1998

University of Maine Bulletin, 1998-1999 Undergraduate Catalog, Part 4

University of Maine

Key to Abbreviations

Course Prefixes

ACE Academic and Career Exploration
AED Art Education
AES Applied Ecology and Environmental Sciences
ANT Anthropology
ARH Art History
ART Art
AST Astronomy
AVS Animal and Veterinary Sciences
BIO Biological Sciences
BLS Black Studies
BMB Biochemistry, Microbiology and Molecular Biology
BRE Bio-Resource Engineering
BRT Bio-Resource Engineering Technology
BUA Business Administration
CAN Canadian Studies
CDS Communication Disorders
CEC Education-Counseling
CET Civil Engineering Technology
CHE Chemical Engineering
CHF Child Development and Family Relations
CHY Chemistry
CIE Civil and Environmental Engineering
CLA Classics
COM Communication
COS Computer Science
DAN Dance
DIS Disability Studies
EAD Education-Administration
EAE Education-Adult Education
EBI Education-Bilingual Education
ECE Electrical and Computer Engineering
ECO Economics
EDA Education-Measurement and Testing
EDB Education-Basic Professional
EDC Education-Curriculum
EDF Education-Liberal Education
EDG/EDU Education-General
EDH/EDL/EDM Education-History and Philosophy
EDS Education-Research
EDT Education-Telecommunications
EDW Education-Workshops
EEL Education-Early Literacy
EES Ecology and Environmental Science
EET Electrical Engineering Technology
EGS Education-Gender Studies
EMA Education-Mathematics
EML Education-Middle Level
ENG English
EPT Education-Psychology
ERL Education-Literacy
ERR Education-Reading Recovery
ESC Education-Science
ESS Education-Social Studies
FAS Franco-American Studies
FES Forest Ecosystem Science
FOE Forest Engineering
FRE French
FSB First-Year Student Book Course
FSN Food Science and Nutrition
FTY Forestry
GEE General Engineering
GEO Geography
GER German
GES Geological Sciences
GRE Greek
HED Education-Higher Education
HON Honors
HTY History
HUD Human Development
IEI English as a Second Language
INT Interdisciplinary
ISI Integrating Students Into Interdiscipilinary Studies
JMC Journalism and Mass Communication
KPE Kinesiology and Physical Education
LAS Liberal Arts and Sciences
LAT Latin
LHC Landscape Horticulture
LIB Liberal Studies
MAT Mathematics and Statistics
MDM Multimedia
MEE Mechanical Engineering
MET Mechanical Engineering Technology
MIS Military Science
MLC Modern Languages and Classics
MUE Music-Education
MUH Music-History
MUL Music-Literature
MUO Music-Organizations and Ensembles
MUP Music-Performance
MUS Music-General
MUY Music-Theory
NAS Native American Studies
NAV Naval Science
NFA Natural Sciences, Forestry and Agriculture
NRC Natural Resources
NUR Nursing

OCE Oceanography
ONE Onward-English
ONM Onward-Mathematics
ONO Onward-Orientation
ONR Onward-Reading
ONS Onward-Science
PAA Public Administration
PAX Peace Studies
PHI Philosophy
PHY Physics
POS Political Science
PPA Pulp and Paper Technology
PRT Parks, Recreation and Tourism
PSY Psychology
REP Resource Economics and Policy
RUS Russian
SMS Marine Sciences
SED Education-Special Education
SIE Spatial Information Engineering
SOC Sociology
SPA Spanish
STT Education-Student Teaching
SWK Social Work
THE Theatre
TME Technical Mathematics for Engineering
TSO Technology and Society
UST University Studies
WLE Wildlife Ecology
WSC Wood Science and Technology
WST Women's Studies

College Abbreviations

BPPH College of Business, Public Policy and Health
EDHD College of Education and Human Development
EGR College of Engineering
LAS College of Liberal Arts and Sciences
NSFA College of Natural Sciences, Forestry and Agriculture

Department and Discipline Abbreviations

ACE Academic and Career Exploration
AES Applied Ecology and Environmental Sciences
ANT Antropology
ART Art
BLS Black Studies
BMB Biochemistry, Microbiology and Molecular Biology
BSC Biological Sciences
BSE Biosystems Sciences
BUA Business Administration
CAN Canadian Studies
CDS Communication Disorders
CHE Chemical Engineering
CHY Chemistry
CIE Civil and Environmental Engineering
COJ Communication and Journalism
COS Computer Science
DIS Disability Studies
ECE Electrical and Computer Engineering
ECO Economics
EDU Education
ENG English
FAS Franco-American Studies
FES Forest Ecosystem Science
FOE Forest Engineering
FSN Food Science and Nutrition
FTY Forestry
GEE General Engineering
GES Geological Sciences
HDF Human Development and Family Studies
HON Honors
HTY History
IEI Intensive English Institute
ISI Integrating Students Into Interdiscipilinary Studies
KPE Kinesiology and Physical Education
MAT Mathematics and Statistics
MDM Multimedia
MEE Mechanical Engineering
MIS Military Science
MLC Modern Languages and Classics
NAS Native American Studies
NAV Naval Science
NFA Natural Sciences, Forestry and Agriculture
NRC Natural Resources
NUR School of Nursing
ONW Onward
PAA Public Administration
PAX Peace Studies
PHI Philosophy
PHY Physics and Astronomy
POS Political Science
PRT Parks, Recreation and Tourism
PSY Psychology
REP Resource Economics and Policy
SCI Sciences
SET School of Engineering Technology
SIE Spatial Information Engineering
SMS School of Marine Science
SOC Sociology
SPA School of Performing Arts
SSWK School of Social Work
TSO Technology and Society
UST University Studies
WLE Wildlife Ecology
WSC Wood Science and Technology
WST Women's Studies

Interdisciplinary Listings

Departments listing the course are shown in parentheses.

INT 105 (ECO,REP) Environmental Policy
INT 110 (ECO, REP) Modern Economic Problems
INT 190 (BSC, REP) World Food Supply, Population and the Environment
INT 211 (BSE, MET) Introduction to CAM and Welding
INT 219 (BSC) Introduction to Ecology
INT 256 (BSC, FES) Tree Pests and Disease
INT 305 (SOC) Women of Maine: An Autobiographical Approach
INT 319 (BSC) General Ecology
INT 323 (AES, BSC, NRC, WLE) Introduction To Conservation Biology
INT 329 (REP, SOC) The Individual and the Community
INT 330 (CIE,REP) Waste Management
INT 398 (CHE, CHY, ECE) Undergraduate Research Participation
INT 410 (ANT, ENG, MLC) Introduction to the Study of Linguistics
INT 440 (ANT, HTY) Shipwreck Sites: Archaeological and Historical Investigations
INT 441 (ANT, HTY) Maritime History and Archaeology of New England
INT 450 (AES, REP) Design and Management of Agroecosystems
INT 460 (BSC, BSE, CIE) Environmental Aspects of Aquaculture
INT 475 (BSC, FTY, SMS, WLE) Field Studies in Ecology
INT 476 (HDF) School and Society Study Tour
INT 482 (AES, BSC) Pesticides and the Environment
INT 494 (PAA, POS) Field Experience
INT 500 (AES, ANT, BSC, GES) Seminar in Quaternary Studies
INT 510 (BSC, SMS) Marine Invertebrate Zoology
INT 514 (ECO, REP) Microeconomic Theory
INT 521 (BUA, COJ, NUR, PAA, SWK) International and Intercultural Relationships
INT 525 (BSC, BSE, FTY) Tropical Deforestation Seminar
INT 528 (CDS, NUR, PSY, SWK) Interdisciplinary Rural Health Care Delivery I
INT 529 (CDS, NUR, PSY, SWK) Interdisciplinary Rural Health Care Delivery II
INT 530 (ECO, REP) Econometrics
INT 551 (BUA, CHE, FTY, WSC) Structure of the Pulp and Paper Industry
INT 553 (BUA, CHE, FTY, WSC) Markets and Marketing ir the Pulp and Paper Industry
INT 555 (AES, BSC) Pest-Plant Interactions
INT 563 (BSC, SMS) Marine Benthic Ecology

Course Descriptions

Courses in Academic and Career Exploration (ACE)

ACE 100 Academic and Career Explorations Seminar
Introduction to UMaine resources, academic programs and strategies for achieving academic success. Activities designed to foster exploration and evaluation of interests, goal and abilities and their relationship to potential majors and careers. Prerequisite: First year ACE student or permission of ACE Director. (Pass/Fail Grade Only). **Cr 1.**

ACE 196 Academic and Career Exploration Field Experience
Field experience for students seeking to explore their academic and career interests. Prior approval of the field experience is required and will be based on a detailed written plan and documentation presented by the student and approved by the Career Center Manager or the student's Faculty Advisor or Academic Dean. Open to students in all majors as well as students with undeclared majors. Prerequisite: permission. **Cr 0-3.**

Courses in Art Education (AED)

AED 171 The Teaching of Art
Current approaches, methods and materials for the teaching of art in the elementary grades. Art Education theory and curricula taught in conjunction with general art knowledge and experiences. Junior or senior elementary education majors or permission. Not open to art education majors. (Satisfies the General Education Artistic and Creative Expression Requirement.) Lec 2, Lab 1. **Cr 3.**

AED 371 Methods and Materials in Art Education
Introduction to instructional methods and strategies in art education. Exploration, development and evaluation of approaches to teaching, teaching and learning styles, educational materials, media and technologies. Provides an opportunity for in-school teaching observations. Required for art education majors and art certification students. Open to non-art education majors by permission only. Prerequisites: EDB 202 and EDB 221; ART 100, ART 200, ART 110 and ART 120; ARH 155 and ARH 156; 15 credits of college requirements. Corequisites: AED 372 and AED 373. Lec 1, Lab 2. **Cr 3.**

AED 372 Foundations of Art Education
Includes historical, philosophical, political, psychological and sociological foundations of art education; theories of child art; and critical examination of current research, trends and issues in art education. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Art education majors or art certification students only. Corequisites: AED 371 and AED 373. Lec 3. **Cr 3.**

AED 373 Introduction to Curriculum
Introduction to art curricula strategies and development. Includes instructional planning, lesson writing and organization, and practicum experience. Art education majors or art certification students only. Corequisite: AED 371 and AED 372. Lec 2, Lab 1. **Cr 3.**

AED 375 Art Education Workshop and Laboratory
Plan of study, projects and credit arranged. Limited to art education majors. **Cr Ar.**

AED 473 Advanced Curriculum in Art Education
An examination of current theory, research and practice pertaining to curriculum development in art education. Including an exploration of traditional and innovative approaches to curriculum development in art education, problems and issues relevant to art curricula design and implementation, critical examination of existing curricula, and practice in developing and evaluating art curricula. Art education majors, art certification students or by instructor's permission only. Prerequisites: AE 371, AED 372 and AED 373 or permission. Lec 3. **C**

AED 474 Topics in Art Education
Seminar in advanced research and practice in art education and related are Specific topic to be announced. **C**

AED 496 Field Experience in Art Education
Students involved in pre-professional activities with art education in scho or community agencies may apply for supervision and credit for the proje Prerequisite: AED 371, AED 372, AED 373 and permission. **Cr**

AED 497 Independent Study in Art Education
Advanced projects, readings, or seminars in art education. Topic and form study to be determined by student in consultation with faculty member. Prerequisite: AED 371, AED 372, AED 373 or equivalents and permission **Cr**

AED 498 Directed Study in Art Education
Advanced projects, readings, or seminars in art education. Topic and form study to be determined by student in consultation with faculty member. Prerequisite: AED 371, AED 372, AED 373 or equivalents and permission **Cr**

AED 574 Topics in Art Education
Advanced seminar and workshop with research projects in art education a related areas. Specific topic to be announced or arranged. The course may repeated once for credit. Prerequisite: Art teaching experience. **Cr**

AED 597 Independent Study in Art Education
Advanced level projects, readings or seminars in art education. Topic and fo of study to be determined by the student in consultation with faculty membe Prerequisite: graduate standing and permission. May be repeated for credit. **Cr**

AED 598 Directed Study in Art Education
Structured projects, readings or seminars in art education at an advanced level. Topics and form of study to be determined by the student under the direction of a faculty member. Prerequisite: graduate standing and permission. May be repeated for credit. **Cr**

Courses in Applied Ecology and Environmental Sciences (AES)

AES 100 Plant Science
Response of agricultural and horticultural plants to environmental factors such as moisture, temperature, light and soil fertility and pests. Manipulati of the environmental factors in order to improve plant growth is discusses. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Lec 3, Lab 2. **Cr**

AES 101 Cropping Systems
Principles and practices of various cropping systems involving agricultural crops. Weekly guest lecturers discuss major species of the Northeast. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: AES 100 or permission. Rec 4. **Cr**

AES 105 Principles of Sustainable Agriculture
Basic design principles and examples of environmentally and economically sustainable agricultural systems. The course will describe the use of synthetic fertilizers and pesticides, but emphasis will be placed on identifying management practices that a) biologically improve soil structure, organic matter content, and fertility; and b) minimize or eliminate the need for chemical interventions for control of insect pests, pathogens, and weeds. (Satisfies the General Education Human Values and Social Contexts Population and the Environment Requirement.) Rec 3. **Cr 3.**

AES 140 Soil Science
Considers the chemical, physical and biological properties of soil, as well as the origin, management and interrelationships of soils to plant growth. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BMB 207 or CHY 121. Rec 3. **Cr 3.**

AES 141 Soil Science Lab
A series of practical laboratory exercises providing hands-on experience with soil measurements and information use. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BMB 207 or CHY 121. **Cr 1.**

AES 250 Forest Soil Science
Fundamentals of soil science in the context of forest ecosystems including development, properties, and management. Linkages between soils and forest growth, surface and ground water, and the atmosphere are emphasized. Prerequisite: CHY 121. Rec 3. **Cr 3.**

AES 305 Problems in Applied Ecology and Environmental Sciences
Opportunity is provided for specialization in specific areas of applied ecology and environmental sciences. Prerequisite: permission. **Cr Ar.**

AES 344 Soil and Water Conservation
A consideration of the human-influenced and natural processes affecting soil quality and water quality. The linkages between soil and water quality will be emphasized. State and federal regulation of soil and water quality will be discussed. The class meets in one 4 hour block per week. Class time will be spent primarily in lecture and group work. There will be occasional field trips and laboratory exercises. Prerequisites: AES 140/AES 141 or AES 250 or permission. **Cr 3.**

AES 360 Chemical Principles of Environmental Quality
Introduction to environmental chemistry presenting how chemical principles can be applied to the understanding of environmental problems. Emphasizes the effect of our industrial activity; the flow of chemicals and energy through the atmosphere, hydrosphere and biosphere. Prerequisites: AES 140, AES 141 and either BMB 208 or CHY 132. Lec 3. **Cr 3.**

AES 396 Field Experience in Applied Ecology and Environmental Sciences
An approved program of work experience which contributes to the academic major and for which academic credit is given. Students may work part time or full time for a semester in a job related to their professional career goals. Prerequisite: junior standing and permission. (Pass/Fail Grade Only.) **Cr 1-16.**

AES 401 Advanced Crop Management
Production practices for specific agricultural crops important to Maine. Students may register for one or more of the following sections. (001) Fruits. Scientific principles and practices used in the production of fruit crops. The culture of fruits adapted to the Northeast with emphasis on apples and blueberries. (002) Vegetables. The characteristics and culture of important vegetable crops. Considers their adaptation to local soil and climatic conditions. (003) Forages. The practices important in grazing management, and cultivation of forest grasses, legumes, and silage corn. Covers the principles of forage preservation. (Spring - odd.) (004) Potato. Production practices of potatoes for tablestock, processing and seed. Prerequisite: AES 100 or AES 101 or permission. **Cr 3.**

AES 403 Weed Ecology and Management
Ecological principles and their application in non-chemical and reduced input weed management strategies. (Fall - odd.) Prerequisites: AES 100, AE 101 and BIO 319 or WLE 200; or equivalents. Lec 2, Lab 2. **Cr**

AES 440 Soil Chemistry and Plant Nutrition
A study of the origin and nature of soil chemical properties and their effect on plant growth, the source and function of essential nutrients, the chemist of fertilizer and lime reactions in soils. The environmental consequences o fertilization and other soil management practices are emphasized. Prerequisites: AES 140 or AES 250 and CHY 132 or BMB 208. Lec 3. **Cr**

AES 442 Soil Taxonomy
Taxonomy and classification of soils. Prerequisites: AES 140 or AES 250 and GES 101. Junior, senior or graduate standing. Rec 2, Lab 3. **Cr**

AES 444 Soil Morphology and Soil Mapping
Soil profile description and soil map construction taught in an intensive 3 week course. Prerequisites: AES 140 or AES 250 and AES 442. Lab 6. **Cr**

AES 449 Soil Organic Matter and Fertility
Fundamental aspects of soil organic matter management. Principles of pla residue decomposition and the environmental and agricultural implication of human intervention in this process. (Fall - odd.) Prerequisites: AES 14 or AES 250 and CHY 132 or BMB 208. Lec 3, Lab 1. **Cr**

AES 457 Plant Pathology
Principles of plant disease. Open to juniors and seniors. Prerequisite: BIO 100. Lec 3, Lab 1. **Cr**

AES 479 Crop Ecology and Physiology
An examination of agricultural systems focusing on the physiological responses of plant communities and the critical role of nitrogen, water relations and photosynthesis within these communities. Extensive reading and a written project are required. (Spring - even.) Prerequisites: AES 100 AES 105 or permission. Lec 3. **C**

AES 509 Experimental Design
Principles of research in biological sciences, design of experiments, statistical analysis and interpretation of data. Lec 3, Lab 2. **C**

AES 510 Plant Population Ecology
Dispersal, dormancy, recruitment, competitive interactions, effects of herbivores and pathogens, ecotypic differentiation and micro-evolution, patterns of resource allocation toward vegetative growth and reproduction (Fall - even.) Prerequisite: BIO 319 or permission. **C**

AES 546 Chemistry of Soils
Covers composition and chemical transformation in soils, soil-solution equilibria considerations, soil profile development, and ion-exchange phenomena in soils. (Spring - even.) Prerequisites: AES 140, AES 440 or permission. Lec 2, Lab 4. **C**

AES 549 Advanced Soil Microbiology
Soil microorganisms and there relevance to ecosystem processes (nutrient cycling, energy flow, etc..) (Fall - even.) Prerequisite: BMB 322 or permission. Lec 3, Lab 3. **C**

AES 580 Graduate Seminar in Applied Ecology and Environmental Sciences
Student presentations of their research proposal before a critical audience peers and faculty. **C**

AES 597 Special Topics in Applied Ecology and Environmental Scien
Advanced study of topics in applied ecology and environmental sciences Prerequisite: permission. **Cr**

Courses in Anthropology (ANT)

ANT 101 Introduction to Anthropology: Human Origins and Prehist
A survey course focusing on the evolution of humankind, the developme culture, and the beginnings of civilization. Required for Anthropology majors. (Satisfies the General Education Human Values and Social Conte

Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) **Cr 3.**

ANT 102 Introduction to Anthropology: Diversity of Cultures
A survey course focusing on the nature of culture, similarities and differences among the world's cultures, relationships among cultures, and culture change. Required for Anthropology majors. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) **Cr 3.**

ANT 107 Introduction to World Archaeology
An overview of the human record as determined by archaeology using examples drawn from the global experience. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 3.**

ANT 120 Religions of the World
A survey of the distinctive features of the major world religions and the most studied Native American, African and aboriginal Australian religions. Focuses on the fit between myth and ritual, the problems involved in trying to understand both "from the believer's point of view," and what generalizations can be made about religion in general. (Satisfies the General Education Human Values and Social Contexts Cultural Divesity and International Perspectives Requirement.) **Cr 3.**

