Doctoral Research
Credits:
Cr/F.

Arts/History & Studio

ARTS 832 - Advanced Drawing
Credits: 4.00
Complex compositional problems of image making will be addressed. Students will explore a broad range of solutions to pictorial problems to reinforce and expand individual concepts of image and technique. Along with structured in-class work, graduate students will be required to develop sustained out of class projects in consultation with the instructor. May be repeated for a total of 8 credits. Prereq: permission.

ARTS 846 - Advanced Painting
Credits: 4.00
Development and refinement of technical skills leading to more advanced conceptual problems will be emphasized. Along with structured in-class work, graduate students will be required to develop sustained out of class projects in consultation with the instructor. May be repeated for a total of 8 credits. Prereq: permission.

ARTS 897 - Seminar in Art History
Credits: 4.00
Topics and prerequisites to be announced before preregistration. May be repeated with permission instructor up to a maximum of 12 credits. (Also offered as ARTS 799.)

ARTS 932 - Graduate Drawing
Credits: 6.00
Structured to emphasize developing skills and to explore techniques to create invented and observed space. Drawing will be considered as an inventive tool to extend the students' repertoire of ideas. May be repeated for a total of 12 credits. Prereq: advanced drawing; permission.

ARTS 932T - Graduate Drawing (Teaching)
Credits: 6.00
This course intends to encourage the practice and study of drawing and introduces students to approaches to the teaching of drawing. Students work on projects designed to develop individual bodies of work in drawing and explore the teaching of drawing through development of course syllabi and observation of Introductory Drawing courses. The course includes discussions and demonstrations of the use of slides, reproductions, digital imagery, and critiques in the teaching of drawing.

ARTS 996 - Independent Study in the Visual Arts
Credits: 1.00 to 6.00
C01 - Drawing; D01 - Painting; E01 - Printmaking; I01 - Painting in Italy; L01 - Art History. An opportunity for independent study in the above listed disciplines. The content and structure of the course will be developed through collaboration of the graduate student and the supervising faculty member. May be repeated for a total of 18 credits in any one area. Prereq: undergraduate degree in studio art and permission.

ARTS 997 - Graduate Painting Thesis
Credits: 10.00
The Graduate Painting Thesis is the culmination of the MFA student's graduate work in painting. The course requires: 1) continued work in the studio under supervision of graduate faculty; 2) a more formal midterm critique with graduate faculty (oral summarization of thesis work); 3) extensive work with The Art

Gallery in preparation for the MFA Thesis Exhibition (including hanging the exhibition); 4) the thesis exhibition itself; and 5) an oral presentation to the faculty during the thesis exhibition.

ARTS 998 - Graduate Painting Seminar
Credits: 4.00
Students meet once a week for a three-hour structured session of painting from life under the supervision of the instructor. Students are expected to apply the information gained in these sessions to the development of their individual bodies of work in their studios. Additional requirements could include readings, presentations, gallery and museum visits, discussions, and critques.

Plant Biology

PBIO 801 - Plant Physiology
Credits: 3.00
Structure-function relationship of plants, internal and external factors regulating plant growth and development, plant hormones, plant metabolism, water relations, and mineral nutrition. Prereq: introductory botany or concepts of plant growth; one year of college chemistry (e.g., general chemistry); organic chemistry or basic chemistry; or permission.

PBIO 809 - Plant Stress Physiology
Credits: 3.00
Examines the physiological and biochemical mechanisms of plant response to abiotic stresses including drought, salt, high and low temperature, visible and ultraviolet radiation, heavy metals, and air pollutants. Discusses current hypotheses, agricultural and ecological implications. Prereq: plant physiology; biochemistry;/ or permission.

PBIO 813 - Biochemistry of Photosynthesis
Credits: 4.00
The physiology and biochemistry of photosynthesis in higher plants and microorganisms: light reactions, electron transport, membrane structure and function, carbon assimilation pathways, energy conservation, and metabolic regulation. Agronomic and ecological aspects of photosynthesis are examined. Prereq: plant physiology or biochemistry. (Not offered every year.)

PBIO 817 - Lake Ecology
Credits: 4.00
Introduction to the ecology of freshwater systems with emphasis on lakes. Origins of lakes and the effects of watersheds on lake chemistry and nutrient cycling are explored. Other topics include the impact of human disturbances on productivity and aquatic food webs and methods used for the management and restoration of lakes. Comparisons are made of the structure and functions of lake ecosystems found in temperate, tropical and arctic regions. Prereq: general biology. (Also offered as ZOOL 817.)

PBIO 819 - Field Studies in Lake Ecology
Credits: 4.00
Ecology of lakes and other freshwater habitats examined through field studies. Emphasizes modern methods for studying lakes, analysis and interpretation of data, and writing of scientific papers. Seminars on research papers and student presentations of class studies. Field trips to a variety of lakes, from the coastal plain to White Mountains; investigate problems, such as eutrophication, acidification, biodiversity and biotoxins. Capstone experiences include interaction with state agencies, lake stakeholders and the submission of written manuscripts for publication. Prereq: introductory biology. (Also offered as ZOOL 819.) Special fee. Lab.

PBIO 822 - Marine Phycology
Credits: 4.00
Identification, classification, ecology, and life histories of the major groups of marine algae, particularly the benthonic marine algae of New England. Periodic field trips. Prereq: principles of biology or elementary botany or survey of the plant kingdom. Lab. (Not offered every year.) Special fee.

PBIO 825 - Marine Ecology

Credits: 4.00
Marine environment and its biota, emphasizing intertidal and estuarine habitats. Includes field, laboratory, and independent research project. Prereq: general ecology; permission. Marine invertebrate zoology, oceanography, and statistics are desirable. (Also offered as ZOOL 825.) Special fee. (Not offered every year.)

PBIO 827 - Algal Physiology
Credits: 3.00
Survey of major topics in the physiology and biochemistry of marine and freshwater algae including nutrition, metabolic pathways, reproductive physiology, storage and extracellular products, cell inclusion, growth, and development. Prereq: introduction to biochemistry or permission. (Not offered every year.)
Co-requisites:

PBIO 832 - Lake Management: A Multidisciplinary Approach
Credits: 4.00
Lectures and seminars on interpreting lake water quality, developing a natural history inventory for lakes, the process of creating a lake management plan, and resolution of conflicting uses of lakes. Students develop lake management plans in cooperation with governmental agencies and lake associations. Guest speakers from State agencies and non-governmental organizations. Introduction to and use of GIS (Geographic Information Systems) methods for the analysis of lakes and watersheds. Presents lake management issues from scientific and social science points of view. Open to students from all disciplines. (Also offered as ZOOL 832.) Special fee. Lab.

PBIO 847 - Aquatic Plants in Conservation
Credits: 4.00
A field-intensive class focusing upon freshwater and marine vascular plants with an emphasis on species commonly associated with ecological restoration, the identification and conservation of rare species, and the adaptations and management of invasive species of aquatic habitats in New England. Field trips emphasize the flora of various wetland habitats, including open water and vegetated fresh water wetlands, as well as coastal and estuarine habitats. Lectures and readings examine the current trends in research and management focusing upon specific taxa and pertinent facets of their taxonomy, physiology, and natural history. Prereq: PBIO 566 or permission. Special fee.

PBIO 852 - Mycology
Credits: 4.00
Classification, identification, culturing, life histories, and ecology of fungi, from slime molds to hallucinogenic mushrooms; the significance of fungi in human history, from their contribution to the art of bread making and alcoholic fermentation to their destructiveness as agents of deadly diseases of plants and animals. Prereq: principles of biology I, II or introduction to botany, or equivalent. Special fee. Lab.

PBIO 858 - Plant Anatomy
Credits: 5.00
Anatomy of vascular plants from a functional/developmental point of view with emphasis on Angiosperms. Basic cell and tissue structure of plant organs will be covered as well as the importance of chaos, fractals, scaling, mechanical stress and environmental factors in determining the role anatomy plays in the biology of plants. Prereq: principles of biology or introductory botany. Lab. (Not offered every year.)

PBIO 860 - Insect Pest Management
Credits: 4.00
Students learn the principles of integrated pest management, as they apply to insects (and some other anthropods). Additionally, they learn to recognize the major orders of insects, and some insect families that are important as natural enemies of pests. Course incorporates a significant amount of writing, plus

learning to search the scientific literature. Prereq: BIOL 411 and BIOL 412 or equivalent.

PBIO 899 - Master's Thesis
Credits: 1.00 to 10.00
May be repeated up to a maximum of 10 credits. Cr/F.

PBIO 985 - Advanced Topics
Credits: 1.00 to 6.00
Discussions of current topics in selected areas of plant biology. A) Systematic Botany; B) Physiology; C) Pathology; D) Anatomy; E) Morphology; F) Ecology; G) Mycology; H) Phycology; I) Cell Biology; J) Genetics; K) Evolution; L) Plant Utilization; M) Cell Physiology; N) Developmental Plant Biology; O) Cell and Tissue Culture; P) Physiological Ecology; Q) Plant Disease Control; R) Plant Hormones. Prereq: permission.

PBIO 995 - Investigations
Credits: 1.00 to 6.00
Supervised projects in selected areas of plant biology. A) Systematic Botany; B) Physiology; C) Pathology; D) Anatomy; E) Morphology; F) Ecology; G) Phycology; H) Mycology; I) Cell Biology; J) Cell Physiology; K) Microtechnique; L) Cell and Tissue Culture; M) Genetics; N) Crop Management; O) Developmental Plant Biology; P) Scientific Writing; Q) History of Botany; R) Teaching in Plant Biology; S) Plant Growth Research and Modeling. Prereq: permission.

PBIO 997 - Graduate Seminar
Credits: 1.00
Tips and techniques for effective communication in science. Discussions and practice in oral and written communication, including presentations at scientific meetings, seminars, grant proposals, abstracts, dissertations, and research papers. Cr/F.

PBIO 999 - Doctoral Research
Credits:
Cr/F.

Physics

PHYS 805 - Experimental Physics
Credits: 4.00
Experiments in nuclear, solid-state, and surface physics. Includes discussion of laboratory techniques, data analysis, and data presentation. Special projects assigned to individual students.

PHYS 806 - Introduction to Physics Research
Credits: 1.00
Introduction to research in physics including research currently conducted at UNH, library resources, responsible conduct in research, how research differs from coursework, and how research results are presented in the research community. Cr/F.

PHYS 808 - Optics
Credits: 4.00
Geometrical optics, electromagnetic theory of light, interference, diffraction, polarization, related phenomena and nonlinear optics. (Alternate years only.)

PHYS 810 - Introduction to Astrophysics
Credits: 4.00
Review of the sun, stars, Milky Way, external galaxies, and expansion of the universe. Recent discoveries of radio galaxies, quasi-stellar objects, cosmic black-body radiation, x rays, ad gamma rays precede a discussion of Newtonian and general relativistic cosmological models, steady-state/big-bang theories, and matter-antimatter models. (Also offered as EOS 810.) (Alternate years only.)

PHYS 811 - Topics in Modern Physics
Credits: 1.00 to 4.00
Discussions, lectures, and laboratory work on topics of current interest in physics. An introductory course for secondary school teachers and others with some science background.

PHYS 812 - Introduction to Space Plasma Physics
Credits: 4.00
Introduction to the subject of space plasma physics including solar physics, heliospheric physics, magnetospheric physics, and ionospheric physics. The course provides an overview of the basic phenomena and processes (e.g. particle acceleration and transport, shock formation, magnetic structures and reconnection, wave propagation, wave-particle interactions, instabilities), theoretical techniques (e.g. single-particle orbits, kinetic and fluid descriptions), and experimental techniques. (Also offered as EOS 812.) (Alternate years only.)

PHYS 818 - Introduction to Solid-State Physics
Credits: 4.00
Crystal structure, diffraction, lattice vibrations, electronic and optical properties of metals and semiconductors; selected topics in modern condensed matter physics. Prereq: introduction to quantum mechanics I, electricity and magnetism I or equivalent. (Normally offered every other year.)

PHYS 820 - Nuclear Physics
Credits: 4.00
Nuclear phenomenology, reactions, models, radiation, interaction of radiation with matter; accelerators; properties and interactions of elementary particles; symmetries and symmetry breaking standard model.

Prereq: introduction to quantum mechanics I and II; electricity and magnetism I and II; or permission of instructor.

PHYS 864 - General Relativity and Cosmology
Credits: 4.00
Review of special relativity, and the motivation for considering gravity in terms of curvature of space time. Introduction to Riemannian geometry, general relativity and Einstein's equations. Application of general relativity in the study of black holes, gravitational waves, cosmology, as well as recent results on inflation and quantum gravity. (Alternate years only.)

PHYS 895 - Independent Study
Credits: 1.00 to 8.00
Individual project under direction of a faculty adviser.

PHYS 899 - Master's Thesis
Credits: 1.00 to 6.00
May be repeated up to a maximum of 6 credits. Cr/F.

PHYS 900 - Introduction to Physics Research and Teaching I
Credits: 1.00
Introduction to teaching/research in physics including responsibilities and methods for teaching assistants, research currently conducted at UNH , library sources, responsible conduct in research, how research differs from coursework, how research results are presented in the research community, and readings from physics education research literature. Cr/F.

PHYS 901 - Introduction to Physics Research and Teaching II
Credits: 1.00
Introduction to teaching/research in physics including responsibilities and methods for teaching assistants, research currently conducted at UNH , library sources, responsible conduct in research, how research differs from coursework, how research results are presented in the research community, and readings from physics education research literature. Cr/F.

PHYS 902 - Issues in Teaching and Learning Physics
Credits: 1.00 to 3.00
Issues in teaching and learning physics including cognitive models of learning; assessment tools; meta-cognitive issues; role of mathematics; effectiveness of labs; issues in problem solving; misconceptions studies. Extensive reading, writing, discussion and reflection is required. May be repeated for a maximum of 3 credits.

PHYS 931 - Mathematical Physics
Credits: 3.00
Complex variables, differential equations, asymptotic methods, integral transforms, special functions, linear vector spaces and matrices, Green's functions, and additional topics selected from integral equations, variational methods, numerical methods, tensor analysis, and group theory. (Also offered as MATH 931.)

PHYS 935 - Statistical Physics
Credits: 3.00
Review of thermodynamics and kinetic theory, followed by an introduction to classical and quantum statistical mechanics. Microcanonical, canonical, and grande canonical ensembles; ideal Fermi and Bose gases and applications of statistical mechanics to selected physical problems. Prereq: PHYS 931; 939; 943.

PHYS 939 - Classical Mechanics
Credits: 3.00
Newtonian, Lagrangian, and Hamiltonian formulation of the classical mechanics of particles and rigid bodies. Topics that serve as background for the study of modern physical theories are emphasized.

PHYS 941 - Electromagnetic Theory I
Credits: 3.00
The formulation and detailed application of electromagnetic theory to physical problems. The material covered is at the level of the text by J.D. Jackson, "Classical Electrodynamics".

PHYS 942 - Electromagnetic Theory II
Credits: 3.00
The formulation and detailed application of electromagnetic theory to physical problems. The material covered is at the level of the text by J.D. Jackson, "Classical Electrodynamics".

PHYS 943 - Quantum Mechanics I
Credits: 3.00
Introduces non-relativistic quantum theory, covering wave mechanics, Dirac notation, angular momentum, the use of perturbation theory to calculate atomic energy levels, the interaction of atoms with radiation, and various approaches to calculating the differential scattering cross-section.

PHYS 944 - Quantum Mechanics II
Credits: 3.00
See description for PHYS 943.

PHYS 951 - Plasma Physics
Credits: 3.00
Kinetic theory of plasmas; plasma waves, instabilities, turbulence, diffusion, adiabatic motion of charged particles, nonlinear plasma phenomena. Prereq: PHYS 935; 941; 941. (Normally offered every other year.)

PHYS 953 - Magnetohydrodyamics of the Heliosphere
Credits: 3.00
Introduction to solar physics, with emphasis on gas dynamics and magnetic fields. Interior structure, the theory of convection, wave motions in the presence of magnetism and gravity, coronal heating theories, steady and nonsteady flows, dynamo theory, and the theory of solar flares and other transient phenomena. Salient observational data are reviewed. (Normally offered every other year.)

PHYS 954 - Heliospheric Physics
Credits: 3.00
The solar wind and its effects on cosmic rays. The basic equations of the solar wind: mass, momentum, angular momentum, and energy balance. Transport processes. Waves, shocks, and instabilities in the solar wind. The basic equations of energetic particle transport. Solar modulation of solar and glacatic cosmic rays. Interaction of energetic particles with shock waves. Salient data are reviewed. (Normally offered every other year.) Also offered as EOS 954

PHYS 962 - Advanced Quantum Mechanics II
Credits: 3.00
Relativistic wave equations, propagator theory and Fyenman diagrams, quantum theory of Radiation, second quantization, introduction to quantum field theory and related topics.

PHYS 965 - Advanced Solid-State Physics
Credits: 3.00

Theory of crystalline metals, semiconductors, and insulators. Selected topics from the following: surfaces, films, quantum dots, clusters, solid-state devices. Prereq: PHYS 935; 941; 943. (Normally offered every other year.)

PHYS 987 - Magnetospheres
Credits: 3.00
Introduces plasma of physics of the interaction of solar and stellar winds with planets having internal magnetic fields, most predominately, the Earth. Both MHD and kinetic descriptions of internal and boundary processes of magnetospheres as well as treatment of the interaction with collisional ionospheres. Flow of mass, momentum, and energy, through such systems. Prereq: PHYS 951; 952;/or permission. (Also offered as EOS 987.) (Normally offered every other year.)

PHYS 995 - Special Topics
Credits: 1.00 to 3.00
Any special fields of study not covered by the above courses may be included. Topic choices in previous years: astrophysics; elementary particles; lasers/masers; many-body theory; general relativity and cosmology; group theory; atomic physics; quantum theory of light; nonlinear equations, and chaos. May be taken more than once. (Not offered every year.)

PHYS 999 - Doctoral Research
Credits:
Cr/F.

Political Science

POLT 801 - Courts and Public Policy
Credits: 3.00
Impact of judicial decisions on public policy and influences on judicial decision making at the federal, state, and local levels.

POLT 804 - Policy and Program Evaluation
Credits: 3.00
Policy and program evaluation of federal, state, and local governmental enterprise; focuses on the politics, practices, and methods of evaluative investigation. Evaluation as a technique for providing rational information for budgetary and policy-making decisions.

POLT 806 - State and Local Government
Credits: 3.00
Advanced study of powers, politics, political cultures, and constitutional settings of American state and local government.

POLT 808 - Administrative Law
Credits: 3.00
Examines the legal rules governing regulatory agencies, in the U.S. Topics include regulatory adjudication and rulemaking, legislative and executive control over administrative agencies, judicial review and public participation. Course examines federal and state levels of government.

POLT 811 - Public Opinion and Survey Research
Credits: 3.00
Examination of the role of public opinion in democracy. Research, design, implementation and analysis of a public opinion survey.

POLT 812 - Leadership Theory and Practice
Credits: 3.00
Exploration of the major theoretical approaches to leadership, including students' and others' leadership skills, styles, roles, and practices. Students will refine their own conceptual and practical approaches to leadership in a variety of settings.

POLT 815 - Art of Negotiation
Credits: 3.00
Identification, analysis, evaluation and application of effective communication and negotiation skills. Course will include case studies, and simulation/role-playing exercises.

POLT 818 - Special Topics - Public Administration
Credits: 1.00
Selected topics in public administration, emphasis on specific aspects of management in public and non-profit sectors.

POLT 821 - Feminist Political Theory
Credits: 3.00
Exploration of various strands of feminist political theory; taking a specifically political view of the challenges of feminist activism and philosophy. Issues of public space, power, social transformation and

democracy addressed.

POLT 825 - Politics and Literature
Credits: 3.00
Seminar: Advanced work in exploring classical and contemporary works of literature to illustrate perennial issues in political philosophy.

POLT 840 - States and Societies in the Middle East
Credits: 3.00
Exploration of changing relationships between states and societies in the Middle East and North Africa from WWII to the present. Analyzes the creation of states and markets, the origins of authoritarian and democratic rule, the politics of environment and development, and the evolution of Islamist movements. Country and case studies vary. Previous coursework in comparative politics (POLT 540-559) or history is strongly recommended.

POLT 851 - Comparative Environmental Politics and Policy
Credits: 3.00
Environmental politics and policy across national boundaries and at different levels of governance. Comparisons of the U.S. and European Union environmental policies to build a foundation for comparisons across national boundaries and sub-national authorities. Students improve their understanding of how and why comparative methods are used to gain insight into politics and policymaking. Central concepts and debates addressed include the roles of expertise, sustainability, precautionary principle, the use of market mechanisms in policy, environmental justice, policy devolution and flexibility, environmental performance assessment, NGO roles, activism, and social movements. A range of theoretical approaches and historical and contemporary events and case studies, evaluating the claims and explanatory power of various concepts and theories. Includes ethical issues emerging from the theory and practice of environmental politics.

POLT 860 - Theories of International Relations
Credits: 3.00
Theoretical approaches of international politics, international organization, and international political economy with particular emphasis on systems theories, domestic determinants of foreign policy, and theories of decision making.

POLT 878 - International Organization
Credits: 3.00
Various forms of cooperation among nations on security, economic, environmental and social issues through international organizations such as the United Nations, NATO, the World Trade Organization and other global and regional bodies. Includes examination of the role and influence of non-governmental international organizations.

POLT 880 - International Environmental Politics, Policy and Law
Credits: 3.00
Explores international/global environmental politics and policymaking, multilateral negotiations, the role of science and technology in policymaking, state capacity, the making of international law, implementation, and compliance. Other issues include climate control, marine pollution, long-range air pollution, United States leadership in the global political arena, North-South divisions in global politics, environmental justice, sustainable development, and the role of the United Nations and other international organizations.

POLT 897B - Seminar in American Politics
Credits: 3.00
Advanced analysis and individual research.

POLT 897C - Seminar in Comparative Politics
Credits: 3.00
Advanced analysis focusing on government and politics in foreign nations or regions. Areas of interest may include: constitutional structures, political parties and interest groups, legislatures, bureaucracy and public policy. Topics address such concerns as: religion and politics, patterns of economic development, ethnic strife, political leadership

POLT 897E - Seminar in International Politics
Credits: 3.00
Advanced analysis focusing on problems of theory and contemporary issues in international politics. Areas of interest may include: democratic norms in international relations; NATO expansion and European security; the peace process in the Middle East, etc. See department listings for semester offerings.

POLT 897F - Seminar in Public Administration
Credits: 3.00
Advanced analysis and individual research, including opportunities for direct observation of governmental administration.

POLT 897I - Seminar in Political Thought
Credits: 3.00
Advanced treatment and individual research.

POLT 898B - Seminar in American Politics
Credits: 3.00
Advanced analysis and individual research.

POLT 898C - Seminar in Comparative Politics
Credits: 3.00
Advanced analysis focusing on government and politics in foreign nations or regions. Areas of interest may include: constitutional structures, political parties and interest groups, legislatures, bureaucracy and public policy. Topics address such concerns as: religion and politics, patterns of economic development, ethnic strife, political leadership

POLT 898E - Seminar in International Politics
Credits: 3.00
Advanced analysis focusing on problems of theory and contemporary issues in international politics. Areas of interest may include: democratic norms in international relations; NATO expansion and European security; the peace process in the Middle East, etc. See department listings for semester offerings.

POLT 898F - Seminar in Public Administration
Credits: 3.00
Advanced analysis and individual research, including opportunities for direct observation of governmental administration.

POLT 898I - Seminar in Political Thought
Credits: 3.00
Advanced treatment and individual research.

POLT 899 - Master's Thesis
Credits: 3.00 to 6.00
Each student carries out original research that culminates in a master's thesis. Permission Required. Cr/F.

POLT 900 - Political Science Pro-Seminar
Credits: 3.00
Familiarizes students with political science as a profession. Briefly surveys the scope of the discipline in terms of the substantive fields and methodological approaches. Examines the logic of research design and explores diverse methods of inquiry (i.e., archival, experimental, case study, comparative analysis, field study, survey, etc.), including the process of generating a presentable research paper.

POLT 905 - Introduction to Statistical Analysis
Credits: 3.00
Quantitative research, design and analysis methodology and techniques for political science and public policy and administration.

POLT 906 - Foundations and Theories of Public Administration
Credits: 3.00
Introduction to essential aspects of public and non-profit administration. Critical concepts and theoretical bases; operational nature of public and non-profit administration; contributions of key scholars and practitioners to the study and understanding of public and non-profit administration.

POLT 907 - Legal and Policy-Making Environment on Public and Non-Profit Sectors
Credits: 3.00
Though the use of case studies, analysis and assessment of legal, institutional, social, political and economic settings within public and non-profit sectors.

POLT 908A - Capstone in Public Administration
Credits: 3.00
In-Service.

POLT 908B - Capstone in Public Administration
Credits: 6.00
Pre-Service.

POLT 909 - Organization and Management in Public and Non-profit Sectors
Credits: 3.00
Introduction to key actors, theories and concepts in the fields of organizational theory and behavior.

POLT 911 - Public Management Techniques
Credits: 3.00
Introduction to analytic decision-making and planning techniques applicable to public sector management.

POLT 912 - Human Resource Management in Public and Non-profit Sectors
Credits: 3.00
Examination of the administration, politics, and strategies of effective public human resource management.

POLT 914 - Financial Management and Budgeting in Public and Non-profit Sectors
Credits: 3.00
Analysis, goal setting, and strategic planning in a governmental setting, with particular emphasis on budgetary processes as a means for controlling policy effectiveness.

POLT 918 - Non-Profit Management
Credits: 3.00
Introduction to governance and management in the non-profit sector: finance, development, personnel management, strategic planning, and risk management.

POLT 995 - Reading and Research
Credits: 1.00 to 3.00
A) American Politics; B) Comparative Politics; C) International Politics; D) Political Thought; E) Public Administration; F) Public Policy. The graduate student engages in independent study under the direction of one of the members of the department. Requires approval of the graduate committee. MPA candidates who have been exempted from the administrative internship are required to complete a 4 credit independent research project in lieu of POLT 970.

POLT 996 - Reading and Research
Credits: 1.00 to 3.00
A) American Politics; B) Comparative Politics; C) International Politics; D) Political Thought; E) Public Administration; F) Public Policy. The graduate student engages in independent study under the direction of one of the members of the department. Requires approval of the graduate committee. MPA candidates who have been exempted from the administrative internship are required to complete a 4 credit independent research project in lieu of POLT 970.

Psychology

PSYC 894 - Advanced Research
Credits: 4.00 or 8.00
Student designs and conducts original research that culminates in a paper of publishable quality. Completion of either this course or PSYC 899 satisfies the department's research requirement for the master's degree. May be taken for 4 credits per semester in each of two semesters or 8 credits in one semester. Maximum of 8 credits. Cr/F.

PSYC 899 - Master's Thesis
Credits: 4.00 or 8.00
four credits per semester in each of two semesters or 8 credits in one semester. Maximum of 8 credits. Cr/F.

PSYC 901 - Graduate Pro-seminar
Credits:
Students and graduate faculty in psychology meet periodically for a mutual exchange on current issues in psychology. Cr/F.

PSYC 902 - Graduate Pro-seminar
Credits:
Students and graduate faculty in psychology meet periodically for a mutual exchange on current issues in psychology. Cr/F.

PSYC 904 - First-year Graduate Seminar
Credits: 4.00
Coverage of fields of psychology represented in the department's graduate program and taught in the department's introductory psychology course that psychology graduate students teach during their third year in the program. Course is focused on providing common background among students when they enroll in advanced graduate seminars and on assuring they have certain foundational knowledge when they begin to teach the introductory psychology course. Course is required of all first-year psychology graduate students in fall semester. Taught in seminar format. PSYC majors only.

PSYC 905 - Research Methodology and Statistics I
Credits: 4.00
A consideration of research techniques and problems of methodology in psychology. The first semester stresses the principles of statistical inference, correlational approaches, and their interrelatedness in design. Topics considered include probability theory, linear regression, function-free prediction, the theory underlying statistical inference, parametric and nonparametric tests of significance, and principles of analysis of variance. The second semester extends correlational approach to the techniques and methodology of multiple regression and considers the appropriate use and theoretical bases of complex designs. Prereq: undergraduate statistics and experimental psychology.

PSYC 906 - Research Methodology and Statistics II
Credits: 4.00
A consideration of research techniques and problems of methodology in psychology. The first semester stresses the principles of statistical inference, correlational approaches, and their interrelatedness in design. Topics considered include probability theory, linear regression, function-free prediction, the theory

underlying statistical inference, parametric and nonparametric tests of significance, and principles of analysis of variance. The second semester extends correlational approach to the techniques and methodology of multiple regression and considers the appropriate use and theoretical bases of complex designs. Prereq: undergraduate statistics and experimental psychology.

PSYC 907 - Research Methods and Statistics III
Credits: 4.00
The application of multivariate methods of data analysis in psychological research: multiple regression, analysis of covariance, Hotelling's T2 multivariate analysis of variance, path analysis, discriminant functions, canonical correlation, factor analysis.

PSYC 909 - Advanced Seminar in Quantitative and Analytic Methods
Credits: 4.00
Advanced treatment of methodological topics of current interest. Content varies: representative topics include field research, surveys, time series, causal analyses, log-linear models, formal and mathematical models, and computer simulation. May be repeated for credit.

PSYC 914 - Advanced Seminar in Cognition
Credits: 4.00
An in-depth examination of one or more specific topics in cognition including issues in memory, attention, the use and development of language, and cognitive science. May be repeated for credit.

PSYC 917 - Advanced Seminar in Sensory and Perceptual Processes
Credits: 4.00
Comprehensive examination of a specific topic in sensory and perceptual processes. May be repeated for credit.

PSYC 933 - Advanced Seminar in Physiological Psychology
Credits: 4.00
In-depth examination of a specific topic in the neurosciences. Topics vary depending on interests of instructor and students. May be repeated for credit.

PSYC 945 - Advanced Seminar in Behavioral Analysis
Credits: 4.00
Current empirical and theoretical issues in the analysis of behavior. May be repeated for credit.

PSYC 954 - Advanced Seminar in Social Psychology
Credits: 4.00
Intensive coverage of the experimental and theoretical literature in a selected area of basic or applied social psychology. Students participate directly in the conduct of the seminar by means of individual topical discussions, development and/or execution of research designs, and critical assessment of the current state of the topic area under discussion. Illustrative topics: political behavior, para-linguistics and non-verbal communication, ethnic and racial prejudice, and environmental psychology. May be repeated for credit.

PSYC 974 - Advanced Seminar in the History and Theory of Psychology
Credits: 4.00
In-depth examination of a specific topic in the history and/or theory of psychology. Topics vary each time the seminar is offered. May be repeated for credit.

PSYC 982 - Advanced Seminar in Developmental Psychology
Credits: 4.00

In-depth analysis of one or several specific topics or issues in developmental psychology. May be repeated for credit.

PSYC 991 - Practicum and Seminar in the Teaching of Psychology
Credits: 6.00
Practicum offers the student an opportunity to teach introductory psychology under close supervision from the staff. The seminar is coordinated with this experience and focuses on both practical and theoretical issues of significance in the teaching/learning process at the college level.

PSYC 992 - Practicum and Seminar in the Teaching of Psychology
Credits: 6.00
Practicum offers the student an opportunity to teach introductory psychology under close supervision from the staff. The seminar is coordinated with this experience and focuses on both practical and theoretical issues of significance in the teaching/learning process at the college level.

PSYC 995 - Reading and Research
Credits: 1.00 to 4.00
A) Cognition/Psycholinguistics; B) Developmental Psychology; C) History and Theory of Psychology; D) Learning and Behavior Analysis; E) Personality/Psychopathology; F) Physiological Psychology; G) Sensation/Perception; H) Social Psychology; I) Statistics/Methodology. As part of the development as an independent scholar, the student is encouraged to plan (1) broad reading in an area; (2) intensive investigation of a special problem; or (3) experimental testing of a particular question. Requires approval of both adviser and faculty member directing project. May be repeated for credit

PSYC 998 - Problems and Issues
Credits: 4.00
Seminar on a problem that has been the subject of specialized research and study by a member of the faculty. Topic and instructor vary. May be repeated for credit.

PSYC 999 - Doctoral Research
Credits:
Cr/F.

Political Science

POLT 801 - Courts and Public Policy
Credits: 3.00
Impact of judicial decisions on public policy and influences on judicial decision making at the federal, state, and local levels.

POLT 804 - Policy and Program Evaluation
Credits: 3.00
Policy and program evaluation of federal, state, and local governmental enterprise; focuses on the politics, practices, and methods of evaluative investigation. Evaluation as a technique for providing rational information for budgetary and policy-making decisions.

POLT 806 - State and Local Government
Credits: 3.00
Advanced study of powers, politics, political cultures, and constitutional settings of American state and local government.

POLT 808 - Administrative Law
Credits: 3.00
Examines the legal rules governing regulatory agencies, in the U.S. Topics include regulatory adjudication and rulemaking, legislative and executive control over administrative agencies, judicial review and public participation. Course examines federal and state levels of government.

POLT 811 - Public Opinion and Survey Research
Credits: 3.00
Examination of the role of public opinion in democracy. Research, design, implementation and analysis of a public opinion survey.

POLT 812 - Leadership Theory and Practice
Credits: 3.00
Exploration of the major theoretical approaches to leadership, including students' and others' leadership skills, styles, roles, and practices. Students will refine their own conceptual and practical approaches to leadership in a variety of settings.

POLT 815 - Art of Negotiation
Credits: 3.00
Identification, analysis, evaluation and application of effective communication and negotiation skills. Course will include case studies, and simulation/role-playing exercises.

POLT 818 - Special Topics - Public Administration
Credits: 1.00
Selected topics in public administration, emphasis on specific aspects of management in public and non-profit sectors.

POLT 821 - Feminist Political Theory
Credits: 3.00
Exploration of various strands of feminist political theory; taking a specifically political view of the challenges of feminist activism and philosophy. Issues of public space, power, social transformation and

democracy addressed.

POLT 825 - Politics and Literature
Credits: 3.00
Seminar: Advanced work in exploring classical and contemporary works of literature to illustrate perennial issues in political philosophy.

POLT 840 - States and Societies in the Middle East
Credits: 3.00
Exploration of changing relationships between states and societies in the Middle East and North Africa from WWII to the present. Analyzes the creation of states and markets, the origins of authoritarian and democratic rule, the politics of environment and development, and the evolution of Islamist movements. Country and case studies vary. Previous coursework in comparative politics (POLT 540-559) or history is strongly recommended.

POLT 851 - Comparative Environmental Politics and Policy
Credits: 3.00
Environmental politics and policy across national boundaries and at different levels of governance. Comparisons of the U.S. and European Union environmental policies to build a foundation for comparisons across national boundaries and sub-national authorities. Students improve their understanding of how and why comparative methods are used to gain insight into politics and policymaking. Central concepts and debates addressed include the roles of expertise, sustainability, precautionary principle, the use of market mechanisms in policy, environmental justice, policy devolution and flexibility, environmental performance assessment, NGO roles, activism, and social movements. A range of theoretical approaches and historical and contemporary events and case studies, evaluating the claims and explanatory power of various concepts and theories. Includes ethical issues emerging from the theory and practice of environmental politics.

POLT 860 - Theories of International Relations
Credits: 3.00
Theoretical approaches of international politics, international organization, and international political economy with particular emphasis on systems theories, domestic determinants of foreign policy, and theories of decision making.

POLT 878 - International Organization
Credits: 3.00
Various forms of cooperation among nations on security, economic, environmental and social issues through international organizations such as the United Nations, NATO, the World Trade Organization and other global and regional bodies. Includes examination of the role and influence of non-governmental international organizations.

POLT 880 - International Environmental Politics, Policy and Law
Credits: 3.00
Explores international/global environmental politics and policymaking, multilateral negotiations, the role of science and technology in policymaking, state capacity, the making of international law, implementation, and compliance. Other issues include climate control, marine pollution, long-range air pollution, United States leadership in the global political arena, North-South divisions in global politics, environmental justice, sustainable development, and the role of the United Nations and other international organizations.

POLT 897B - Seminar in American Politics
Credits: 3.00
Advanced analysis and individual research.

POLT 897C - Seminar in Comparative Politics
Credits: 3.00
Advanced analysis focusing on government and politics in foreign nations or regions. Areas of interest may include: constitutional structures, political parties and interest groups, legislatures, bureaucracy and public policy. Topics address such concerns as: religion and politics, patterns of economic development, ethnic strife, political leadership

POLT 897E - Seminar in International Politics
Credits: 3.00
Advanced analysis focusing on problems of theory and contemporary issues in international politics. Areas of interest may include: democratic norms in international relations; NATO expansion and European security; the peace process in the Middle East, etc. See department listings for semester offerings.

POLT 897F - Seminar in Public Administration
Credits: 3.00
Advanced analysis and individual research, including opportunities for direct observation of governmental administration.

POLT 897I - Seminar in Political Thought
Credits: 3.00
Advanced treatment and individual research.

POLT 898B - Seminar in American Politics
Credits: 3.00
Advanced analysis and individual research.

POLT 898C - Seminar in Comparative Politics
Credits: 3.00
Advanced analysis focusing on government and politics in foreign nations or regions. Areas of interest may include: constitutional structures, political parties and interest groups, legislatures, bureaucracy and public policy. Topics address such concerns as: religion and politics, patterns of economic development, ethnic strife, political leadership

POLT 898E - Seminar in International Politics
Credits: 3.00
Advanced analysis focusing on problems of theory and contemporary issues in international politics. Areas of interest may include: democratic norms in international relations; NATO expansion and European security; the peace process in the Middle East, etc. See department listings for semester offerings.

POLT 898F - Seminar in Public Administration
Credits: 3.00
Advanced analysis and individual research, including opportunities for direct observation of governmental administration.

POLT 898I - Seminar in Political Thought
Credits: 3.00
Advanced treatment and individual research.

POLT 899 - Master's Thesis
Credits: 3.00 to 6.00
Each student carries out original research that culminates in a master's thesis. Permission Required. Cr/F.

POLT 900 - Political Science Pro-Seminar
Credits: 3.00
Familiarizes students with political science as a profession. Briefly surveys the scope of the discipline in terms of the substantive fields and methodological approaches. Examines the logic of research design and explores diverse methods of inquiry (i.e., archival, experimental, case study, comparative analysis, field study, survey, etc.), including the process of generating a presentable research paper.

POLT 905 - Introduction to Statistical Analysis
Credits: 3.00
Quantitative research, design and analysis methodology and techniques for political science and public policy and administration.

POLT 906 - Foundations and Theories of Public Administration
Credits: 3.00
Introduction to essential aspects of public and non-profit administration. Critical concepts and theoretical bases; operational nature of public and non-profit administration; contributions of key scholars and practitioners to the study and understanding of public and non-profit administration.

POLT 907 - Legal and Policy-Making Environment on Public and Non-Profit Sectors
Credits: 3.00
Though the use of case studies, analysis and assessment of legal, institutional, social, political and economic settings within public and non-profit sectors.

POLT 908A - Capstone in Public Administration
Credits: 3.00
In-Service.

POLT 908B - Capstone in Public Administration
Credits: 6.00
Pre-Service.

POLT 909 - Organization and Management in Public and Non-profit Sectors
Credits: 3.00
Introduction to key actors, theories and concepts in the fields of organizational theory and behavior.

POLT 911 - Public Management Techniques
Credits: 3.00
Introduction to analytic decision-making and planning techniques applicable to public sector management.

POLT 912 - Human Resource Management in Public and Non-profit Sectors
Credits: 3.00
Examination of the administration, politics, and strategies of effective public human resource management.

POLT 914 - Financial Management and Budgeting in Public and Non-profit Sectors
Credits: 3.00
Analysis, goal setting, and strategic planning in a governmental setting, with particular emphasis on budgetary processes as a means for controlling policy effectiveness.

POLT 918 - Non-Profit Management
Credits: 3.00
Introduction to governance and management in the non-profit sector: finance, development, personnel management, strategic planning, and risk management.

POLT 995 - Reading and Research
Credits: 1.00 to 3.00
A) American Politics; B) Comparative Politics; C) International Politics; D) Political Thought; E) Public Administration; F) Public Policy. The graduate student engages in independent study under the direction of one of the members of the department. Requires approval of the graduate committee. MPA candidates who have been exempted from the administrative internship are required to complete a 4 credit independent research project in lieu of POLT 970.

POLT 996 - Reading and Research
Credits: 1.00 to 3.00
A) American Politics; B) Comparative Politics; C) International Politics; D) Political Thought; E) Public Administration; F) Public Policy. The graduate student engages in independent study under the direction of one of the members of the department. Requires approval of the graduate committee. MPA candidates who have been exempted from the administrative internship are required to complete a 4 credit independent research project in lieu of POLT 970.

Public Health

PHP 900 - Public Health Care Systems
Credits: 3.00
The focus of this course is on the pattern of services in the United States and on the structure and function of their component parts. It examines the impact on the system of a wide range of external factors including social, political, economic, professional, legal, and technological forces.

PHP 901 - Epidemiology
Credits: 3.00
Exploration of factors underlying the distribution and determinants of states of health in various human populations. Emphasis is placed on investigative techniques, epidemiologic methodology, and disease prevention. Unlike other core courses in the MPH Program which are 8 weeks in length, this course is 16 weeks in length.

PHP 902 - Environmental Health
Credits: 3.00
This course offers a general introduction to the ecological basis of health and disease. It applies the principles and framework of ecosystems to human health problems associated with environmental hazards, including toxic and infectious agents that contaminate our air, water, food, the work place and other special environments. Links between environmental and occupational health effects will be explored within the public health model. Policy required for regulation and alternative strategies for prevention will be discussed.

PHP 903 - Biostatistics
Credits: 3.00
This course introduces students to the principles of biostatistics. Students learn through classroom instruction, lab instruction and exercises, a variety of statistical methods in public health. Students review measures of central tendency, rates, and standardization, probability, sampling, hypothesis testing, comparisons, and simple, multiple and logistic regression techniques. Unlike other core courses in the MPH Program which are 8 weeks in length, this course is 16 weeks in length.

PHP 904 - Social and Behavioral Health
Credits: 3.00
A graduate level course which provides fundamental concepts of the behavioral sciences as they illuminate public health. Since public health practice is the application of physical, biological and behavioral knowledge to living societies, a firm understanding of human social organization and behavior is essential. Individual and community responses to prevention, identification of symptoms, diagnoses, treatments, chronic ailments and rehabilitation are discussed. In each of these areas, the course explores the interaction between community, family, patient, and health care provider.

PHP 905 - Public Health Administration
Credits: 3.00
This course focuses on public health managers, organizational culture, management process, management functions and roles, leadership, motivation, communication, and human resource management.

PHP 906 - Public Health Finance and Budgeting

Credits: 3.00
This course reviews the manner in which public health services are financed in the United States, including sources and uses of such funds. In addition students will be introduced to the vocabulary and tools of financial management and budgeting, including financial statements, basic accounting conventions, and the process of developing and managing a programmatic budget.

PHP 907 - Public Health Policy
Credits: 3.00
An analysis of the public policy process, the development of public health policy in the United States, and a discussion of specific public health policy issues with international comparisons. This course begins with an analytical framework for analyzing the American political system and process. It is followed by a general introduction to health policy in the United States with examples of specific policies and programs. Students will be asked to examine specific public health policy in-depth.

PHP 908 - Public Health Ethics
Credits: 3.00
This course examines selected ethical issues arising in public health policy and practice and ethical dilemmas faced by public health professionals, practitioners, and researchers. Students analyze competing personal, organizational, professional, and societal interests, values, and responsibilities. Case studies apply different models of ethical decision making and provide MPH students with an added opportunity to explore and clarify their values and those of their colleagues.

PHP 912 - Public Health Law
Credits: 3.00
This course seeks to provide the legal basis for public health that is needed to effectively practice public health, especially with respect to understanding and enforcing compliance with public health regulations, and managing public health programs and organizations. The course introduces the core elements of law, legal practice and reasoning, and illustrates their application and use in public health.

PHP 914 - Public Health Policy Analysis
Credits: 3.00
Analysis of the public policy outputs from the perspectives of effectiveness, efficiency, and equity by applying analytical tools to public health policies in the United States. This course begins by examining the major methods used to examine health policy outputs. The perspectives of effectiveness, efficiency and equity are used as a framework for the course. Students read and critique articles from health services research literature that use previously learned methodologies.

PHP 920 - Social Marketing
Credits: 3.00
This course offers and introduces students to the vocabulary and tools of marketing public health programs and services. Expanding upon traditional principles of marketing and consumer behavior the student will be exposed to the theory, practice and challenges of marketing social change. The course also explores the current and emerging issues related to public health marketing.

PHP 922 - Public Health Economics
Credits: 3.00
This course gives each student a hands-on opportunity to become familiar with a broad range of health economics issues and analyses. The objective is to help its graduates successfully compete for advancement in careers requiring knowledge of health policy analysis.

PHP 924 - Policy and Practice of Community Health Assessment
Credits: 3.00

This course explores the process of community health assessment as a tool for bridging the gap between public health and the personal health care system. It provides an historical perspective of using population based measurements as a framework for health improvement initiatives. It examines several community health assessment methodologies and explores the complexity of developing a community-based health assessment.

PHP 926 - Evaluation in Public Health
Credits: 3.00
An introduction to program evaluation as it relates to public health practice and research, primarily in the United States. Public health-specific examples are presented throughout the course. Includes discussion of striking a balance between scientific rigor and the practicalities often faced by program evaluators.

PHP 928 - Principles of Toxicology
Credits: 3.00
This special topics lecture course in public health ecology is an introduction to the science of toxicology. Students gain an understanding of broad toxicological principles and their application to current public health issues. In general, the course provides a mechanistic basis for how substances initiate toxicity, the major environmental determinants of risk, and the risk assessment framework. Examples of toxicants to be examined include the following: drugs, pesticides, food additives and contaminants, environmental pollutants, natural and household products. Public Health majors only.

PHP 930 - Climate Change and Health
Credits: 3.00
An overview of the climate system including its physical and chemical compounds, the greenhouse effect, forcing agents and dynamics at global, regional and local scales. Human dimensions of climate change will be considered in light of data and models. An environmental epidemiology framework for analyzing the direct and indirect impacts of climate variability to public health as well as appropriate public policies, such as monitoring the greenhouse gas emission reductions will be developed.

PHP 932 - Disease Ecology
Credits: 3.00
Students will have an understanding of the basic structure and dynamics of: climate system, ecological systems, social systems. Also gained will be the understanding of epidemiological significance of co evolutionary processes linking climate system with ecological and social systems that influence the interaction between human beings and disease agents and the understanding of the relational significance of assessment frameworks including ecosystem health, ecosystem services, environmental epidemiology, epidemiological environment.

PHP 934 - Work Environment Policy and the Health of Workers
Credits: 3.00
Overview of occupational safety and health policy in the U.S. Focus on the legal context, especially on OSHA, and provides an analytical framework for examining the role of social, economic, and political factors in the recognition and control of occupational hazards. Some attention to the more technical aspects of this field (e.g., industrial hygiene, ergonomics, general health and safety); emphasis on understanding current occupational health and safety policies and controversies.

PHP 936 - Global Public Health
Credits: 3.00
Course is designed to provide students with an introduction to and overview of the key areas of global health by addressing the major determinants of health and how health status is measured to determine the burden of disease in the developing world.

PHP 938 - Health Education and Promotion
Credits: 3.00
An in-depth review of approaches to health promotion and disease prevention intervention in different settings, used varied strategies, and for different target groups. Course is intended to be practical in nature focusing on the specifics of intervention development and delivery. Examples drawn from field of public health. Prereq: PHP 904 Social and Behavioral Health.

PHP 940 - Health and the Built Environment
Credits: 3.00
Overview of relationships between where people live, work, learn and play (built environment) and their health. Promotes an interdisciplinary approach to address chronic public health problems such as heart disease, obesity and depression, as well as tackling environmental issues.

PHP 964 - Applied Epidemiology
Credits: 3.00
Course provides a thorough understanding of essential statistical and epidemiological concepts and their effective application in everyday public health practice. Students are given numerous real-life examples to demonstrate the theory in practice. Prereq: PHP 901 and instructor permission. Public Health majors only.

PHP 985A - Special Topics in Policy and Management
Credits: 1.00 to 3.00
Study of a special topic in Public Health Policy and Management. May be repeated up to a maximum of 3 credits. Prereq: permission.

PHP 985B - Special Topics in Public Health Ecology
Credits: 1.00 to 3.00
Study of a special topic in Public Health Ecology. May be repeated up to a maximum of 3 credits. Prereq: permission.

PHP 990 - Field Study
Credits: 3.00
This course provides a 16-week long opportunity for students to synthesize, integrate, and apply the skills and competencies they have acquired during enrollment in the MPH Program and apply them to a public health problem or project in a professional public health practice setting. Students are expected to spend a minimum of 40 hours in the organization (not including preparation time) exploring how that organization deals with a particular public health issue and working on a project for that organization. In addition, students present the findings of their work in a poster session following the conclusion of the course. This public health experience is conducted under the direction of a faculty member and a community public health mentor. This class meets one hour prior to the regularly scheduled core and elective courses in the MPH Program. Prereq: Completion of core courses and permission of course instructor and MPH Program Director.

PHP 995 - Independent Study
Credits: 1.00 to 3.00
Directed readings and other activities to explore a specific topic related to public health. May be repeated up to a maximum of 3 credits. Prereq: Permission of faculty member and MPH Program Director.