ANT 170 Popular Archaeology
Many popular ideas about the past are at odds with what professional archaeologists think they know. Most of us find the past inherently interesting, without embellishment. But we are commonly confronted by intriguing beliefs in visits by ancient astronauts, the lost continent of Atlantis, etc. While some of these ideas may have merit, many do not. This course develops methods for evaluating critically the archaeological record, sorting out science from pseudoscience and distinguishing that which is plausible from that which is unlikely. **Cr 3.**

ANT 173 Archaeology of American Civilization
The spread of European culture to the Americas, particularly during colonial and early American periods, as seen through its archaeological sites and artifacts. This introductory survey entails a chronological and topical survey of the evolution of American civilization covering Native American-European contact, early colonial sites, 18th-century society, and the industrial revolution. Emphasis on North America. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) **Cr 3.**

ANT 210 Physical Anthropology
Introduces current topics in human biology and evolution including human origins and the fossil record, human genetics and population variability, and human and non-human primate behavior. (Satisfies the General Education Science Applications of Scientific Knowledge Requirement.) **Cr 3.**

ANT 221 Introduction to Folklore
A survey of the different genres of folklore, its forms, uses, functions and modes of transmission. Emphasis on belief, custom and legend. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and the Cultural Diversity and International Perspectives Requirements.) **Cr 3.**

ANT 300 Basic Theory in Cultural Anthropology
A seminar in which the most important theories shaping modern cultural and social anthropology will be presented through the analysis of key monographs. Emphasis placed on developing critical thinking and library research skills. (Satisfies the General Education Social Context and Institutions, Cultural Diversity and International Perspectives and Writing Intensive Requirements.) Required of all Anthropology majors. Prerequisite: ANT 102 and major standing or permission. **Cr 3.**

ANT 317 Fundamentals of Archaeology
Techniques of excavation and analysis; theoretical basis of methods and fundamental principles; application to specific case studies; the use of geological, biological, chemical and other tools in archaeological research. A one-day compulsory weekend field trip to local archaeological sites. Required for Anthropology majors. (Satisfies the General Education Science Applications of Scientific Knowledge, the Human Values and Social Context Cultural Diversity and International Perspectives Requirements.) Prerequisites: ANT 101 or ANT 170 or ANT 173 or ANT 107 or permission. **Cr 3.**

ANT 405 Nutritional Anthropology
An anthropological approach to the study of food preferences and eating patterns, as well as individual and population variability in nutrient requirements for different environments and life stages. Emphasizes both biological and sociocultural aspects of such topics as obesity, lactose intolerance infant feeding practices, and food networks. Prerequisite: ANT 101 or ANT 102 or FSN 101 or permission. **Cr 3.**

ANT 413 Museum Anthropology
Class projects in the Hudson Museum centering on curation, conservation, exhibition or interpretation of archaeological and ethnographic objects. The class project will be determined at the beginning of each semester. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: permission. **Cr 3.**

ANT 422 Folklore of Maine and The Maritime Provinces
A survey of the genres of folklore found in the major linguistic traditions (English, French, Native American) of the Northeast, with emphasis on Maine. Special attention given to the occupational traditions of farming, fishing and lumbering. Prerequisite: ANT 221 or permission of instructor. **Cr 3.**

ANT 424 Narrative
Considers narrative and storytelling as universals in human culture including definitions and distinctions (myths, legends, history, story, truth, fiction), uses and functions, performance and creativity. Illustrative material drawn from a variety of cultures, including Native American groups. Prerequisite: ANT 221 or permission of instructor. **Cr 3.**

ANT 425 Oral History and Folklore: Fieldwork
Training and experience in collecting materials of folklore, folklife and oral history, especially through use of tape recorders. Covers advance preparations, interviewing techniques, processing of transcripts, and utilization of materials so gathered in writing and research. Tape and equipment provided. Prerequisite: permission. **Cr 3.**

ANT 437 Medical Anthropology
Examines health systems in western and non-western societies from ethnomedical and medical ecological perspectives. Focus on social and cultural implications of health-related beliefs and practices and their relationship to evolution, ecology and epidemiology. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ANT 102 or ANT 300 or permission. **Cr 3.**

ANT 439 Psychological Anthropology
An introduction to the concepts, theories and techniques involved in anthropological investigations of the relationships of culture, society, and the individual. Prerequisite: ANT 102 or ANT 300 or permission. **Cr 3.**

ANT 441 People and Cultures of the Pacific Islands
Topics include Pacific geography, the history and prehistory of the the Pacific islands, cultural traditions of the ancient Polynesians with special reference to the political evolution of their societies, cultural traditions of the Melanesians with special reference to art, warfare and ritual, cultural traditions of the Micronesians with special reference to the problems of these Oceanic people in the modern world. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ANT 102 or ANT 300 or permission. **Cr 3.**

ANT 445 Gender and Anthropology
An interdisciplinary analysis of social, cultural, economic, political and religious factors that shape people's conceptions of sexuality, masculinity

Courses in Academic and Career Exploration (ACE)

ACE 100 Academic and Career Explorations Seminar
Introduction to UMaine resources, academic programs and strategies for achieving academic success. Activities designed to foster exploration and evaluation of interests, goal and abilities and their relationship to potential majors and careers. Prerequisite: First year ACE student or permission of ACE Director. (Pass/Fail Grade Only). **Cr 1.**

ACE 196 Academic and Career Exploration Field Experience
Field experience for students seeking to explore their academic and career interests. Prior approval of the field experience is required and will be based on a detailed written plan and documentation presented by the student and approved by the Career Center Manager or the student's Faculty Advisor or Academic Dean. Open to students in all majors as well as students with undeclared majors. Prerequisite: permission. **Cr 0-3.**

Courses in Art Education (AED)

AED 171 The Teaching of Art
Current approaches, methods and materials for the teaching of art in the elementary grades. Art Education theory and curricula taught in conjunction with general art knowledge and experiences. Junior or senior elementary education majors or permission. Not open to art education majors. (Satisfies the General Education Artistic and Creative Expression Requirement.) Lec 2, Lab 1. **Cr 3.**

AED 371 Methods and Materials in Art Education
Introduction to instructional methods and strategies in art education. Exploration, development and evaluation of approaches to teaching, teaching and learning styles, educational materials, media and technologies. Provides an opportunity for in-school teaching observations. Required for art education majors and art certification students. Open to non-art education majors by permission only. Prerequisites: EDB 202 and EDB 221; ART 100, ART 200, ART 110 and ART 120; ARH 155 and ARH 156; 15 credits of college requirements. Corequisites: AED 372 and AED 373. Lec 1, Lab 2. **Cr 3.**

AED 372 Foundations of Art Education
Includes historical, philosophical, political, psychological and sociological foundations of art education; theories of child art; and critical examination of current research, trends and issues in art education. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Art education majors or art certification students only. Corequisites: AED 371 and AED 373. Lec 3. **Cr 3.**

AED 373 Introduction to Curriculum
Introduction to art curricula strategies and development. Includes instructional planning, lesson writing and organization, and practicum experience. Art education majors or art certification students only. Corequisite: AED 371 and AED 372. Lec 2, Lab 1. **Cr 3.**

AED 375 Art Education Workshop and Laboratory
Plan of study, projects and credit arranged. Limited to art education majors. **Cr Ar.**

AED 473 Advanced Curriculum in Art Education
An examination of current theory, research and practice pertaining to curriculum development in art education. Including an exploration of traditional and innovative approaches to curriculum development in art education, problems and issues relevant to art curricula design and implementation, critical examination of existing curricula, and practice in developing and evaluating art curricula. Art education majors, art certification students or by instructor's permission only. Prerequisites: AED 371, AED 372 and AED 373 or permission. Lec 3. **Cr 3.**

AED 474 Topics in Art Education
Seminar in advanced research and practice in art education and related areas. Specific topic to be announced. **Cr 3.**

AED 496 Field Experience in Art Education
Students involved in pre-professional activities with art education in schools or community agencies may apply for supervision and credit for the project. Prerequisite: AED 371, AED 372, AED 373 and permission. **Cr Ar.**

AED 497 Independent Study in Art Education
Advanced projects, readings, or seminars in art education. Topic and form of study to be determined by student in consultation with faculty member. Prerequisite: AED 371, AED 372, AED 373 or equivalents and permission. **Cr Ar.**

AED 498 Directed Study in Art Education
Advanced projects, readings, or seminars in art education. Topic and form of study to be determined by student in consultation with faculty member. Prerequisite: AED 371, AED 372, AED 373 or equivalents and permission. **Cr Ar.**

AED 574 Topics in Art Education
Advanced seminar and workshop with research projects in art education and related areas. Specific topic to be announced or arranged. The course may be repeated once for credit. Prerequisite: Art teaching experience. **Cr 3.**

AED 597 Independent Study in Art Education
Advanced level projects, readings or seminars in art education. Topic and form of study to be determined by the student in consultation with faculty member. Prerequisite: graduate standing and permission. May be repeated for credit. **Cr 3.**

AED 598 Directed Study in Art Education
Structured projects, readings or seminars in art education at an advanced level. Topics and form of study to be determined by the student under the direction of a faculty member. Prerequisite: graduate standing and permission. May be repeated for credit. **Cr 3.**

Courses in Applied Ecology and Environmental Sciences (AES)

AES 100 Plant Science
Response of agricultural and horticultural plants to environmental factors such as moisture, temperature, light and soil fertility and pests. Manipulation of the environmental factors in order to improve plant growth is discusses. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Lec 3, Lab 2. **Cr 4.**

AES 101 Cropping Systems
Principles and practices of various cropping systems involving agricultural crops. Weekly guest lecturers discuss major species of the Northeast. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: AES 100 or permission. Rec 4. **Cr 4.**

AES 105 Principles of Sustainable Agriculture
Basic design principles and examples of environmentally and economically sustainable agricultural systems. The course will describe the use of synthetic fertilizers and pesticides, but emphasis will be placed on identifying management practices that a) biologically improve soil structure, organic matter content, and fertility; and b) minimize or eliminate the need for chemical interventions for control of insect pests, pathogens, and weeds. (Satisfies the General Education Human Values and Social Contexts Population and the Environment Requirement.) Rec 3. **Cr 3.**

AES 140 Soil Science
Considers the chemical, physical and biological properties of soil, as well as the origin, management and interrelationships of soils to plant growth. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BMB 207 or CHY 121. Rec 3. **Cr 3.**

AES 141 Soil Science Lab
A series of practical laboratory exercises providing hands-on experience with soil measurements and information use. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BMB 207 or CHY 121. **Cr 1.**

AES 250 Forest Soil Science
Fundamentals of soil science in the context of forest ecosystems including development, properties, and management. Linkages between soils and forest growth, surface and ground water, and the atmosphere are emphasized. Prerequisite: CHY 121. Rec 3. **Cr 3.**

AES 305 Problems in Applied Ecology and Environmental Sciences
Opportunity is provided for specialization in specific areas of applied ecology and environmental sciences. Prerequisite: permission. **Cr Ar.**

AES 344 Soil and Water Conservation
A consideration of the human-influenced and natural processes affecting soil quality and water quality. The linkages between soil and water quality will be emphasized. State and federal regulation of soil and water quality will be discussed. The class meets in one 4 hour block per week. Class time will be spent primarily in lecture and group work. There will be occasional field trips and laboratory exercises. Prerequisites: AES 140/AES 141 or AES 250 or permission. **Cr 3.**

AES 360 Chemical Principles of Environmental Quality
Introduction to environmental chemistry presenting how chemical principles can be applied to the understanding of environmental problems. Emphasizes the effect of our industrial activity; the flow of chemicals and energy through the atmosphere, hydrosphere and biosphere. Prerequisites: AES 140, AES 141 and either BMB 208 or CHY 132. Lec 3. **Cr 3.**

AES 396 Field Experience in Applied Ecology and Environmental Sciences
An approved program of work experience which contributes to the academic major and for which academic credit is given. Students may work part time or full time for a semester in a job related to their professional career goals. Prerequisite: junior standing and permission. (Pass/Fail Grade Only.) **Cr 1-16.**

AES 401 Advanced Crop Management
Production practices for specific agricultural crops important to Maine. Students may register for one or more of the following sections. (001) Fruits. Scientific principles and practices used in the production of fruit crops. The culture of fruits adapted to the Northeast with emphasis on apples and blueberries. (002) Vegetables. The characteristics and culture of important vegetable crops. Considers their adaptation to local soil and climatic conditions. (003) Forages. The practices important in grazing management, and cultivation of forest grasses, legumes, and silage corn. Covers the principles of forage preservation. (Spring - odd.) (004) Potato. Production practices of potatoes for tablestock, processing and seed. Prerequisite: AES 100 or AES 101 or permission. **Cr 3.**

AES 403 Weed Ecology and Management
Ecological principles and their application in non-chemical and reduced input weed management strategies. (Fall - odd.) Prerequisites: AES 100, AES 101 and BIO 319 or WLE 200; or equivalents. Lec 2, Lab 2. **Cr 3.**

AES 440 Soil Chemistry and Plant Nutrition
A study of the origin and nature of soil chemical properties and their effects on plant growth, the source and function of essential nutrients, the chemistry of fertilizer and lime reactions in soils. The environmental consequences of fertilization and other soil management practices are emphasized. Prerequisites: AES 140 or AES 250 and CHY 132 or BMB 208. Lec 3. **Cr 3.**

AES 442 Soil Taxonomy
Taxonomy and classification of soils. Prerequisites: AES 140 or AES 250 and GES 101. Junior, senior or graduate standing. Rec 2, Lab 3. **Cr 3.**

AES 444 Soil Morphology and Soil Mapping
Soil profile description and soil map construction taught in an intensive 3 week course. Prerequisites: AES 140 or AES 250 and AES 442. Lab 6. **Cr 3.**

AES 449 Soil Organic Matter and Fertility
Fundamental aspects of soil organic matter management. Principles of plant residue decomposition and the environmental and agricultural implications of human intervention in this process. (Fall - odd.) Prerequisites: AES 140 or AES 250 and CHY 132 or BMB 208. Lec 3, Lab 1. **Cr 4.**

AES 457 Plant Pathology
Principles of plant disease. Open to juniors and seniors. Prerequisite: BIO 100. Lec 3, Lab 1. **Cr 4.**

AES 479 Crop Ecology and Physiology
An examination of agricultural systems focusing on the physiological responses of plant communities and the critical role of nitrogen, water relations and photosynthesis within these communities. Extensive reading and a written project are required. (Spring - even.) Prerequisites: AES 100, AES 105 or permission. Lec 3. **Cr 3.**

AES 509 Experimental Design
Principles of research in biological sciences, design of experiments, statistical analysis and interpretation of data. Lec 3, Lab 2. **Cr 4.**

AES 510 Plant Population Ecology
Dispersal, dormancy, recruitment, competitive interactions, effects of herbivores and pathogens, ecotypic differentiation and micro-evolution, patterns of resource allocation toward vegetative growth and reproduction. (Fall - even.) Prerequisite: BIO 319 or permission. **Cr 3.**

AES 546 Chemistry of Soils
Covers composition and chemical transformation in soils, soil-solution equilibria considerations, soil profile development, and ion-exchange phenomena in soils. (Spring - even.) Prerequisites: AES 140, AES 440 or permission. Lec 2, Lab 4. **Cr 4.**

AES 549 Advanced Soil Microbiology
Soil microorganisms and there relevance to ecosystem processes (nutrient cycling, energy flow, etc..) (Fall - even.) Prerequisite: BMB 322 or permission. Lec 3, Lab 3. **Cr 4.**

AES 580 Graduate Seminar in Applied Ecology and Environmental Sciences
Student presentations of their research proposal before a critical audience of peers and faculty. **Cr 1.**

AES 597 Special Topics in Applied Ecology and Environmental Sciences
Advanced study of topics in applied ecology and environmental sciences. Prerequisite: permission. **Cr Ar.**

Courses in Anthropology (ANT)

ANT 101 Introduction to Anthropology: Human Origins and Prehistory
A survey course focusing on the evolution of humankind, the development of culture, and the beginnings of civilization. Required for Anthropology majors. (Satisfies the General Education Human Values and Social Context/

Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Cr 3.

ANT 102 Introduction to Anthropology: Diversity of Cultures
A survey course focusing on the nature of culture, similarities and differences among the world's cultures, relationships among cultures, and culture change. Required for Anthropology majors. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Cr 3.

ANT 107 Introduction to World Archaeology
An overview of the human record as determined by archaeology using examples drawn from the global experience. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Cr 3.

ANT 120 Religions of the World
A survey of the distinctive features of the major world religions and the most studied Native American, African and aboriginal Australian religions. Focuses on the fit between myth and ritual, the problems involved in trying to understand both "from the believer's point of view," and what generalizations can be made about religion in general. (Satisfies the General Education Human Values and Social Contexts Cultural Divesity and International Perspectives Requirement.) Cr 3.

ANT 170 Popular Archaeology
Many popular ideas about the past are at odds with what professional archaeologists think they know. Most of us find the past inherently interesting, without embellishment. But we are commonly confronted by intriguing beliefs in visits by ancient astronauts, the lost continent of Atlantis, etc. While some of these ideas may have merit, many do not. This course develops methods for evaluating critically the archaeological record, sorting out science from pseudoscience and distinguishing that which is plausible from that which is unlikely. Cr 3.

ANT 173 Archaeology of American Civilization
The spread of European culture to the Americas, particularly during colonial and early American periods, as seen through its archaeological sites and artifacts. This introductory survey entails a chronological and topical survey of the evolution of American civilization covering Native American-European contact, early colonial sites, 18th-century society, and the industrial revolution. Emphasis on North America. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Cr 3.

ANT 210 Physical Anthropology
Introduces current topics in human biology and evolution including human origins and the fossil record, human genetics and population variability, and human and non-human primate behavior. (Satisfies the General Education Science Applications of Scientific Knowledge Requirement.) Cr 3.

ANT 221 Introduction to Folklore
A survey of the different genres of folklore, its forms, uses, functions and modes of transmission. Emphasis on belief, custom and legend. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and the Cultural Diversity and International Perspectives Requirements.) Cr 3.

ANT 300 Basic Theory in Cultural Anthropology
A seminar in which the most important theories shaping modern cultural and social anthropology will be presented through the analysis of key monographs. Emphasis placed on developing critical thinking and library research skills. (Satisfies the General Education Social Context and Institutions, Cultural Diversity and International Perspectives and Writing Intensive Requirements.) Required of all Anthropology majors. Prerequisite: ANT 102 and major standing or permission. Cr 3.

ANT 317 Fundamentals of Archaeology
Techniques of excavation and analysis; theoretical basis of methods and fundamental principles; application to specific case studies; the use of geological, biological, chemical and other tools in archaeological research. A one-day compulsory weekend field trip to local archaeological sites. Required for Anthropology majors. (Satisfies the General Education Science Applications of Scientific Knowledge, the Human Values and Social Context Cultural Diversity and International Perspectives Requirements.) Prerequisites: ANT 101 or ANT 170 or ANT 173 or ANT 107 or permission. Cr 3.

ANT 405 Nutritional Anthropology
An anthropological approach to the study of food preferences and eating patterns, as well as individual and population variability in nutrient requirements for different environments and life stages. Emphasizes both biological and sociocultural aspects of such topics as obesity, lactose intolerance infant feeding practices, and food networks. Prerequisite: ANT 101 or ANT 102 or FSN 101 or permission. Cr 3.

ANT 413 Museum Anthropology
Class projects in the Hudson Museum centering on curation, conservation, exhibition or interpretation of archaeological and ethnographic objects. The class project will be determined at the beginning of each semester. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: permission. Cr 3.