PHP 996 - Applied Topics in the Essentials of Public Health
Credits: 3.00
This course will require students to attend at least six approved workshops on concepts related to the Ten Essential Services of Public Health. After attending the required workshops, a student will write an integrating paper summarizing what s/he has learned across these workshops at it relates to the Ten

Essential Services and identify the types of skills s/he will need to be more effective as a public health professional.

PHP 998 - Integrating Seminar
Credits: 3.00
This final course in the MPH curriculum serves as the capstone to the MPH degree and provides the opportunity for students to work in teams, bringing both their individual and joint perspectives and expertise, to address a particular public health problem for a New Hampshire-based public health entity. This course incorporates substantive, analytical, administrative, and policy perspectives. Students make a formal presentation of recommendations at the conclusion of the course. This class meets one hour prior to the regularly scheduled core and elective courses in the MPH Program. Prereq: Completion of core courses and permission of course instructor and MPH Program Director.

Recreation Management & Policy

RMP 800 - Concepts of Recreation and Leisure
Credits: 3.00
An overview of historical and philosophical perspectives of the play, recreation, therapeutic recreation, and park and natural resource conservation movements. Students examine recreation leisure and recreation resources in contemporary society, particularly in the context of the development of social capital. Includes leisure values and ideals, the emergence and evolution of "free time" diversity, and public policy implications. Prereq: permission.

RMP 805 - Management and Policy in Therapeutic Recreation
Credits: 3.00
Students acquire knowledge of current principles and procedures for assuming an administrative role in the therapeutic recreation profession. Includes issues and practices related to supervision, reimbursement, quality improvement programs, consultation, marketing, and more. Prereq: permission.

RMP 806 - Recreation Administration and Organizational Behavior
Credits: 3.00
The organization and administration of public, private, and not-for-profit recreation agencies. The primary unit of analysis in this class is the recreation organization and the environment in which it operates. Emphasis is placed on organization, management, marketing, and financing applications, theories, and research. Prereq: RMP 800, permission.

RMP 811 - Recreation Resource Management
Credits: 3.00
An examination of the supply and demand of natural resources for outdoor recreation uses, with emphasis on relationships between public and private roles and responsibilities. Historical, social, and environmental impacts of outdoor recreation use are discussed. Current principles and techniques of recreation resource planning and management are outlined. Prereq: permission.

RMP 830 - Camp Administration and Leadership
Credits: 3.00
Provides students with an understanding of administrative and organizational practices in structured camp settings. The theory, practice, and challenges of program planning for youth and adult development within the recreation context of camping. Explores current sociological, environmental, economical and legislative trends influencing contemporary camp management. Prereq: permission

RMP 868 - Theories of Youth Development
Credits: 3.00
This course provides students with a foundation in the theories and philosophies associated with the field of youth development. In this course, students critically analyze the strengths, limitations, and potential applications of various theories, philosophies, and ideas. Examples include: Developmental Systems Theory, Ecological Systems Theory, protective factors, and developmental assests. Students work or volunteer with a youth program for the duration of the semester in order to facilitate application of course concepts.

RMP 870 - Management and Design of Recreation and Park Facilities
Credits: 3.00

Provides students with an orientation to the theories, design, operation, and functions of recreational facilities. Topics include facility development, operational considerations, and auxiliary functions that impact the manager's role. Students gain insight into key areas of facility management through visitations to actual facilities. Prereq: RMP 800, 805 or 806; permission. Special fee.

RMP 872 - Law and Public Policy in Leisure Services
Credits: 3.00
Topics including an overview of the nature of law and U.S. legal systems; the law of torts, contracts, civil liberties and rights; risk management and legal research are addressed in the context of recreation services and resources. Public policy and professional advocacy implications are examined as related to legislative and decisional systems. Prereq: RMP 800 and permission.

RMP 875 - Entrepreneurial and Commercial Recreation
Credits: 3.00
Principles of business planning and development as applied to the private sector leisure services industry. Emphasizes knowledge of key commercial leisure services profiles and their intersection with allied professions such as hospitality and tourism. This course is designed to examine commerical recreation from both a macro and micro perspective. This multi-level approach helps prepare students to write a viable business plan for their own commerical recreation enterprise.

RMP 897 - Master's Project
Credits: 3.00
Prereq: RMP 800, 805 or 806. Permission required.

RMP 899 - Master's Thesis
Credits: 3.00
Prereq: RMP 800, 805 or 806, A graduate level statistics and graduate level methods course. Permission required. May be repeated for a maximum of 6 credits. Cr/F.

RMP 912 - Non-Profit Administration and Leadership
Credits: 3.00
An overview of the creation, management, and administration of non-profit organizations and businesses. Examines legal requirements for charter and incorporation by state law and Federal guidelines from the Internal Revenue Service. Current trends and issues in non-profit sector business are explored and a survey of the wide diversity of non-profit sector organizations is included. Since a high percentage of recreation agencies are incorporated as non-profit organizations, specific applications are made to the field of leisure and recreation. Prereq: RMP 800, 805 or 806 or permission.

RMP 924 - Fund Development and Grantwriting
Credits: 3.00
Students develop an understanding of the meaning of philanthropy, its importance in society, and its integral relationship to the fund development process. The social context for philanthropy, development, and fund raising and the changing practices for non-profit leadership are addressed. Presents and evaluates strategies and communication tools used to support fund development goals. Students develop abilities in grantwriting, requesting major donor support, structuring annual giving campaigns, and establishing special events. Prereq: RMP 800 or permission. Also listed as SW 957.

RMP 964 - Graduate Internship
Credits: 3.00
Supervised, professional administrative work experience in an approved recreation, park, tourism, or health care agency. Students participate in a 14-week 560-hour internship experience after receiving approval from their academic adviser and the internship coordinator. Prereq: RMP 800, 805 or 806, permission.

Cr/F.

RMP 970 - Teaching Practicum
Credits: 3.00
Students work with a faculty mentor to investigate, observe, and practice teaching methods and learning theory. Includes the various instructional technologies as tools to enhance the teaching/learning process. The Teaching Practicum is designed for students who wish to assume part-time or adjunct University teaching positions upon completion of the Master's degree or who see themselves pursuing a future doctoral degree with higher education as a career goal. Prereq: RMP 800 and permission. Cr/F.

RMP 980 - Independent Study
Credits: 1.00 to 3.00
Prereq: RMP 800 and 805 or 806, permission. May be repeated for a maximum of 6 credits.

RMP 995 - Colloquium Seminar
Credits: 3.00
As a capstone course for the M.S. Degree in Recreation Management and Policy, this course is designed to invite students to bring content and ideas formed in previous coursework and experience to the consideration of opportunities and challenges in future professional practice. Central themes include ethical problem solving and issues and trends within the profession. Approaches to ethical inquiry, analysis of evidence and advocacy methodologies are addressed in the context of forming and articulating professional positions. The course is conducted as a colloquium with all participants contributing to the learning process. Prereq: RMP 800, 805 or 806, and permission.

RMP 998 - Special Topics
Credits: 2.00 to 4.00

Resource Administration & Mgt

RAM 805 - Ecotourism: Managing for the Environment
Credits: 4.00
Ecotourism by definition embraces both the environment and economics. A comprehensive framework for planning and managing ecotourism in order to both maximize the potential benefits and minimize the potential costs for people and the environment. Conducted in a seminar format, case studies used to assess the role of ecotourism in the sustainable development of natural resources. Prereq: introduction to tourism. (Also offered as TOUR 705.)

RAM 867 - Social Impact Assessment
Credits: 4.00
A cross-disciplinary perspective on the issues, problems, and methods of Social Impact Assessment (SIA). The analytic approach and theoretical framework provided applied to the assessment of very diverse events--changes in the natural environment, local economy, or dominant technology. SIA is required of most U.S. and Canadian federal and state sponsored projects that come under the National Environmental Protection Act, to include tourism, park and recreation development, highways, reservoirs, timber production, hazardous waste disposal, as well as policy issues. SIA is also required for all projects funded by international donor agencies such as USIA, the World Bank, and private international development agencies.

RAM 877 - Topics in Community Planning
Credits: 4.00
Advanced treatment of the concepts and tools required for effective local and regional planning to guide land use, capital investment in infrastructure, and organization for service delivery. Prereq: CEP 614 or permission. (Also offered as CEP 777.) (Offered every other year.)

RAM 896 - Investigations
Credits: 2.00 to 4.00
A) Resource Administration; B) Resource Management; C) Resource Policy; D) Public Laws and Resources. Prereq: permission. May be repeated.

RAM 898 - Directed Research
Credits: 4.00 to 6.00
Hours and credits to be arranged. Not available if credit obtained for RAM 899. A year-long course; an IA grade (continuous course) given at the end of the first semester. Prereq: permission. Cr/F.

RAM 899 - Master's Thesis
Credits: 1.00 to 10.00
May be repeated for a maximum of 10 credits. Cr/F.

RAM 900 - Resource Administration and Management Internship
Credits: 4.00
Practical administrative and management experience in an area of professional interest. Open only to graduate students in the RAM program. Cr/F.

RAM 911 - Natural and Environmental Resource Management
Credits: 4.00
Fundamental economic, aesthetic, and ethical principles involved in the management of natural resources.

Ways to apply these principles in the formulation and evaluation of resource management policies, including the management of specific renewable resources, soils, water, forests, and wildlife. Prereq: permission. (Also offered as RECO 911.) (Offered every other year.)

RAM 993 - Natural and Environmental Resources Seminar
Credits: 2.00
Presentation and discussion of recent research, literature, and policy problems in the natural and social sciences influencing resource use. (Also offered as RECO 993.) Cr/F.

Social Work

SW 801 - Women and Aging
Credits: 3.00
An overview of women as they age in the American culture, with a brief international overview. Ethnic and cross-cultural perspectives explored. Areas to be studied include biological aging, focusing on menopause; economics and women, including retirement issues; women in the media; lesbian relationships; and late marriages.

SW 805 - Child and Adolescent Risks and Resiliency: Program, Policy and Practice
Credits: 3.00
Major social work policy and program questions in the field of child welfare introduced. The relationship between child welfare and the rest of the social work profession analyzed. Various types of child welfare services, some aspects of social and child welfare policy studied, as well as current research and practice issues in child welfare services.

SW 810 - Computer Utilization in Social Work
Credits: 3.00
Provides students with a basic understanding of computerization and its application in social work. Computer literacy is seen as a requirement for effective practice of social work in the 21st century.

SW 812 - Understanding Developmental Disabilities
Credits: 3.00
Analysis of the complex social contexts of people with developmental disabilities. Explores and questions traditional approaches and the current service system. Examines family and community services and resources.

SW 814 - Introduction to Addiction: Assessment and Intervention
Credits: 3.00
Information and skills necessary to address issues of substance abuse with individuals, families and communities. Overview of the dynamics of addiction; the treatment and recovery process; and the role of social work professionals in the identification and treatment of addiction. Special populations (women, adolescents, elderly, gay/lesbian/ bisexual/transgendered, ethnic/racial groups) discussed. Treatment approaches explored.

SW 815 - Practice with Gay, Lesbian, Bisexual, and Transgender People
Credits: 3.00
Sexual minorities constitute the minority group a counselor most consistently encounters wherever he or she works. Addresses the task of counseling gay, lesbian, and bisexual people on both personal and professional levels for the counselor. Readings include theoretical, experimental, clinical, counseling, and personal perspectives, as well as providing an introduction to the gay/lesbian/bisexual subculture. Students explore and examine their own attitudes and assumptions regarding gays, lesbians, and bisexuals.

SW 820 - Social Welfare Policy I
Credits: 3.00
The history and development of social welfare systems in the United States. Origins and development of significant policies, values, attitudes, and other issues related to the social welfare system and the delivery of service. Basic social welfare concepts studied and economic inequality in the U.S. examined along with

policy responses to this social issue.

SW 830 - Social Work Practice I
Credits: 3.00
Basic concepts, theories, and skills of social work practice. Lectures and discussions, readings and written exercises, and laboratory and practice sessions. Students use the experiential parts of the course (laboratory and interview simulations) to apply the conceptual and theoretical knowledge.
Co-requisites: SW 880

SW 831 - Social Work Practice II: Practice in Small Groups and Community Organizations
Credits: 3.00
Continuation of Social Work Practice I with the further aim of introducing students to social work with groups and communities as models of social work practice.
Co-requisites: SW 881

SW 840 - Implications of Race, Culture, and Oppression for Social Work Practice
Credits: 3.00
This foundation course is designed to increase students awareness of historical, social, political, economic and cultural aspects of micro- and macro-level oppression directed at minorities. Course materials focus on insidious societal forces that shape and profoundly alter life experiences of large numbers of people, with special attention to social relationships that promote the welfare of some, while limiting opportunities and choices for others, including racial and ethnic minorities, children, women, the poor, the handicapped, GLBTQ individuals, and others. Students consider practice issues in multicultural SW.

SW 850 - Human Behavior and the Social Environment I
Credits: 3.00
In this course, students learn about behavior and development and its context across the lifecycle. The semester addresses growth and development from the prenatal period through the end of life using social systems theory/person-in-the-environment as a conceptual framework. The different systems that impact individual development including family, community, and larger systems are examined. Human worth and social justice themes permeate course materials, class disucussions, and activities.

SW 851 - Human Behavior and the Social Environment II
Credits: 3.00
In this course, students learn about behavior and development and its context across the life cycle from a macro systems perspective. The macrosystems that impact individual development are examined. Societal forces that are often invisible shape and profoundly alter life experiences of larger numbers of people. HSBE II pays special attention to social relationships that promote welfare of some while limiting opportunities and choices for others. the semester explores the influence of class, gender, race, ethnicity, religion, age, sexual orientation, and other aspects of diversity on development and behavior of larger systems.

SW 860 - Research Methods in Social Work
Credits: 3.00
Designed to acquaint first-year master's degree students with the concepts and skills necessary to carry out research in social work practice. Particular emphasis placed on methodological issues related to research in a variety of practice contexts. Although the skills necessary to review research critically are examined, the primary emphasis is on preparing the student to carry out research related to practice.

SW 870 - Intimate Partner Violence
Credits: 3.00
This course examines intimate partner violence or domestic violence from its historical roots to the present.

In accordance with an historical and contextual approach, we examine theories that explain and describe the phenonmenon, research that attempts to define it, as well as social policies , social movements, and intervention from a social work perspective. Intimate partner violence *IPV) also known as domestic violence, cuts across racial, ethnic, and class boundaries and impedes victim's well-being and social participation. IPV includes many physical assault, sexual assualt, emotional, verbal, and economic abuse and coercive control.

SW 880 - Field Internship I
Credits: 3.00
This two-semester requirement provides supervised learning and practice within social work programs in a wide range of program settings. Students spend 16 hours per week in the field. Individual field placements arranged with each student by the field coordinator. In order to receive credit, students must satisfactorily complete both SW 880 and SW 881. A concurrent integrative seminar is required. In this weekly seminar attention is given to the development of basic social work skills and techniques, legal and ethical issues, and the development of appropriate professional relationships. A primary goal is to integrate classroom learning with the field experience. Special fee. Cr/F.
Co-requisites: SW 830

SW 881 - Field Internship II
Credits: 3.00
SW 881 is a continuation of SW 880, Field Internship I. Students must satisfactorily complete both field experience semesters to receive credit. Prereq: SW 880 (Field Internship I). Cr/F.
Co-requisites: SW 831

SW 885 - Study Abroad: Comparative Social Welfare Systems
Credits: 3.00
Students in this course examine the historical development of social welfare in another country including an analysis of the underlying values and attitudes that dictate practice and policy decisions. The course includes agency site visits, lectures, themed readings and visits to important cultural sites. Only open to first and second year MSW students. Special fee. Cr/F.

SW 897 - Special Topics in Social Work and Social Welfare
Credits: 2.00 or 3.00
Seminar for graduate students. Topics may include: A) Drugs and Chemical Dependency; B) Intimate Partner Violence C) Social Action in Education Settings D) Social Action in the Dominican Republic. May be repeated for different topics. Special fee.

SW 899 - Master's Thesis
Credits: 6.00 to 10.00
Each student carries out original research that culminates in a master's thesis. Permission required. Prereq: Completion of 30 credit hours; minimum GPA 3.0. Cr/F.

SW 900 - Advanced Standing Practice and Field Seminar
Credits: 3.00
Weekly seminar held concurrently with field placement designed to orient and adequately prepare advanced standing students for advanced practice and field courses. Bridges the undergraduate and graduate curriculum and reviews foundation year concepts, theories, and skills of social work practice and field. Exploration of social work identity and professional relationships with supervisors, colleagues, and agencies. Primary focus on social work values and ethics and the development of ethical decision-making skills including the importance of culturally competent practice. Only offered to advanced standing MSW students. Cr/F.

SW 926 - Social Welfare Policy II
Credits: 3.00
A continuation of the exploration of social policy issues begun in SW 820. Students review various methods of social policy analysis and apply these to issues of concern at the state, local, and agency levels. The course's key organizing concept is the integration of social policy concerns with social work practice and the promotion of client well-being. Prereq: SW 820.

SW 932 - Direct Practice III: Clinical Assessment and Intervention
Credits: 3.00
Builds on the academic and direct practice foundations from Practice I and II and incorporates a focus on the conscious and purposeful use of self as a therapeutic or change agent. Differential assessment is featured through the application of the scientific method and a bio-psycho-social perspective. Several frameworks for assessment and intervention are explored including: psychodynamic, systemic, cognitive-behavioral, family, group and community/organizational frameworks. Prereq: SW 831.
Co-requisites: SW 982

SW 933 - Direct Practice IV: Advanced Clinical Assessment and Intervention
Credits: 3.00
This course marks the end of MSW preparation for entering the field and, as such, focuses on professional identity development and positioning. Critical thinking and conscious, purposeful and differential use of self as a therapeutic or change agent are emphasized. Advanced assessment using cognitive, psychodynamic, social constructionist and systemic frameworks is offered with a focus each week on role-plays and presentations of case material from field experiences that help to integrate theory with practice. Prereq: SW 932.
Co-requisites: SW 983

SW 936 - Community and Administrative Practice III: Community Organization and Political Strategies
Credits: 3.00
Provides students with the knowledge base and skills in the areas of: community assessment, intervention, planning, budgeting, and developing organizational change and political strategies. Students learn to use strategies of cultivation, mobilization and sustaining support that empowers underserved constituent groups. Course provides both historical and current contexts for change efforts across organizational and community systems. Course is required of students in the community and administrative practice concentration, but also open as an elective to any M.S.W. student who has completed first-year practice courses
Co-requisites: SW 982

SW 937 - Community and Administrative Practice IV: Management of Human Service Organizations

Credits: 3.00
Continuation of the exploration of macro practice issues begun in SW 936. Preparation of students for performing managerial functions in public and private human service settings, including those that serve diverse constituent groups. Focuses on the concepts, principles, values, and strategies that inform administrative practice, including policy formulation and program planning. Emphasis on the integration of organizational theory, managerial roles, ans a systems knowledge base. Course is required of students in the community and administrative practice concentration (Prereq: SW 936), but is also open as an elective to any direct practice M.S.W. student who has completed first-year practice courses. Coreq: SW 983 if CAP concentration.

SW 952 - Human Behavior and the Social Environment III
Credits: 3.00

Designed to acquaint master's degree students with the epidemiology, classification, and etiology of the major mental illnesses; with a primary objective to develop the student's diagnostic skills in the field of psychopathology. Students become familiar with historical and current mental health policy issues. At course conclusion students have an effective working knowledge of the bio-psycho-social basis of the major mental disorders, the behavioral symptomology that characterizes them, the use of psychotropic medication in treatment, and their classification according to the current DSM system. Prereq: SW 850 and SW 851.

SW 957 - Fund Development and Grantwriting
Credits: 3.00
This course is designed to introduce students to various fundraising strategies to support nonprofit health and human service organizations. Students are provided with an overview of philanthropy and nonprofit organizations in the United States, effective fundraising and individual donor strategies, and ethical and legal issues related to fundraising. Student use a case-study approach for planning, developing, and writing successful grant proposals to fund health and human services programming.

SW 962 - Research II Statistics
Credits: 3.00
Social science statistics is a set of methods used to organize and analyze data for the purpose of either answering research questions or testing social science theories with data. Course provides practical, data-oriented introduction to the methods of modern statistical analysis with a focus on understanding and interpretation rather than the details of calculation. Students with extensive experience may test out.

SW 965 - Research III: Program and Practice Evaluation
Credits: 3.00
A one semester course, basic introduction to evaluation methods in the context of social work practice and social welfare. Students develop and conduct evaluations of practice, programs, and policies. Course provides skills required for practice and program evaluation. Prereq: SW 860; 962.

SW 973 - Interventions with Groups
Credits: 3.00
Principles of social work practice with groups are explored. Therapeutic focus is on helping the individual within the framework of a group setting. The purpose and usefulness of group work as a preventative method and as an intervention tool are analyzed. History , various theories, techniques of group facilitation and typologies of treatment and task groups are examined. Students actively participate in a group simulation called "class-as-a-group" to enhance their skills and understanding of group work.

SW 974 - Social Work Supervision
Credits: 3.00
Prepares students for a supervisory role in human service agencies. Basic principles of administrative, supportive and educational supervision are reviewed and related to the student's own experiences in supervision or as a supervisor. This elective course is open to both direct practice and community and administrative practice students.

SW 975 - Theory and Practice of Family Therapy
Credits: 3.00
This course is designed to provide students with an introduction to the theory and practice of family therapy. Major approaches to be examined include structural, strategic, systemic, brief, narrative family therapy, and social constructionism. Students have an opportunity to present cases they are currently working with in their internships and are able to practice family therapy techniques with the use of a team coaching them from behind a one-way mirror.

SW 979 - Social Work and the Law
Credits: 3.00
Social work practitioners routinely encounter and interact with the legal system in their work. The course provides knowledge of, and learning about, the differences between the legal and social service networks, the realities of work involving the law, and legal issues, as well as an understanding of those aspects of the legal system most likely to impact clients and their families.

SW 982 - Field Internship III
Credits: 4.00
This two semester requirement provides advanced practice experience in a wide range of social work settings. Students spend 24 hours per week in the field. Individual field placements are arranged with each student by the field coordinator. In order to receive course credit, students must satisfactorily complete both semesters(SW 982 and SW 983). A concurrent integrative seminar is also required. The goal of the weekly seminar is to assist students in conceptualizing and integrating the multiple theoretical issues and practice concepts of course work and the practicum. Students are expected to take major responsibility for the semester, using the instructor as a resource. Coreq: SW 932 or SW 936. Special fee. Cr/F.

SW 983 - Field Internship IV
Credits: 4.00
This two semester requirement provides advanced practice experience in a wide range of social work settings. Students spend 24 hours per week in the field. Individual field placements are arranged with each student by the field coordinator. In order to receive course credit, students must satisfactorily complete both semesters. A concurrent integrative seminar is also required. The goal of the workshop-style weekly seminar is to assist students in conceptualizing and integrating the multiple theoretical issues and practice concepts of course work and the practicum. Students are expected to take major responsibility for the semester, using the instructor as a resource. Coreq: SW 933 or SW 937. Cr/F.

SW 992 - Special Projects and Independent Study
Credits: 1.00 to 3.00
Projects, research and reading programs in areas of concentration. Sixty days advance approval of the student's plan of study by adviser and proposed instructor required. Prereq: 24 cr. in M.S.W. coursework. May be repeated to maximum of 6 credits. Special fee. Cr/F.

Sociology

SOC 815 - Criminological Theory
Credits: 4.00
Introduces graduate students and advanced undergraduates to the major theoretical literature in crime and delinquency. Covers both classical and contemporary theory, with empirical assessments of theories, including marco- and micro-level control, strain, and learning theories as well as recent developments in biosocial, deterrence, labeling, and critical/feminist theories.

SOC 820 - Sociology of Drug Use
Credits: 4.00
Examines licit and illicit drug use from a sociological perspective. Draws primarily from the sociology of mental health and criminology to explore a variety of drug-related topics including: historical and current U.S. drug trends, dominant theoretical approaches about the initiation into, and continued use of drugs, drug-related crime, therapeutic use of drugs, prevention and treatment of drug problems, and drug-related policies.

SOC 825 - Social Demography
Credits: 4.00
Social demography examines the linkages between changes in the size, composition and distribution of the population and changes in social, environmental, economic and political factors. The course examines demographic methods and the materials and the analytical techniques used by demographers to analyze population redistribution, fertility, work, marriage, migration and mortality. The policy implications of demographic change will be examined with attention to the United States as well as the developed and developing world.