ANT 422 Folklore of Maine and The Maritime Provinces
A survey of the genres of folklore found in the major linguistic traditions (English, French, Native American) of the Northeast, with emphasis on Maine. Special attention given to the occupational traditions of farming, fishing and lumbering. Prerequisite: ANT 221 or permission of instructor. Cr 3.

ANT 424 Narrative
Considers narrative and storytelling as universals in human culture including definitions and distinctions (myths, legends, history, story, truth, fiction), uses and functions, performance and creativity. Illustrative material drawn from a variety of cultures, including Native American groups. Prerequisite: ANT 221 or permission of instructor. Cr 3.

ANT 425 Oral History and Folklore: Fieldwork
Training and experience in collecting materials of folklore, folklife and oral history, especially through use of tape recorders. Covers advance preparations, interviewing techniques, processing of transcripts, and utilization of materials so gathered in writing and research. Tape and equipment provided. Prerequisite: permission. Cr 3.

ANT 437 Medical Anthropology
Examines health systems in western and non-western societies from ethnomedical and medical ecological perspectives. Focus on social and cultural implications of health-related beliefs and practices and their relationship to evolution, ecology and epidemiology. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ANT 102 or ANT 300 or permission. Cr 3.

ANT 439 Psychological Anthropology
An introduction to the concepts, theories and techniques involved in anthropological investigations of the relationships of culture, society, and the individual. Prerequisite: ANT 102 or ANT 300 or permission. Cr 3.

ANT 441 People and Cultures of the Pacific Islands
Topics include Pacific geography, the history and prehistory of the the Pacific islands, cultural traditions of the ancient Polynesians with special reference to the political evolution of their societies, cultural traditions of the Melanesians with special reference to art, warfare and ritual, cultural traditions of the Micronesians with special reference to the problems of these Oceanic people in the modern world. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ANT 102 or ANT 300 or permission. Cr 3.

ANT 445 Gender and Anthropology
An interdisciplinary analysis of social, cultural, economic, political and religious factors that shape people's conceptions of sexuality, masculinity

ligion, culture, and political ideology as systems of belief and value, 2) the lationship between religious and national identity and 3) the role of erests and values in determining political action. (Satisfies the General lucation Human Values and Social Context/ Social Contexts and stitutions Requirement.)
Cr 3.

NT 472 North American Prehistory
he history of North American native peoples from the first evidence to the rival of the Europeans. Emphasis on major issues such as glacial and stglacial adaptation, development of agriculture, and the emergence of dentism. Prerequisite: ANT 317 or permission.
Cr 3.

NT 473 Principles of Colonial Archaeology
review of methods used in historic archaeology to investigate the spread of ropean culture to the Americas, particularly during colonial and early nerican periods. Covers excavation techniques, documentary research and alytical methods. Case studies taken principally from French and English lonial sites in Maine. Recommended for students wishing to participate on cavations of historic sites (see ANT 477, Field Research in Archaeology.) me familiarity with either archaeology or early American history helpful.
Cr 3.

NT 474 Artifacts of Colonial America
laboratory course covering the identification, classification, and erpretation of artifacts from historic archaeological sites. Handcrafted and ss-produced materials of domestic and foreign manufacture will be sidered, especially the glass, iron and ceramic artifacts most commonly overed on Colonial and Early American sites. Class projects will erally focus on collections from excavation in Maine. (Satisfies the neral Education Science Applications of Scientific Knowledge quirement.)
: 3, Lab 2.
Cr 4.

NT 475 Paleoenvironmental Archaeology
oduces historical and current theoretical literature which addresses tural environmental relationships in prehistoric contexts. Emphasis on lining the kinds of environmental data that survive in the historical record ological, floral, faunal, soils, etc.), the sampling methods used to collect erent kinds of data and types of inferences that can be made from viving data regarding fossil cultural environmental relationships. tisfies the General Education Human Values and Social Context pulation and the Environment Requirement.) Prerequisite: ANT 317.
Cr 3.

NT 477 Field Research in Archaeology
oduction to archaeological field techniques through excavation of an haeological site. Intensive training in site survey, excavations techniques, ording, analysis and preliminary interpretation of archaeological erials. Generally conducted on prehistoric and historic sites in Maine. mission by application only. (Satisfies the General Education Science plications of Scientific Knowledge and the Human Values and Social text Cultural Diversity and International Perspectives Requirements.) requisite: permission. Offered Summers only.
Cr 2-6.

NT 478 Zooarchaeology
boratory course covering techniques for analysis and interpretation of ological remains from archaeological sites. (Satisfies the General cation Science Basic or Applied Sciences Requirement.) Prerequisite: T 317 or permission. Rec 2, Lab 2.
Cr 4.

NT 479 Advanced Laboratory Techniques in Archaeology
view of site sampling and artifact classification necessary to the paration of archaeological site reports. Prerequisite: ANT 317. Some field erience recommended. Rec 2, Lab 2.
Cr 3.

NT 480 South American Prehistory
istory archaeology of South America from the first arrival of people to th Spanish Conquest. Changing lifeways as South American peoples pted to and with new and changing environments and technologies. gin and development of complex society in the region, culminating with th nca Empire. (Satisfies the General Education Human Values and Social text Cultural Diversity and International Perspectives Requirement.) Prerequisites: ANT 101 or ANT 107 or ANT 170 or permission.
Cr 3.

ANT 481 Language and Culture
Introduction to the writings of key figures in the fields, exploring their broader implications in such areas as non-linguistic communication, semantics, linguistic relativity, structural anthropology and general problems in cognitive Anthropology. Prerequisite: ANT 102 and INT 410 or permission.
Cr 3.

ANT 490 Topics in Anthropology
Advanced treatment of specialized problems in anthropology with emphasis on analysis in frontier areas of anthropological research. Topics vary. May be repeated for credit. Prerequisite: permission.
Cr 3.

ANT 491 Intercultural Understanding
A human relations workshop in which anthropology and other social and behavioral sciences are applied to cultural, ethnic, racial, religious and intergroup conflict in contemporary life. Students draw upon their own background and experiences. Offered Summers only.
Cr 3.

ANT 492 Capstone in Anthropology
Provides seniors with an opportunity to conduct in-depth research and analysis with a faculty member in conjunction with an existing course. Program must be approved by department. Required of majors. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: senior standing.
Cr 1.

ANT 497 Department Projects
A special project course. Specific content, scheduling and credit hours proposed by student in consultation with instructor. Maximum of 3 credit hours.
Cr Ar.

ANT 499 Current Issues in Modern Anthropology
A seminar on the selected theorists whose work has had an enduring significance in the development of anthropology. Emphasis on key theoretical approaches behind contemporary work in anthropology, the place of anthropology in intellectual history, and the relationship between anthropology and the other social sciences. Prerequisite: ANT 300 or ANT 215 or permission.
Cr 3.

ANT 570 Seminar in Northeastern North American Prehistory
The prehistory of Northeastern North America viewed from an interdisciplinary perspective. Prerequisite: ANT 472 or equivalent and permission.
Cr 3.

ANT 571 Archaeology of Complex Societies
Archaeological perspective on the development of complex societies: those societies differentiated by status, occupation and other criteria, in which most people submit to the authority of a small, elite group with a monopoly over force. Also archaeological analysis of institutions in complex societies using the Inca empire of South America for examples. Prerequisite: One upper division course in Anthropology and/or permission.
Cr 3.

ANT 573 Advanced Methods in Historical Archaeology
A seminar devoted to researching American lifeways of historic periods using archaeological and historical data. Emphasis on interpreting current UM excavations. Prerequisite: ANT 474 or ANT 477.
Cr 3.

ANT 576 Models in Archaeology
A seminar considering current theoretical approaches to prehistoric archaeology. Prerequisite: ANT 472 or equivalent and permission.
Cr 3.

ANT 597 Advanced Topics in Anthropology
Advanced students study selected topics with a staff member. Prerequisite: Graduate student standing and advanced undergraduates by permission. Credits to be arranged with instructor. Departmental approval required.
Cr 1-3.

and femininity in egalitarian, ranked and stratified societies. In addition the impact of political and economic transformations, such as colonialism, economic development policies and state policies upon gender definition and relations will be explored. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: ANT 102. **Cr 3.**

ANT 450 Hunters and Food Gatherers
A survey of the vanishing people whose subsistence economy has remained at the hunting and gathering level. Focus on groups in all major geographical and cultural areas and their unique and common problems. Emphasis on environmental and cultural perspectives. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ANT 102 or ANT 300 or permission. **Cr 3.**

ANT 451 North American Indian Ethnology
Covers both traditional culture patterns and modern developments and problems. Includes consideration of traditional culture areas, emphasizing adaptations and cultural dynamics, past and present. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: ANT 102 or ANT 300 or permission. **Cr 3.**

ANT 452 Civilization in South Asia
An exploration into the nature of civilization in South Asia, focusing on India. The central religious tradition of Hinduism and the caste order are investigated, with complementary perspectives provided by non-Hindu traditions. The impact of colonialism and development of national identities are also considered. Anthropological views are distinguished from and supplemented by other disciplinary perspectives. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisites: ANT 102 or ANT 300 or permission of instructor. **Cr 3.**

ANT 453 People and Cultures of Mesoamerica
A study of contemporary peasant and tribal societies of Mexico and Guatemala including their history since the Spanish Conquest. Focuses on Mestizo and Native American communities, relations between folk societies and urban areas, current theory concerning Middle American societies. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ANT 102 or ANT 300 or permission. **Cr 3.**

ANT 454 Cultures and Societies of the Middle East
Emphasis on Arab world, Turkey, Iran and Afghanistan. Covers religious organization, kinship, political organization, and economics as well as contemporary life and the current problems in the ethnography. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ANT 102 or ANT 300 or permission. **Cr 3.**

ANT 456 Ethnic Conflict in the Modern World
An exploration of ethnic conflict and revival today including a survey of anthropological theories of ethnicity, focusing on ethnic revival in the modern world. European and other ethnic groups of the industrialized West provide the major cases to be considered. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisites: ANT 102 or ANT 300 or permission of instructor. **Cr 3.**

ANT 459 Peoples and Cultures of South America
Social, political, economic and religious institutions of native and mestizo peoples in South America, using examples from selected areas (Amazonian lowlands, Andean highlands, southern cone.) Traditional culture patterns and modern developments and problems, including syncretism of European and native systems and role of modern beliefs about pre-European lifeways. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ANT 102 or permission. **Cr 3.**

ANT 461 Islamic Fundamentalism
A survey of the distinctive ideological and social features of Islamic fundamentalist movements of the twentieth century including comparisons with other religious revitalization movements. Prerequisite: one course in Anthropology or Sociology or permission. **Cr 3.**

ANT 462 Numerical Methods in Anthropology
Introduction to how numerical methods are used in anthropological research. Topics include: survey and history of numerical methods in anthropology, presentation and description of quantitative and qualitative anthropological data, probability, testing anthropological hypotheses using parametric and nonparametric statistics, the pitfalls and potential of numerical methods in anthropology. (Satisfies the General Education Mathematics Requirement.) Prerequisites: 300 level course in anthropology or permission. MAT 232 recommended but not required. **Cr 3.**

ANT 463 Systems of Kinship and Descent
The basic concepts of kinship and descent in small-scale and complex societies; examination of specific systems; critical examination of the different approaches to the study of them. Emphasis on the relationship between kinship and other aspects of social structure. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ANT 102 or ANT 300 or permission. **Cr 3.**

ANT 464 Cultural Ecology
Comparative study of human populations in ecosystems. Topics include the adaptive nature of culture, implications of the ecological approach for anthropological theory, sociocultural evolution and change, and contemporary problems. Case studies from simple and complex societies. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions, Cultural Diversity and International Perspectives, and Population and the Environment Requirements.) Prerequisite: ANT 102 or ANT 300 or permission. **Cr 3.**

ANT 465 Political Anthropology
A study of mechanisms and institutions for mediating disputes and allocating public power in selected non-Western societies. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ANT 102 or ANT 300 or permission. **Cr 3.**

ANT 466 Economic Anthropology
Comparative study of production, consumption and exchange in selected non-Western societies. Emphasis on factors influencing economic decisions in a variety of social and cultural settings. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ANT 102 or ANT 300 or permission. **Cr 3.**

ANT 467 Peasant Studies
Peasants, neither primitive nor modern, are the majority of humanity. A comparative study of peasant societies in various parts of the world including a critical examination of the body of anthropological theory concerning peasantry. Prerequisite: ANT 102 or ANT 300 or permission. **Cr 3.**

ANT 469 Theories of Religion
Considers various anthropological approaches to religion including evolutionary, historical, psychological, functional, structural, and symbolic. Emphasis on the appropriateness of these theories for the wide range of cross-cultural material available. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ANT 102 or permission. **Cr 3.**

ANT 470 Religion and Politics
A study of religion and politics in a wide variety of human societies, past and present with particular emphasis on 1) the interrelationships among

religion, culture, and political ideology as systems of belief and value, 2) the relationship between religious and national identity and 3) the role of interests and values in determining political action. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions Requirement.) **Cr 3.**

ANT 472 North American Prehistory
The history of North American native peoples from the first evidence to the arrival of the Europeans. Emphasis on major issues such as glacial and postglacial adaptation, development of agriculture, and the emergence of sedentism. Prerequisite: ANT 317 or permission. **Cr 3.**

ANT 473 Principles of Colonial Archaeology
A review of methods used in historic archaeology to investigate the spread of European culture to the Americas, particularly during colonial and early American periods. Covers excavation techniques, documentary research and analytical methods. Case studies taken principally from French and English colonial sites in Maine. Recommended for students wishing to participate on excavations of historic sites (see ANT 477, Field Research in Archaeology.) Some familiarity with either archaeology or early American history helpful. **Cr 3.**

ANT 474 Artifacts of Colonial America
A laboratory course covering the identification, classification, and interpretation of artifacts from historic archaeological sites. Handcrafted and mass-produced materials of domestic and foreign manufacture will be considered, especially the glass, iron and ceramic artifacts most commonly recovered on Colonial and Early American sites. Class projects will generally focus on collections from excavation in Maine. (Satisfies the General Education Science Applications of Scientific Knowledge Requirement.)
Lec 3, Lab 2. **Cr 4.**

ANT 475 Paleoenvironmental Archaeology
Introduces historical and current theoretical literature which addresses cultural environmental relationships in prehistoric contexts. Emphasis on outlining the kinds of environmental data that survive in the historical record (geological, floral, faunal, soils, etc.), the sampling methods used to collect different kinds of data and types of inferences that can be made from surviving data regarding fossil cultural environmental relationships. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) Prerequisite: ANT 317. **Cr 3.**

ANT 477 Field Research in Archaeology
Introduction to archaeological field techniques through excavation of an archaeological site. Intensive training in site survey, excavations techniques, recording, analysis and preliminary interpretation of archaeological materials. Generally conducted on prehistoric and historic sites in Maine. Admission by application only. (Satisfies the General Education Science Applications of Scientific Knowledge and the Human Values and Social Context Cultural Diversity and International Perspectives Requirements.) Prerequisite: permission. Offered Summers only. **Cr 2-6.**

ANT 478 Zooarchaeology
A laboratory course covering techniques for analysis and interpretation of osteological remains from archaeological sites. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: ANT 317 or permission. Rec 2, Lab 2. **Cr 4.**

ANT 479 Advanced Laboratory Techniques in Archaeology
A review of site sampling and artifact classification necessary to the preparation of archaeological site reports. Prerequisite: ANT 317. Some field experience recommended. Rec 2, Lab 2. **Cr 3.**

ANT 480 South American Prehistory
Prehistory archaeology of South America from the first arrival of people to the Spanish Conquest. Changing lifeways as South American peoples adapted to and with new and changing environments and technologies. Origin and development of complex society in the region, culminating with the Inca Empire. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisites: ANT 101 or ANT 107 or ANT 170 or permission. **Cr 3.**

ANT 481 Language and Culture
Introduction to the writings of key figures in the fields, exploring their broader implications in such areas as non-linguistic communication, semantics, linguistic relativity, structural anthropology and general problems in cognitive Anthropology. Prerequisite: ANT 102 and INT 410 or permission. **Cr 3.**

ANT 490 Topics in Anthropology
Advanced treatment of specialized problems in anthropology with emphasis on analysis in frontier areas of anthropological research. Topics vary. May be repeated for credit. Prerequisite: permission. **Cr 3.**

ANT 491 Intercultural Understanding
A human relations workshop in which anthropology and other social and behavioral sciences are applied to cultural, ethnic, racial, religious and intergroup conflict in contemporary life. Students draw upon their own background and experiences. Offered Summers only. **Cr 3.**

ANT 492 Capstone in Anthropology
Provides seniors with an opportunity to conduct in-depth research and analysis with a faculty member in conjunction with an existing course. Program must be approved by department. Required of majors. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: senior standing. **Cr 1.**

ANT 497 Department Projects
A special project course. Specific content, scheduling and credit hours proposed by student in consultation with instructor. Maximum of 3 credit hours. **Cr Ar.**

ANT 499 Current Issues in Modern Anthropology
A seminar on the selected theorists whose work has had an enduring significance in the development of anthropology. Emphasis on key theoretical approaches behind contemporary work in anthropology, the place of anthropology in intellectual history, and the relationship between anthropology and the other social sciences. Prerequisite: ANT 300 or ANT 215 or permission. **Cr 3.**

ANT 570 Seminar in Northeastern North American Prehistory
The prehistory of Northeastern North America viewed from an interdisciplinary perspective. Prerequisite: ANT 472 or equivalent and permission. **Cr 3.**

ANT 571 Archaeology of Complex Societies
Archaeological perspective on the development of complex societies: those societies differentiated by status, occupation and other criteria, in which most people submit to the authority of a small, elite group with a monopoly over force. Also archaeological analysis of institutions in complex societies using the Inca empire of South America for examples. Prerequisite: One upper division course in Anthropology and/or permission. **Cr 3.**

ANT 573 Advanced Methods in Historical Archaeology
A seminar devoted to researching American lifeways of historic periods using archaeological and historical data. Emphasis on interpreting current UM excavations. Prerequisite: ANT 474 or ANT 477. **Cr 3.**

ANT 576 Models in Archaeology
A seminar considering current theoretical approaches to prehistoric archaeology. Prerequisite: ANT 472 or equivalent and permission. **Cr 3.**

ANT 597 Advanced Topics in Anthropology
Advanced students study selected topics with a staff member. Prerequisite: Graduate student standing and advanced undergraduates by permission. Credits to be arranged with instructor. Departmental approval required. **Cr 1-3.**

Courses in Art History (ARH)

ARH 151 Principles of Two-Dimensional Art
An analysis of the fundamental premises underlying such two-dimensional art forms as painting, drawing and printmaking. Not an historical survey, although masterpieces are studied. (Satisfies the General Education Human Values and Social Contexts Artistic and Creative Expression Requirement.) Lec 3. **Cr 3.**

ARH 152 Principles of Three-Dimensional Art
An analysis of the fundamental premises underlying such three-dimensional art forms as architecture and sculpture. Not an historical survey, although masterpieces are studied. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Lec 3. **Cr 3.**

ARH 155 Art History I
Introductory survey of painting, sculpture, architecture, and other arts in their various contexts from the Upper Paleolithic and Ancient World to the end of the Middle Ages. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives and Artistic and Creative Expression Requirements.) Lec 3. **Cr 3.**

ARH 156 Art History II
Introductory survey of painting, sculpture, architecture, and other arts in their various contexts from the Renaissance to the present. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Artistic and Creative Expression Requirement.) Lec 3. **Cr 3.**