SOC 830 - Communities and the Environment
Credits: 4.00
People and the natural environments in which they live fundamentally structure communities around the globe. Economic change, expanding development , and human migration are transforming social and environmental conditions in both rural and urban settings, altering the identities of many communities as well as their relationships with the natural world. The importance of these emerging social and environmental issues has made them a focus for social science inquiry. This course exposes students to a range of sociological concepts, theories, and research approaches related to the study of communities and environmental issues. Some of the substaintive themses that are covered include: population dynamnics and environmental change; social capital and social networks; political economy and comunity development; collective action and social movements; science, technology, and environmental risks; and environmental racism and justice. The principal assignment for the course will be a research project where students investigate a community or environmental issue of their own interest.

SOC 840 - Sociology of Mental Health
Credits: 4.00
Introduces students to different sociological approaches for studying and understanding mental health and illness. Students examine the social distribution of mental illness in the United State and the social-structural factors that help to explain mental health variations. Also addresses issues surrounding mental health treatment, systems, and policies for the mentally ill.

SOC 842 - Sociology and Social Policy

Credits: 4.00
Social policy and public policy defined: description of the policy making process. The political sociology of the policy-making process; who makes policy and who influences policy, under what conditions, and with what effect. Definition of social policy research and the various roles social scientist can adopt for policy-relevant work. Students are responsible for critiquing the readings and for preparing a substantial research paper.

SOC 845 - Race, Ethnicity, and Inequality
Credits: 4.00
Sociological perspectives on race and ethnic relations for graduate and advanced undergraduate students. Topics include the creation of racial and ethnic identities; the nature and extent of segregation; education, employment, and wealth inequalities; and the effects of state policy. Course emphasizes both theoretical and empirical assessments

SOC 873 - Sociology of Childhood
Credits: 4.00
This course will expose students to a variety of sociological perspectives on childhood in American society. Focus will be on the analysis of how social institutions, like the modern American family, school, economic system, justice system and communications media affect children. Assumes a prior understanding of important sociological concepts, critical thinking skills and social science writing ability.

SOC 876 - Family Violence Research Seminar
Credits: 4.00
Analysis of abusive relationships within the family, especially physical and sexual abuse of children and spouses. Each student designs and conducts and empirical study to test a theory purporting to explain intra-family violence, the consequences of violence for families and society, or a study of what might prevent family violence. Permission required.

SOC 880 - Social Conflict
Credits: 4.00
Analysis of the social conditions associated with the major forms of conflict management in human societies: discipline, rebellion, vengeance, negotiation, mediation, law, therapy, supernaturalism, and avoidance.

SOC #894 - Evaluation of Social Programs
Credits: 4.00
Evaluation research defined: purposes of evaluation; design of evaluation studies; setting of programs; utilization of evaluation results. Examination of case studies of evaluations of social programs. Students are responsible for designing an evaluation study in their chosen substantive area. Prereq: methods of social research.

SOC 897 - Special Topics
Credits: 4.00
Occasional or experimental offerings. May be repeated for different topics.

SOC 899 - Master's Thesis
Credits: 1.00 to 10.00
Usually 6 credits but up to 10 credits when the problem warrants. Cr/F.

SOC 900 - Pro-seminar
Credits: 2.00
An introduction to the discipline of sociology and to the graduate program. Topics include writing for

professional audiences, publishing, applying for support, TA workshop, writing a thesis or dissertation. Meetings with faculty members throughout the semester. Cr/F.

SOC 901 - Sociological Methods I: Intermediate Social Statistics
Credits: 4.00
Application of statistical methods to the analysis of social data, with particular emphasis on multiple regression and related topics.

SOC 902 - Sociological Methods II: Research Design
Credits: 4.00
Systematic investigation of each step in the design and implementation of sociological research. Selected techniques of data collection and analyses are pursued. Prereq: methods of social research; social statistics;/or their equivalents or permission.

SOC 903 - Sociological Methods III: Advanced Social Statistics
Credits: 4.00
Multivariate statistical methods for the analysis of social data. Topics include problem-solving with multiple regression, categorical-variable models, dynamic models, and others.

SOC 904 - Sociological Methods IV: Qualitative and Historical Research Methods
Credits: 4.00
An introduction to qualitative and historical methods of data gathering and analysis in the social sciences. The seminar is intended as an intensive workshop training in such techniques as participant observation, in-depth interviewing, content analysis, and archival exploration. Students conduct qualitative and/or historical research and are responsible for designing an individual project, collecting and analyzing appropriate data, and writing a research paper.

SOC 911 - Sociological Theory I
Credits: 4.00
The content, presuppositions, and implications of the body of classical sociological theory, exemplifying the full range of sociological inquiry.

SOC 912 - Sociological Theory II
Credits: 4.00
The content, presuppositions, and implications of contemporary sociological theory. Students engage in theory construction and analysis and in this endeavor are encouraged to develop their particular interests in substantive areas. Prereq: SOC 911.

SOC 921 - Crime and Conflict
Credits: 4.00
Serves as the core course for the Crime and Conflict concentration. Theories and patterns of crime; the social origins of violent and nonviolent conflict; the role of social factors in the justice system; alternative forms of crime control and conflict management.

SOC 975 - Sociology of the Family
Credits: 4.00
Major approaches in the sociological study of families. Individuals in families, family relationships, and families as groups and the interrelationships among these levels. Interactional and systemic properties of marriage, parent-child relations, and extended family relations.

SOC 980 - Social Stratification
Credits: 4.00

Introduces students to the core of theoretical, methodological, and substantive issues in social stratification. Readings include classical and contemporary theories of stratification and work exploring the sources and consequences of stratification. Inequalities based on class, race, and gender examined.

SOC 988 - Medical Sociology: Health, Healing, and Society
Credits: 4.00
Social context of wellness, illness, and healing; stratification and health; mortality and morbidity in relation to class, race, ethnicity, religion, gender, and age; social control functions of medicine: medicalization and de-medicalization; interaction of physicians and patients; medical occupations; mental health and mental illness; stress and illness; medical care systems in various countries.

SOC 990 - Teaching Sociology Seminar
Credits: 4.00
Helps graduate students explore teaching techniques and improve their teaching skills. Topics include: setting course goals, designing lectures, evaluating student course work, leading discussion, and experimenting with innovative teaching techniques. (Also offered as GRAD 974.)

SOC 995 - Reading and Research
Credits: 2.00 to 8.00
A student prepared by training and experience to do the independent work under the guidance of an instructor may register. Prereq: 16 graduate hours of sociology and permission. Hours and credit to be arranged. May be repeated for different topics.

SOC 996 - Reading and Research
Credits: 2.00 to 8.00
A student prepared by training and experience to do the independent work under the guidance of an instructor may register. Prereq: 16 graduate hours of sociology and permission. Hours and credit to be arranged. May be repeated for different topics.

SOC 997 - Advanced Special Topics
Credits: 2.00 or 4.00
Occasional or experimental offerings.

SOC 999 - Doctoral Research
Credits:
Cr/F.

Spanish

SPAN 890 - Topics in Second Language Acquisition/Pedagogy/Methodology
Credits: 3.00
A) Introduction to Second Language Acquisition, B) Internet Technologies and Second Language Learning. Special fee. May be taken more than once if no duplication of content.

SPAN 897 - Topics in Hispanic Literature and Cultural Studies
Credits: 3.00
A) Medieval Spanish Literature, B) Spanish Literature of the Renaissance and the Golden Age, C) Spanish Litterature of the 18th and 19th Centuries, D) Spanish Literature of the 20th Century (Poetry/Theater/Prose,), E) Contemporary Spanish Literature, F) Spanish Cultural Studies, G) Latin American Literatureof the 16th and 17th Centuries, H) Latin American Literature of the 18th and 19th Centuries, I) 20th Century Latin American Literature (Poetry/Theater/Prose), J) Contemporary Latin American Literature, K) Cyberliterature and Cyberculture, L) Transatlantic Studies, M) Spanish and Latin American Philosophy and Essay, N) Indigenous Cultural Expression of the Americas, O) Hispanic Film Studies, P) U.S. Hispanic Cultural Studies, Q) Latin American Cultural Studies, R) Senior Seminar, S) Other. Special fee. May be taken more than once for credit if no duplication of content.

SPAN 898 - Topics in Hispanic Linguistics and Cultural Studies
Credits: 3.00
a) History of the Spanish Language, B) Study of Spanish Mood and Aspect, C) Sociolinguistics of Spanish, D) Discourse Analysis, E) Politeness and Pragmatics, F) Bilingualism and Spanish in the U.S., G) Spanish Pronouns, H) Regional ans Social Variation in Spanish Phonetics, I) Other. Prereq: permission of instructor. Special fee. May be taken more than once for credit if no duplication of content.

SPAN 901 - Bibliography and Methods of Research
Credits: 3.00
Required of all graduate students, to be taken concurrently with all graduate work from first to last semester during the program of study. An introduction to standard bibliographical techniques and to form and style in the preparation and writing of research findings. Preparation bibliographical essay is the final requirement for graduation. IA (continuous grading). Special fee.

SPAN 903 - Applied Linguistics
Credits: 3.00
Required of all graduate assistants teaching in the departmental program. Discussion of current methodology and linguistic approaches to the teaching of Spanish. Instruction in the use of media, technology and the Language Resource Center. Readings, discussion, class observation and teaching portfolio. IA (continuous grading). Special fee.

SPAN 995 - Independent Study
Credits: 1.00 to 3.00
Guided individual study with training in bibliography and organization of materials. Topics selected by instructor and student in conference. Barring duplication of content, may be repeated for credit.

SPAN 997 - Graduate Seminar
Credits: 3.00
Selected topics in Spanish linguistics, literature and cultural studies. Special fee.

Engineering

ENGR 891 - Engineering Fundamentals I
Credits: 4.00
The purpose of this course is to provide recent hires into the ELDP (Engineering Leadership Development Program) at BAE Systems with the engineering fundamentals needed to address the complex problems that face BAE Systems engineers. The focus of the course is to help one develop the ability to solve difficult and complex problems within interdisciplinary engineering teams. Engineering breadth is gained through a series of modules. This is the first of two courses taken by BAE Systems engineering in the ELDP during their first year, in order to take the class a person must be in the BAE Systems ELDP program.

ENGR 892 - Engineering Fundamentals II
Credits: 4.00
The purpose of this course is to provide recent hires into the ELDP (Engineering Leadership Development Program) at BAE Systems with the engineering fundamentals needed to address complex problems that face BAE Systems engineers. The focus of the course is to help one develop the ability to solve difficult and complex problems within interdisciplinary engineering teams. Engineering breadth is gained through a series of modules. This is the second of two courses taken by BAE Systems engineering in the ELDP during their first year. In order for a student to take this course they must be in the BAE Systems ELDP program.

ENGR 999 - Doctoral Research
Credits:
Cr/F.

Zoology

ZOOL 808 - Stream Ecology
Credits: 4.00
Ecological relationships of organisms in flowing water; streams as ecosystems. Lectures on physical and chemical features of streams, floral and faunal communities, and factors controlling populations of benthic invertebrates. Laboratory exercises employ both field and laboratory experimental techniques. Weekly seminars on original research papers. Special fee. (Not offered every year.)

ZOOL 810 - Ichthyology
Credits: 4.00
An introduction to the evolution, systematics, anatomy, physiology, and ecology of fishes, with an emphasis on New England species. Prereq: principles of biology or equivalent. Lab. (Offered alternate years.) Special fee.

ZOOL 812 - Mammalogy
Credits: 4.00
Evolution, ecology, behavior, physiology, and diversity of mammals. Focuses on conceptual issues such as the relations of structure, function, physiology, and ecology of species; reproductive physiology and life history strategies; and the evolution of mating systems and social structure. Requires familiarity with mammalian groups to the family level and identification of local fauna to species. Prereq; principles of biology or equivalent. Lab. (Not offered every year.) Special fee.

ZOOL 813 - Animal Behavior
Credits: 4.00
Introduces the naturalistic study of animal behavior. Emphasizes the evolution, development, physiology, and ecology of behavior. Topics include the genetic and acquired bases of behavior; neuroethology and behavioral endocrinology; communication; orientation; foraging strategies; reproductive ecology; and the evolution of altruistic behavior. Prereq: principles of biology I and II or equivalent. Lab. Special fee.

ZOOL 817 - Lake Ecology
Credits: 4.00
Introduction to the ecology of freshwater systems, with emphasis on lakes. Origins of lakes and effects of watersheds on lake chemistry, nutrient cycling, and the lake food web are explored. Other topics include the impact of human disturbances on productivity and aquatic food web and methods used for the management and restoration of lakes. Comparisons are made of the structure and functions of lake ecosystems found in temperate, tropical and arctic regions. Prereq: general biology. (Also offered as PBIO 817.

ZOOL 819 - Field Studies in Lake Ecology
Credits: 4.00
Ecology of lakes and other freshwater habitats examined through field studies. Emphasizes modern methods for studying lakes, analysis and interpretation of data, and writing of scientific papers. Seminars on research papers and student presentations of class studies. Field trips to a variety of lakes, from the coastal plain to White Mountains; investigate problems, such as eutrophication, acidification, biodiversity and biotoxins. Capstone experiences include interaction with state agencies, lake stakeholders and the submission of written manuscripts for publication. Prereq: introductory biology. (Also offered as PBIO 819.) Special fee. Lab.

ZOOL 825 - Marine Ecology
Credits: 4.00
Marine environment and its biota, emphasizing intertidal and estuarine habitats. Includes field, laboratory, and an independent research project. Prereq: general ecology; permission. Marine invertebrate zoology, oceanography, and statistics are desirable. (Also offered as PBIO 825.) Special fee. (Not offered every year.)

ZOOL 832 - Lake Management: A Multidisciplinary Approach
Credits: 4.00
Lectures and seminars on interpreting lake water quality, developing a natural history inventory for lakes, the process of creating a lake management plan, and resolution of conflicting uses of lakes. Students develop actual lake management plans in cooperation with government agencies and lake associations. Guest speakers from state agencies and non-governmental organizations. Introductions to and use of GIS (Geographic Information Systems) methods for the analysis of lakes and watersheds. Present lake management issues from scientific and social science points of view. Open to students from all disciplines. (Also offered as PBIO 832.) Special fee. Lab.

ZOOL 833 - Behavioral Ecology
Credits: 4.00
Behavioral adaptations of animals to their environment including the evolution of behavior and behavioral genetics; foraging and competition for resources; reproductive ecology, mating systems and parental care; and the evolution of cooperative behavior. Examples include both vertebrates and invertebrates. Emphasis is on critical understanding of concepts as exhibited in oral and written exercises. Students conduct independent investigations. Prereq: animal behavior or ecology or evolution course. Lab. (Offered in alternate years.)

ZOOL 845 - Biology and Diversity of Insects
Credits: 4.00
The lecture examines the unique biologies and structure of insects, the most diverse group of organisms. The laboartory project is based on past public requests for an understanding of aquatic insect biodiversity in streams. Experience in sampling, sorting, and identifying aquatic insects is developed, and an understanding of biodiversity indices is developed for a formal report and presentation. Prereq: BIOL 411-412 or equivalent. Special fee. (Not offered every year).

ZOOL 850 - Biological Oceanography
Credits: 4.00
Biological processes of the oceans, including primary and secondary production, trophodynamics, plankton diversity, zooplankton ecology, ecosystems and global ocean dynamics. Field trips on R/V Gulf Challenger and to the Jackson Estuarine Laboratory. Prereq: one year of biology or permission of instructor. (Also offered as EOS 850, ESCI 850.) Special fee. Lab. (Not offered every year.)

ZOOL 872 - Fisheries Biology
Credits: 3.00
Principles of fisheries science, with emphasis on techniques used to assess the biological characteristics of exploited fish populations and the use of such information for fisheries management. Prereq: ZOOL 810; permission. (Not offered every year.)

ZOOL 873 - Physiology of Fish
Credits: 4.00
Investigation of the physiological processes responsible for maintaining homeostasis in fishes. Focus is on the function and regulation of the major organ systems during stress and environmental adaptation. Topics include reproduction, osmoregulation, digestion, endocrinology and sensory perception.

ZOOL 877 - Neurobiology and Behavior
Credits: 4.00
Survey of fundamental concepts and recent discoveries in neurobiology. Topics include structure and function of neurons, development, cellular basis of behavior (sensory and motor systems), neuropharmacology, and neural plasticity (learning). Prereq: principles of biology I and II or permission. Physiology also desirable.

ZOOL 895 - Advanced Studies
Credits: 1.00 to 4.00
Independent study in various areas, including but not limited to: animal behavior; departmental biology; ecology; electron microscopy; evolution; genetics; histology; history of biology; invertebrate biology; neurobiology and behavior; physiology; teaching practices; underwater research; vertebrate biology; biological techniques. Course sections for advanced work, individual or group seminar. May include reading, laboratory work, organized seminars, and conferences. Prereq: permission of department chairperson and staff concerned.

ZOOL 899 - Master's Thesis
Credits: 1.00 to 10.00
Prereq: permission of department chairperson and prospective supervisor. May be repeated up to a maximum of 10 credits. Cr/F.

ZOOL 902 - Writing and Publishing Science
Credits: 2.00
Participants in this seminar (1) make significant progress on one or more of their current academic writing projects; (2) increase their understanding of the genres, protocols, and mechanisms of scientific writing and publishing; and (3) develop strategies and skills for getting professional writing done efficiently and well, in graduate school and beyond.

ZOOL 997 - Seminar
Credits: 1.00 to 2.00
Reports on recent zoological literature. Subject fields are those listed under ZOOL 895, 896; not all areas available every semester. Required of graduate students in zoology. Cr/F.

ZOOL 998 - Seminar
Credits: 1.00 to 2.00
Reports on recent zoological literature. Subject fields are those listed under ZOOL 895, 896; not all areas available every semester. Required of graduate students in zoology. Cr/F.

ZOOL 999 - Doctoral Research
Credits:
Cr/F.

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Graduate Faculty

A

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Affiliate Professor of Earth, Oceans, and Space, University Professor of Environmental Sciences; B.S., Yale University, 1971; M.F.S., Yale School of Forestry, 1973; Ph.D., Yale University, 1976.

Abrams, Eleanor D. (1994)
Professor of Education; B.S., University of Massachusetts at Amherst, 1983; Ph.D., Louisiana State University, 1993.

Abtahian, Maya Ravindranath (2009)
Assistant Professor of English and Linguistics; B.A., Cornell University, 1998; Ph.D., University of Pennsylvania, 2009.

Afolayan, Funso (1996)
Associate Professor of History; B.A., University of Ife, Nigeria, 1980; M.A., Obafemi Awolowo University, Nigeria, 1984; Ph.D., ibid., 1991.

Aktekin, Tevfik (2010)
Assistant Professor of Business Administration and Decision Sciences; B.Sc., Yildiz Technical University, Istanbul, Turkey, 2002; M.B.A., George Washington University, 2004; Ph.D., ibid., 2009.

Alexander, Lee (2000)
Research Associate Professor of Marine Sciences; B.S., Marietta College, 1968; M.S., University of New Hampshire, 1980; Ph.D., Yale University, 1986.

Aliouche, E. Hachemi (2007)
Associate Professor of Hospitality Management; B.S., University of New Hampshire, 1980; M.A., ibid., 1982; Ph.D., ibid., 1992.

Amato-Wierda, Carmela C. (1995)
Associate Professor of Materials Science; B.A., Harvard University, 1988; Ph.D., Rensselaer Polytechnic Institute, 1993.

Annicchiarico, Michael J. (1991)
Associate Professor of Music; B.M., University of New Hampshire, 1976; M.F.A., Brandeis University, 1981; Ph.D., ibid., 1993.

Arriaza, Pablo (2009)
Assistant Professor of Social Work; B.S., Florida State University, 1990; M.S.W., ibid., 1992; Ph.D., University of Alabama, 2009.

Arrington, Barbara (2007)
Professor of Health Management and Policy; B.S., Columbia University, 1970; M.P.H., University of Missouri at Columbia, 1976; Ph.D., St. Louis University, 1985.

Arthanat, Sajay (2007)
Assistant Professor of Occupational Therapy; B.Sc., India Medical University, 1997; Advanced Certificate in Assistive Technology, State University of New York at Buffalo, 2004; Ph.D., ibid., 2007.

Asbjornsen, Heidi (2011)
Associate Professor of Environmental Conservation Studies and Earth, Oceans, and Space and Forestry; B.A., Carleton College, 1989; M.S., Yale University, 1993; Ph.D., ibid., 1999.

Aytur, Semra A. (2009)
Assistant Professor of Health Management and Policy; B.A., Brown University, 1991; M.P.H., Boston University, 1996; Ph.D., University of North Carolina at Chapel Hill, 2006.

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B

Babbitt, Kimberly J. (1996)
Professor of Wildlife and Conservation Biology; B.S., University of New Hampshire, 1984; M.S., Texas A & M University, 1988; Ph.D., University of Florida, 1996.

Bachrach, David (2003)
Associate Professor of History; B.A., Carleton College, 1994; M.A., University of Notre Dame, 1997; Ph.D., ibid., 2001.

Bailey, Brigitte Gabcke (1987)
Associate Professor of English; B.A., University of Virginia, 1977; A.M., Harvard University, 1980; Ph.D., ibid., 1985.

Baker, Alan L. (1972)
Associate Professor of Biology and Marine, Estuarine and Freshwater Biology; B.A., State University of New York at Binghamton, 1965; Ph.D., University of Minnesota, 1973.

Baldwin, Kenneth C. (1982)
Professor of Mechanical Engineering and Ocean Engineering and Marine Sciences; B.S.M.E., Northeastern University, 1973; M.S.M.E., University of New Hampshire, 1977; Ph.D., University of Rhode Island, 1982.

Ballestero, Thomas P. (1983)
Associate Professor of Civil Engineering and Environmental Engineering; B.S.C.E., Pennsylvania State University, 1975; M.S.C.E., ibid., 1977; Ph.D., Colorado State University, 1981.

Balling, L. Christian (1967)

Professor of Physics; B.A., Oberlin College, 1960; M.A., Harvard University, 1961; Ph.D., ibid., 1965.

Banach, Mary (1995)
Associate Professor of Social Work; B.A., University of Wisconsin at Milwaukee, 1975; M.S.W., New York University, 1978; D.S.W., Columbia University, 1995.

Banyard, Victoria L. (1995)
Professor of Psychology; B.A., Brown University, 1988; M.A., University of Michigan at Ann Arbor, 1990; Ph.D., ibid., 1994.

Barber, Heather (1993)
Associate Professor of Kinesiology; B.S., St. Lawrence University, 1978; M.S., Pennsylvania State University, 1982; Ph.D., University of Oregon, 1992.

Barber, Nelson A. (2009)
Associate Professor of Hospitality Management; B.S., San Jose State University, 1978; A.O.S., Culinary Institute of America, 2004; M.S., Purdue University, 2005; Ph.D., Texas Tech University, 2008.

Barkey, Dale P. (1987)
Professor of Chemical Engineering and Environmental Engineering; B.A., Clark University, 1979; M.S., University of Cincinnati, 1982; Ph.D., University of California at Berkeley, 1987.

Barnett, Carole K. (1994)
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Barrows, Clayton W. (2006)
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Bartos, Radim (1997)
Associate Professor of Computer Science; M.S., Czech Technical University, 1987; M.S., University of Denver, 1996; Ph.D., ibid., 1997.

Basterra, Maria (2001)
Associate Professor of Mathematics and Statistics; B.S., University of Texas at Austin, 1992; M.S., University of Chicago, 1993; Ph.D., ibid., 1998.

Bauer, Christopher F. (1981)
Professor of Chemistry; B.S., University of Notre Dame, 1974; M.S., University of Illinois at Urbana-Champaign, 1976; Ph.D., Colorado State University, 1979.

Baughman, Reagan A. (2003)
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Beane, Silas Robert , III (2003)
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Beasley, Joan B (2013)
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Becker, Mimi Larsen (1993)
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Sciences; B.A., Carleton College, 1957; M.A., Duke University, 1989; Ph.D., ibid., 1996.

Bedker, Patricia D. (1985)
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Beemer, Cristy (2008)
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Bell, Brent J. (2005)
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Bell, Erin S. (2003)
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Beller-McKenna, Daniel (1998)
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Benassi, Victor A. (1982)
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Berda, Erik (2010)
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Berglund, Per (2003)
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Berlinsky, David L. (2001)
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Bishop, Melissa M. (2008)
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Bobilya, Dennis J. (1982)
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Boettcher, Margaret S. (2009)
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Bolker, Jessica A. (1997)
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Bolster, W. Jeffrey (1991)
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Bornstein, Steven P. (1989)
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Boulton, Elizabeth P. (1988)
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Boysen, Andrew A. (1998)
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Braswell, Bobby H. (2001)
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Brettschneider, Marla A. (1996)
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M.S., ibid., 1999; Ph.D., University of Wisconsin at Madison, 2004.

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+Broders, Kirk D. (2011)
Assistant Professor of Sustainable Agriculture and Food Systems; B.S., The Ohio State University, 2004; Ph.D., ibid., 2008.