ARH 162 Modern Architecture and Design
A broad survey of modern European and American architecture and design. Investigates historical building systems and decorations in terms of their relationship to 20th century achievements in building and engineering. Focus on the aesthetic and social ideas of structures, spaces and design as well as key monuments, schools, and major figures. Special emphasis on urban planning and environmental design. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression and the Western Cultural Tradition Requirements.) Lec 3. **Cr 3.**

ARH 168 Canadian Art
Survey of Canadian art and architecture from the native peoples to the 20th century. Emphasis on the major ideas and styles and their relationship to American and European prototypes and analogues. (Satisfies the General Education Human Values and Social Contexts Cultural Diversity and International Perspectives, the Artistic and Creative Expression and the Western Cultural Tradition Requirements.) Lec 3. **Cr 3.**

ARH 251 Classical Art
Survey of the art and architecture of Greece and Rome in their historical context since the beginnings of Aegean civilization to the Christianization of the Roman Empire. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives and Artistic and Creative Expression Requirements.) Prerequisite: ARH 155 or permission. Lec 3. **Cr 3.**

ARH 252 Mediterranean Medieval Art and Architecture
An in-depth survey of the art and architecture of the Mediterranean world, including Southern Europe, the Mid-East and northern Africa, from the first decades through the fourteenth century, examines how diverse Christian and Islamic cultures built upon the strong legacy of the Classical world. The unique artistic visions of each region spawned cross-cultural developments, facilitated by the relative ease of movement that the Mediterranean permitted. Prerequisite: ARH 155 or permission. **Cr 3.**

ARH 253 Northern European Medieval Art and Architecture
Surveys the art and architecture of the major civilizations of Northern Europe that developed there from the fourth century through the fifteenth, including the Carolingian, Ottonian, Romanesque and Gothic eras, focussing upon the diversity of particular cultural identities and their interrelationships among one another and the Mediterranean cultures with which they interacted. (Satisfies the General Education Human Values and Social Contexts Western Cultural Tradition and Cultural Diversity and International Perspectives Requirements.) Prerequisite: ARH 155 or permission. **Cr 3.**

ARH 255 Italian Renaissance Art
Survey of the major works of painting, sculpture and architecture of the Italian Renaissance in their historical context from the 13th century to the early 16th century. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives and Artistic and Creative Expression Requirements.) Prerequisite: ARH 156 or permission. Lec 3. **Cr 3.**

ARH 257 Northern Renaissance Art
Survey of the art of the Netherlands, France, Spain, and Germany in its historical context from Late Gothic of the 14th century to Mannerism of the 16th century. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives and Artistic and Creative Expression Requirements.) Prerequisite: ARH 155 and ARH 156 or permission. Lec 3. **Cr 3.**

ARH 258 Baroque Art and Architecture
Surveys the art and architecture of the Baroque era in Southern and Northern Europe, along with their settlements in the Americas, focus on the major shifts in the European world outlook. The course investigates how the art of the period reflects the rise of strong national identities, radically shifting political powers, growing colonialism around the globe, religious reformation and increased interests in empirical knowledge and scientific inquiry. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives and Artistic and Creative Expression Requirements.) Prerequisite: ARH 156 or permission. **Cr 3.**

ARH 260 The Modern Classical Tradition
This topical survey develops the Classical tradition in western visual arts from 1700 to 1900 within the broader context of the political, social and cultural changes of the era. It considers issues from the Rococo and Neoclassical movements to Realism, Impressionism and Post-Impressionism. Prerequisite: ARH 156 or permission. Lec 3. **Cr 3.**

ARH 261 The Modern Romantic Tradition
This topical survey of the romantic tradition in western visual arts from 1700 to 1900 looks to the broader political, social and cultural contexts of the era. This class considers movements in art from Romanticism to Symbolism and Post-Impressionism. Prerequisite: ARH 156 or permission. Lec 3. **Cr 3.**

ARH 262 Early Modern Art: From Fauvism to Surrealism
In a thematic consideration of art and its related concepts from 1900 to 1945, this course places particular emphasis on the notions of modernity and the diversity of artistic forms that the period spawned. Prerequisite: ARH 156 or permission. Lec 3. **Cr 3.**

ARH 263 Late Modern Art: From Abstract Expressionism Through New Forms
This thematic course considers art forms and conceptual developments from the mid-Twentieth century through the middle of the 1970's. It places particular emphasis on the expanding nature of the work of art and the changing role, place and function of the artist during the period. Prerequisite: ARH 156 or permission. Lec 3. **Cr 3.**

ARH 270 Topical Survey in History of Art
Surveys the historical artifacts and monuments of culture not covered by the regular rotation of Department offerings, such as those by African, Asian or Pre-Columbian peoples. Students may repeat this course for credit to study different cultures. (Satisfies the General Education Human Values and Social Contexts Social Contexts and Institutions, Cultural Diversity and International Perspectives and Artistic and Creative Expression Requirements.) Prerequisite: permission. **Cr 3.**

ARH 351 Art Theory and Criticism
Examination and discussion of aesthetic theory and its relationship to the visual arts; study of a wide range of ideas in the development of aesthetic

hought with primary emphasis on contemporary theory; application of heoretical systems in the critical analysis of a work of art. Prerequisite: ARH 155 and ARH 156 or permission. Lec 3. **Cr 3.**

ARH 352 Critical Methods in History of Art
This seminar immerses students within the historiography of History of Art, making them familiar with the philosophical underpinnings, historical context, rhetorical tones, critical vocabularies and intended goals of each investigative strategy. The exploration of the various methodological approaches that the field has supported includes: Connoisseurship, Iconography, Reception Theory, Marxism, Feminism, Deconstruction, Visual Linguistics and perhaps other emerging schemes. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and the Demonstrated Writing Competency Requirements.) Prerequisite: permission. Lec 3. **Cr 3.**

ARH 361 Topics in Art History
Identifies and develops a particular topic within the field of History of Art not covered by traditional notions of period, geographic identity, or style. Specific topics will vary from semester to semester. May be repeated for credit. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: ARH 155 or ARH 156 or permission. Lec 3. **Cr 3.**

ARH 362 Medieval Art and Architecture Seminar
Addresses focussed topics within the field of Medieval History of Art, such as the spread of the Gothic style across Europe, the regional flavors of the Romanesque, the relationship between the Byzantine and Roman churches, etc. Students define their own research projects, work with them over the course of the semester, present them within the forum of the seminar and develop them as major papers. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives, Artistic and Creative Expression and the Demonstrated Writing Competency Requirements.) Prerequisites: ARH 252, ARH 253 or permission. **Cr 3.**

ARH 363 Renaissance Art and Architecture Seminar
Addresses focussed topics defined by the instructor within the field of Renaissance History of Art, such as the post-Plague decades of the fourteenth century, the origins of Mannerism, the rise of artistic theory, etc. Students define their own research projects, work with them over the course of the semester, present them within the forum of the seminar and develop them as major papers. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives, Artistic and Creative Expression and the Demonstrated Writing Competency Requirements.) Prerequisites: ARH 255 or ARH 257 or permission. **Cr 3.**

ARH 366 Twentieth Century Art and Architecture Seminar
In an in-depth consideration, this seminar focuses upon the culture, period, artists or artist, or of a particular issue in the history of art and/or architecture of the twentieth century. Specific topics vary from semester to semester. May be repeated for credit. Prerequisites: ARH 262 or ARH 263 or permission. **Cr 3.**

ARH 368 History of Art Gender Studies Seminar
In a focussed study, this seminar will identify specific gender issues in the history of art, such as cultural vision and the male-gaze, feminist activism in the arts, gender codings of style, etc. Students will define their own research projects, work with them over the course of the semester, present them within the forum of the seminar and develop them as major papers. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Social Contexts and Institutions Cultural Diversity and International Perspectives, Artistic and Creative Expression and Demonstrated Writing Competency Requirements.) Prerequisites: ARH 155 or ARH 156 or permission. **Cr 3.**

ARH 369 Film and Video Theory Seminar
This seminar identifies specific topics in film and video theory, with careful attention to their critical language, philosophical underpinnings and social contexts and develop them in terms of select examples. Students define their own research projects, work with them over the course of the semester, present them within the forum of the seminar and develop them as major papers. Prerequisites: ARH 155 or ARH 156 or permission. **Cr 3.**

ARH 397 Independent Study in Art History
Advanced independent study or research and writing projects in the history of art and related areas. Prerequisite: Juniors and seniors only, permission. **Cr Ar.**

ARH 398 Directed Study in Art History
Advanced independent study or research and writing projects in the history of art and related areas. Prerequisite: Juniors and seniors only, permission. **Cr Ar.**

ARH 493 Medieval Research Seminar
Focus on special topics selected by the instructor in the field of Medieval History of Art. Students will define and research their own individual projects, present them within the forum of the seminar, with the aim of delivering them at a professional conference and bring them to fruition as publishable papers. (Satisfies the General Education Human Values and Social Contexts Western Cultural Tradition, Cultural Diversity and International Perspectives, Artistic and Creative Expression and Demonstrated Writing Competency Requirements.) Prerequisite: permission. **Cr 3.**

ARH 494 Renaissance Research Seminar
Focus on special topics selected by the instructor in the field of Renaissance History of Art. Students will define and research their own individual projects, present them within the forum of the seminar, with the aim of delivering them at a professional conference and bring them to fruition as publishable papers. (Satisfies the General Education Human Values and Social Contexts Western Cultural Tradition, Cultural Diversity and International Perspectives, Artistic and Creative Expression and the Demonstrated Writing Competency Requirements.) Prerequisite: permission. **Cr 3.**

ARH 495 Modern/Post-Modern Seminar
An advanced examination of major theoretical tendencies in modern and contemporary visual art, this seminar stresses connections with the other arts and various conceptual frames, such as Marxism, existentialism, structuralism and post-structuralism. Entails intensive reading, research and writing on selected topics that vary semester to semester. May be repeated for credit. Prerequisites: ARH 262 or ARH 263 or permission. **Cr 3.**

ARH 496 Field Experience in Art History
Students engaged in professional activities related to their area of study may apply for supervision and credit for the project. Prerequisite: Juniors and seniors only, permission. **Cr Ar.**

ARH 497 Independent Study in Art History
Advanced independent study or research and writing projects in the history of art and related areas. Prerequisite: Juniors and seniors only, permission. **Cr Ar.**

ARH 498 Directed Study in Art History
Advanced directed study or research and writing projects in the history of art and related areas. Prerequisite: Juniors and seniors only, permission. **Cr Ar.**

ARH 499 Capstone Experience in History of Art
As a guided practicum, this course will have senior majors draw from the full breadth of their undergraduate experiences in the History of Art. Requires students to research a focused project developed from primary source materials, in an investigation that will result in a professional presentation, namely a publishable paper, a public lecture, a museum show or an equivalent. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: permission. **Cr 3.**

ARH 597 Independent Graduate Study
Entails advanced research and writing projects in the history of art. Prerequisites: Graduate Standing and instructor's permission. **Cr 1-3.**

Courses in Art (ART)

ART 100 Drawing I
The fundamentals of drawing through creative exercises exploring the principles of line, value, texture, space, and form. Examines various media and their relationship to expression and composition. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Lab 6. **Cr 3.**

ART 110 2-D Design
Fundamentals of basic design through studio experience. Covers analysis of design, composition and basic perceptual and aesthetic aspects of color. Uses a series of problems that explore the areas listed above. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Lab 6. **Cr 3.**

ART 120 3-D Design
An introduction to the fundamentals of three dimensional design including volume, mass, line, plane, space and time. Uses a series of problems that explore the areas listed above. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Lab 6. **Cr 3.**

ART 131 Fundamentals of Painting I
Basic introductions to the painting art. Exercises in color, technique and composition. Studio and outdoor subjects. All media. Prerequisite: ART 200 or permission. (Not open to art majors.) Lab 6. **Cr 3.**

ART 132 Fundamentals of Painting II
Exercises in color, technique, and composition including studio and outdoor subjects utilizing all media. Prerequisite; ART 131 or permission. (Not open to art majors.) Lab 6. **Cr 3.**

ART 180 Photography I
Fundamentals of black and white photography, including film processing, printing and print control, camera basics, exposure, photographic history, lighting, and the art of photography. Prerequisite: Art majors must have advisor's permission. Lab 6. **Cr 3.**

ART 200 Drawing II
A continuation of the fundamentals of drawing in black and white media and the introduction of a variety of color media with continued emphasis on their relationship to expression and composition. Prerequisite: ART 100. Lab 6. **Cr 3.**

ART 220 Sculpture I
A series of projects that investigate the techniques and process approach in sculpture. Includes welding, carving, casting, forming and other forms of fabrication. General use of hand and power equipment. Prerequisite: ART 120. Lab 6. **Cr 3.**

ART 230 Painting I
Painting in oil or acrylic paint. Fundamentals of color mixing, paint application, composition and expressive content. Prerequisite: ART 200, ART 110. Lab 6. **Cr 3.**

ART 240 Printmaking I
The fundamentals of printmaking covering monoprinting and intaglio. Emphasis on technical, aesthetic, conceptual and expressive development. Prerequisite: ART 110, ART 200. Lab 6. **Cr 3.**

ART 250 Graphic Design I
Explores the principles of applied design as used in the production of brochures, catalogues, magazines, newspapers, etc. Exercises in type, layout and issues of technology will be covered. Prerequisite: ART 110 or permission. Lab 6. **Cr 3.**

ART 260 Topics in Studio Art
Selected topics surveying specific media, thematic content or contemporary issues. Topics will vary from semester to semester. May be repeated for credit. Prerequisites: ART 200, ART 110, ART 120 or permission. Lab 6. **Cr 3.**

ART 280 Photography II
A continuation of the fundamentals of black and white photography. Prerequisite: ART 180. Lab 6. **Cr 3.**

ART 300 Drawing III
Continued study of drawing in a wide variety of media. Emphasis on creative thinking, problem solving, expression and technique. Prerequisite: ART 200. Lab 6. **Cr 3.**

ART 302 Figure Drawing
Drawing based on the human figure. Focus on understanding the basics of human structure and incorporating this understanding with technical, expressive and aesthetic development. Prerequisite: ART 200. Lab 6. **Cr 3.**

ART 320 Sculpture II
A thematic and process approach to exploring concepts allowing students to pursue selected individual projects. Introduction to additional materials and techniques. Prerequisite: ART 220. Lab 6. **Cr 3.**

ART 330 Painting II
Further development of painting concepts with emphasis on the characteristics of materials. Individual investigations of technical and expressive issues. Prerequisite: ART 230. Lab 6. **Cr 3.**

ART 340 Printmaking II
Continued explorations in printmaking with emphasis on color and multi-plate color printing. Lithography will be covered. Intaglio, monoprinting, relief and other printmaking media will be studied on a rotating basis. Prerequisite: ART 240. Lab 6. **Cr 3.**

ART 350 Graphic Design II
Continued study of graphic design. Prerequisite: ART 250 or permission. Lab 6. **Cr 3.**

ART 360 Topics in Studio Art
Selected topics surveying particular media, thematic content or contemporary issues. Specific topics will vary from semester to semester. Course may satisfy level II requirements in painting, printmaking or sculpture. May be repeated for credit. Prerequisite: permission of instructor. Lab 6. **Cr 3.**

ART 397 Independent Study in Studio Art
Advanced independent study and research in studio art or related areas. Projects must be designed by the student and approved by the designated instructor. Prerequisites: the highest level course in the subject area. Juniors and seniors only with permission of the instructor. **Cr Ar.**

ART 398 Directed Study in Studio Art
Advanced study and research in studio art or related areas directed by a faculty member. Prerequisites: the highest level course in the subject area. Juniors and seniors only with permission of the instructor. **Cr Ar.**

ART 402 Figure Drawing II
Advanced study of figure drawing. Emphasis on understanding form and structure, with technical and expressive development. Prerequisite: ART 302. Lab 6. **Cr 3.**

ART 420 Sculpture III
Individual and group collaborative projects working with site specific sculpture or installations. Emphasis on process including scale models and other considerations for final presentation for jurying. Prepares artists, engineers, architects in universal commission procedures. Field trips to research existing projects may be included in this course. May be repeated for credit. Prerequisite: ART 320 or permission. Lab 6. **Cr 3.**

ART 430 Painting III
Guided study in painting stressing individual growth through special projects. Emphasis on conceptual as well as technical development. May be repeated for credit. Prerequisite: ART 330. Lab 6. **Cr 3.**

ART 440 Printmaking III
Continued study of printmaking through a variety and choice of printmaking media. Emphasis on conceptual as well as technical development. May be repeated for credit. Prerequisite: ART 340. Lab 6. **Cr 3.**

ART 460 Topics in Studio Art
Advanced study of selected topics surveying particular media, thematic content or contemporary issues. Specific topics will vary from semester to

semester. May be repeated for credit. Prerequisite: Senior standing or permission of the instructor. Lab 6. **Cr 3.**

ART 496 Field Experience in Art
Students engaged in professional activities related to their area of study may apply for supervision and credit for the project. Prerequisite: Seniors and/or permission. **Cr Ar.**

ART 497 Independent Study in Studio Art
Advanced independent study and research in studio art or related areas. Projects must be designed by the student and approved by the designated instructor. Prerequisites: the highest level course in the subject area and ART 397. Seniors only with permission of the instructor. **Cr Ar.**

ART 498 Directed Study in Studio Art
Advanced study and research in studio art or related areas directed by a faculty member. Prerequisites: the highest level course in the subject area and ART 398. Seniors only with permission of the instructor. **Cr Ar.**

ART 499 Senior Studio Seminar
A capstone course for studio art majors which requires the synthesis of all previous course work and focuses on the development of essential professional practices in the visual arts. Prerequisite: junior or senior standing. **Cr 3.**

ART 597 Independent Study in Studio Art
Graduate level independent study in studio art (painting, sculpture, printmaking, drawing), or related areas. Projects must be designed by the student and approved by the graduate instructor in studio art. Prerequisite: permission of the instructor. **Cr Ar.**

ART 598 Directed Study in Studio Art
Graduate level study and research in studio art or related areas directed by a graduate faculty member in studio art. Prerequisite: permission of the instructor. **Cr Ar.**

Courses in Astronomy (AST)

AST 109 Introduction to Astronomy
A descriptive survey of astronomy including contemporary views of the universe. Topics include the solar system, stars, galaxies, black holes, quasars, and cosmology. May be taken without AST 110. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Lec 3. **Cr 3.**

AST 110 Introduction to Astronomy Laboratory
Laboratory and observational exercises to accompany AST 109. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Corequisite: AST 109. Lab 2. **Cr 1.**

AST 114 Navigation
Covers piloting, dead-reckoning, and celestial navigation. A working knowledge of trigonometry is required. (Satisfies the General Education Science Applications of Scientific Knowledge Requirement.) Rec 3. **Cr 3.**

AST 215 General Astronomy I
A more detailed introduction to astronomy and astrophysics than AST 109 covering solar system astronomy including celestial mechanics, astronomical coordinate systems, Kepler's laws, and the sun. Prerequisites: MAT 127, PHY 112 or PHY 122, or permission. Lec 3. **Cr 3.**

AST 216 General Astronomy II
An introduction to one or more of: stars, galaxies, quasars, and/or cosmology. Not given every year. This course is independent of AST 215 which is not a prerequisite. Prerequisite: MAT 127, PHY 112 or PHY 122 or permission. Lec 3. **Cr 3.**

AST 451 Astrophysics
Application of the principles of physics to selected topics in the study of cosmogony, stellar evolution and dynamics, interstellar processes, the formation and evolution of galaxies, and cosmology. Prerequisite: PHY 236, PHY 238, PHY 455, MAT 453 or permission. Rec 3. **Cr 1-3.**

AST 497 Topics in Astrophysics
Selected topics in areas not already covered by regular course offerings in the Department. Prerequisite: permission of instructor. **Cr 1-3.**

AST 598 Special Topics in Theoretical or Experimental Astrophysics
Prerequisite: departmental permission. **Cr Ar.**

Courses in Animal and Veterinary Science (AVS)

AVS 145 Animal Science
Fundamental principles of the animal sciences, including animal genetics, breeding systems, the physiology of reproduction, animal nutrition, and the physiology of lactation. (Satisfies the General Education Science Basic or Applied Sciences and Ethics Requirements.) Prerequisites: First-year students and sophomores or by permission. Lec 3, Lab 2. **Cr 4.**

AVS 151 History of Veterinary Medicine
Examines the history of veterinary medicine from the ancient world to the present. Topics include: the relationship, or lack thereof, between veterinary medicine and the animal welfare movement, veterinary medicine's contribution to bacteriology and preventive medicine, and the new direction of veterinary medicine in the twentieth century. (Satisfies the General Education Ethics Requirement.) Lec 3. **Cr 3.**

AVS 200 Topics in Animal and Veterinary Science
A survey of current issues related to animal production will be researched by students who will present the issues in a series of debates. Each student will be responsible for organizing one debate team and serving on several debate teams. Lec 1. **Cr 1.**

AVS 203 Equine Management
An introductory course designed to familarize students with the equine industry and with the principles of equine anatomy, nutrition, disease management and routine care. Prerequisites: BIO 100 and sophomore status. Lec 3. **Cr 3.**

AVS 249 Laboratory Animal Technology
The principles and practices associated with research animal care in clinics, hospitals and laboratories. Topics will include animal models for human diseases and maintenance of germ-free animals; animal housing facilities; mating systems and record keeping; animal welfare issues and characteristics of various species. (Satisfies the General Education Ethics Requirement.) Prerequisite: AVS 145. Lec 2, Lab 2. Offered in spring of even numbered years. **Cr 3.**

AVS 346 Dairy Cattle Technology
The application of breeding, feeding, housing, selection, care, records, breed association programs and recent research findings to herd management. (Satisfies the General Education Ethics Requirement.) Prerequisite: AVS 145, AVS 455, AVS 480. **Cr 3.**

AVS 349 Livestock Management
The selection, breeding, feeding, care and management of beef cattle, sheep and swine. (Satisfies the General Education Ethics Requirement.) Prerequisites: AVS 145, AVS 455, AVS 480. Lec 3. **Cr 3.**

AVS 351 Animal Science Techniques
Direct application of current techniques used in the management of dairy and beef cattle, sheep and companion animals. Included are restraint, dehorning, castration, docking, milking, shearing and health management and computer applications in the animal sciences. Prerequisite: AVS 145. Lec 1, Lab 4. **Cr 3.**

AVS 368 Independent Study in the Animal Sciences
An in-depth study into a specific area to be approved by the staff advisor at time of registration. (1) anatomy, (2) behavior, (3) breeding, (4) disease, (5) management, (6) nutrition, (7) physiology. Not more than five credit hours will be permitted toward graduation. Prerequisite: AVS 145 and permission. **Cr Ar.**

AVS 370 University Dairy Cooperative I
The first of a two course sequence involving a work experience at the dairy

operation at the J.F. Witter Animal Science Center. Students are responsible for the management of the University dairy herd including: feeding, milking, reproduction, maintenance and marketing. Students, along with faculty advisors and the herdsperson, make management decisions that affect the day to day operation of the University dairy. **Cr 4.**

AVS 371 University Dairy Cooperative II
The second of a two course sequence involving a work experience at the dairy operation at the J.F. Witter Animal Science Center. Students are responsible for the management of the University dairy herd including: feeding, milking, reproduction, maintenance and marketing. Students, along with faculty advisors and the herdsperson, make management decisions that affect the day to day operation of the University dairy. Prerequisite: AVS 370. **Cr 4.**

AVS 396 Field Experience in Animal and Veterinary Science
An approved program of work experience which contributes to the academic major for which academic credit is given. Students may work part time or full time for a semester in a job related to their professional career goals. Prerequisite: Permission. (Pass/Fail Grade Only.) **Cr 1-16.**

AVS 401 Senior Paper in Animal Science I
An original investigation of a problem in animal science, under the guidance of a faculty member. Students are required to submit a draft report describing their research. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirments.) Prerequisites: AVS 200, ENG 317 or equivalent and senior standing. **Cr 2.**

AVS 402 Senior Paper in Animal Science II
The student will prepare a final copy of the work done in AVS 401 and present an oral report to faculty and students. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisites: AVS 401 and COM 103 or equivalents and senior standing. Lec 1. **Cr 1.**

AVS 437 Animal Diseases
Introduction to the study of disease in animals, including the causes, pathology and control of diseases of domestic animals. Prerequisite: BIO 377 or permission. Lec 3. **Cr 3.**

AVS 445 Sustainable Animal Production Systems
A study of various animal (monogastric/ruminant) production systems in relation to sustainable agriculture with emphasis on integration into overall farm management scheme and evaluation on the basis of animal productivity, farm profitability and environmental impact. Offered in Spring semester of odd years. Prerequisites: AVS 145, AES 100, AES 105. Lec 3. **Cr 3.**

AVS 455 Animal Nutrition
Principles of nutrition; the digestion, absorption and utilization of nutrients and the consequences of their deficiency, excess or imbalance. Prerequisite: BIO 204, BMB 208 or equivalent. Lec 4. **Cr 4.**

AVS 461 Animal Breeding
Covers the inheritance of the commercially valuable characteristics and methods of estimating heritability and repeatability; mating systems and their effects; progeny testing, selection indices and other methods to increase intensity and accuracy of selection. Prerequisite: MAT 122 or MAT 126 or MAT 151, COS 100 or MAT 232, BIO 462 or equivalent. Lec 2, Lab 2. **Cr 3.**

AVS 463 Feeding Companion Animals
Nutritional requirements and adequate diets for horses, cats, and dogs will be the principle area of study. Prerequisites: AVS 455 or permission. **Cr 1.**

AVS 466 Feeding Dairy Cattle
Balancing rations using a variety of feedstuffs for the lactating dairy cow. Prerequisites: AVS 346, AVS 455. Lec 2. **Cr 2.**

AVS 480 Physiology of Reproduction
Comparative development and functions of the reproductive process in domestic animals. Prerequisite: BIO 377. Lec 3. **Cr 3.**

AVS 502 Ruminant Nutrition and Physiology
Ruminant metabolism, especially rumen function, factors which modify it. The anatomical and physiological development of the rumen, as well as factors affecting digestion and microbial metabolism in the context of a dynamic system. Prerequisites: AVS 455, BMB 322 or permission. Lec 3. **Cr 3.**

AVS 504 Research Methods in Ruminant Nutrition
A multi-disciplinary introduction to some laboratory and animal techniques used in nutritional research. Prerequisites: AVS 455 or FSN 410 or permission. Lec 2, Lab 6. **Cr 3.**

AVS 506 Vitamins
Advanced study of the fundamental role of vitamins in nutrition, including their chemical properties, absorption, metabolism, storage, excretion and deficiency symptoms. A biochemical basis of vitamin function and their interrelationships with other substances. Prerequisites: BMB 322 or permission. Lec 2. **Cr 3.**

AVS 561 Simulation Using a Structured Language
Studies the applicability of simulation techniques to research problems, the components of a dynamic model including programming in a C++ simulator with a spatial component, and analysis of the output. Prerequisite: One programming course and permission. **Cr 3.**

AVS 590 Special Topics in Animal Science
Anatomy, breeding, diseases, management, nutrition, physiology as related to poultry or dairy. Prerequisite: permission. **Cr Ar.**

Courses in Biological Sciences (BIO)

BIO 100 Basic Biology
An introduction to fundamental principles of structure and function in plants and animals. Open to students of all colleges. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Lec 3, Lab 2 **Cr 4.**

BIO 110 Biology: The Living Science
A laboratory course introducing the science of Biology. Emphasis is on processes and principles of science across disciplines. Focused examples are presented from topics such as ecology, evolution and cellular biology. The role of science in the resolution of ethical issues regarding the impact of the human population on the environment will be emphasized. Degree credit cannot be earned for both BIO 100 and BIO 110. (Satisfies the General Education Science Basic or Applied Sciences and Human Values and Social Contexts Population and the Environment Requirements.) Lec 3, Lab 2. **Cr 4.**

BIO 200 Biology of Organisms
Introduces functions (physiology) and structures (anatomy, morphology) of animals and plants stressing basic physiological processes and adaptations to the environment. Equal attention is given to plants and animals. Students completing BIO 200 cannot take BIO 201, BIO 204 or BIO 208 for degree credit. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BIO 100 or permission. Lec 3, Lab 3. **Cr 4.**

BIO 202 Plant Diversity
The morphology, reproduction, ecology and phylogenetic significance of the major groups of plants, algae and fungi. Open to students of all colleges. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BIO 100, BIO 110 or equivalent. Lec 3, Lab 2. **Cr 4.**

BIO 205 Field Natural History of Maine
The plant and animal life and physical features of aquatic, wetland, and terrestrial ecosystems in Maine, observed during five weekday afternoon field trips and two full single-day trips on separate weekends during the first half of the semester. Each student carries out an independent field natural history project culminating in a research paper during a five-week project period (no classes) in the second half of the semester. The course concludes with a half-day field trip on winter natural history. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Lec 2, Field 4. **Cr 4.**

BIO 208 Anatomy and Physiology
Considers general principles of animal life with emphasis on the structure

and functions of the human body. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BIO 100. Students completing BIO 204 cannot take BIO 208 for degree credit. Lec 3, Lab 2. Cr 4.

BIO 210 Introductory Marine Biology
An introduction to life in the sea with an emphasis on the primary producers (e.g., algae) and consumers in marine ecosystems. Communities considered include estuaries, the rocky shore, the Gulf of Maine, and coral reefs. With laboratory. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BIO 100 or equivalent. Not open to students who have had BIO 213. Lec 2, Lab 3. Cr 4.

BIO 213 An Introduction to Marine Science
A non-laboratory introduction to the history of our interaction with the sea including marine organisms, characteristics of the marine environment, the exploitation and pollution of the sea. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) Prerequisite: BIO 100 highly recommended. Cr 3.

BIO 220 Insects, Science and Society
Designed to acquaint the non-biology major the role of insects in natural systems and human interactions with insects and their close relatives. Insect structure, biology, ecology and effects on human health and food supplies are discussed. Offered without lab. (Satisfies the General Education Science Applications of Scientific Knowledge Requirement.) Lec 3. Cr 3.

BIO 233 Dendrology
Identification and natural history of trees and native shrubs of North America. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BIO 100. Lec 2, Lab 3. Cr 3.

BIO 251 Plants and Society
The impact of plants on the economic and social welfare of society. Topics include: food, fiber, spice and medicinal plants, international conservation, ethnobotany, aquaculture, plant diseases and plant biotechnology. (Satisfies the General Education Science Applications of Scientific Knowledge Requirement.) Prerequisite: BIO 100 or permission. Cr 3.

BIO 296 Zoology Professional Experiences
Students engage in research, clinical determinations, field studies or allied activities with medical professionals, hospitals, laboratories, state agencies, and other organizations approved by the department. May be repeated for credit up to total of 8 credit hours. Cr Ar.

BIO 300 Field Marine Biology
An introduction to the major coastal and marine habitats and communities in Maine including: sand dunes, salt marshes, mud flats, sea grass meadows, exposed rocky shores, sheltered rocky shores, tide pools, estuarine and oceanic plankton communities and disjunct species and habitats. Emphasis will focus on the natural history and ecology of important organisms occupying, influencing or regulating these communities. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: one year of biology or equivalent; recommended BIO 210 or BIO 213. Lec 2, Lab/field 4. Cr 4.

BIO 304 Problems in Biology
Prerequisite: permission. Cr Ar.

BIO 305 Medical Parasitology
A study of the medically important parasites and their life cycles, as well as epidemiology and laboratory methods of diagnosis. Prerequisite: Medical Technology students only or permission. Lec 2, Lab 2. Cr 3.

BIO 319 General Ecology
Ecological principles for the science major including environmental factors, population ecology, community ecology and ecosystem energetics. Prerequisites: one year of college chemistry, one year of college biological science. Lec 3. Cr 3.

BIO 326 Introductory Entomology
Fundamental principles of insect life and the relation of insects to plants, animals, and human. Laboratory includes a study of structure, and systematics. An insect collection is required. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BIO 100. Lec 2, Lab 3. Cr 4.

BIO 327 Introductory Applied Entomology
An introduction to entomology with emphasis on regulating populations of pest insects and the fundamentals of insect biology which influence insect populations. Laboratory emphasizes identification and sight recognition of insects of importance to ornamental plants and field crops. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BIO 100. Lec 2, Rec 1, Lab 2. Cr 4.

BIO 329 Vertebrate Biology
An introduction to the classes of vertebrates, their characteristics, evolution, reproduction and locomotion. Emphasis on adaptive aspects of structure and life histories. Prerequisite: BIO 204. Lec 3. Cr 3.

BIO 331 Vertebrate Biology Laboratory
A study of taxonomy of regional vertebrate fauna including structure and function of representatives of vertebrate classes and taxonomy of local vertebrates. Prerequisite: BIO 329 or concurrently. Lab 2. Cr 1.

BIO 333 Comparative Anatomy
The structure, origin and history of the vertebrate organ systems. Prerequisite: BIO 204 or permission. Lec 2, Lab 4. Cr 4.

BIO 336 Developmental Biology
Considers the transformation of the fertilized egg into a new adult individual including the concepts of growth and development of organisms. Prerequisite: BIO 204. Lec 2, Lab 4. Cr 4.

BIO 353 Invertebrate Zoology
The morphology, ecology, life histories and phylogenetic relationships of invertebrates exclusive of insects and parasites. Prerequisite: BIO 204. Lec 3, Lab 3. Cr 4.

BIO 354 Biology of Behavior
Examines mechanisms of animal behavior, stressing how behavior adapts animals to their environments. Prerequisite: BIO 204 or equivalent. Lec 3. Cr 3.

BIO 377 Animal Physiology
Physiological processess in vertebrates with emphasis on the integration of organ systems. A pre-professional course for pre-medical, pre-dental, pre-graduate school, nutrition, and exercise physiology students. Prerequisites: BIO 204 and one year of chemistry. Lec 3. Cr 3.

BIO 378 Animal Physiology Laboratory
Experimental analysis of physiological processes. Extensive animal surgery is involved. Prerequisites: BIO 377 previously or concurrently and 1 year of chemistry. Lab 4. Cr 2.

BIO 387 Undergraduate Research in Biology I
Open to juniors and seniors who have special interest and qualifications in some branch of biological research. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisite: departmental permission. Cr Ar.

BIO 388 Undergraduate Research in Biology II
Open to juniors and seniors who have special interest and qualifications in some branch of biological research. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisite: departmental permission. Cr Ar.

BIO 391 Undergraduate Independent Study in Biology I
(Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisite: departmental permission. Cr Ar.

BIO 392 Undergraduate Independent Study in Biology II
(Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisite: departmental permission. Cr Ar.

BIO 396 Field Experience in Biology
An approved work experience which contributes to the academic major and for which academic credit is given. Students may work part time or full time for a semester and have the opportunity to gain practical experience in a job related to their professional career goals. Prerequisite: junior standing and permission of instructor. (Pass/Fail Grade Only.) **Cr 1-16.**

BIO 400 Biological Sciences Writing Intensive
Designed to supplement existing courses in Biology. Additional writing will be required in conjunction with regular course work providing students with intensive writing in their major discipline. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Must be taken concurrently with a regular Biology course. Prerequisite: permission. **Cr 1-2.**

BIO 401 Natural History of the Maine Coast
An ecological field study of the habitats, communities, populations and natural history of the Maine coast. Field trips are conducted at the Todd Wildlife Sanctuary (Hog Island) as well as on the mainland and coastal islands. Evening seminars are included. For information and application, write directly to: National Audubon Society, Audubon Ecology Camp, HC 60, Box 102, Keene Neck Road, Medomak, Maine 04551. Do not apply directly to the University of Maine. (Summer course only.) **Cr 1-2.**

BIO 402 Capstone Experience in Biological Sciences
A senior-year experience for Biology, Botany and Zoology majors that emphasizes important biological concepts by synthesizing and augmenting prior learning. Utilizes class discussions, group participation, readings, formal student classroom presentations and a senior paper. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisite: senior standing in Biology, Botany or Zoology majors. Lec 3. **Cr 3.**

BIO 421 Introduction to Clinical Laboratory Methods
An introduction to basic theory and laboratory practice in clinical hematology and urinalysis, including an introduction to the theory and function of relevant laboratory instruments. Required for medical technology students. Prerequisite: BIO 451, BMB 322, BMB 322 Lab. Medical Technology students only. Lec 3, Lab 3. **Cr 4.**

BIO 422 Clinical Hematology
A comprehensive study of the principles, methodology and pathological states in hematology. Lectures and laboratory practice. (EMMC, MMC.) **Cr 7.**

BIO 423 Clinical Microbiology
A comprehensive study of the principles and techniques of diagnostic microbiology and parasitology. Lectures and laboratory practice. (EMMC, MMC.) **Cr 7.**

BIO 424 Clinical Immunohematology
Fundamental techniques of blood grouping and cross-matching proceeding to advanced studies of human blood groups, theory and practice in special problems, and advanced techniques Lectures and laboratory practice. (EMMC, MMC.) **Cr 7.**

BIO 425 Clinical Chemistry
Basic techniques of clinical chemistry proceeding to advanced theories and methodology. Includes theory and technique of immunochemistry. Lectures and laboratory practice. (EMMC, MMC.) **Cr 9.**

BIO 426 Clinical Microscopy
Lectures and laboratory practice in the microscopical examination of urine and body fluids. (EMMC, MMC.) **Cr 2.**

BIO 430 Ecology and Systematics of Aquatic Insects
Taxonomy, life history and ecology of aquatic insects. Emphasis on role of insects in the structure and function of aquatic ecosystems in both natural and managed settings. Field trips, research project and collection required. (Fall - odd). Prerequisite: introductory entomology course or permission. Lec 2, Lab 4. **Cr 4.**

BIO 433 Mammalogy
Considers the characteristics, functional anatomy, behavior and ecology of mammals. Lectures, laboratory study and field trips. Prerequisite: BIO 329 or BIO 333 or permission. Lec 3, Lab 3. **Cr 4.**

BIO 434 Avian Biology and Ecology
Advanced discussion of the characteristics, functional morphology, behavior, evolution, biogeography, and ecology of birds. Lectures, laboratory study, and an independent project. Prerequisites: BIO 329 and an ecology course or permission. Lec 3, Lab 3. **Cr 4.**

BIO 435 Plant Anatomy
The origin, development and structure of tissue systems of vegetative and reproductive organs of vascular plants. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BIO 100. Lec 2, Rec 1, Lab 2. **Cr 4.**

BIO 436 Biological Ultrastructure
The ultrastructure of cells, tissues and organ systems. Prerequisite: BIO 204. Lec 3. **Cr 3.**

BIO 438 Morphogenesis and Differentiation
Analysis of interacting systems in development. Study of regulation of morphogenesis and differentiation at the organ, tissue and cellular levels, with emphasis on experimental approach towards problems in development. (Satisfies the General Education Capstone Experience Requirement.) Prerequisites: BIO 336 or permission. Lec 3. **Cr 3.**

BIO 441 Electron Microscopes-Theory and Use
Principles of operation of transmission and scanning electron microscopes and their use in examining biological material. Interpretation of electron micrographs. Prerequisites: 1 year chemistry, 1 year physics, 1 year biology. Lec 2. **Cr 2.**

BIO 445 Plant Genetics
An introduction to the principles of genetics with emphasis on inheritance in vascular plants. Polyploidy, cytoplasmic inheritance and the principles of plant breeding receive special attention. Prerequisite: BIO 100 or equivalent, sophomore standing. Lec 3. **Cr 3.**

BIO 448 Insect Pest Ecology and Management
Discuss basic principles of insect population dynamics, natural mortality and management of insects. Biological and biorationale strategies for pest suppression will be emphasized with case studies in agricultural, forest and aquatic ecosystems. (Fall - even.) Prerequisite: BIO 326, BIO 327 or INT 256 (Can be taken concurrently). Lec 3. **Cr 3.**

BIO 450 Histology
Microscopic anatomy of animal tissues. Prerequisites: BIO 204 or BIO 208 and junior standing or permission. Lec 2, Lab 4. **Cr 4.**

BIO 452 Plant Physiology
Physiological processes in plants, with emphasis on water relations, mineral nutrition and physiological ecology. Prerequisite: BIO 100 and one year of chemistry; BIO 201 recommended. Lec 3. **Cr 3.**

BIO 453 Plant Physiology Laboratory
Laboratory study of the physiological function of plants. Prerequisite or corequisite: BIO 452. Lab 2. **Cr 1.**

BIO 461 Insect Biology, Taxonomy and Systematics
Biology, morphology, and evolutionary relationships of the insect orders and major families with an introduction to the principles of modern systematics. Laboratory deals exclusively with the identification of native and exotic specimens. (Spring - odd.) Prerequisite: BIO 326, BIO 327 or INT 256. Lec 2, Lab 6. **Cr 4.**

BIO 462 Principles of Genetics
The nature of hereditary factors and the mechanisms by which they are transmitted and expressed. Prerequisite: BIO 100 and junior standing. Lec 3. **Cr 3.**

BIO 463 River Ecology
An introduction to the ecology of rivers with emphasis on the role of physical and biological factors in controlling ecosystem processes and how these processes are influenced by human activities. Field trips and research

projects required. (Satisifies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BIO 319 or equivalent. Lec 2, Lab 4. Cr 4.