Bromberg, Daniel E. (2012)
Assistant Professor of Political Science; B.A., State University of New York at Albany, 2001; M.P.A., University of Vermont, 2006; Ph.D., Rutgers University, 2009.

Broussard, Cynthia Anne (2000)
Associate Professor of Social Work; B.A., University of Texas at Austin, 1974; M.S.W., Louisiana State University, 1977; Ph.D., Washington State University, 1986.

Brown, Benjamin C. (1996)
Associate Professor of Sociology; B.A., Earlham College, 1987; M.A., Emory University, 1992; Ph.D., ibid., 1996.

Brown, Warren R. (1972)
Associate Professor of Political Science and Humanities; B.A., Willamette University, 1966; M.A., Claremont Graduate School and University Center, 1972; Ph.D., ibid., 1976.

Bryce, Julia G. (2003)
Associate Professor of Earth Sciences; B.A., University of Virginia, 1993; Ph.D., University of California at Santa Barbara, 1998.

Bstieler, Ludwig A. (2001)
Associate Professor of Marketing and Business Administration; M.B.A., University of Innsbruck, Austria, 1989; Ph.D., ibid., 1997.

Burdick, David M. (1992)
Research Associate Professor of Marine, Estuarine and Freshwater Biology and Marine Sciences; B.S., Hobart College, 1977; Ph.D., Louisiana State University, 1988.

Burger, John F. (1977)
Professor of Biology and Zoology; B.A., Grinnell College, 1962; M.Sc., University of Arizona, 1965; Ph.D., ibid., 1971.

Burke, Joanne D. (2004)
Clinical Associate Professor of Nutrition and Sustainable Agriculture and Food Systems; B.S., University of Rhode Island, 1975; M.Ed., Tufts University, 1977; R.D., ibid., 1977; Ph.D., University of New Hampshire, 2001.

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+ Indicates time devoted to Agricultural Experiment Station
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Calarco, John R. (1981)
Professor of Physics; B.S., George Washington University, 1963; M.S., University of Illinois at Urbana-Champaign, 1965; Ph.D., ibid., 1969.

Calculator, Stephen N. (1983)
Professor of Communication Sciences and Disorders ; B.A., State University of New York College at Oswego, 1974; M.S., State University of New York College at Geneseo, 1975; Ph.D., University of Wisconsin at Madison, 1980.

Calder, Brian R. (2001)
Research Associate Professor of Ocean Engineering and Marine Sciences; M.Eng., Heriot-Watt University, 1994; Ph.D., ibid., 1997.

Came, Rosemarie E. (2010)
Assistant Professor of Earth Sciences; B.S., Boston College, 1994; M.A., ibid., 1998; Ph.D., Massachusetts Institute of Technology, 2005.

Carey, Gale B. (1989)
Professor of Nutrition; B.S., University of Massachusetts at Amherst, 1974; M.S., University of Wisconsin at Madison, 1976; Ph.D., University of California at Davis, 1981.

Cariens, Benjamin S. (2002)
Associate Professor of Art and Art History; B.A., College of William and Mary, 1991; M.F.A., Boston University, 1993; M.A., Harvard University, 1999.

Caron, Rosemary M. (2003)
Associate Professor of Health Management and Policy; B.A., Regis College, 1990; Ph.D., Dartmouth College, 1995; MPH, Boston University, 1997.

Carr, Russell T. (1984)
Professor of Chemical Engineering and Environmental Engineering; B.S., Brigham Young University, 1980; M.S., University of Rochester, 1983; Ph.D., ibid., 1984.

Carroll, John E. (1974)
Professor of Environmental Conservation Studies and Sustainable Agriculture and Food Systems; A.B., Louisiana Technical University, 1966; M.A., Western Michigan University, 1968; Ph.D., Michigan State University, 1974.

Carter, Michael J. (1987)
Associate Professor of Electrical and Computer Engineering; B.S.E., University of Michigan at Ann Arbor, 1975; M.S., Stanford University, 1976; Ph.D., University of Michigan at Ann Arbor, 1984.

Carter, Vernon Brooks (2003)
Associate Professor of Social Work; A.A., Orange County Community College, 1968; B.A., State University of New York College at Oneonta, 1970; M.S.W., University of New Hampshire, 1998; Ph.D., Boston College, 2003.

Cashman, Holly R. (2008)
Associate Professor of Spanish and Languages, Literatures, and Cultures; B.A., Hood College, 1994; M.A., University of Michigan at Ann Arbor, 1997; Ph.D., ibid., 2001.

Celikkol, Barbaros (1969)
Professor of Mechanical Engineering and Ocean Engineering and Marine Sciences; B.A., Elon College, 1964; M.S., Stevens Institute of Technology, 1967; Ph.D., University of New Hampshire, 1972.

Chamberlin, Kent A. (1985)
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Chandler, Donald S. (1981)
Professor of Biology and Zoology; B.S., University of California at Davis, 1971; M.S., University of Arizona, 1973; Ph.D., Ohio State University, 1976.

Chandran, Benjamin D. (2005)
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Charpentier, Michel (1999)
Associate Professor of Computer Science; B.S., Institut National Polytechnique, 1990; M.S., ibid., 1993; Ph.D., ibid., 1997.

Chaston, John M. (1989)
Associate Professor of Spanish and Languages, Literatures, and Cultures; B.A., Brigham Young University, 1980; M.A., ibid., 1982; Ph.D., University of Texas at Austin, 1987.

Chavajay, J. Pablo (2002)
Associate Professor of Psychology; Licenciado, Universidad de San Carlos, Guatemala, 1989; M.A., University of California at Santa Cruz, 1995; Ph.D., ibid., 1999.

Chen, Li-Jen (2008)
Research Assistant Professor of Physics and Earth, Oceans, and Space; B.S., National Taiwan University, 1993; M.S., University of Washington, 1997; Ph.D., ibid., 2002.

Chini, Gregory P. (1999)
Associate Professor of Mechanical Engineering; B.S., University of Virginia, 1993; M.S., Cornell University, 1996; Ph.D., ibid., 1999.

Chiu, Monica E. (1998)
Professor of English; B.A., College of St. Catherine, 1987; M.A., University of Binghamton, England, 1992; Ph.D., Emory University, 1996.

Cho, Eun Kyeong (2008)
Associate Professor of Education; B.A., Ewha Women's University, Korea, 1991; M.A., ibid., 1993; Ed.M., Teachers College, Columbia University, 2001; Ed.D., ibid., 2005.

Christie, Drew (1981)
Associate Professor of Philosophy; B.A., Princeton University, 1974; M.S.L., Yale University Law School, 1978; Ph.D., Massachusetts Institute of Technology, 1983.

Chu, Brian W.K. (2001)
Associate Professor of Art and Art History; B.F.A., Queens College, City University of New York, 1991; M.F.A., ibid., 1993.

Chu, Feixia (2009)
Assistant Professor of Biochemistry, Molecular and Cellular Biology; B.S., Wuhan University. P.R. China, 1995; M.S., University of South Florida, 1998; Ph.D., University of California at San Francisco, 2004.

Ciccone, Stephen J. (2000)
Associate Professor of Accounting and Finance and Business Administration; B.S., University of Florida, 1994; M.Acc., ibid., 1994; Ph.D., Florida State University, 2000.

Clyde, William C. (1998)
Associate Professor of Earth Sciences; B.A., Princeton University, 1990; M.S., University of Michigan at Ann Arbor, 1993; Ph.D., ibid., 1997.

Cohn, Ellen S. (1978)
Professor of Psychology; B.A., Clark University, 1974; M.A., Temple University, 1976; Ph.D., ibid., 1978.

Collins, John J. (1988)
Associate Professor of Genetics; B.A., Colgate University, 1976; Ph.D., University of Wisconsin at Madison, 1984.

Collins, Karen E. (2002)
Associate Professor of Kinesiology; B.A., Princeton University, 1994; M.S., University of New Hampshire, 1998; Ph.D., University of North Carolina at Greensboro, 2002.

Collins, M. Robin (1985)
Professor of Civil Engineering and Environmental Engineering; B.S.C.E., Virginia Polytechnic Institute and State University, 1970; M.S.S.E., ibid., 1972; Ph.D., University of Arizona, 1985.

Congalton, Russell G. (1991)
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Connell, James (2002)
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Connelly, Vincent J. (2004)
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Professor of Economics; B.A., Eastern Illinois University, 1982; Ph.D., University of North Carolina at Chapel Hill, 1987.

Cook, Jenni Carbaugh (2001)
Associate Professor of Music; B.M., Bradley University, 1995; M.M., University of Illinois, 1997; D.M.A., University of Illinois at Urbana-Champaign, 2001.

Cook, Raymond A. (1992)
Associate Professor of Civil Engineering; A.B., University of Illinois at Urbana-Champaign, 1981; B.S.C.E., ibid., 1981; M.S.C.E., Cornell University, 1991; Ph.D., ibid., 1992.

Cook, Summer (2009)
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Cooper, Vaughn S. (2004)
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Cote, Richard H. (1988)
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Couse, Leslie J. (2003)
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Cullen, Kelly L. (2001)
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D

Daniel, Jo S. (2001)
Associate Professor of Civil Engineering; B.S., University of New Hampshire, 1994; M.S., North Carolina State University, 1996; Ph.D., ibid., 2001.

Davis, J. Matthew (1993)
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Associate Professor of Spanish and Languages, Literatures, and Cultures; B.A., University of Illinois at Chicago, 1985; M.A., University of Wisconsin at Madison, 1988; Ph.D., ibid., 1992.

Dorsey, Kurk (1994)
Associate Professor of History; B.A., Cornell University, 1987; M.A., Northwestern University, 1989; Ph.D., Yale University, 1994.

Dorsey, Marion Girard (2005)
Associate Professor of History; B.A., Stanford University, 1993; J.D., Harvard University, 1997; Ph.D., Yale University, 2002.

Dowd, Eleanne Solorzano (1999)
Associate Professor of Decision Sciences and Business Administration; B.S., University of Florida, 1993; M.S., ibid., 1995; Ph.D., University of South Carolina, 1999.

Drake, Allen D. (1983)
Associate Professor of Marine Sciences and Electrical and Computer Engineering and Ocean Engineering; B.S., University of Rhode Island, 1967; S.M., Massachusetts Institute of Technology, 1968; E.E., ibid., 1969; A.M., Harvard

University, 1971; Ph.D., Tufts University, 1978.

Drugan, Robert C. (1995)
Professor of Psychology and Neuroscience and Behavior; B.A., Susquehanna University, 1979; M.A., University of Colorado, 1981; Ph.D., ibid., 1984.

Drumheller, Grant (1986)
Professor of Art and Art History; B.F.A., Boston University, 1976; M.F.A., ibid., 1978.

Druskat, Vanessa Urch (2003)
Associate Professor of Management and Business Administration; B.A., Indiana University at Bloomington, 1982; M.A., Columbia University, 1988; Ph.D., Boston University, 1996.

Dubnick, Melvin J. (2005)
Professor of Political Science; B.S., Southern Colorado State College, 1968; Ph.D., University of Colorado, 1974.

Ducey, Mark J. (1998)
Professor of Forestry; B.A., Yale University, 1990; M.F.S., ibid., 1992; Ph.D., ibid., 1996.

Dutta, Devkamal (2007)
Assistant Professor of Management and Business Administration; B.S.E., BITS Pilani, India, 1986; Ph.D., University of Western Ontario, Canada, 2007.

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E

Ebrahimi, Fatemeh (2010)
Research Assistant Professor of Earth, Oceans, and Space and Physics; M.Sc., Polytechnic University of Tehran, Iran, 1993; B.Sc., ibid., 1996; Ph.D., University of Wisconsin at Madison, 2003.

Echt, Olof E. (1990)
Professor of Physics and Materials Science; Diploma, Free University Berlin, Germany, 1975; Ph.D., University of Konstanz, Germany, 1979.

Eckert, Robert T. (1978)
Professor of Community and Environmental Planning and Environmental Conservation Studies and Forestry; B.S., S.U.N.Y. College of Environmental Science and Forestry at Syracuse, 1967; Ph.D., Ohio State University, 1978.

Edwards, Katie (2011)
Assistant Professor of Psychology; B.S., University of Georgia, 2005; M.S., Ohio University, 2007; Ph.D., ibid., 2011.

Eggers, Walter F. (1989)
Professor of English; B.A., Duke University, 1964; Ph.D., University of North Carolina at Chapel Hill, 1971.

Elmslie, Bruce T. (1989)
Professor of Economics; B.S., Westminster College, Utah, 1983; Ph.D., University of Utah, 1988.

Emison, Patricia A. (1987)
Professor of Art and Art History; B.A., Bryn Mawr College, 1978; M.A., Columbia University, 1980; M.Phil., ibid., 1982; Ph.D., ibid., 1985.

England, Richard W. (1976)
Professor of Economics; B.A., Oakland University, 1965; M.A., University of Michigan at Ann Arbor, 1967; Ph.D., ibid., 1974.

***Erickson, Peter S.** (1997)
Professor of Animal Science and Dairy Management; B.S., University of Massachusetts at Amherst, 1982; M.S., University of Maine at Orono, 1984; Ph.D., University of Illinois at Urbana-Champaign, 1989.

Eshbach, Robert W. (1987)
Associate Professor of Music; Certificate, University of Vienna, 1971; B.A., Yale University, 1973; M.M., New England Conservatory of Music, 1976.

Etebari, Ahmad (1980)
Professor of Accounting and Finance and Business Administration; B.B.A., Teheran Business College, Iran, 1973; M.B.A., Texas A & M University, 1975; Ph.D., University of North Texas, 1979.

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F

Fagerberg, Wayne R. (1984)
Professor of Biochemistry, Molecular and Cellular Biology and Biology and Marine Sciences; B.S., University of Wyoming, 1967; M.S., University of South Florida, 1972; Ph.D., ibid., 1975.

Fairchild, Elizabeth A. (2009)
Research Assistant Professor of Marine, Estuarine and Freshwater Biology and Zoology; B.A., University of New Hampshire, 1991; M.S., ibid., 1998; Ph.D., ibid., 2002.

Farag, Ihab H. (1976)
Professor of Environmental Engineering; B.S., Cairo University, Egypt, 1967; M.S., Massachusetts Institute of Technology, 1970; Sc.D., ibid., 1976.

Farrugia, Charles J. (2002)
Research Professor of Earth, Oceans, and Space and Physics; B.S., University of Malta, 1966; M.S., University of Bern, Switzerland, 1978; Ph.D., ibid., 1984.

Feintuch, Burt H. (1988)
Professor of English; B.A., Pennsylvania State University, 1971; M.A., University of Pennsylvania, 1972; Ph.D., ibid., 1975.

Feldman, David V. (1987)
Associate Professor of Mathematics and Statistics; B.A., Yale University, 1977; Ph.D., Wesleyan University, 1987.

Ferber, Michael K. (1987)
Professor of Humanities and English; B.A., Swarthmore College, 1966; M.A., Harvard University, 1969; Ph.D., ibid., 1975.

Fetzer, Susan J. (1996)
Professor of Nursing; B.A., University of Connecticut, 1973; B.S.N., ibid., 1975; M.S.N., University of Alabama, 1980; M.B.A., New Hampshire College, 1990; Ph.D., Adelphi University, 1998.

Finkelhor, David (1992)
Professor of Sociology; B.A., Harvard University, 1968; M.Ed., Harvard Graduate School of Education, 1971; Ph.D., University of New Hampshire, 1978.

Fitzpatrick, Ellen (1997)
Professor of History; B.A., Hampshire College, 1974; Ph.D., Brandeis University, 1981.

Foster, Diane L. (2008)
Associate Professor of Mechanical Engineering and Ocean Engineering and Marine Sciences; B.S.M.E., University of Massachusetts, Amherst, 1989; M.S.M.E., University of Maine at Orono, 1991; Ph.D., Oregon State University, 1996.

Foxall, Thomas L. (1984)
Professor of Animal Science and Biochemistry, Molecular and Cellular Biology and Biomedical Science; B.S., Lebanon Valley College, 1968; M.S., University of Bridgeport, 1977; Ph.D., University of New Hampshire, 1980.

Frankel, Barbara R. (1988)
Associate Professor of Family Studies; B.A., University of Wisconsin at Madison, 1970; M.S.W., Kent State University, 1976; Ph.D., Purdue University, 1988.

Freedman, Diane P. (1992)
Professor of English; A.B., Cornell University, 1977; M.A.T., ibid., 1978; M.A., Boston University, 1982; Ph.D., University of Washington, 1989.

+French, Richard A. (2008)
Clinical Professor of Biomedical Science and Marine, Estuarine and Freshwater Biology; B.S., University of Connecticut, 1982; D.V.M., University of Illinois at Urbana-Champaign, 1987; M.S., ibid., 1991; Ph.D., ibid., 1996.

Frey, Serita D. (2002)
Professor of Environmental Sciences; B.S., University of Virginia, 1988; M.S., ibid., 1992; Ph.D., Colorado State University, 1999.

Frierson, Cathy A. (1991)
Professor of History; B.A., University of North Carolina at Chapel Hill, 1975; A.M., Harvard University, 1978; Ph.D., ibid., 1985.

Frolking, Stephen E. (1995)
Research Professor of Earth, Oceans, and Space and Earth Sciences; B.S., University of New Hampshire, 1980; M.S., ibid., 1983; Ph.D., ibid., 1993.

Fu, Tat S. (2010)
Assistant Professor of Civil Engineering; B.S., University of Southern California, 2003; M.S., ibid., 2004; M.B.S., ibid., 2007; Ph.D., ibid., 2009.

Fukawa-Connelly, Timothy P. (2008)
Assistant Professor of Mathematics and Statistics; B.A., University of Portland, 1997; M.A., Miami University, 2000; Ph.D., University of Maryland, 2007.

Fuld, Kenneth (1979)
Professor of Psychology; B.A., Northeastern University, 1971; Ph.D., Dartmouth College, 1976.

Fussell, Barry K. (1987)
Professor of Mechanical Engineering; B.S., Ohio State University, 1975; M.S., ibid., 1980; Ph.D., ibid., 1987.

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G

Galvin, Antoinette B. (1997)
Research Professor of Earth, Oceans, and Space and Physics; B.S., Purdue University, 1974; M.S., University of Maryland, 1976; Ph.D., ibid., 1982.

Gardner, Kevin H. (1999)
Professor of Environmental Engineering and Civil Engineering, Associate Professor of Environmental Sciences; B.S., Union College, 1989; M.S., Clarkson University, 1991; Ph.D., ibid., 1996.

Garland, Virginia E. (1988)
Associate Professor of Education; B.A., University of South Carolina, 1969; M.A.T., Harvard University, 1972; Ph.D., University of Connecticut, 1981.

Gass, Michael A. (1981)
Professor of Kinesiology, Affiliate Professor of Education; B.A., St. Olaf College, 1978; M.A., University of Northern Colorado, 1979; Ph.D., University of Colorado, 1986.

Ge, Liming (1998)
Professor of Mathematics and Statistics; B.S., Peking University, 1984; M.S., Qufu Normal University, 1987; Ph.D., University of Pennsylvania, 1995.

Germaschewski, Kai (2008)
Assistant Professor of Physics and Earth, Oceans, and Space; Diploma, Heinrich-Heine University Duesseldorf, German, 1998; Ph.D., Heinrich-Heine University Duesseldorf, Germany, 2001.

Gibson, Brett M. (2003)
Associate Professor of Psychology and Neuroscience and Behavior; B.A.,

University of Minnesota, 1991; M.S., Bucknell University, 1995; Ph.D., University of Nebraska at Lincoln, 1999.

Gibson, John F. (2010)
Assistant Professor of Mathematics and Statistics; B.A., St. John's College, 1988; Ph.D., Cornell University, 2002.

Glass, Christopher W. (2005)
Research Professor of Earth, Oceans, and Space and Marine Sciences and Marine, Estuarine and Freshwater Biology; B.Sc., The Queens University, 1979; Ph.D., University of Glasgow, 1982.

Gleason, Brian W (2011)
Assistant Professor of Mathematics and Statistics; B.S., University of Utah, 2004; M.S., ibid., 2007; Ph.D., University of Georgia, 2011.

Gold, Janet (1995)
Professor of Spanish and Languages, Literatures, and Cultures; B.A., Albertus Magnus College, 1971; M.A., Worcester State College, 1981; Ph.D., University of Massachusetts at Amherst, 1990.

Goldberg, Michael D. (1991)
Professor of Economics; B.S., Lehigh University, 1980; Ph.D., New York University, 1991.

Goldfarb, Jillian (2010)
Assistant Professor of Environmental Engineering; B.S., Northeastern University, 2004; Sc.M., Brown University, 2005; Ph.D., ibid., 2008.

Golinski, Jan V. (1990)
Professor of History and Humanities; B.A., Cambridge University, England, 1979; Ph.D., The University of Leeds, England, 1983.

Goodspeed, Charles H. (1978)
Associate Professor of Civil Engineering; B.S.C.E., Worcester Polytechnic Institute, 1967; M.S.C.E., ibid., 1969; Ph.D., University of Cincinnati, 1972.

Gottwald, Sheryl (1997)
Clinical Assistant Professor of Communication Sciences and Disorders ; B.S., Northeastern University, 1976; M.S., Pennsylvania State University, 1979; Ph.D., Temple University, 1990.

Gould, Eliga H. (1993)
Professor of History; A.B., Princeton University, 1983; M.Sc., University of Edinburgh, 1987; M.A., Johns Hopkins University, 1988; Ph.D., ibid., 1992.

Graham, Karen J. (1987)
Professor of Mathematics and Statistics; B.A., State University of New York College at Cortland, 1975; M.A., State University of New York at Albany, 1978; M.S., University of New Hampshire, 1983; Ph.D., ibid., 1986.

Graham, Suzanne E. (2004)
Associate Professor of Education; B.S., Brown University, 1985; Ed.M., Harvard Graduate School of Education, 1990; Ed.D., ibid., 1997.

+Grandy, A. Stuart (2011)
Assistant Professor of Environmental Sciences; B.S., Evergreen State College, 1995; M.S., University of Maine at Orono, 1998; Ph.D., Michigan State University, 2005.

Greenberg, Arthur (2000)
Professor of Chemistry; B.S., Fairleigh Dickinson University, 1967; A.M., Princeton University, 1971; Ph.D., ibid., 1971.

Greenslade, Margaret E. (2007)
Assistant Professor of Chemistry; B.S., Bryn Mawr College, 1998; Ph.D., University of Pennsylvania, 2005.

Grenier, Michelle A. (2000)
Associate Professor of Kinesiology; B.S., University of Massachusetts at Amherst, 1978; M.S., University of New Hampshire, 1995; Ph.D., ibid., 2004.

Gress, David L. (1974)
Professor of Civil Engineering; B.S., Purdue University, 1966; M.S., ibid., 1968; Ph.D., ibid., 1976.

Grimm, Curt D. (2007)
Research Associate Professor of Anthropology; B.A., University of New Hampshire, 1979; M.A., State University of New York at Binghamton, 1985; Ph.D., ibid., 1991.

Grinde, Roger B. (1993)
Associate Professor of Decision Sciences and Business Administration; B.A., Carroll College, 1984; M.S., Oregon State University, 1986; Ph.D., Pennsylvania State University, 1993.

Griswold, Lou Ann (1987)
Associate Professor of Occupational Therapy; B.S., Colorado State University, 1979; M.S., ibid., 1986; Ph.D., University of New Hampshire, 1995.

Grizzle, Raymond E. (2000)
Research Professor of Marine, Estuarine and Freshwater Biology and Marine Sciences and Zoology; B.S., Florida State University, 1972; M.S., University of Central Florida, 1981; Ph.D., Rutgers University, 1988.

Gross, Todd S. (1988)
Professor of Mechanical Engineering and Materials Science; B.S., Carnegie Mellon University, 1975; Ph.D., Northwestern University, 1981.

Gruen, Thomas (2011)
Professor of Business Administration and Marketing; B.A., Gordon College, 1977; M.B.A., Indiana University, 1980; M.S., ibid., 1995; Ph.D., ibid., 1997.

Gullace, Nicoletta F. (1995)
Associate Professor of History; B.A., University of Rochester, 1983; M.A., University of California at Berkeley, 1987; Ph.D., ibid., 1993.

Gunlogson, Elizabeth (2007)
Associate Professor of Music; B.A., Luther College, 1993; M.M., Indiana University, 1996; D.M., Florida State University, 2006.

Guo, Lin (2009)
Assistant Professor of Marketing and Business Administration; B.A., Renmin University of China, 2001; M.A., ibid., 2004; Ph.D., University of Arizona, 2010.

Gupta, Nivedita R. (2002)
Associate Professor of Chemical Engineering and Environmental Engineering; B.Tech., Indian Institute of Technology at Bombay, India, 1993; Ph.D., Pennsylvania State University, 1999.