BIO 464 Taxonomy of Vascular Plants
Identification and evolutionary biology of flowering plants. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BIO 100. Lec 2, Rec 1, Lab 2. Cr 4.

BIO 465 Evolution
The origin and development of evolutionary theory and the mechanisms which bring about the genetic differentiation of groups of organisms. Prerequisite: BIO 100. Lec 3. Cr 3.

BIO 466 Genetics Laboratory
Fundamental experiments illustrating genetic analysis, with emphasis on eukaryotes. Prerequisite: BIO 462 (previously or concurrently.) Lab 4. Cr 2.

BIO 467 Wetland and Aquatic Biology
A multidisciplinary study of wetlands and shallow water aquatic systems, covering major life forms and their environments. Field, lecture and laboratory work. Prerequisites: BIO 100, BIO 204 and BIO 205. Cr 4.

BIO 471 Fishery Biology Laboratory
Includes field and laboratory exercises in techniques commonly employed in fishery biology, data interpretation and report preparation. Two Saturday field trips. Prerequisite: BIO 472 (previously or concurrently.) Lab 2. Cr 1.

BIO 472 Fishery Biology
Introduction to theory and practice of contemporary fishery biology emphasizing ecology, life history, fish population sampling and manipulation, human factors and multiple use concepts. Prerequisites: BIO 329, BIO 319 or WLE 200. Lec 3. Cr 3.

BIO 473 Biology of Algae
Comparative morphology and reproduction, identification and classification of algae. Laboratory and field work emphasize study of living material and include techniques on algal culture, sexuality, microtechnique and preservation. Prerequisites: BIO 100 and BIO 202 or permission. Lec 2, Lab 4. Cr 4.

BIO 474 Neurobiology
Foundations on the organization and function of the nervous systems in various animals. The course will specifically address how single nerve cells function; how groups of neurons interact; how systems of neurons provide brain function and behavior. Sensory and motor system interplay will be emphasized. Prerequisites: BIO 204, PHY 112, CHY 132 or permission. Lec 3. Cr 3.

BIO 477 The Molecular Biology of Disease
An intensive and in depth review of disease pathology with the emphasis on the molecular basis of human diseases. Normal cellular processes and how their disruption can lead to disease will be reviewed. Topics to be covered include: cell growth, injury and adaptation, genetic disorders, cancer, AIDS, environmental exposures, the role of oxidative stress and free radicals in disease and gene therapy. Prerequisite: BMB 280 or permission of instructor. Cr 3.

BIO 479 Experimental Endocrinology
A comprehensive survey of the vertebrate endocrine glands and their functional relationships with emphasis on experimental and comparative approaches. Prerequisite: BIO 377 and Organic Chemistry. Lec 3, Lab 4. Cr 3.

BIO 480 Cell Biology
Examines the fundamental cellular, subcellular and molecular characteristics of cells with emphasis on structure and function of organelle systems common to eukaryotic cells. Associated laboratory exercises employ techniques commonly utilized in cell biological research. Prerequisite: BIO 204 or BIO 208, Organic Chemistry or Biochemistry. Lec 3, Lab 2. Cr 4.

BIO 481 Seminar in the Biological Sciences I
Literature reviews of topics selected from current botanical research. Lec 1. Cr 1.

BIO 482 Seminar in the Biological Sciences II
Literature reviews of topics selected from current botanical research. Lec 1. Cr 1.

BIO 485 Comparative Animal Physiology
A comparative approach to the functional adaptations of animals to diverse environments, with emphasis on underlying physiological and biochemical mechanisms. Prerequisite: BIO 204, a year of chemistry and junior standing. Lec 3, Lab 2. Cr 4.

BIO 487 Problems in Zoology I-Field Ornithology/Field Studies
Field studies in identification of land and water birds in a variety of habitats along the Maine coast. This program is based at the Todd Wildlife Sanctuary (Hog Island.) For information and an application, write directly to: National Audubon Society, Audubon Ecology Camp in Maine, HC 60, Box 102, Keene Neck Road, Medomak, Maine 04551. Do not apply directly to the University of Maine. Also, Eagle Hill Wildlife Research Station offers specialty field seminars on the Maine Coast involving intensive practical field experiences and follow-up laboratory work and discussions. For information and an application, write directly to: Eagle Hill Wildlife Research Station, Dyer Bay Road, Steuben, Maine 04680. (Offered summers only.) Cr 1-2.

BIO 496 Field Experience in Botany
Students work as field botanists pursuant to an authorized activity or research project. Cr Ar.

BIO 501 Physiological and Molecular Processes in the Algae
Physiological and molecular biology of unicellular and macroalgae, concentrating on marine algae. Cr 3.

BIO 502 Advanced Cell Biology
Topics in cell biology including: cellular energetics, organization, and function. Normal cell maturation and cancer will also be examined. Prerequisite: Graduate standing or permission. Cr 3.

BIO 504 Advanced Developmental Biology
Cellular mechanisms of animal development, including fertilization, cell cleavage, cell movement, cellular interactions, extracellular matrix, developmental genetics and cancer. Prerequisites: BIO 336 or BIO 438 or permission. Cr 3.

BIO 507 Advanced Genetics
Structure and function of eukaryotic genes and control of gene expression. Prerequisites: BIO 462 or equivalent. Cr 3.

BIO 508 Advanced Comparative Physiology
Functional analysis of systemic physiology in phylogenetically diverse groups of animals. Emphasis on adaptation to various environmental variables and stressors and on the underlying cellular and metabolic mechanisms of adaptation. Prerequisites: a course each in physiology, organic chemistry or biochemsitry, and physics. Lec 3, Lab 2. Cr 4.

BIO 511 Insect Ecology
Ecological effects of biotic and abiotic factors on insects and on insect population ecology. Outside reading and field trips required. (Fall - even.) Prerequisite: Beginning course in ecology, and background in statistics, physiology and entomology or permission. Lec 2, Rec 1. Cr 3.

BIO 512 Advanced Seminar in Biology
Readings and presentations of recent primary literature in specific areas of zoology. Topics vary and may involve both theoretical and applied studies. Section 01-Cell Biology; Section 02-Developmental Biology; Section 03-Ecology; Section 04-Genetics; Section 05-Physiology. May be repeated for credit. Prerequisite: permission. Cr 1-3.

BIO 525 Community Ecology
An advanced discussion of the organization of biological communities including community structure, stratification and patterns, niche division and species diversity, competition, predation, community classification and description, biogeography of communities, succession and climax. Prerequisites: BIO 319 or equivalent. Lec 3. Cr 3.

BIO 532 Biology of the Fungi
The major taxa of fungi are examined in relation to their ecology and physiology. Prerequisite: BIO 100 or equivalent and/or basic Ecology course or permission. **Cr 3.**

BIO 533 Behavior and Ecology of Fishes
Locomotion, sensory biology, feeding, growth, reproduction, migration and adaptation to habitats, treated from a behavioral and ecological standpoint. Prerequisite: BIO 329 or BIO 472 or permission. Lec 3. **Cr 3**

BIO 540 Seminar in Evolutionary Ecology
Covers the theoretical and applied aspects of ecological and evolutionary principles. Prerequisites: permission. **Cr Ar.**

BIO 541 Electron Microscopy Laboratory
Covers techniques of transmission and scanning electron microscopy, especially those applicable to biological sciences. Prerequisites: BIO 441 (previously or concurrently), permission. Lab 6. **Cr 3.**

BIO 545 Physiological Plant Ecology
A study of interactions between plants and their physical environment. Concepts of energy and gas exchange used to examine effects of solar and terrestrial radiation, ambient temperature, wind, moisture supply, CO2 and O2 in plants. Adaptations to a variety of stresses including high and low temperature, low moisture and low N and P will be discussed. Prerequisite: BIO 319 or equivalent plus BIO 452 or permission. (Open to graduate students and advanced undergraduates.) Lec 3. **Cr 3.**

BIO 550 Biogeochemistry of Terrestrial Ecosystems
Biogeochemical patterns and processes in forest ecosystems. Comparative data from the ecological literature used to examine the important processes of element cycling, including atmospheric deposition, canopy processes, plant nutrient circulation, decomposition, animal-insect interactions, soil chemical phenomena, weathering, leaching, gaseous fluxes, forest hydrology and overall watershed biogeochemical responses to disturbance. Prerequisite: permission plus BIO 319 and one year of college chemistry. (Open to advanced undergraduate and graduate students.) Lec 3. **Cr 3.**

BIO 551 Biometry
Design and quantitative analysis of biological experiments, including practical applications of quantitative models and statistics. Lec 1, Lab 2. **Cr 3.**

BIO 568 Advanced Plant Ecology
Classical and modern perspectives on vegetation ecology, including floristic and ecosystem approaches, classification and ordination of vegetation data, dynamics of vegetation with emphasis on the role of disturbance in landscape development, paleoecological perspectives, plant population ecology. Prerequisite: BIO 319 or equivalent, one year calculus. Lec 2, Lab 4, plus two field trips. **Cr 4.**

BIO 570 Morphology, Physiology and Behavior of Insects I
Investigates the fundamental principles of insect systems in terms of structure and function. Includes laboratory exercises. (Fall - odd.) Prerequisite: BIO 326 or BIO 327 or permission. **Cr 1-3.**

BIO 571 Morphology, Physiology and Behavior of Insects II
Investigates the fundamental principles of insect systems in terms of behavior patterns and physiological processes for the survival of individuals and populations. Includes laboratory exercises. (Spring - even.) Prerequisite: BIO 326 or BIO 327 or permission. **Cr 1-3.**

BIO 576 Biological Rhythms
Review of the physiology of rhythmic processes in plants and animals. Ecological, behavioral and evolutionary aspects. Emphasis is placed on the cellular mechanisms underlying oscillatory systems and molecular approaches to the clock. Prerequisites: BIO 480. **Cr 2.**

BIO 581 Seminar
Techniques, procedures and results in botanical literature. **Cr 1.**

BIO 585 Physiological Ecology of Marine Organisms
Functions and adaptive responses of organisms to environmental variables; emphasis on marine and estuarine invertebrates. Extensive readings in primary literature. Prerequisites: BIO 377, BIO 480 or BIO 485. **Cr 3.**

BIO 586 Physiological Ecology Laboratory
Independent student projects involving field observation and collection and laboratory analysis of animal responses to marine environmental factors. Prerequisite: BIO 585 (previously or concurrently) and permission. Lab 4. **Cr 2.**

BIO 587 Graduate Research in Biology I
Students conduct individual research problems and research seminars. Emphasis on development of scientific skills. Prerequisite: permission. **Cr 1-3.**

BIO 588 Graduate Research in Biology II
Students conduct individual research problems and research seminars. Emphasis on development of scientific skills. Prerequisite: permission. **Cr 1-3.**

BIO 590 Advanced Topics in Aquatic Biology
In-depth study of various aspects of freshwater or marine biology. Students select topic, prepare critical papers and organize discussion. May be repeated for credit. Prerequisite: permission. **Cr 2.**

BIO 591 Graduate Independent Study in Biology I
Independent research not a part of thesis preparation. Prerequisite: permission. **Cr Ar.**

BIO 592 Graduate Independent Study in Biology II
Independent research not a part of thesis preparation. Prerequisite: permission. **Cr Ar.**

BIO 596 Zoology Professional Experiences
Students engage in research, clinical determinations, field studies or allied activities with medical professionals, hospitals, laboratories, state agencies and other organizations approved for this purpose by the Department of Biological Sciences. Prerequisite: graduate standing. May be repeated for credit up to a total of 6 credit hours. **Cr 1-3.**

BIO 597 Special Topics in Biology
Prerequisite: permission. **Cr Ar.**

Course in Black Studies (BLS)

BLS 101 Introduction to Black Studies
An interdisciplinary course introducing the student to several of the key issues and topics of Black culture including events of African American history. Sociological and economic perspectives as well as issues of identity will be discussed. The African Diaspora, Africanisms, Pan-Africanism and contemporary African/African American relations are studied. (Satisfies the General Education Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) **Cr 3.**

Courses in Biochemistry, Microbiology, and Molecular Biology (BMB)

BMB 207 Fundamentals of Chemistry
Reviews the essentials of inorganic chemistry and studies the types and reactions of organic compounds. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: one year of high school chemistry. Lec 3, Lab 2. **Cr 4.**

BMB 208 Elementary Physiological Chemistry
Structure and properties of biological molecules, including carbohydrates, lipids, proteins, nucleic acids, vitamins and hormones, composition and function of body fluids, study of digestion and metabolism. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BMB 207 or the equivalent. Lec 3, Lab 2. **Cr 4.**

BMB 221 Organic Chemistry
Basic theories of organic chemistry, including reactions, mechanisms and nomenclature. Emphasis on those aspects of organic chemistry which relate to biological chemistry. Prerequisites: BMB 207 or CHY 121 and CHY 123. **Cr 3.**

BMB 221L Laboratory in Organic Chemistry
Laboratory exercises illustrating the principles presented in BMB 221. Lab 2. **Cr 1.**

BMB 280 Introduction to Molecular and Cellular Biology
An in-depth introduction to macromolecules, cell structure, metabolic processes, gene expression and molecular replication common to all organisms. Prerequisite: BIO 100. Lec 3. **Cr 3.**

BMB 300 General Microbiology
A basic biology course dealing with general principles as illustrated by microorganisms, in bacteria and viruses. Covers cell structure, cell metabolism, genetics, geochemical activities, and host-parasite relations. Prerequisite: one year of chemistry and one year of biology or permission. Lec 3. **Cr 3.**

BMB 305 General Microbiology Laboratory
A laboratory study of the properties of bacteria and related microorganisms including techniques and identification. Suggested for students majoring in sciences. Prerequisite or corequisite: BMB 300. Lab 4. **Cr 2.**

BMB 322 Biochemistry
A study of the properties of proteins and enzymes, nucleic acids, carbohydrates, and lipids, metabolism and energy production, replication and protein synthesis. Prerequisite: CHY 251 or BMB 221. Lec 3. **Cr 3.**

BMB 322L Introductory Biochemistry Laboratory
Laboratory exercises illustrating the principles presented in BMB 322. Lab 2. **Cr 1.**

BMB 396 Field Experience in Biochemistry, Microbiology and Molecular Biology
An approved program of work experience which contributes to the academic major and for which academic credit is given. Students may work part time or full time for a semester, and gain practical experience in a job related to their professional career goals. Prerequisite: junior standing and permission. (Pass/Fail Grade Only.) **Cr 1-16.**

BMB 400 Molecular Genetics
The structure of DNA and of genes, and the mechanisms of gene regulation, particularly as they pertain to cell growth and differentiation. Includes a discussion of the experimental techniques used in the genetic manipulation of organisms. Prerequisite: BMB 280, BMB 322. Lec 3. **Cr 3.**

BMB 410 Diversity of Microorganisms
Metabolic diversity of microorganisms will be emphasized. Major metabolic groups of bacteria will be examined in detail and comparisons will be made between the different groups. Bacterial evolution and the current state of bacterial taxonomy will be discussed. Prerequisite: BMB 300, BMB 305. **Cr 3.**

BMB 420 Pathogenic Microbiolgoy and Serology
Characterization of the production of disease by microorganisms in the human host. Prerequisite: BMB 300, BMB 305. Lec 3. **Cr 3.**

BMB 421 Pathogenic Microbiology and Serology Laboratory
Procedures used in the clinical diagnostic laboratory to identify the causative agent of human infectious diseases. Corequisite: BMB 420. Lab 2. **Cr 1.**

BMB 430 Bacterial Physiology
The properties and behavior of bacteria with respect to their chemical and physical requirements for life and reproduction. Prerequisite: BMB 300, BMB 322. Lec 3. **Cr 3.**

BMB 431 Bacterial Physiology Laboratory
Laboratory experiments and exercises designed to expose students to aspects of bacterial physiology and to selected assays, techniques, and equipment used in physiology research. Prerequisite: BMB 300, BMB 322. Lab 2. **Cr 1.**

BMB 440 Introductory Immunology
An introduction to the organization and function of the immune system including the basic properties of humoral and cell-mediated immune responses, the reactions or antigens and antibodies and the lymphocytes involved. Prerequisite: CHY 251. Lec 3. **Cr 3.**

BMB 441 Immunology Laboratory
A laboratory course to introduce students to diagnostic and experimental techniques routinely used in the immunology lab. Prerequisite or corerequisite: BMB 440 and BMB 471. Lab 2. **Cr 1.**

BMB 450 Principles of Biochemistry
Biological, chemical and physical characteristics of essential precursor molecules for metabolic pathways, energy production, cofactors, storage polymers, nucleic acid and proteins. Prerequisite: CHY 252 or permission. Lec 3. **Cr 3.**

BMB 455 Virology
Introduction to the study of viruses, emphasizing their nature, methods of cultivation, mode of transmission, genetics and mechanisms of pathogenieity. Prerequisite: BMB 300, BMB 400. Lec 3. **Cr 3.**

BMB 456 Virology Laboratory
Introduction to methods of virus propagation, assay and characterization, including cell culture, in vitro infectivity assays, and cytopathic effects. Corequisite: BMB 455. Lab 2. **Cr 1.**

BMB 460 Advanced Biochemistry
A continuation of BMB 450, with emphasis on elements of molecular biology and similar topics. May include discussions of cellular control mechanisms, virus structure, enzyme kinetics. Prerequisite: BMB 450 or permission. Lec 3. **Cr 3.**

BMB 464 Analytical and Preparative Biochemical Laboratory Methods
Laboratory techniques for the manipulation and analysis of biochemical materials including biological activity assays, concentration determinations, ligand binding analysis, enzyme kinetics and methods for macromolecular fractionation and characterization. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: BMB 322 or BMB 451. **Cr 4.**

BMB 470 Seminar in Biochemistry
Preparation and presentation of papers dealing with current research in the field of biochemistry. **Cr 1.**

BMB 471 Cell Culture Laboratory
A laboratory course devoted to eukaryotic cell culture techniques and applications. Prerequisite: BMB 305. Lab 2. **Cr 1.**

BMB 480 Seminar in Microbiology
Preparation and presentation of papers dealing with current research and developments in the field of bacteriology. (Satisfies the General Education Demonstrated Writing Competency Requirement.) **Cr 1.**

BMB 481 Radiation Biology
A survey of the various types of radiation, their detection and the effect of radiation on macromolecules and living organisms including survival, mutagenesis, and repair of radiation damage. Prerequisites: PHY 121, PHY 122 or equivalent, CHY 252 or BMB 221 or equivalent and permission. **Cr 2.**

BMB 490 Microbial Genetics Lecture and Laboratory
A lecture and laboratory chiefly in the genetics of Escherichia coli, its bacteriophages, and and mechanisms of genetic exchange among prokaryotes. Lectures cover all materials and problems presented in the text. Laboratory sessions may include chemical mutagenesis, transposon mutagenesis, in vitro mutagenesis, transduction, conjugation, transformation, genetic mapping, physical mapping, complementation analyses, maxi cell expression of proteins, and regulatory studies using gene fusions and operon fusions. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: BMB 300 and BMB 305 or permission. **Cr 4.**

BMB 491 Biochemistry, Microbiology and Molecular Biology Research
Research in Biochemistry, Microbiology and Molecular Biology. A comprehensive report is required. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: seniors and graduate students only. **Cr Ar.**

BMB 497 Independent Study
A laboratory and conference for students desiring to pursue some particular line of investigation. Prerequisite: permission. **Cr Ar.**

BMB 500 Nucleic Acids
Biological, chemical and physical properties and structure-function relationships of nucleic acids and their evolution. Prerequisites: BMB 460. **Cr 3.**

BMB 505 Principles of Microbial Ecology
The distribution and activities of microorganisms in natural systems with particular emphasis on the role of bacteria in elemental cycles, animal-microbe and plant-microbe interactions, and the relationship between physiological and ecological attributes of microorganisms. Prerequisites: BMB 300 or BIO 319 or permission. Lec 3. **Cr 3.**

BMB 510 Laboratory in Molecular Biology
Selected exercises in recombinant DNA technology and related subjects, including nucleic acid purification, construction of recombinant DNA molecules, DNA-DNA and DNA-RNA hybridization, and DNA sequencing. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: BMB 400, BMB 464 or permission. **Cr 5.**

BMB 525 Proteins and Enzymes
Emphasis is on contemporary principles of protein structure and interactions, enzymes and catalysis, and membrane function. Prerequisite: BMB 460 or permission. Rec 3. **Cr 3.**

BMB 530 Cellular Signal Transduction Mechanisms
Signal transduction mechanisms used by cells to perceive extracellular messages and to produce proper responses in regulating growth, development and metabolism. Prerequisite: BMB 460 or permission. **Cr 3.**

BMB 540 Advanced Immunology
Selected topics in immunology including regulation autoimmune disease, immunogenetics, and immunodeficiences. Emphasis on topics of current significance. Prerequisite: BMB 300, BMB 322 and BMB 440 or permission **Cr 3.**

BMB 545 Plant Molecular Biology
Current research topics in plant molecular biology. Molecular techniques used to address regulatory mechanisms of plant gene expression. Prerequisite: BMB 450, BMB 460, BMB 400, BMB 510 or permission. **Cr 3.**

BMB 550 Special Topics in Molecular Biology
Includes lectures/seminars on the structure, regulation and evolution of genetic elements, viruses, and cell-surface glycoproteins. Prerequisites: BMB 500 or BMB 460 and permission. May be repeated for credit. **Cr Ar.**

BMB 551 Advanced Topics in Animal Virology
In depth consideration of selected topics in animal virology related to viral structure, virus cell interactions, virus replication, and viral oncogenesis. Emphasis on topics of current significance. Prerequisite: BMB 455 or permission. Lec 3. **Cr 3.**

BMB 560 Prokaryotic Genetics and Molecular Biology
A literature-based course focusing on the power of bacterial and phage genetics and bacterial and phage molecular biology. The course is neither a lecture course nor a seminar course: what is stressed is discussion. Students must read and think about papers critically, and should be prepared to give a five-to-ten minute summary of each paper to initiate discussion. Half of the final grade is based upon class participation and half on an oral final exam. Students should be familiar with basic prokaryotic genetic methodologies prior to this course. Prerequisites: BMB 490 or equivalent or permission. **Cr 3.**

BMB 598 Special Topics in Microbiology
Covers selected topics or areas within the field of Microbiology. May be repeated for graduate credit. Prerequisite: permission. **Cr 1-3.**

Courses in Bio-Resource Engineering (BRE)

BRE 122 Fundamentals of Bio-Resource Engineering
This course is for all Bio-Resource Engineering students. Emphasis will be on the fundamentals of computer programming, terrain analysis, ethics in engineering and total quality management. Students will learn to solve basic engineering problems using the aforementioned tools. Lab 4. **Cr 2.**

BRE 123 Introduction to Bio-Resource Engineering
A second semester foundations course for the BRE curriculum designed to acquaint students with the scope of the discipline. Students will develop the basic work skills necessary to function effectively as engineers. Topics include engineering applications in agriculture, environment, food and forestry. Prerequisite: BRE 122. **Cr 2.**

BRE 220 Introduction to Bio-Resource Engineering
Basic concepts of the engineering and organization of bio-resource production systems with particular emphasis on forestry, agriculture and aquaculture. Rec 2, Lab 2. **Cr 3.**

BRE 234 Engineering of Biological Systems
The structure, function and energy transformations of biological systems at the cellular, organismal and population levels will be reviewed. Engineering applications, involving the identification and quantification of the physical and chemical paramenters within these systems and their environments, will be studied. Prerequisite: BIO 100. Lec 2, Lab 2. **Cr 3.**

BRE 255 Materials in Bio-Resource Engineering
Introduction to physical and mechanical properties of structural and biological material useful in Bio-Resource and forest engineering design and application. Prerequisite: PHY 121 or permission of instructor. Lec 2, Lab 2. **Cr 3.**

BRE 257 Computer Applications in Bio-Resource Engineering
An introductory programming course using the FORTRAN language. Program exercises are selected to illustrate numerical techniques important in engineering and are done on either the mainframe or microcomputer. Introduces use of microcomputers, data files, graphic input and output devices, editors, wordprocessors and spreadsheets. Prerequisite: MAT 126. Lec 2, Rec 2. **Cr 3.**

BRE 269 Computer Aided Drafting and Design-AutoCAD
A computer aided drafting course using the AutoCAD two and three dimensional software package on microcomputers. Assignments include both mechanical and architectural design. Geometric Dimensioning and Tolerancing is discussed. Laboratories are individually scheduled by each student using one of the University clusters with an AutoCAD server. Lec 1, Lab 6. **Cr 3.**

BRE 281 Elementary Plane Surveying
Designed to help the student understand the concepts and develop the skills necessary for basic surveying. Lec 1. **Cr 1.**

BRE 282 Introduction to Bio-Resource Engineering Research
Introduces engineering experimentation involving biological material. Primarily for sophomores majoring in bio-resource engineering. Lec 1, Lab 2. **Cr 2.**

BRE 298 Special Topics in Bio-Resource Engineering
Studies are offered in hydraulic power systems, surveying techniques and advanced welding and design. Also available as a five week block course. Transcript will show area of study. **Cr Ar.**

BRE 360 Analysis of Biological Systems
The basics of engineering economics, systems optimization and statistics of biological systems will be investigated. Time value of money, alternatives under constraints and statistical methods will be examined. Corequisite: MAT 258. Prerequisite: BRE 122 and permission of instructor. **Cr 2.**

BRE 380 Senior Seminar
Problems associated with professionalism and the first employment of the young Bio-resource engineer. Lec 1. **Cr 1.**

BRE 396 Field Experience in Bio-Resource Engineering
An approved program work experience which contricuts to the academic major and for which academic credit is given. Students may work part time or full time for a semester in a job related to their professional career goals. Prerequisite: junior standing and permission. (Pass/Fail Grade Only.) **Cr 1-16.**

BRE 449 Engineering in Aquaculture
Introduction to the application of engineering principles and practices to the

commercial culture of marine and freshwater plants and animals. No engineering or engineering technology majors. Prerequisite: SMS 211 and CHY 122 or permission. Rec 2, Lab 2. **Cr 3.**

BRE 452 Advanced Fluid Power
An advanced level fluid power course which examines the design of pneumatic and hydraulic circuits, control theory applied to fluid power actuated mechanical systems, data acquisition, transducers, computer interfacing, and programming for control. Laboratory work includes design and test of fluid power systems including programming the motion of cylinders and motors using PLC's and personal computers. Prerequisite: BRE 462 or BRT 362 or permission. Rec 2, Lab 3. **Cr 3.**

BRE 460 Power and Machinery
A design course for engineering majors covering design considerations of heat engines; power requirements and capacities of machinery; interactions between power units, implements and the ground. Prerequisite: MEE 230 and MEE 251. Lec 2, Lab 3. **Cr 3.**

BRE 462 Power Transmission and Control
Covers fluid power theory and fundamentals, circuit analysis for hydraulic and pneumatic systems, mechanical and electro-mechanical power transmission design. Selection and design of componentry for control of load. Prerequisites: MEE 251 and MEE 360 (or CIE 250.) Lec 2, Lab 3. **Cr 3.**

BRE 463 Structures and Environmental Design
Fundamentals of heat transfer, psychrometrics, ventilation, animal energetics, waste handling, atmospheric properties required for storage of biological products. Basic structural design of buildings. Applications to the design of animal and plant production and product storage structures. Prerequisite: MEE 251. Lec 2, Lab 3. **Cr 3.**

BRE 465 Soil and Water Resources Engineering
Engineering analysis for and design of systems for maintaining environmental water quality and soil productivity in agricultural and forested watersheds. Includes nutrient cycling and natural systems for water pollution control, soil-water-plant relationships and engineering design of soil/water management systems. Prerequisite: CIE 250 or MEE 360. Lec 2, Lab 3. **Cr 3.**

BRE 466 Irrigation and Water Supply Design
Examines the environmental factors influencing plant growth with an emphasis on water, soil water retention and movement, irrigation system design and management, analysis and design of surface water and groundwater supply systems, environmental impacts of agricultural water management. Prerequisite: BRE 465 or permission of instructor. Lec 2, Lab 2. **Cr 3.**

BRE 469 Food Process Design and Engineering
Involves the study of selected information related to the processing of food products. Emphasis is given to heat transfer, mass transfer and energy requirements. Design of processes and related equipment is considered. Design of food quality control equipment as it relates to HACCP and ISO standards is examined. Prerequisite: MEE 230 or CHE 385 and MEE 360 or CIE 250 (may be taken concurrently.) Lec 2, Lab 2. **Cr 3.**

BRE 492 Design Project
Designed to give students in Bio-Resource Engineering and Forest Engineering a supervised design experience. Each student will be required to select and design components and systems for engineering projects identified by the BRE faculty. Requires the student to demonstrate his or her ability to understand and apply scientific principles and engineering knowledge to the solution of real life problems. (Satisfies the General Education Capstone Experience and Demonstrated Writing Competency Requirements.) Prerequisites: Junior standing in the BRE or FOE curriculum. Rec 1, Lab 8. A minimum of 4 credits must be taken over a period of two or more semesters. **Cr Ar.**

BRE 497 Special Problems in Bio-Resource Engineering **Cr Ar.**
Independent study.

BRE 550 Computer Simulation and Analysis of Processes
Basic discrete event simulation methodology as applied to processes and systems will be explored. Random number generation, simulation designs, validation and output analysis. Applications to various areas of scientific modeling and manufacturing systems. Knowledge of a scientific computer programming language are expected. Prerequisites: BRE 360, MAT 332 or permission of the instructor. Lec 3. **Cr 3.**

BRE 597 Advanced Topics in Bio-Resource Engineering
Advanced topics not regularly covered in other BRE courses. Content varies based on instructor interest area. May be repeated for credit. Prerequisite: Senior or graduate standing; permission. **Cr 1-3.**

BRE 599 Independent Study in Bio-Resource Engineering
Advanced independent study for qualified students who present suitable projects for intensive investigation in the area of faculty interest. May be repeated for credit. Prerequisite: Senior or graduate standing; permission. **Cr 1-3.**

Courses in Bio-Resource Engineering Technology (BRT)

BRT 110 Principles of Machine Fabrication
The selection, care and use of tools, wordworking techniques, metalworking and welding as it relates to the machine fabrication typically utilized in the Bio-Resources discipline. **Cr 2.**

BRT 360 Processing Machinery
Introduction to machinery used in processing food and fiber. Study of mechanisms and components with emphasis on commercial applications. Topics include power transmission, materials handling, safety, and properties of bulk materials related to transport. Prerequisite: MAT 142A. Lec 2, Lab 2. **Cr 3.**

BRT 362 Fluid Power Technology
Examines basic fluid power systems, component installation and function analysis, basic system design, troubleshooting and testing techniques. Prerequisite: PHY 111, PHY 112 or permission. Lec 2, Lab 3. **Cr 3.**

BRT 363 Buildings and Environment
A consideration of environmental control including methods and materials of construction, functional requirements and system economics of production, processing and storage buildings. Prerequisite: MAT 142A. Lec 2, Lab 2. **Cr 3.**

BRT 364 Automation and Process Control
An introduction to measurement theory, process monitoring, data acquisition, applied control theory and robotics with emphasis on applications in processing and manufacturing. Prerequisite: MAT246A and PHY 112. Lec 2, Lab 2. **Cr 3.**

BRT 365 Water Supply and Waste Management
The study of hydrologic processes and development of water supply systems, water quality and quantity analyses, and reservoir development. Design of pumping plants, wells, water delivery systems, and waste disposal systems is covered; environmental and energy concerns are reviewed, with emphasis on selection of components and management strategies. Lec 2, Lab 3. **Cr 3.**

BRT 367 Power and Biomass Industries
A study of the sources and application of power, particularly for those industries that deal with biomass. Topics include sources and uses of energy; fuels and combustion; power units for mobile and stationary application; vehicle transmission systems; interactions between cross-country vehicles; implements, loads, and the ground; and application of new power sources to agricultural and forest power needs. Prerequisite: MET 233 or equivalent. Rec 2, Lab 3. **Cr 3.**

BRT 369 Processing Technology
A study of the sizing and selection of equipment and systems for the food and fiber processing industry. Introduces pumps, fans and their systems in relation to the basics of fluid mechanics, aid ventilating and drying systems in relation to the psychometric properties of air vapor mixtures. Considers the principles of materials handling and handling systems. Introduces the theory and application of refrigeration and air conditioning. Prerequisites: MAT 122 and PHY 111, PHY 112. Lec 2, Lab 2. **Cr 3.**

BRT 392 Senior Capstone Project
Designed to give students in Bio-Resource Engineering Technology an applications-oriented design experience during their senior year. Each student will be required to select and design components and systems for engineering projects identified by the BRE faculty. Requires the student to demonstrate his or her ability to understand and apply scientific principles and engineering knowledge to the solution of real life problems. (Satisfies the General Education Capstone Experience and Demonstrated Writing Competency Requirements.) Prerequisite: Senior standing in the BRT curriculum. Rec l, Lab 6. A minimum 3 credits over two or more semesters. **Cr Ar.**

Courses in Business Administration (BUA)

BUA 100 Majoring in Business
Introduces students to general resources of the University of Maine and specific resources of the College of Business, Public Policy and Health that are important to students majoring in business. Topics covered include an overview of library and computing facilities, graduation requirements and programs of study for the B.S. degree in Business Administration, internships and cooperative education opportunities, study abroad and other exchange programs and careers in business. (Pass/Fail Grade Only.) **Cr 1.**

BUA 201 Principles of Accounting I
An introduction covering the fundamental accounting equation, basic principles of accounting measurements, accounting cycle, construction of financial statements, and asset analysis and valuation. Prerequisite: sophomore standing. **Cr 3.**

BUA 202 Principles of Accounting II
A continuation of BUA 201 covering analysis and valuation of liabilities and stockholder's equity, basic principles of consolidated statements, and the cashflow statement, cost accumulation methods and management decision-making. Prerequisites: BUA 201, sophomore standing. **Cr 3.**

BUA 220 The Legal Environment of Business
An examination of fundamental legal concepts and their application to the business community. Considers the evolution of law and its underlying conceptual framework from which legal rules and principles of business develop. Selected legal cases will be critically analyzed and discussed. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Ethics Requirements.) Must be taken in series with BUA 349 to meet Ethics requirement. Neither course alone fulfills the requirement. Prerequisite: sophomore standing. **Cr 3.**

BUA 301 Intermediate Accounting I
A study of principles regarding the valuation and recording of working capital items and noncurrent items, capital stock and surplus, statement analysis. Prerequisites: BUA 202, junior standing. **Cr 3.**

BUA 302 Intermediate Accounting II
A study of the accounting and valuation problems of assets and a consideration of current issues and controversies in financial accounting. Prerequisite: BUA 301; junior standing. **Cr 3.**

BUA 305 Cost Accounting
The principles and methods of job order costs, including inventory control and pricing, labor, and analysis and allocation of factory overhead. Principles and practices of process cost accounting. Prerequisites: BUA 202, junior standing. **Cr 3.**

BUA 306 Advanced Managerial Accounting
A comprehensive study of joint and by-product costs, estimated and standard costs, distribution and differential costs. Also covers budgeting, analysis of cost structure, and management use of standards. Prerequisite: BUA 305; junior standing. **Cr 3.**

BUA 307 Advanced Accounting
Principles, theory and procedures of parent and subsidiary accounting. A comprehensive study of consolidated statements, affiliation structures, and consolidations and mergers. Also includes home office and branch accounting. Prerequisite: BUA 301, BUA 302; junior standing. **Cr 3.**

BUA 308 Emerging Issues and International Accounting
Application of accounting principles to emerging issues and international accounting dimensions. Prerequisite: BUA 301, BUA 302. **Cr 3.**

BUA 310 Auditing
The systematic verification of financial statement including a study of the responsibilities, liabilities and ethics of the independent public accountant. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: BUA 301. **Cr 3.**

BUA 312 Federal Taxation of Individuals
A study of federal tax laws as they affect individuals. Includes determination of gross income, deductions from gross income, exclusions from gross income, and tax planning to reduce taxable income. Students will use federal tax forms to prepare individual income tax returns. Prerequisites: BUA 202, junior standing. **Cr 3.**

BUA 315 Taxation of Corporations, Partnerships and Estates
Studies the federal taxation of corporations, partnerships and estates. Issues covered include: 1) factors determining whether an entity should be taxed as a corporation or a partnership; 2) tax effect of investments in corporations on the corporation and its shareholders; 3) taxation of corporate distributions to shareholders; 4) taxation of investments in partnerships and distributions to partners; and 5) use of trusts and estates in retirement planning. Prerequisites: BUA 312; junior standing. **Cr 3.**

BUA 325 Principles of Management and Organization
Analysis of the internal organizational structure and the process of management in business enterprises both domestic and international. Focus on concepts, methods, and techniques of planning, organizing, directing, and controlling the functions of the modern manager, and the impact of these processes upon effective interpersonal relations. Prerequisites: ECO 120 and ECO 121, junior standing. **Cr 3**

BUA 326 Dynamics of Organization and Behavior
An analysis of business organization and problems encountered by administrators in an interpersonal setting. Emphasis on the findings of behavioral sciences relevant to the management of economic enterprises. Examines interdisciplinary approaches to human relations and adjustment problems in modern organizations, as well as motivation, leadership, and organization theory as related to work and productivity. Prerequisite: BUA 325. **Cr 3**

BUA 327 Seminar in Contemporary Management Problems
Covers developments in the behavioral and management sciences, the development of management thought, and critical issues in organizational theory, with special reference to industrial application. Students conduct in depth library research or field work in select managerial topics. Prerequisite: BUA 326. **Cr 3**

BUA 328 Canadian/U.S. Business: A Comparison
A comparative review of the recent history of Canadian-U.S. business relations with primary emphasis on cross-border trade issues and the impact of that bilateral trade on Maine's business environment. Focus on energy, lumber, paper, agricultural products, industrial production, freight/ transportation, and foreign investments. (Satisfies the General Education Human Values and Social Context and Cultural Diversity and International Perspectives Requirements.) Prerequisite: junior standing. **Cr 3**

BUA 330 Personnel Management and Industrial Relations
An interdisiplinary survey of the personnel management systems of private and public organizations. An integrated behavioral, quantitative and systems approach permits an applied synthesis of the social sciences used to analyze the employment relationship. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: ECO 120, ECO 121, and PSY 100, or equivalent or permission, junior standing. **Cr 3**

BUA 331 Labor-Management Relations
An interdisciplinary survey of the labor-management systems of the private and public sectors. Considers the nature and characteristics of labor-management relations from structural, historical, international, legal, psychological, and economic perspectives. (Satisfies the General Education

Human Values and Social Context/ Social Contexts and Institutions Requirement.) Prerequisite: junior standing. Cr 3.