Gwebu, Kholekile L. (2006)
Associate Professor of Decision Sciences and Business Administration; B.S., National University of Lesotho, Africa, 1998; M.B.A., Kent State University, 2002; Ph.D., ibid., 2006.

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H

Hackett, Robin (2001)
Associate Professor of English; B.A., University of California at Davis, 1986; M.A., Sonoma State University, 1993; Ph.D., City University of New York, 2000.

Hadwin, Donald W. (1977)
Professor of Mathematics and Statistics; B.S., Michigan State University, 1967; M.A., University of Wisconsin at Madison, 1968; Ph.D., Indiana University at Bloomington, 1975.

Hahn, Joan E. (2008)
Associate Professor of Nursing; B.A., University of Rochester, 1975; B.S., ibid., 1982; M.S., Rush University, 1988; Ph.D., ibid., 1994; Post-Masters Certificate, University of California at Los Angeles, 2007.

Haines, Tom (2011)
Assistant Professor of English; B.A., Dartmouth College, 1990; M.J., University of California at Berkeley, 1994.

Hale, +Iago L. (2012)
Assistant Professor of Genetics and Sustainable Agriculture and Food Systems; B.A., Dartmouth College, 1997; M.Sc., University of California at Davis, 2007; Ph.D., ibid., 2011.

Halstead, John M. (1988)
Professor of Community and Environmental Planning and Environmental and Resource Economics and Tourism Planning and Development; B.A., University of Notre Dame, 1976; M.S., University of Massachusetts at Amherst, 1981; Ph.D., Virginia Polytechnic Institute and State University, 1989.

Hamilton, Lawrence C. (1977)
Professor of Sociology; B.A., University of California at Santa Barbara, 1970; M.A., University of Colorado, 1974; Ph.D., ibid., 1978.

Haney, James F. (1972)
Professor of Marine, Estuarine and Freshwater Biology and Zoology; A.B., Miami University, Ohio, 1961; M.A., ibid., 1963; Ph.D., University of Toronto, Canada, 1970.

Hardy, Stephen H. (1988)
Professor of Kinesiology, Affiliate Professor of History; A.B., Bowdoin College, 1970; M.S., University of Massachusetts at Amherst, 1976; M.A., ibid., 1978; Ph.D., ibid., 1980.

Harkless, Gene E. (1985)
Associate Professor of Nursing; B.S.N., Duke University, 1976; M.S.N., Vanderbilt University, 1980; D.N.Sc., Boston University, 1991.

Harris, Benjamin (2001)
Professor of Psychology, Affiliate Professor of History; B.A., Hampshire College, 1971; M.A., Vanderbilt University, 1973; Ph.D., ibid., 1975.

Harris, J. William (1985)
Professor of History; B.S., Massachusetts Institute of Technology, 1968; M.A., Johns Hopkins University, 1976; Ph.D., ibid., 1982.

Harris, Larry G. (1969)
Professor of Biology and Marine, Estuarine and Freshwater Biology and Marine Sciences and Zoology; A.B., University of California at Berkeley, 1965; Ph.D., ibid., 1970.

Harrist, Chris (2009)
Assistant Professor of Recreation Management and Policy; B.S., Tarleton State University, 2000; M.S., ibid., 2003; Ph.D., Texas A & M University, 2008.

Hartter, Joel N. (2007)
Associate Professor of Geography, Affiliate Assistant Professor of Natural Resources; B.S., University of Michigan, 2000; B.S.E., ibid., 2000; M.S., Oregon State University, 2004; Ph.D., University of Florida, 2007.

Harvey, N. Paul , III (2007)
Associate Professor of Management and Business Administration; B.S., University of Connecticut, 2000; M.B.A., State University of New York at Binghamton, 2002; Ph.D., Florida State University, 2006.

Haskins, Robert (2004)
Associate Professor of Music; B.M., Johns Hopkins University, 1982; Concert Recital Diploma, Guildhall School of Music and Drama, London, England, 1986; M.A., Eastman School of Music, University of Rochester, 1996; D.M.A., ibid., 1997; Ph.D., ibid., 2004.

Hasseldine, David John (2011)
Associate Professor of Accounting and Finance and Business Administration; Master of Commerce in Accounting, University of Canterbury, 1987; M.B.A., Indiana University, 1996; Ph.D., ibid., 1997.

Hatcher, Philip J. (1986)
Professor of Computer Science; B.S., Purdue University, 1978; M.S., ibid., 1979; Ph.D., Illinois Institute of Technology, 1985.

Hegarty, Charles Boyd (2009)
Assistant Professor of Recreation Management and Policy; B.A., Denison University, 1996; M.S., Indiana University, 2000; Ph.D., ibid., 2008.

Helms, Edgar J. , Jr. (2003)
Clinical Professor of Health Management and Policy; B.A., Drew University, 1967; M.A., University of New Hampshire, 1971.

Henry, Robert M. (1980)
Associate Professor of Civil Engineering; B.S.C.E., University of Pennsylvania, 1973; M.S.C.E., ibid., 1974; Ph.D., ibid., 1980.

Herold, Marc W. (1975)
Associate Professor of Economics; B.S., Swiss Federal Polytechnic Institute, 1967; M.B.A., University of California at Berkeley, 1970; Ph.D., ibid., 1979.

Hersman, F. William (1984)
Professor of Physics; B.A., University of Cincinnati, 1977; B.S., ibid., 1977; Ph.D., Massachusetts Institute of Technology, 1982.

Hertz, Susan M. (1986)
Associate Professor of English; B.A., University of New Hampshire, 1978.

Hibschweiler, Rita A. (1988)
Professor of Mathematics and Statistics; B.A., State University of New York at Buffalo, 1979; M.A., ibid., 1981; Ph.D., State University of New York at Albany, 1988.

Hight, Eleanor M. (1992)
Professor of Art and Art History and Humanities; B.A., Skidmore College, 1970; A.M., Harvard University, 1977; Ph.D., ibid., 1986.

Hiley, David R. (1999)
Professor of Philosophy; B.A., Auburn University, 1966; M.A., University of Georgia, 1969; Ph.D., ibid., 1972.

Hiller, Marc D. (1979)
Associate Professor of Health Management and Policy; B.S., University of Pittsburgh, 1972; M.P.H., ibid., 1974; Dr.P.H., ibid., 1978.

Hinson, Edward K. (1985)
Associate Professor of Mathematics and Statistics; B.S., University of Florida, 1979; M.S., Northwestern University, 1982; Ph.D., ibid., 1985.

Hobbie, Erik A. (2002)
Research Associate Professor of Earth, Oceans, and Space, Affiliate Associate Professor of Biology; B.S., Yale University, 1987; M.S., University of Virginia, 1994; Ph.D., ibid., 1997.

Holtrop, Maurik (2002)
Associate Professor of Physics; B.S., University of New Hampshire, 1987; Ph.D., Massachusetts Institute of Technology, 1995.

Hood, Craig A. (1981)
Professor of Art and Art History; B.A., Pennsylvania State University, 1979; M.F.A., Indiana University at Bloomington, 1981.

Hopkins, Lori (1997)
Associate Professor of Spanish and Languages, Literatures, and Cultures; B.A., University of Virginia, 1984; M.A., University of Wisconsin at Madison, 1987;

Ph.D., ibid., 1993.

Houtenville, Andrew James (2009)
Associate Professor of Economics; B.A., Richard Stockton College, 1988; M.A., University of New Hampshire, 1991; Ph.D., ibid., 1997.

Howard, Theodore E. (1982)
Professor of Environmental Conservation Studies and Environmental and Resource Economics and Forestry; B.S., University of Maine at Orono, 1972; M.F., Duke University, 1974; Ph.D., Oregon State University, 1982.

Howell, W. Huntting (1980)
Professor of Marine, Estuarine and Freshwater Biology and Marine Sciences and Zoology; B.A., Otterbein College, 1969; M.S., University of Rhode Island, 1975; Ph.D., ibid., 1980.

Hrabak, Estelle M. (1995)
Associate Professor of Biochemistry, Molecular and Cellular Biology and Genetics; B.S., Michigan State University, 1978; Ph.D., University of Wisconsin at Madison, 1992.

Huang, Ju-Chin (1998)
Professor of Economics; B.S., National Taiwan University, Taipei, Republic of China, 1985; M.Sc., North Carolina State University, 1988; Ph.D., ibid., 1994.

Huddleston, Mark W. (2007)
Professor of Political Science; B.A., State University of New York at Buffalo, 1972; M.A., University of Wisconsin at Madison, 1973; Ph.D., ibid., 1978.

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Innis, Daniel E. (2007)
Professor of Marketing and Business Administration; B.B.A., Ohio University, 1985; M.B.A., Miami University, 1986; Ph.D., The Ohio State University, 1991.

Irish, James (2007)
Research Professor of Ocean Engineering; B.S., Antioch College, 1967; M.S., Scripps Institution of Oceanography, University of California at San Diego, 1969; Ph.D., ibid., 1971.

Isenberg, Philip A. (1991)
Research Professor of Earth, Oceans, and Space and Physics; B.S., Massachusetts Institute of Technology, 1971; M.S., University of Chicago, 1974; Ph.D., ibid., 1977.

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J

Jacobs, Jennifer M. (2003)
Professor of Environmental Engineering and Civil Engineering, Associate Professor of Environmental Sciences; Sc.B., Brown University, 1987; M.S., Tufts University, 1993; Ph.D., Cornell University, 1997.

Jacoby, A. Robb (1961)
Professor of Mathematics and Statistics; S.B., University of Chicago, 1941; S.M., ibid., 1942; Ph.D., ibid., 1946.

Jahnke, Leland S. (1977)
Professor of Marine, Estuarine and Freshwater Biology; B.A., University of Minnesota, 1961; M.A., ibid., 1966; M.S., ibid., 1968; Ph.D., ibid., 1973.

Janson-Sand, Colette H. (1981)
Associate Professor of Nutrition; B.S., Bridgewater State College, 1967; M.S., University of New Hampshire, 1970; Ph.D., ibid., 1980.

Jha, Sanjeev (2009)
Assistant Professor of Business Administration and Decision Sciences; B.Eng., College of Engineering, Bhagalpur, India, 1993; M.B.A., International Management Institute, New Dehli, India, 1998; Ph.D., University of Illinois at Chicago, 2009.

Johnson, Joel E. (2005)
Assistant Professor of Marine Sciences, Associate Professor of Earth Sciences; B.S., University of Minnesota, 1996; M.S., University of Illinois, 1998; Ph.D., Oregon State University, 2004.

Johnson, Kenneth M. (2008)

Professor of Sociology, Affiliate Professor of Political Science; B.A., University of Michigan, 1972; M.A., University of North Carolina at Chapel Hill, 1975; Ph.D., ibid., 1980.

Johnson, Paul C. (1979)
Professor of Environmental Conservation Studies and Forestry; B.S., Emory and Henry College, 1968; Ph.D., Cornell University, 1974.

Johnson, Richard P. (1985)
Professor of Chemistry; B.S., Syracuse University, 1972; Ph.D., ibid., 1976.

Jonas, Michael (2010)
Assistant Professor of Computer Information Systems; B.S., College of William and Mary, 1987; M.S., ibid., 1989; Ph.D., Tufts University, 2003.

Jones, Lisa M. (2001)
Research Associate Professor of Psychology; B.A., University of Virginia, 1992; M.A., University of Rhode Island, 1997; Ph.D., ibid., 1999.

Jones, Stephen H. (1989)
Research Associate Professor of Biology and Marine, Estuarine and Freshwater Biology and Marine Sciences; B.S., University of Maine at Orono, 1976; M.S., University of Wisconsin at Madison, 1980; Ph.D., ibid., 1983.

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Graduate Faculty

K

Kaen, Fred R. (1973)
Professor of Accounting and Finance and Business Administration; B.S., Lehigh University, 1963; M.B.A., University of Michigan at Ann Arbor, 1967; Ph.D., ibid., 1972.

Kalargyrou, Valentini (2009)
Assistant Professor of Hospitality Management; B.S., Athens University of Economics and Business, 1990; Master in Hotel Administration, University of Nevada at Las Vegas, 2005; Ph.D., ibid., 2009.

Kalinowski, Michael F. (1980)
Associate Professor of Family Studies; B.A., Bennington College, 1970; M.Ed., University of Massachusetts at Amherst, 1972; Ed.D., ibid., 1976.

Kalnejais, Linda (2007)
Assistant Professor of Earth Sciences and Marine Sciences and Earth, Oceans, and Space; B.S., University of Western Australia, 1995; Ph.D., Massachusetts Institute of Technology, 2005.

Kayser, John R. (1969)
Associate Professor of Political Science; B.A., University of New Hampshire, 1962; M.A., Ohio State University, 1964; Ph.D., Claremont Graduate School and University Center, 1969.

Kazura, Kerry (1995)
Associate Professor of Family Studies; B.A., University of Southern Maine, 1989; M.S., Auburn University, 1992; Ph.D., ibid., 1995.

Kempster, William G. (1999)

Professor of Music; B.A., University of New England, 1977; D.M.A., University of Alberta, Canada, 1999.

Kerns, Georgia M. (1991)
Associate Professor of Education; B.S.Ed., University of Delaware, 1969; M.Ed., ibid., 1975; M.Ed., University of New Hampshire, 1983; Ph.D., University of Kansas, 1987.

Kies, Christopher (1979)
Professor of Music; B.M. Composition and B.M. Piano, New England Conservatory of Music, 1973; M.F.A., Brandeis University, 1977; Ph.D., ibid., 1984.

Kinner, Nancy E. (1983)
Professor of Civil Engineering and Environmental Engineering; A.B., Cornell University, 1976; M.S.C.E., University of New Hampshire, 1980; Ph.D., ibid., 1983.

Kinsey, Brad Lee (2001)
Professor of Mechanical Engineering and Materials Science; B.S., University of Michigan at Ann Arbor, 1992; M.S., Northwestern University, 1998; Ph.D., ibid., 2001.

Kirkpatrick, John T. (1984)
Clinical Professor of Sociology; B.A., Colby College, 1977; M.A., University of New Hampshire, 1979; Ph.D., ibid., 1983.

Kirsch, Nicholas J. (2009)
Assistant Professor of Electrical and Computer Engineering; B.S., University of Wisconsin at Madison, 2003; M.S., Drexel University, 2006; Ph.D., ibid., 2009.

Kirshen, Paul H. (2012)
Research Professor of Earth, Oceans, and Space, Research Assistant Professor of Environmental Engineering, Research Professor of Civil Engineering; Sc.B., Brown University, 1970; M.S., Massachusetts Institute of Technology, 1972; Ph.D., ibid., 1975.

Kistler, Lynn M. (2002)
Professor of Earth, Oceans, and Space and Physics; B.S., Harvey Mudd College, 1981; Ph.D., Harvard University, 1987.

+Klein, Anita S. (1985)
Associate Professor of Genetics and Marine, Estuarine and Freshwater Biology and Marine Sciences; B.A., University of Rochester, 1975; Ph.D., Michigan State University, 1981.

Klewicki, Joseph C. (2005)
Professor of Mechanical Engineering; B.S., Michigan State University, 1983; M.S., Georgia Institute of Technology, 1985; Ph.D., Michigan State University, 1989.

Konzett, Delia C. (2003)
Associate Professor of English; B.A., Georgia State University, 1989; M.A., University of Chicago, 1991; Ph.D., ibid., 1997.

Korkolis, Yannnis (2009)
Assistant Professor of Mechanical Engineering; B.A., National Technical University of Athens, Greece, 1998; M.Sc., ibid., 2002; Ph.D., University of Texas at Austin, 2009.

Kovach, Adrienne I. (2004)

Research Assistant Professor of Genetics and Biology and Wildlife and Conservation Biology; B.S., University of Kansas, 1990; Ph.D., North Carolina State University, 1998.

Krasner, James (1989)
Professor of English; B.A., Hampshire College, England, 1983; M.A., University of Pennsylvania, 1985; Ph.D., ibid., 1989.

Krzanowski, James E. (1985)
Professor of Mechanical Engineering and Materials Science; B.E., Stevens Institute of Technology, 1978; M.S., Massachusetts Institute of Technology, 1981; Ph.D., ibid., 1983.

Kucharek, Harald A. (2006)
Research Associate Professor of Earth, Oceans, and Space and Physics; B.S., Universität Regensburg, Germany, 1986; Ph.D., Technische Universität Munich, Germany, 1989.

Kuh, Lisa Porter (2011)
Assistant Professor of Family Studies; B.S., Chestnut Hill College, 1984; M.Ed., Harvard Graduate School of Education, 1990; Ph.D., University of Washington, 2008.

Kun, Andrew L. (2000)
Associate Professor of Electrical and Computer Engineering; B.S., University of New Hampshire, 1992; M.S., ibid., 1994; Ph.D., ibid., 1997.

Kuo, Pei-Jou (2010)
Assistant Professor of Hospitality Management; B.B.A., National Taiwan University, Taipei, Republic of China, 1997; M.S., University of Massachusetts at Amherst, 2003; Ph.D., Pennsylvania State University, 2010.

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***La Valley, Kenneth J.** (2004)
B.S., University of New Hampshire, 1993; M.S., University of Rhode Island, 1996; Ph.D., ibid., 2005.

LaCourse, John R. (1980)
Professor of Electrical and Computer Engineering; B.A., University of Connecticut, 1974; M.S., ibid., 1977; Ph.D., ibid., 1981.

Laflamme, David J. (2003)
Research Assistant Professor of Health Management and Policy; B.S., Plymouth State College, 1989; M.P.H., Tulane University, 1997; Ph.D., John Hopkins University, 2003.

Laird, Jo (1979)
Associate Professor of Earth Sciences; B.A., University of California at San Diego, 1969; Ph.D., California Institute of Technology, 1977.

Lammers, Richard (2008)
Research Associate Professor of Earth, Oceans, and Space; B.S., University of Toronto, Canada, 1988; M.S., ibid., 1990; Ph.D., ibid., 1998.

Lane, Peter J. (2003)
Professor of Management and Business Administration; B.A., University of New Hampshire, 1981; M.B.A., University of Massachusetts at Amherst, 1992; Ph.D., University of Connecticut, 1996.

Langan, Richard (1992)
Affiliate Associate Professor of Zoology; B.A., Lehigh University, 1971; M.S., University of New Hampshire, 1980; Ph.D., ibid., 1992.

Lanier, Douglas M. (1990)
Professor of English; B.A., Stetson University, 1977; M.A., Duke University, 1980; Ph.D., ibid., 1988.

LaRoche, Dain (2007)
Assistant Professor of Kinesiology; B.S., University of New Hampshire, 1996; M.S., University of Massachusetts, Amherst, 1998; Ph.D., University of Utah, 2004.

Laudano, Andrew P. (1986)
Associate Professor of Biochemistry, Molecular and Cellular Biology; B.S., Southern Connecticut State University, 1974; M.S., ibid., 1976; Ph.D., University of California at San Diego, 1981.

Laue, Thomas M. (1984)
Professor of Biochemistry, Molecular and Cellular Biology and Materials Science; B.A., John Hopkins University, 1971; Ph.D., University of Connecticut, 1981.

Lee, Lina (1996)
Professor of Spanish and Languages, Literatures, and Cultures; B.A., Fu Jen Catholic University, 1979; M.A., North Texas State University, 1986; Ph.D., University of Texas at Austin, 1992.

Lee, Martin A. (1984)
Professor of Earth, Oceans, and Space and Physics; B.S., Stanford University, 1966; Ph.D., University of Chicago, 1971.

Lee, Thomas D. (1980)
Associate Professor of Environmental Conservation Studies and Environmental Sciences and Forestry and Wildlife and Conservation Biology; B.S., S.U.N.Y. College of Environmental Science and Forestry at Syracuse, 1973; M.S., University of Alberta, Canada, 1976; Ph.D., University of Illinois at Urbana-Champaign, 1980.

Leichtman, Michelle D. (2002)
Associate Professor of Psychology; B.A., Wellesley College, 1985; M.A., Cornell University, 1991; Ph.D., ibid., 1994.

Lepler, Jessica M. (2008)
Assistant Professor of History; B.A., Tulane University, 2000; M.A., Brandeis University, 2005; Ph.D., ibid., 2007.

Lessard, Marc R. (2004)
Associate Professor of Earth, Oceans, and Space and Physics; Ph.D., Dartmouth College, 1997.

Lesser, Michael P. (1993)
Research Professor of Marine, Estuarine and Freshwater Biology and Marine Sciences; B.A., University of New Hampshire, 1983; M.S., ibid., 1985; Ph.D., University of Maine at Orono, 1989.

Lewis, James B. (1989)
Associate Professor of Health Management and Policy; B.A., University of Pittsburgh, 1972; M.M., Northwestern University, 1974; Sc.D., John Hopkins University, 1985.

Li, Changsheng (1992)
Affiliate Professor of Natural Resources, Research Professor of Earth, Oceans, and Space; B.S., University of Science and Technology of China, 1964; M.S.,

Chinese Academy of Sciences, 1981; Ph.D., University of Wisconsin and Chinese Academy of Science, 1988.

Li, Gonghu (2009)
Assistant Professor of Chemistry; B.S., Hubei Normal University, P.R. China, 1997; M.S., Chinese Academy of Sciences, P.R. China, 2000; Ph.D., University of Iowa, 2005.

Li, Jun (2004)
Associate Professor of Management and Business Administration; B.S., Beijing University, P.R. China, 1995; M.S., ibid., 1999; Ph.D., Texas A & M University, 2004.

Li, Linyuan (2002)
Associate Professor of Mathematics and Statistics; B.S., Xuzhou Teachers College, 1985; M.S., East China Normal University, 1988; M.S., University of New Mexico, 1997; Ph.D., Michigan State University, 2002.

Licciardi, Joseph M. (2002)
Associate Professor of Earth Sciences; B.A., State University of New York College at Geneseo, 1992; M.S., Oregon State University, 1995; Ph.D., ibid., 2000.

Lieber, Rochelle (1981)
Professor of English; A.B., Vassar College, 1976; Ph.D., Massachusetts Institute of Technology, 1980.

Lightbody, Anne (2010)
Assistant Professor of Earth Sciences and Environmental Sciences; B.S., Yale University, 1999; M.S., Massachusetts Institute of Technology, 2004; Ph.D., ibid., 2007.

Linder, Ernst (1987)
Professor of Mathematics and Statistics; ETH, University of Zurich, Switzerland, 1978; M.S., Union College, 1980; Ph.D., Pennsylvania State University, 1987.

Lindsay, Bruce E. (1976)
Professor of Community and Environmental Planning and Environmental and Resource Economics and Tourism Planning and Development; B.A., King's College, 1971; M.S., University of Massachusetts at Amherst, 1973; Ph.D., ibid., 1976.

Lippmann, Thomas C. (2008)
Associate Professor of Marine Sciences and Earth Sciences, Research Associate Professor of Ocean Engineering; B.A., Linfield College, 1985; Ph.D., Oregon State University, 1992.

Litvaitis, John A. (1985)
Professor of Wildlife and Conservation Biology; B.S., University of New Hampshire, 1975; M.S., Oklahoma State University, 1978; Ph.D., University of Maine at Orono, 1984.

Litvaitis, Marianne Klauser (1986)
Professor of Environmental Conservation Studies and Marine, Estuarine and Freshwater Biology and Wildlife and Conservation Biology and Zoology; B.S., Clemson University, 1980; M.S., ibid., 1982; Ph.D., University of Maine at Orono, 1985.

Liu, Yixin (2007)
Assistant Professor of Accounting and Finance and Business Administration; B.A., Nankai University, P.R. China, 1998; M.S., Southern Illinois University at

Carbondale, 2000; Ph.D., University of Iowa, 2007.

Lockwood, Mary Katherine (2001)
Clinical Associate Professor of Biomedical Science and Nutrition and Zoology; B.S., Davidson College, 1977; M.S., The Pennsylvania State University, 1980; Ph.D., University of California at Los Angeles, 1989.

Lopate, Clifford (2002)
Research Associate Professor of Earth, Oceans, and Space and Physics; B.A., Swarthmore College, 1982; S.M., University of Chicago, 1983; Ph.D., ibid., 1989.

Lord, Susan A. (1995)
Assistant Professor of Social Work; B.A., University of New Hampshire, 1975; M.S.W., Smith College, 1979; Ph.D., University of New Hampshire, 2004.

+Loy, J. Brent (1967)
B.S., Oklahoma State University, 1963; M.S., Colorado State University, 1965; Ph.D., ibid., 1967.

Lu, Yan (1996)
Associate Professor of History; B.A., Fudan University, Shanghai, 1982; M.A., Michigan State University, 1989; M.A., Cornell University, 1993; Ph.D., ibid., 1996.

Lyon, Alynna J. (2003)
Associate Professor of Political Science; B.A., New Mexico State University, 1991; M.A., ibid., 1993; Ph.D., University of South Carolina, 1999.

Lyon, Mark (2008)
Assistant Professor of Mathematics and Statistics; B.S., Brigham Young University, 2002; M.S., ibid., 2003; Ph.D., California Institute of Technology, 2009.

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M

MacFarlane, Lisa (1987)
Professor of English; B.A., Princeton University, 1979; M.A., University of Michigan at Ann Arbor, 1982; Ph.D., ibid., 1987.

Macieski, Robert L. (1994)
Associate Professor of History, Affiliate Associate Professor of History; B.A., Boston College, 1980; M.A., ibid., 1982; Ph.D., ibid., 1993.

MacLeod, Leslie N.H. (2004)
Professor of Health Management and Policy; B.S., Boston College, 1964; Ed.D., University of Massachusetts at Amherst, 1984; M.Sc., Dartmouth College, 1997.

Mair, Robert G. (1985)
Professor of Psychology and Neuroscience and Behavior; A.B., Brown University, 1972; Sc.M., ibid., 1975; Ph.D., ibid., 1979.

Malley, James P. , Jr. (1988)
Professor of Civil Engineering and Environmental Engineering; B.S., Rutgers, The State University of New Jersey, 1980; M.S., University of Massachusetts at Amherst, 1984; B.S.C.E., ibid., 1987; Ph.D., ibid., 1988.

Mallory, Bruce L. (1979)
Professor of Education; B.A., Allegheny College, 1971; M.Ed., ibid., 1972; Ph.D., George Peabody College, 1979.

Malone, Mary (2006)
Associate Professor of Political Science; B.A., St. Joseph's College, 1995; M.A., University of Pittsburgh, 2000; Ph.D., ibid., 2004.

Manalo, Alberto B. (1986)
Associate Professor of Community and Environmental Planning and Environmental and Resource Economics and Sustainable Agriculture and Food Systems and Tourism Planning and Development; B.S., University of the Philippines, 1976; M.S., Kansas State University, 1978; Ph.D., ibid., 1986.

Margolin, Aaron B. (1988)
Professor of Biomedical Science and Marine Sciences; B.S., University of Arizona, 1982; Ph.D., ibid., 1986.

Marshall, Courtney (2010)
Assistant Professor of English and Women's Studies; B.A., Rutgers University, 2000; M.A., University of California at Los Angeles, 2005; Ph.D., ibid., 2009.

Martí-Olivella, Jaume (2003)
Associate Professor of Spanish and Languages, Literatures, and Cultures; Licenciatura, Universidad de Barcelona, Spain, 1976; M.A., University of Illinois at Urbana-Champaign, 1978; Ph.D., ibid., 1988.

Martin, Mary E. (1998)
Affiliate Assistant Professor of Natural Resources, Research Assistant Professor of Earth, Oceans, and Space; B.S., University of New Hampshire, 1988; Ph.D., ibid., 1994.

Marx, Jerry D. (1995)
Associate Professor of Social Work; B.S., University of Southern Maine, 1981; M.S.W., Boston College, 1984; Ph.D., ibid., 1994.

Mathews, Dennis E. (1998)
Research Assistant Professor of Genetics; B.A., Indiana University at Bloomington, 1976; M.A., ibid., 1982; Ph.D., University of Wisconsin at Madison, 1988.

Mathieson, Arthur C. (1965)
Professor of Marine, Estuarine and Freshwater Biology and Marine Sciences; B.A., University of California at Los Angeles, 1960; M.A., ibid., 1961; Ph.D., University of British Columbia, 1965.

Mattingly, Marybeth J. (2009)
Research Assistant Professor of Sociology; B.A., Dartmouth College, 1996; M.A., University of Maryland, 2000; Ph.D., ibid., 2005.

Mayer, John D. (1989)
Professor of Psychology; B.A., University of Michigan at Ann Arbor, 1975; M.A., Case Western Reserve University, 1979; Ph.D., ibid., 1982.

Mayer, Larry A. (2000)
Professor of Ocean Engineering and Marine Sciences and Earth Sciences; B.S., University of Rhode Island, 1973; Ph.D., University of California at San Diego, 1979.

Mayne, Howard R. (1985)
Professor of Chemistry; B.Sc., University of Manchester, England, 1974; M.Sc., ibid., 1975; Ph.D., ibid., 1977.

McBride, Mekeel (1979)
Professor of English; B.A., Mills College, 1972.

McConnell, Mark L. (1991)
Professor of Earth, Oceans, and Space and Physics; B.S., Case Western Reserve

University, 1980; Ph.D., University of New Hampshire, 1987.

McCrone, Sharon M. (2007)
Associate Professor of Mathematics and Statistics; B.A., Dartmouth College, 1988; Ph.D., University of New Hampshire, 1997.

McDowell, William H. (1989)
Professor of Environmental Sciences; B.A., Amherst College, 1975; Ph.D., Cornell University, 1982.

McGaughy, Jill A. (2004)
Associate Professor of Psychology and Neuroscience and Behavior; B.A., Bradley University, 1991; M.A., Ohio State University, 1993; Ph.D., ibid., 1998.

McGrath, Robert J. (2002)
B.S., University of New Hampshire, 1996; M.S., Harvard University, 1998; Ph.D., Brandeis University, 2006.

McHugh, John Philip (1986)
Associate Professor of Mechanical Engineering; B.S., University of Michigan at Ann Arbor, 1978; M.S., ibid., 1981; Ph.D., ibid., 1986.

McKinsey, Martin (2002)
Associate Professor of English; B.A., Hampshire College, 1977; M.A., Syracuse University, 1990; M.A., University of Virginia, 1998; Ph.D., ibid., 2002.

McMahon, Gregory (1988)
Associate Professor of History; B.A., University of Kansas, 1975; M.A., Miami University, Ohio, 1979; Ph.D., Oriental Institute of the University of Chicago, 1988.

Mebert, Carolyn J. (1979)
Associate Professor of Psychology; B.A., Boston University, 1974; Ph.D., ibid., 1978.

Medina, Ricardo A. (2007)
Associate Professor of Civil Engineering; B.S.C.E., Christian Brothers College, 1997; M.S., Stanford University, 1999; Ph.D., ibid., 2003.

Mellyn, Elizabeth W. (2008)
Assistant Professor of History; B.A., University of Chicago, 1999; A.M., Harvard University, 2002; Ph.D., ibid., 2007.

Meredith, Dawn C. (1987)
Associate Professor of Physics; B.S., St. John's University, 1980; M.S., California Institute of Technology, 1984; Ph.D., ibid., 1987.

Merenda, Michael J. (1977)
Professor of Management and Business Administration; B.A., Northeastern University, 1970; B.S., ibid., 1970; M.B.A., ibid., 1972; Ph.D., University of Massachusetts at Amherst, 1978.

Merton, Andrew H. (1972)
Professor of English; B.A., University of New Hampshire, 1967.

Messner, Richard A. (1985)
Associate Professor of Electrical and Computer Engineering; B.S., Clarkson University, 1979; M.S., ibid., 1981; Ph.D., ibid., 1985.

Middleton, Michael J. (2001)

Associate Professor of Education; A.B., Harvard University, 1987; Ed.M., ibid., 1990; Ph.D., University of Michigan at Ann Arbor, 2000.

Miletkov, Mihail K. (2008)
Assistant Professor of Accounting and Finance and Business Administration; B.B.A., University of Georgia, 2002; Ph.D., ibid., 2008.

Miller, Brian (2011)
Clinical Assistant Professor of Social Work; .

Miller, Glen P. (1995)
Professor of Chemistry, Associate Professor of Materials Science; B.Sc., Clarkson University, 1987; Ph.D., ibid., 1991.

Miller, John P. (1992)
Associate Professor of Kinesiology and Athletic Training; B.S., Brooklyn College, City University of New York, 1981; M.S., Long Island University, 1983; Ph.D., University of Maryland, 1992.

Miller, Lisa C. (1993)
Associate Professor of English; B.A., University of New Hampshire, 1980; M.A., ibid., 1988.

Miller, Patrick B. (2006)
Research Associate Professor of Health Management and Policy; B.S., University of New Hampshire, 1991; M.P.H., ibid., 2003.

Miller, W. Thomas , III (1979)
Professor of Electrical and Computer Engineering; B.S., Pennsylvania State University, 1972; M.S., ibid., 1974; Ph.D., ibid., 1977.

Minocha, Subhash C. (1974)
Professor of Biology and Genetics and Marine, Estuarine and Freshwater Biology and Marine Sciences; B.Sc., Punjab University, India, 1968; M.Sc., ibid., 1969; Ph.D., University of Washington, 1974.

Möbius, Eberhard (1990)
Professor of Earth, Oceans, and Space and Physics; Diploma, Ruhr-Universitaet, Bochum, Germany, 1973; Ph.D., ibid., 1977.

Mohr, Robert D. (2001)
Associate Professor of Economics; B.A., University of Virginia, 1993; M.S., University of Texas at Austin, 1998; Ph.D., ibid., 2001.

Moore, Gregg E. (2008)
Research Assistant Professor of Biology and Marine, Estuarine and Freshwater Biology and Marine Sciences; B.S., Tufts University, 1994; M.S., Boston University, 1997; Ph.D., ibid., 2003.

Moore, Sean D. (2003)
Associate Professor of English; B.A., University of Massachusetts at Amherst, 1991; M.A., Georgetown University, 1995; Ph.D., Duke University, 2003.

Morgan, Ann L. (1981)
Associate Professor of Recreation Management and Policy; B.A., Hanover College, 1974; M.S., Pennsylvania State University, 1976; Re.D., Indiana University at Bloomington, 1981.

Morris, Douglas E. (1984)
Associate Professor of Community and Environmental Planning and

Environmental and Resource Economics and Tourism Planning and Development; B.S., Oklahoma State University, 1968; M.S., ibid., 1969; Ph.D., ibid., 1972.

Moser, Dana (2011)
Assistant Professor of Communication Sciences and Disorders ; B.A., Texas A & M University, 1998; M.S.P., University of South Carolina, 2004; Ph.D., ibid., 2007.

Moses, Jennifer K. (1990)
Professor of Art and Art History; B.F.A., Temple University, 1984; M.F.A., Indiana University at Bloomington, 1988.

Moses, Mark (2005)
Clinical Associate Professor of Family Studies; B.A., Northeastern University, 1971; Ph.D., Ohio University, 1979.

Mukasa, Samuel B. (2010)
Professor of Earth Sciences; B.S., University of New Hampshire, 1977; M.S., Ohio State University, 1980; Ph.D., University of California at Santa Barbara, 1984.

Mulligan, Shelley E. (1996)
Associate Professor of Occupational Therapy; M.S., Colorado State University, 1990; Ph.D., University of Washington, 1997.

Murphy, Sharon B. (2005)
Assistant Professor of Social Work; B.A., State University of New York at Plattsburgh, 1973; M.S.W., Adelphi University, 1985; Certificate, University of Wisconsin at Madison, 1997; Ph.D., Arizona State University, 1998.

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N

Neefus, Christopher D. (1998)
Professor of Biology and Marine, Estuarine and Freshwater Biology and Marine Sciences; B.S., Boston University, 1971; Ph.D., University of New Hampshire, 1982.

Ness, Bryan M (2009)
Assistant Professor of Communication Sciences and Disorders ; B.S., University of Nevada at Reno, 2000; M.S., ibid., 2002; Ph.D., University of Oregon, 2009.

Ness, Bryan M. (2009)
B.S., University of Nevada at Reno, 2000; M.S., ibid., 2002; Ph.D., University of Oregon, 2009.

Newkirk, Thomas R. (1977)
Professor of English; B.A., Oberlin College, 1970; M.Ed., University of Massachusetts at Boston, 1973; Ph.D., University of Texas at Austin, 1977.

Nikshych, Dmitri A. (2001)
Professor of Mathematics and Statistics; B.S., National Technical University of Ukraine, 1994; M.S., ibid., 1996; Ph.D., University of California at Los Angeles, 2001.

Niman, Neil B. (1985)
Associate Professor of Economics; B.A., University of California at Santa Cruz, 1978; M.A., University of California at Riverside, 1980; Ph.D., University of Texas at Austin, 1985.

Nimmo, John W. (2003)
Associate Professor of Family Studies; B.A., South Australian College of

Education, 1985; M.A., Pacific Oaks College, 1992; Ed.D., University of Massachusetts at Amherst, 1992.

Nisbet, Jane A. (1987)
Professor of Education; B.S., Simmons College, 1977; M.S., University of Wisconsin at Madison, 1980; Ph.D., ibid., 1982.

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O

O'Brien, Edward J. (1988)
Professor of Psychology; B.A., Framingham State College, 1978; M.A., State University of New York College at Oswego, 1980; Ph.D., University of Massachusetts at Amherst, 1984.

Ogembo, Justus M. (2000)
Associate Professor of Anthropology and Education; B.A., Kenyatta University, Nairobi, Kenya, 1986; M.A., University of Nairobi, 1990; Ph.D., Harvard University, 1997.

Oja, Sharon N. (1977)
Professor of Education; B.A., Macalester College, 1966; M.A., University of Minnesota, 1971; Ph.D., ibid., 1978.

Ollinger, Scott V. (2001)
Professor of Environmental Sciences and Forestry and Earth, Oceans, and Space; B.S., State University of New York College at Purchase, 1989; M.S., University of New Hampshire, 1992; Ph.D., ibid., 2000.

Onosko, Joseph J. (1989)
Associate Professor of Education; B.S., University of Wisconsin at Madison, 1979; M.A., ibid., 1984; Ph.D., ibid., 1988.

Orovich, Nicholas N. (1980)
Professor of Music; B.M., University of Wisconsin at Madison, 1976; M.M., New England Conservatory of Music, 1978.

Ortmeier-Hooper, Christina (2008)
Assistant Professor of English; B.A., University of Massachusetts, Amherst, 1995;

M.A.T., University of New Hampshire, 1998; Ph.D., ibid., 2007.

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P

Palace, Michael W. (2009)
Research Assistant Professor of Earth, Oceans, and Space and Environmental Sciences; B.A., University of Virginia, 1992; M.S., ibid., 1995; Ph.D., University of New Hampshire, 2006.

Payne, Thomas (2008)
Assistant Professor of English; B.A., Princeton University, 1984; M.F.A., Columbia University, 1996.

Pazicni, Samuel (2009)
Assistant Professor of Chemistry; B.A., Washington and Jefferson College, 2001; M.S., University of Wisconsin, 2003; Ph.D., ibid., 2006.

Pe'eri, Shachak (2010)
Research Assistant Professor of Ocean Engineering; B.Sc., Tel-Aviv University, 1996; M.Sc., ibid., 1997; Ph.D., ibid., 2005; Post Doctorate, University of New Hampshire, 2006.

Pekins, Peter J. (1987)
Professor of Wildlife and Conservation Biology; B.A., State University of New York College at Plattsburgh, 1976; M.S., University of New Hampshire, 1981; Ph.D., Utah State University, 1988.

Pelletier, Donna Marie (2004)
Clinical Associate Professor of Nursing; B.S., University of Massachusetts at Amherst, 1977; M.S., University of New Hampshire, 2000; DNP, University of Massachusetts at Amherst, 2011.

Pennock, Jonathan R. (2002)

Associate Professor of Marine, Estuarine and Freshwater Biology and Natural Resources; B.A., Earlham College, 1978; M.S., University of Delaware, 1981; Ph.D., ibid., 1983.

Perkins, Donna M. (2005)
Clinical Assistant Professor of Justice Studies Dual Major; B.A., University of Southern Maine, 1997; M.A., University of New Hampshire, 2000; M.S., ibid., 2003; Ph.D., ibid., 2003.

Pescosolido, Anthony T. (2002)
Associate Professor of Management and Business Administration; B.A., Harvard University, 1991; Ph.D., Case Western Reserve University, 2001.

Pfeiffer, Bruce E. (2008)
Assistant Professor of Business Administration and Marketing; B.S., University of Colorado at Boulder, 1991; M.B.A., Rockhurst University, 1997; M.S., University of Colorado at Boulder, 2005; Ph.D., University of Cincinnati, 2008.

Phan, Loan T. (2004)
Associate Professor of Education; B.S., University of Washington, 1994; M.A., University of Nevada at Reno, 1998; Ph.D., ibid., 2001.

Pillemer, David B. (2003)
Professor of Psychology; B.A., University of Chicago, 1972; Ed.D., Harvard Graduate School of Education, 1979.

Pistole, Thomas G. (1971)
Professor of Biomedical Science; Ph.B., Wayne State University, 1964; M.S., ibid., 1966; Ph.D., University of Utah, 1969.

Planalp, Roy Paul (1987)
Associate Professor of Chemistry; S.B., Massachusetts Institute of Technology, 1979; Ph.D., University of California at Berkeley, 1983.

Plante, Catherine A. (1987)
Associate Professor of Business Administration; B.A., University of Cincinnati, 1983; M.A., University of Missouri at Columbia, 1985; Ph.D., Ohio State University, 1991.

Pohl, Karsten (2000)
Associate Professor of Materials Science, Professor of Physics; Diploma, Ludwig-Maximilians University, Munich, Germany, 1990; Ph.D., University of Pennsylvania, 1997.

Polasky, Janet L. (1981)
Professor of History; B.A., Carleton College, 1973; M.A., Stanford University, 1974; Ph.D., ibid., 1978.

Potter, Sharyn J. (1998)
Associate Professor of Sociology; B.S., State University of New York, 1989; M.P.H., Emory University, 1994; Ph.D., ibid., 1998.

Prelli, Lawrence J. (1985)
Professor of Communication, Affiliate Professor of Natural Resources; B.S., State University of New York College at Brockport, 1977; M.A., State University of New York at Albany, 1979; Ph.D., Pennsylvania State University, 1984; M.S., University of New Hampshire, 1998.

Pringle, James M. (2001)
Associate Professor of Earth, Oceans, and Space and Earth Sciences and Marine

Sciences; B.A., Dartmouth College, 1990; Ph.D., Massachusetts Institute of Technology, 1998.

Putnam, Charles T. (2005)
Clinical Associate Professor of Justice Studies Dual Major; B.A., Yale University, 1979; J.D., University of Connecticut, 1985.

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Q

Quinn, Timothy J. (1989)
Associate Professor of Kinesiology; B.S., Bradley University, 1979; M.A., Michigan State University, 1983; Ph.D., ibid., 1987.

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R

Raeder, Joachim (2003)
Professor of Earth, Oceans, and Space and Physics; B.S., University of Koeln, 1985; Ph.D., ibid., 1989.

Ramadanovic, Petar (1999)
Associate Professor of English; B.A., University of Belgrade, Yugoslavia, 1989; M.A., State University of New York at Binghamton, 1993; Ph.D., ibid., 1997.

Ravindranath (Abtahian), Maya (2012)
B.A., Cornell University, 1998; Ph.D., University of Pennsylvania, 2009.

Reardon, Lawrence C. (1993)
Associate Professor of Political Science; B.A., Johns Hopkins University, 1979; M.I.A., Columbia University, 1983; Ph.D., ibid., 1991.

Rebellon, Cesar (2002)
Associate Professor of Sociology; B.A., Rice University, 1996; M.A., Emory University, 1999; Ph.D., ibid., 2002.

Reilly, Ruth A. (1996)
Clinical Associate Professor of Nutrition; B.S., Florida State University, 1965; M.O.E., University of New Hampshire, 1989; Ph.D., ibid., 1998.

Reinhold, Vernon N. (1998)
Research Professor of Biochemistry, Molecular and Cellular Biology; B.S., University of New Hampshire, 1959; M.S., ibid., 1961; Ph.D., University of Vermont, 1965.

Richards, Harry J. (1979)

Associate Professor of Education; B.A., State University of New York at Potsdam, 1968; M.S., State University of New York at Albany, 1969; Ph.D., Florida State University, 1978.

Ripley, David K. (1992)
Professor of Music; A.B., Harvard University, 1970; M.M., New England Conservatory of Music, 1977.

Rivard, David (2008)
Professor of English; B.A., University of Massachusetts, 1975; M.F.A., University of Arizona, 1982.

Robb, Judith A. (1982)
Associate Professor of Education; A.B., Connecticut College, 1967; M.A., University of South Florida, 1969; Ed.D., University of Rochester, 1982.

Robertson, Robert A. (1993)
Associate Professor of Community and Environmental Planning and Tourism Planning and Development and Marine Sciences; B.A., Western Illinois University, 1981; M.A., Oregon State University, 1984; Ph.D., University of Illinois at Urbana-Champaign, 1990.

Rodriguez, Julia E. (1999)
Associate Professor of History; B.A., New School for Social Research, 1989; M.A., ibid., 1992; M.Phil., Columbia University, 1995; Ph.D., ibid., 2000.

Rowe, Rebecca J (2011)
Assistant Professor of Wildlife and Conservation Biology and Natural Resources; B.A., Bowdoin College, 1997; Ph.D., University of Chicago, 2006.

Rucinski, Andrzej (1984)
Professor of Electrical and Computer Engineering; M.S., Technical University of Odessa, Ukraine, 1973; Ph.D., Technical University of Gdansk, Poland, 1982.

Ruml, Wheeler (2007)
Assistant Professor of Computer Science; B.A., Harvard University, 1993; Ph.D., ibid., 2002.

Russell, Robert D. (1975)
Associate Professor of Computer Science; B.A., Yale University, 1965; M.S., Stanford University, 1967; Ph.D., ibid., 1972.

Ryan, James M. (1984)
Professor of Earth, Oceans, and Space and Physics; B.S., University of California at Riverside, 1970; M.S., University of California at San Diego, 1974; Ph.D., University of California at Riverside, 1978.

Rzhanov, Yuri (2003)
Research Professor of Ocean Engineering and Marine Sciences; M.Sc., Novosibirsk State University, Novosibirsk, Russia, 1978; Ph.D., Russian Academy of Sciences, 1983.

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S

Sabin, Mihaela (2007)
Associate Professor of Computer Information Systems, Affiliate Associate Professor of Computer Science; B.S., Ploitehnica University of Bucharest, 1984; M.S., Politechnica University of Bucharest, 1984; M.S.T., University of New Hampshire, 2003; Ph.D., ibid., 2003.

Sable, Janet R. (1989)
Professor of Recreation Management and Policy; B.A., University of Michigan at Ann Arbor, 1975; M.S., Northeastern University, 1981; Ed.D., Boston University, 1988.

Safford, Thomas G. (2007)
Associate Professor of Sociology; B.A., University of North Carolina, 1989; M.A., Stanford University, 1995; Ph.D., Cornell University, 2004.

Salisbury, Joseph (2010)
Research Assistant Professor of Earth, Oceans, and Space, Affiliate Assistant Professor of Earth Sciences; B.A., University of Southern Maine, 1980; M.S., University of New Hampshire, 1990; Ph.D., ibid., 2003.

Saltzberg, Christine W. (2006)
Diploma, Charity Hospital of Louisiana, 1971; B.S., Alfred University, 1989; M.S., University of Rochester, 1991; Ph.D., Cornell University, 2002.

Salvio, Paula M. (1992)
Professor of Education; B.A., Fordham University, 1981; M.A., Wesleyan University, 1983; Ph.D., University of Rochester, 1989.

Salyer, Lucy E. (1989)

Associate Professor of History; B.A., University of California at San Diego, 1979; M.A., University of California at Berkeley, 1983; Ph.D., ibid., 1989.

Samuels, Joanne G. (2007)
Associate Professor of Nursing; A.D.N., Northeastern University, 1975; B.S.N., ibid., 1978; M.S.N., Boston University, 1984; Ph.D., University of Massachusetts at Amherst, 2007.

Scala, Dante J. (2007)
Associate Professor of Political Science; B.A., Villanova University, 1990; M.A., University of Chicago, 1993; Ph.D., ibid., 2000.

Schmidt, Torsten (1988)
Associate Professor of Economics; M.A., University of Florida, 1984; Ph.D., ibid., 1990.

Schnepf, Scott (1981)
Professor of Art and Art History; B.A., Augustana College, 1977; M.F.A., Kansas State University, 1981.

Schram, Thomas H. (1990)
Associate Professor of Education; B.A., Dartmouth College, 1978; B.A., University of Wyoming, 1982; M.Ed., University of Oregon, 1987; Ph.D., ibid., 1990.

Schuh, Mary C (2013)
B.S.Ed., State University of New York College at Geneseo, 1984; M.S.Ed., Syracuse University, 1987; Ph.D., University of New Hampshire, 2002.

Schwadron, Nathan A. (2010)
Associate Professor of Earth, Oceans, and Space and Physics; B.A., Oberlin College, 1990; Ph.D., University of Michigan at Ann Arbor, 1996.

Seaman, Jayson O. (2006)
Assistant Professor of Kinesiology, Affiliate Assistant Professor of Education; B.S., New England College, 1994; M.S., University of New Hampshire, 1999; Ph.D., ibid., 2006.

Seidel, Lee F. (1977)
Professor of Health Management and Policy; A.B., Hobart College, 1967; M.P.A., Pennsylvania State University, 1972; Ph.D., ibid., 1976.

Seiler, David E. (1972)
Professor of Music; B.M., University of Wisconsin at Madison, 1961; M.M., ibid., 1965.

Seitz, W. Rudolf (1976)
Professor of Chemistry; A.B., Princeton University, 1965; Ph.D., Massachusetts Institute of Technology, 1970.

Senier, Siobhan (2000)
Associate Professor of English; A.B., Bowdoin College, 1987; M.A., University of Illinois at Urbana-Champaign, 1992; Ph.D., ibid., 1997.

Shannon, Patrick (2009)
Associate Professor of Social Work; B.A., State University of New York at Buffalo, 1990; M.S.W., State University of New York College at Buffalo, 1993; Ph.D., Virginia Commonwealth University, 2000.

Sharkey, Judy (2001)
Associate Professor of Education; B.A., Franklin Pierce College, 1984; M.A.T.,

School for International Training, 1990; Ph.D., Pennsylvania State University, 2000.

Sharp, Erin Hiley (2009)
Assistant Professor of Family Studies; M.S., Pennsylvania State University, 2003; Ph.D., ibid., 2006; B.S., Virginia Commonwealth University, 2009.

Shea, Christine M. (1994)
Professor of Decision Sciences and Business Administration; B.B.A., Wilfrid Laurier University, Waterloo, Ontario, 1980; M.B.A., ibid., 1984; Ph.D., University of Western Ontario, Canada, 1994.

Shen, Junhao (2004)
Associate Professor of Mathematics and Statistics; B.A., Nanjing University, 1996; Ph.D., University of Pennsylvania, 2004.

Sherman, Sarah Way (1984)
Associate Professor of English; B.A., Marlboro College, 1972; Ph.D., Brown University, 1983.

Shetty, Sandhya (1988)
Associate Professor of English; B.A., Nowrosjee Wadia College, Poona, India, 1977; M.A., University of Poona, India, 1979; M.A., University of Rochester, 1982; Ph.D., ibid., 1987.

Shore, Barry (1974)
Professor of Decision Sciences and Business Administration; B.S.E.E., Tufts University, 1960; M.B.A., University of Massachusetts at Amherst, 1963; Ph.D., University of Wisconsin at Madison, 1968.

Shore, Samuel D. (1965)
Professor of Mathematics and Statistics; B.S., Juniata College, 1959; M.A., Pennsylvania State University, 1961; Ph.D., ibid., 1964.

Short, Frederick T. (1989)
Research Professor of Marine, Estuarine and Freshwater Biology and Marine Sciences; B.A., Plymouth State College, 1972; M.S., University of Rhode Island, 1976; Ph.D., University of Alaska at Fairbanks, 1981.

Short, Kevin M. (1994)
Professor of Mathematics and Statistics; B.A., University of Rochester, 1985; M.S., ibid., 1985; Ph.D., Imperial College of Science & Technology, London, 1988.

Shubov, Marianna A. (2004)
Professor of Mathematics and Statistics; M.S., St. Petersburg State University, Russia, 1972; Ph.D., ibid., 1985.

Sidor, Inga F. (2008)
Clinical Assistant Professor of Marine, Estuarine and Freshwater Biology and Biomedical Science; B.A., Reed College, 1992; D.V.M., Tufts University, 1999.

Siggelakis, Susan J. (1988)
Associate Professor of Political Science; B.A., Rutgers University, 1979; M.A., John Hopkins University, 1983; Ph.D., ibid., 1988.

Silfer, Karl (2008)
Assistant Professor of Physics; B.S., Temple University, 1995; Ph.D., ibid., 2004.

Simmons, Douglas C. (1998)

Assistant Professor of Occupational Therapy; B.S., State University of New York at Buffalo, 1989; M.S., University of New Hampshire, 1998; Ph.D., Nova Southwestern University, 2005.

Simos, Evangelos O. (1977)
Professor of Economics; B.S., Athens Graduate School of Business and Economics, 1972; M.A., Northern Illinois University, 1974; Ph.D., ibid., 1977.

Smith, Andrew E. (2005)
Affiliate Associate Professor of Political Science; B.A., University of Cincinnati, 1983; M.A., ibid., 1987; Ph.D., ibid., 1997.

Smith, Charles W. , III (2003)
Research Professor of Earth, Oceans, and Space and Physics; B.S., University of Maryland, 1977; M.S., College of William and Mary, 1979; Ph.D., ibid., 1981.

Smith, David R. (1979)
Professor of Art and Art History; A.B., Washington University, 1968; M.A., Columbia University, 1971; M.Phil., ibid., 1978; Ph.D., ibid., 1978.

***Smith, Malcolm L.** (2008)
B.A., Washburn University, 1979; M.S., Minnesota State University, 1987; Ph.D., Kansas State University, 2005.

Smith, Nicholas J. (2002)
Associate Professor of Philosophy; B.A., Vassar College, 1994; J.D., State University of New York at Buffalo, 1997; Ph.D., Vanderbilt University, 2002.

+Smith, Richard G. (2010)
Assistant Professor of Sustainable Agriculture and Food Systems and Natural Resources; B.S., University of New Mexico, 1996; Ph.D., Michigan State University, 2005.

Sohl, Jeffrey E. (1983)
Professor of Decision Sciences and Business Administration; B.E., Villanova University, 1972; M.B.A., University of Maryland, 1974; Ph.D., ibid., 1983.

Sokol, Jason (2011)
Assistant Professor of History; B.A., Oberlin College, 1999; M.A., University of California at Berkeley, 2001; Ph.D., ibid., 2006.

Sonnenmeier, Rae M. (1996)
Clinical Associate Professor of Communication Sciences and Disorders ; B.S.Ed., State University of New York College at Buffalo, 1980; M.A., State University of New York at Buffalo, 1984; Ph.D., ibid., 1999.

Sower, Stacia A. (1982)
Professor of Biochemistry, Molecular and Cellular Biology and Biology and Marine, Estuarine and Freshwater Biology and Marine Sciences; B.A., University of Utah, 1973; M.S., Oregon State University, 1978; Ph.D., ibid., 1980.

Sowers, Jeannie L. (2006)
Associate Professor of Political Science; B.A., Harvard University, 1989; M.A., Princeton University, 1996; Ph.D., ibid., 2003.

Stibler, Robert (1978)
Professor of Music; B.S., Susquehanna University, 1970; M.M., Catholic University of America, 1973; D.M.A., ibid., 1979.

Stine, William Wren (1984)

Associate Professor of Psychology and Neuroscience and Behavior; B.S., Georgia Institute of Technology, 1977; M.S., ibid., 1982; Ph.D., ibid., 1983.

Sullivan, Elise R. (2001)
Clinical Assistant Professor of Biomedical Science and Marine Sciences; B.S., University of Miami (Fla.), 1992; Ph.D., University of Maryland, 1999.

Swack, Michael (2010)
B.A., University of Wisconsin at Madison, 1975; MPP, Harvard University, 1979; Ph.D., Columbia University, 1990.

Swartz, Erik E. (2000)
Associate Professor of Kinesiology and Athletic Training; B.S., St. Bonaventure University, 1995; M.A., Western Michigan University, 1996; Ph.D., University of Toledo, 2000.

Swift, M. Robinson (1976)
Professor of Marine Sciences and Mechanical Engineering and Ocean Engineering; B.S., University of New Hampshire, 1971; Ph.D., ibid., 1974.

! Indicates part-time status
+ Indicates time devoted to Agricultural Experiment Station
* Indicates time devoted to Cooperative Extension

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T

Talay, M. Billur (2009)
Assistant Professor of Business Administration and Marketing; B.A., Bosphorus University, Turkey, 2002; M.B.A., ibid., 2004; Ph.D., Michigan State University, 2009.

Tang, Jian-Ming (2007)
Assistant Professor of Physics and Materials Science; B.S., National Taiwan University, 1992; M.S., University of Washington, 1996; Ph.D., ibid., 2001.

Taylor, James T. (1977)
Professor of Wildlife and Conservation Biology and Environmental Conservation Studies and Zoology; B.S., University of Tennessee, 1966; M.S., ibid., 1968; Ph.D., Oregon State University, 1977.

Taylor, Robert L. , Jr. (1984)
Professor of Genetics and Animal Science; B.A., Carson-Newman College, 1975; M.S., Auburn University, 1978; Ph.D., Mississippi State University, 1981.

Teng, Xiaowei (2008)
Assistant Professor of Chemical Engineering; B.S., East China University of Science and Technology, Shanghai, 1998; M.S., ibid., 2001; Ph.D., University of Rochester, 2006.

Thein, May-Win L. (1999)
Associate Professor of Mechanical Engineering and Marine Sciences; B.S., Lehigh University, 1991; M.S., ibid., 1992; Ph.D., Oklahoma State University, 1999.

Thomas, W. Kelley (2002)
Professor of Genetics; B.S., University of Redlands, 1981; M.S., Simon Fraser

University, Canada, 1984; Ph.D., ibid., 1988.

Tisa, Louis S. (1994)
Professor of Genetics; B.Sc.(Hon.), University of Windsor, Canada, 1976; M.Sc., ibid., 1979; Ph.D., University of Wisconsin at Madison, 1987.

Tobin, Carolyn L. (2009)
Assistant Professor of Nursing; Diploma, University of Leicester, 1994; M.A., ibid., 1996; Post Graduate Diploma, Trinity College, Dublin, Ireland, 2001; Ph.D., ibid., 2010.

Tobin, Gerard A. (2007)
B.S.N., London University, London, England, 1989; M.S.N., Kings College, London, England, 1991; Ph.D., Trinity College, Dublin, Ireland, 2005.

Tomellini, Sterling A. (1985)
Professor of Chemistry; B.S., University of Rhode Island, 1979; Ph.D., Rutgers, The State University of New Jersey, 1985.

Torbert, Roy B. (1989)
Professor of Physics and Earth, Oceans, and Space; B.A., Princeton University, 1971; Ph.D., University of California at Berkeley, 1979.

Townson, David H. (1997)
Professor of Animal Science, Associate Professor of Biochemistry, Molecular and Cellular Biology and Biology and Biomedical Science and Sustainable Agriculture and Food Systems; B.S., Michigan State University, 1983; M.S., University of Wisconsin at Madison, 1988; Ph.D., Ohio State University, 1993.

Trauntvein, Nate (2011)
Assistant Professor of Recreation Management and Policy; B.S., Utah State University, 2003; M.S., Pennsylvania State University, 2007; Ph.D., ibid., 2011.

Triplett, Timm A. (1981)
Associate Professor of Philosophy; B.A., Antioch College, 1972; M.A., University of Massachusetts at Amherst, 1980; Ph.D., ibid., 1982.

Trubowitz, Rachel (1986)
Professor of English; B.A., Barnard College, 1976; M.A., Columbia University, 1977; M.Phil., ibid., 1980; Ph.D., ibid., 1985.

Tsang, Paul C. (1989)
Professor of Animal Science and Biomedical Science and Marine, Estuarine and Freshwater Biology and Marine Sciences; B.A., Cornell University, 1978; Ph.D., Boston University, 1986.

Tsavalas, John G. (2006)
Research Assistant Professor of Materials Science; B.S., University of Virginia, 1996; M.S., Georgia Institute of Technology, 1998; Ph.D., ibid., 2001.

Tsukrov, Igor I. (1997)
Professor of Mechanical Engineering and Materials Science and Ocean Engineering and Marine Sciences; B.S., Dnepropetrovsk University, Ukraine, 1986; M.S., Tufts University, 1993; Ph.D., ibid., 1996.

Tucker, Anita (2005)
Assistant Professor of Social Work; B.A., Dartmouth College, 1992; M.S.W., University of Michigan, 1997; Ph.D., Boston College, 2006.

Tucker, Corinna Jenkins (2000)

Associate Professor of Family Studies; B.A., Clark University, 1992; M.S., Pennsylvania State University, 1995; Ph.D., ibid., 1998.

Tucker, James (1992)
Associate Professor of Sociology; B.S., University of Virginia, 1981; M.A., ibid., 1987; Ph.D., ibid., 1992.

Turner, Heather A. (1991)
Professor of Sociology; B.A., University of Western Ontario, Canada, 1985; Ph.D., University of California at San Francisco, 1990.

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U

Urquhart, Peter W. (1989)
Associate Professor of Music; B.A., Princeton University, 1974; M.M., Westminster Choir College, 1978; M.A., Smith College, 1982; Ph.D., Harvard University, 1988.

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V

Vagts, Peggy A. (1978)
Professor of Music; B.M., Morningside College, 1976; M.M., University of Wisconsin at Madison, 1978.

Van Gundy, Karen (2001)
Associate Professor of Sociology; B.S., Virginia Polytechnic Institute and State University, 1994; M.A., University of Cincinnati, 1998; Ph.D., University of Miami (Fla.), 2001.

Van Zandt, Cynthia J. (1998)
Associate Professor of History; B.A., University of Virginia, 1984; M.A., University of Connecticut, 1991; Ph.D., ibid., 1998.

Vandemark, Douglas C. (2005)
Research Associate Professor of Earth, Oceans, and Space and Marine Sciences, Affiliate Associate Professor of Earth Sciences; B.S., Hope College, 1986; M.S., University of Massachusetts at Amherst, 1998; Ph.D., University of New Hampshire, 2005.

VanDeveer, Stacy D. (1998)
Professor of Political Science; B.A., University of Illinois, 1990; M.A., University of Maryland, 1994; Ph.D., ibid., 1997.

Varki, Elizabeth (1997)
Associate Professor of Computer Science; M.S., Villanova University, 1992; Ph.D., Vanderbilt University, 1997.

Varner, Ruth K. (2003)
Research Associate Professor of Earth, Oceans, and Space and Earth Sciences

and Environmental Sciences; B.A., Hartwick College, 1991; M.S., University of New Hampshire, 1993; Ph.D., ibid., 2000.

Vasquez, Bernard J. (1999)
Research Associate Professor of Physics, Research Professor of Earth, Oceans, and Space; B.S., Rensselaer Polytechnic Institute, 1987; Ph.D., University of Maryland, 1992.

Vasudevan, Palligarnai T. (1988)
Professor of Environmental Engineering and Chemical Engineering; B.Tech., University of Madras, India, 1974; M.S., State University of New York at Buffalo, 1984; Ph.D., Clarkson University, 1988.

Veal, Larry J. (1982)
Associate Professor of Music; B.S., University of Illinois at Urbana-Champaign, 1974; M.M., ibid., 1976.

Venkatachalam, A. R. (1992)
Professor of Decision Sciences and Business Administration; B.Eng., University of Madras, India, 1980; M.B.A., Indian Institute of Management, Calcutta, 1983; Ph.D., University of Alabama, 1990.

Vroman, Kerryellen (2005)
Associate Professor of Occupational Therapy; B.S., Massey University, 1990; M.H.S., McMaster University, 1992; Ph.D., Massey University, 2005.

Vroman, Neil B. (1984)
Associate Professor of Kinesiology; B.S., Colgate University, 1975; Ph.D., Pennsylvania State University, 1982.

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W

Wake, Cameron P. (1995)
Research Associate Professor of Earth, Oceans, and Space and Earth Sciences and Marine Sciences; B.S., University of Ottawa, Canada, 1984; M.A., Wilfrid Laurier University, Waterloo, Ontario, 1987; Ph.D., University of New Hampshire, 1993.

Walker, Charles W. (1976)
Professor of Biochemistry, Molecular and Cellular Biology and Marine, Estuarine and Freshwater Biology and Marine Sciences; B.A., Miami University, Ohio, 1969; M.S., Cornell University, 1973; Ph.D., ibid., 1976.

Walsh, Wendy A. (2003)
Research Associate Professor of Sociology; B.A., Bates College, 1989; M.S., University of New Hampshire, 1997; Ph.D., ibid., 2002.

Wang, Le (2008)
Assistant Professor of Economics; B.A., Jinan University, P.R. China, 2001; M.A., Southern Methodist University, 2002; Ph.D., ibid., 2006.

Wansart, William L. (1985)
Associate Professor of Education; B.S., State University of New York at Buffalo, 1972; M.A., University of Northern Colorado, 1975; Ed.D., ibid., 1984.

Ward, Larry G. (1989)
Research Associate Professor of Earth Sciences and Marine Sciences and Ocean Engineering; B.A., University of New Hampshire, 1972; M.S., University of South Carolina, 1974; Ph.D., ibid., 1978.

Ware, Colin (2000)

Professor of Ocean Engineering and Marine Sciences; B.Sc., Durham University, England, 1972; Ph.D., University of Toronto, Canada, 1980; M.Math, University of Waterloo, Canada, 1985.

Warner, Rebecca M. (1981)
Professor of Psychology; B.A., Carnegie Mellon University, 1973; Ph.D., Harvard University, 1978.

Watson, Winsor H. , III (1978)
Professor of Biology and Marine, Estuarine and Freshwater Biology and Marine Sciences and Neuroscience and Behavior and Zoology; B.A., Wesleyan University, 1972; Ph.D., University of Massachusetts at Amherst, 1978.

Watters, David H. (1978)
Professor of English; A.B., Dartmouth College, 1972; Ph.D., Brown University, 1979.

Watts, Alison W. (2007)
Research Assistant Professor of Civil Engineering and Environmental Engineering; B.A., Mount Holyoke College, 1984; M.S., Arizona State University, 1992; Ph.D., University of New Hampshire, 2006.

Wauchope, Barbara A. (2008)
Research Associate Professor of Sociology; B.A., University of North Carolina at Chapel Hill, 1974; M.A., University of New Hampshire, 1987; Ph.D., ibid., 1994.

Weber, Thomas (2006)
Research Assistant Professor of Marine Sciences, Assistant Professor of Ocean Engineering and Mechanical Engineering; B.S., University of Rhode Island, 1997; M.S., ibid., 2000; Ph.D., Pennsylvania State University, 2006.

Webster, Penelope E. (1987)
Associate Professor of Communication Sciences and Disorders ; B.S., Northeastern University, 1976; M.A., State University of New York College at Geneseo, 1978; Ed.D., Boston University, 1984.

Weiner, James L. (1979)
Associate Professor of Computer Science; B.S., University of Massachusetts at Amherst, 1973; M.S., University of Wisconsin at Madison, 1975; Ph.D., University of California at Los Angeles, 1979.

Weintraub, Scott E. (2011)
Assistant Professor of Languages, Literatures, and Cultures and Spanish; A.B., Dartmouth College, 2001; Ph.D., Emory University, 2006.

Weisman, Gary R. (1977)
Professor of Chemistry; B.S., University of Kentucky, 1971; Ph.D., University of Wisconsin at Madison, 1976.

Wells, Melissa (2004)
Associate Professor of Social Work; B.A., University of New Hampshire, 1991; M.S.W., University of Minnesota Duluth, 1995; Ph.D., University of New Hampshire, 2003.

Wharton-McDonald, Ruth M. (1997)
Associate Professor of Education; A.B., Brown University, 1985; Ed.M., Harvard University, 1989; M.A., State University of New York at Albany, 1993; C.A.S., ibid., 1994; Ph.D., ibid., 1996.

Whistler, Cheryl A. (2004)

Associate Professor of Genetics; B.A., University of San Diego, 1991; Ph.D., Oregon State University, 2000.

Whitaker, Cord (2008)
Assistant Professor of English; B.A., Yale University, 2001; M.A., Duke University, 2005; Ph.D., ibid., 2009.

White, Barbara Prudhomme (1998)
Associate Professor of Occupational Therapy; B.S., University of New Hampshire, 1978; Ph.D., University of Minnesota, 1997.

White, Christopher M. (2006)
Associate Professor of Mechanical Engineering; M.Sc., Yale University, 1999; Ph.D., ibid., 2001.

Wible, James R. (1984)
Professor of Economics; A.B., Wheaton College, 1973; Ph.D., Pennsylvania State University, 1980.

Wilburn, Reginald A. (2008)
Assistant Professor of English; B.A., University of the District of Columbia, 1999; M.A., University of Connecticut, 2001; Ph.D., ibid., 2007.

Wilder, Allison (2009)
Assistant Professor of Recreation Management and Policy; B.S., Ithaca College, 1984; M.S., SUNY - Cortland, 1992; Ph.D., Virginia Commonwealth University, 1992.

Williams, Ann J. (2008)
Assistant Professor of English; B.A., University of New Hampshire, 1980; M.A., ibid., 1990; M.F.A., University of Iowa, 1997.

Williams-Barnard, Carol L. (1978)
Associate Professor of Nursing; A.S., Vermont College, 1970; B.S.N., Catholic University of America, 1972; M.S.N., ibid., 1975; D.N.Sc., ibid., 1979; Ph.D., ibid., 2007.

Willkomm, Therese (2005)
Clinical Assistant Professor of Occupational Therapy; B.S., University of Wisconsin at Stout, 1982; M.S., Drake University, 1984; Ph.D., University of Pittsburgh, 1997.

Wilson, Fiona Sara (2011)
Assistant Professor of Business Administration and Management; M.B.A., Simmons College, 1997; D.B.A, Boston University, 2009.

Windt, Mark R. (1998)
B.S., Cornell University, 1972; M.D., University of Connecticut, 1978.

Wollheim, Wilfred M. (2001)
Assistant Professor of Environmental Sciences and Earth, Oceans, and Space; B.S., Cornell University, 1989; M.S., University of Wyoming, 1994; Ph.D., University of New Hampshire, 2005.

Wolper, Ethel Sara (1996)
Associate Professor of History; B.A., University of Chicago, 1982; M.A., ibid., 1984; Ph.D., University of California at Los Angeles, 1994.

Wood, Craig H. (1990)
Associate Professor of Decision Sciences and Business Administration; A.B.,

Stanford University, 1972; M.B.A., University of Chicago, 1974; Ph.D., Ohio State University, 1991.

Woodward, Robert S. (2001)
Professor of Economics and Health Management and Policy; B.S., Haverford College, 1965; Ph.D., Washington University, 1972.

Woodward, William R. (1975)
Professor of Psychology; B.A., Harvard University, 1967; M.A., Princeton University, 1969; M.A., Yale University, 1973; Ph.D., ibid., 1975.

Wosnik, Martin M. (2007)
Associate Professor of Marine Sciences, Assistant Professor of Mechanical Engineering; B.S. eq., Technical University of Darmstadt, Germany, 1992; M.S., State University of New York at Buffalo, 1994; Ph.D., ibid., 2000.

+Wraith, Jon M. (2008)
Professor of Sustainable Agriculture and Food Systems; B.S., Humboldt State University, 1984; M.S., Utah State University, 1986; Ph.D., ibid., 1989.

Wright, Steven C. (2002)
Professor of Kinesiology; B.S., St. Lawrence University, 1978; M.Ed., Boston University, 1980; Ed.D., ibid., 1992.

Wu, Kang (2012)
Assistant Professor of Chemical Engineering; B.S., Tianjin University, 2003; M.S., University of Illinois at Urbana-Champaign, 2008; Ph.D., ibid., 2010.

! Indicates part-time status
+ Indicates time devoted to Agricultural Experiment Station
* Indicates time devoted to Cooperative Extension

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X

Xiao, Jingfeng (2010)
Research Assistant Professor of Earth, Oceans, and Space; B.S., Lanzhou University, 1997; M.S., Beijing University, 2000; Ph.D., University of North Carolina at Chapel Hill, 2006.

Xie, Wenjuan (2008)
Assistant Professor of Accounting and Finance and Business Administration; B.B.A., Peking University, 2000; M.A., ibid., 2002; Ph.D., University of Wisconsin at Madison, 2008.

Xu, Le (2003)
Associate Professor of Accounting and Finance and Business Administration; B.S., Beijing University, P.R. China, 1999; Ph.D., University of Massachusetts at Amherst, 2003.

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Y

Yalcinkaya, Goksel (2007)
Assistant Professor of Marketing and Business Administration; B.S., Ege University, Turkey, 1994; M.B.A., Suffolk University, 1998; M.S., Northeastern University, 2003; Ph.D., Michigan State University, 2007.

Yu, Qiaoyan (2011)
Assistant Professor of Electrical and Computer Engineering; B.S., Xidian University, P.R. China, 2002; M.S., Zhejiang University, P.R. China, 2005; M.S., University of Rochester, 2007; Ph.D., Electrical and Computer Engineering, ibid., 2011.

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Z

Zercher, Charles K. (1991)
Professor of Chemistry; B.A., Messiah College, 1981; M.S., State University of New York College at Buffalo, 1984; Ph.D., University of Notre Dame, 1989.

Zhou, Honggeng (2004)
Associate Professor of Decision Sciences and Business Administration; B.S., Zhejiang University, P.R. China, 1997; M.S., University of Memphis, 1999; M.A., Ohio State University, 2002; Ph.D., ibid., 2003.

Zunz, Sharyn J. (1993)
B.A., University of Wisconsin at Madison, 1970; M.S.W., New York University, 1972; Ph.D., Fordham University, 1993.