BUA 335 Principles of Management Information Systems
Studies the role of information systems and data processing in business planning and control including technology of information systems, economics of information, planning, decision-making and control in business organizations. Prerequisites: Any 200-level COS course, junior standing. Cr 3.

BUA 337 Production and Operations Management
The place of production planning and control in an industrial organization and its relation to the actual production procedure. Problems in design, marketing, forecasting, capacity evaluation and quality control are interwoven with those of production and inventory management. Prerequisites: BUA 325, MAT 215, junior standing. Cr 3.

BUA 340 Problems of Small Business
Develops understanding of the economic and social environment in which the small concern functions. Provides practice in solving problems relevant to small businesses, particularly those operating in Maine. For students who anticipate operating a small business, or dealing with small businesses as customers or suppliers. Prerequisites: BUA 202, BUA 325, BUA 335, BUA 370 and senior standing with permission. Cr 3.

BUA 343 Introduction to International Business
Examines the role of U.S. businesses in the global economy with focus on key concepts and topics in world trade and investments, economic relationships among nations, as well as an understanding of cultural diversities. Provides analyses of problems and opportunities related to establishing, conducting, and maintaining business activities in foreign markets. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisites: ECO 120, ECO 121, junior standing. Cr 3.

BUA 345 International Management
Examines management problems of organizations with international interests, including the significance of cultural traditions and social structures for business conduct. Covers various international styles of managerial functions, structure, and processes. Prerequisite: BUA 325 and BUA 343. Cr 3.

BUA 349 Administrative Policy and Business Environment
A study of administrative decision making and policy setting, with consideration of social and political forces, and ethical values. (Satisfies the General Education Ethics Requirement and the Capstone Experience Requirement.) Must be taken in series with BUA 220 to meet Ethics requirement. Neither course alone fulfills the requirement. Prerequisites: BUA 325, BUA 335, BUA 337, BUA 350, and BUA 370, senior standing. Cr 3.

BUA 350 Business Finance
Examines the promotion, organization, and financing of the single proprietorship, partnership, and corporation, through advanced case studies and problems. Prerequisites: ECO 120, ECO 121, and BUA 201, junior standing. Cr 3.

BUA 351 Corporate Treasury Dynamics
Traces counterflows of cash between the corporate unit and the money market due to seasonal, cyclical, and secular demands. Includes numerous approaches to debt limit determination, and explores the problem of making optimal financing decisions in specific corporate and bank management settings. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: BUA 350. Cr 3.

BUA 352 Financial Institutions
The operations and economic roles of financial institutions: commercial banks, investment houses, and investment markets; savings and insurance institutions; governmental agencies. An institutional introduction to the fields of private and public finance. Prerequisites: ECO 120, ECO 121, BUA 350. Cr 3.

BUA 353 Investment Strategy
Examines the construction and management of investment portfolios. Prerequisites: ECO 120, ECO 121, BUA 350. Cr 3.

BUA 354 Speculative Markets
Examines the futures and options markets, concentrating on the use of derivative assets in risk management. Special emphasis on the ways in which a hedger may transfer unwanted risk to a speculator who is willing to bear it. Prerequisite: BUA 350. Cr 3.

BUA 366 Decision Support Systems for Management
Covers the managerial use of computer-based modelling to aid decision making with special emphasis on modelling complex systems under conditions of uncertainty. Principles of decision making, business modelling methods, decision analysis, decision support systems, and expert systems are covered. Prerequisite: BUA 335. Cr 3.

BUA 370 Marketing
Examines problems of distribution for representative industrial and consumer goods, including merchandising policies, selection of distribution channels, price policies, and advertising and sales promotion methods. Prerequisites: BUA 201, ECO 120 and ECO 121, junior standing. Cr 3.

BUA 372 Advertising
Considers the place of advertising in the marketing program. Business cases are analyzed to determine those situations in which advertising may be profitably employed to stimulate primary and selective demand for industrial and consumer goods and services. Prerequisite: BUA 370. Cr 3.

BUA 374 Sales Management
An analysis of the problems facing marketing management in formulating sales policy and managing the sales organization. Prerequisite: BUA 370. Cr 3.

BUA 375 Retail Management
An introduction to the strategies and tactics of retail management from a marketing management perspective. Prerequisite: BUA 370. Cr 3.

BUA 376 International Marketing
Focuses on marketing principles and strategies valuable to the successful conduct of international business operations. Differing business environments will be examined in order to sensitize students to necessary adjustments in marketing strategies. Prerequisites: BUA 370 and BUA 343. Cr 3.

BUA 378 Marketing Research
Considers marketing research as a tool in solving problems of production and distribution with emphasis on problem formulation, exploratory research, research design, basic observational and sampling requirements, data analysis, interpretation, and sampling. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: BUA 370 and MAT 215. Cr 3.

BUA 380 Managerial Marketing
Emphasizes the integration of marketing, as an organization activity, with other activities of the business firm. Explores problems encountered by top marketing executives in modern business. Prerequisites: BUA 378 or BUA 382. Cr 3.

BUA 382 Consumer Behavior
An exploration of consumer purchase decision processes. Analyzes existing consumer behavior models and their role in the formulation and implementation of marketing strategies. Covers the psychological, sociological and cultural dimensions of buyer behavior, and the current state-of-the-art in consumer research, including the findings from empirical tests of buyer behavior models. Prerequisite: BUA 370. Cr 3.

BUA 390 Special Topics in Business Administration
Study of various aspects of functional areas of accounting, finance, management, marketing, decision sciences, international business and other business-related topics. Topics vary depending on faculty and student interests. May be repeated for credit if the topics differ. Prerequisites: Junior standing and permission. Cr 1-3.

BUA 396 Field Experience-Cooperative Education
From one to six semester hours of degree credit will be granted for field experience in business and managerial fields relevant to the student's educational development and career goals. Prior approval of the project and of the precise number of credits is required, and will be based on a detailed written plan presented by the student. Students will not be granted credit either retroactively or for field experience courses taken at another university or another campus of this university. Prerequisite: junior or senior in the College of Business, Public Policy and Health and permission. **Cr 1-6.**

BUA 400 Introduction to Accounting
Provides pre-MBA students with an introduction to the basic principles underlying the preparation of financial statements and the analysis of financial information. Prerequisite: Pre-MBA students only, permission of the Director of the MBA Program. **Cr 3.**

Courses in Canadian Studies (CAN)

CAN 101 Introduction to Canadian Studies
Acquaints students with varied aspects of the Canadian experience: society, culture, history, native peoples, environment, education, technology, economy and diplomacy. Participating faculty include Canadian-American Center staff, visiting scholars from Canada and the United States, and faculty members from UM Colleges. Course requirements include a field trip to Canada. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Cultural Diversity and International Perspectives Requirements.) Prerequisite: First-year student or sophomore standing. **Cr 3.**

CAN 401 Readings in Canadian Studies
An independent reading course examining issues and problems not studied in regular offerings. The course is arranged between the student and a Canadian Studies faculty member. Prerequisite: CAN 101 plus 6 hours of core courses in Canadian Studies or permission. **Cr 3.**

Courses in Communication Disorders (CDS)

CDS 108 Directed Speech Improvement
Individualized evaluation and self-improvement programs focused on the spoken communication needs of students presenting problems in language, speech, fluency, voice, or hearing. May be repeated for credit. Prerequisite: permission of coordinator, Conley Speech and Hearing Center. (Pass/Fail Grade Only.) **Cr 1.**

CDS 130 Introduction to Communication Disorders
A survey of the major disorders of language, speech and hearing with attention to their recognition and the principles of their treatment. Recommended for all teachers. Not open to first semester first-year students. **Cr 3.**

CDS 388 Hearing and Deaf Studies
An introduction to normal auditory function as a basis for understanding the hard of hearing and deaf. Covers disorders of hearing and procedures for hearing assessment. Prerequisite: CDS 130. **Cr 3.**

CDS 389 Introduction to Audiology
A study of the methods of hearing assessment, including their administration and interpretation. Covers audiometric identification of hearing loss and rehabilitation methods. Prerequisite: CDS 388. **Cr 3.**

CDS 480 Language Development
Study of the sequential aspects of language development from birth to early adulthood. Emphasis on biological, psychological and sociological foundations. Not open to first-year students. Recommended for teachers. **Cr 3.**

CDS 481 Phonological Development and Phonetics
Exploration of phonological theory and normal phonological development. Emphasis on acquiring understanding and use of phonetic transcription skills through laboratory experiences. Prerequisite: Limited to junior or senior majors. **Cr 4.**

CDS 483 Anatomy and Physiology of the Speech Mechanism
The structures, muscular system and nervous system underlying breathing, phonation, articulation, and language. Emphasis on normal neurophysiological function with attention to organic pathologies affecting speech and language. Juniors or seniors. **Cr 3.**

CDS 484 Introduction to Speech Science
Introduces research findings on the importance of acoustical, physiological, and preceptual factors in speech production and reception. Methodology and instrumentation employed in such research are surveyed. Not open to first-year students. **Cr 3.**

CDS 486 Clinical Practicum I
Directed clinical experience with selected case studies/clients presented in the classroom and departmental field sites including Conley Speech and Hearing Center. Must be repeated for a maximum of six credits. Prerequisite: Limited to senior majors only. **Cr 3.**

CDS 487 Organic Speech Disorders
A study of the diagnosis and treatment of speech disorders of organic origin: cleft palate, cerebral palsy, aphasia, and dysarthrias. Not recommended for classroom teachers. Prerequisite: Sophomore standing. **Cr 3.**

CDS 490 Senior Capstone: The Clinical Process I
First of a two-semester course on the clinical process in communication disorders emphasizing observation as a clinical tool, principles of clinical research, scientific and professional writing, and the foundations for professionalism and ethical decision making. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisite: Limited to Senior majors only. **Cr 4.**

CDS 491 Senior Capstone: The Clinical Process II
Second of a two-semester course on the clinical process in communication disorders with primary emphasis on clinical problem solving, decision making, and developing clinical expertise. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: CDS 490. Limited to Senior majors only. **Cr 4.**

CDS 493 Topics in Communication Disorders
In-depth analysis of selected subjects, designed to explore new areas of research and/or current issues. Specific topics vary. Prerequisite: Sophomore standing and permission of Department Chairperson. **Cr 1-3.**

CDS 497 Problems in Communication Disorders I
For the advanced student desiring to study a particular problem under the guidance of a member of the staff. Prerequisite: permission. **Cr 1-3.**

CDS 498 Problems in Communication Disorders II
A continuation of CDS 497. Prerequisite: permission. **Cr 1-3.**

CDS 581 Articulation and Phonology Disorders
Articulation and phonology disorders from developmental and etiological perspectives. Diagnostic and therapeutic procedures appropriate across the lifespan. Prerequisite: CDS 483 or permission. **Cr 3.**

CDS 582 Voice Disorders
Analysis of types, symptoms, and causes of abnormal voice production. Consideration of diagnostic practices, medical and psychological referral procedures, and methods for correction of vocal problems of pitch, intensity, rate, and quality. Prerequisite: CDS 483 and permission. **Cr 3.**

CDS 583 Fluency Disorders
Causation, diagnosis, and treatment of stuttering behavior viewed from various theoretical orientations. Covers clinical management of children and adults who stutter. Prerequisite: CDS 382 or permission. **Cr 3.**

CDS 585 Children's Language Disorders
Developmental language delays, disorders and differences. Application of theory to clinical assessment/intervention for form, content, and use interactions in language development. Prerequisite: CDS 480 and permission. **Cr 3.**

CDS 586 Current Issues in Clinical Practice
Assists the speech and hearing clinician in keeping abreast of theoretical and

applied developments in clinical practice with children and adults. Topics to be arranged each time offered. Prerequisite: permission. **Cr 3.**

CDS 588 Aural Rehabilitation
Considers the effects of hearing loss upon the personal and social development of the individual. Examines principles and procedures of auditory training and speech reading as approaches to language development in the hearing-handicapped person. Prerequisite: CDS 388 or permission. **Cr 3.**

CDS 593 Topics in Communication Disorders
Advanced study of selected topics. Prerequisite: Permission. **Cr 3.**

Courses in Education: Counseling (CEC)

CEC 520 Multicultural and Social Foundations of Counseling
Examines philosophical, historical, cultural and gender foundations in multicultural and contextual counseling theories and practices. Meets state licensure requirements for social and cultural foundations component. **Cr 3.**

CEC 523 The Use of Standardized Tests and Inventories
Considers the selection, use and interpretation of commonly-used standardized group achievement and ability tests, interest inventories and non-clinical assessment of personality and other affective attributes. Prerequisite: Basic knowledge of measurement and statistics. **Cr 3.**

CEC 525 DSM and the Profession of Counseling
The DSM is a clinical tool used by school counselors and other community professionals. Examines the language of the DSM by utilizing a case study approach emphasizing interviewing techniques and treatment planning. Multicultural applications will be explored. **Cr 3.**

CEC 549 Developmental Theories for Counselors
Life-span and life-course developmental theories. Contemporary social issues explored. **Cr 3.**

CEC 551 Introduction to School Guidance
Survey of the philosophy, objectives, principles, and practices of comprehensive developmental school counseling programs (K-12.) Prerequisite: Counselor Education major or permission. **Cr 3.**

CEC 552 Effective Group Work in the Helping Professions
Introductory course linking group theories, research, and practice through a mix of didactic, written, and experiential activities. Lab experience outside of class is required. Prerequisite: permisison. **Cr 3.**

CEC 553 The Profession of Counseling
Examines the history, trends, values, and core beliefs underlying the counseling profession including ethical standards in the counselor-client relationship and applications to various client populations. Emphasizes self-awareness. **Cr 3.**

CEC 556 Established Theories of Counseling
Examines counseling theory and philosophy. Prerequisite: CEC 553. **Cr 3.**

CEC 557 Play Theories and Techniques
Designed for school counselors, teachers, child and adolescent development specialists. Background in play theories, uses and techniques related to development. **Cr 3.**

CEC 559 Counseling for Career Development
Theory and foundations of career development, career resources and assessment, career guidance programs and career counseling issues and techniques. Prerequisite: CEC 553 or CEC 556 or equivalent. **Cr 3.**

CEC 560 Counselor Education Prepracticum
Bridges cognitive courses to the counseling practicum. Uses Personal Growth and Development Center video equipment to provide feedback on skills. Prerequisites: CEC 523, CEC 552, CEC 556, CEC 559. **Cr 3.**

Courses in Civil Engineering Technology (CET)

CET 100 Introduction to Construction Management Technology
An introductory study of the construction process and civil engineering technology. Topics include project concept, design, contracting and construction methods. Some field trips. Lec 1 or Lab 3. **Cr 1.**

CET 101 Plane Surveying
A beginning course studying surveying instruments and their use in the measurement of angles, distances and elevations. Also includes mathematics, computational methods, adjustments and measurement analysis used in plane surveying. Prerequisite: CET 100. Corequisite: TME 151. Lec 2, Lab 2 **Cr 3.**

CET 121 Materials Properties and Testing
The structure, properties and testing of engineering materials and their use in constructed facilities. Includes metals, woods, concrete, bituminous mixtures, plastics, insulation, adhesives and corrosion of materials. Engineering design is introduced by readings and discussions on creativity, the design process and the concepts of marginal economic analysis, probability of failure and safety factors. Design problems include design of concrete mixtures and insulating systems to satisfy specific realistic situations taking into account uncertainty, safety, economic factors and intangibles, as well as technical considerations. The lab will evaluate material performance under applied loads for engineering applications. Physical properties of concrete, metals, plastics and wood. Exercises include study of the variability of materials, construction of probability density functions from test data and computation of the probability of failure. Prerequisite: PHY 107. Lec 3, Lab 3. **Cr 4.**

CET 124 Construction Safety
An introduction to safety on the construction site to include safety measures, training, responsibility for safety, accident investigation and pertinent regulations (OSHA and state.) Will also look at the effect of safety on worker's compensation, liability, employee behavior and time management. Lec 1. **Cr 1.**

CET 130 Building Construction
A study of basic building structural systems, materials and methods, and the graphical representation of same in the most customary forms of construction drawings. Introduction to construction estimating with emphasis on quantity survey. Prerequisite: MET 121. Lec 3, Lab 2. **Cr 4.**

CET 202 Construction Surveying
Study of surveying procedures in construction. Includes volume computations, stakeout, grade, layout, site mapping, profile and cross-sections. Prerequisites: CET 101, COS 100 and TME 152. Lec 1, Lab 3 **Cr 2.**

CET 211 Statics and Strength of Materials
Considers analytical solutions of force systems. Load, shear, moment and deflection values are solved for in beams, trusses, and frames under static loading. Study of stresses and strains that occur as structural members are subjected to shearing, tensile, compressive and flexural forces. Prerequisites: PHY 107, COS 100 or equivalent. Prerequisite or Corequisite: TME 253. Lec 3, Rec 2. **Cr 4.**

CET 212 Structural Design
Design of wood beams and columns; steel beams, columns and tension members; and reinforced concrete beams. Covers building code requirements for loads including dead, live, snow, wind and earthquake. Prerequisite: CET 130 and CET 211. Lec 3, Lab 2. **Cr 4.**

CET 220 Selected Topics in Construction Management Technology
Topics in Engineering Technology not regularly covered in other courses. Content is varied to suit individual needs. May be repeated for credit. Prerequisite: permission. **Cr 1-4.**

CET 320 Construction Methods and Equipment
A study of heavy and building construction operations. Topics include excavation, foundations, reinforced concrete and masonry construction and structural steel erection. Prerequisites: CET 212. Lec 3. **Cr 3.**

CET 326 Soil Mechanics and Foundations
Introduction to the physical properties of soil important to the construction industry. Includes standard ASTM tests, classification systems, drainage, frost action, slope stability and shallow foundations. Prerequisite: CIE 110 and CIE 111. Lec 3, Lab 2. **Cr 4.**

CET 332 Civil Works Technology
Topics related to civil engineering site work, highway design, drainage, hydrology, hydraulics, sewer design, water system design septic systems, erosion control, sedimentation control, mass-haul diagrams and conduits. Prerequisite: CET 202. Lec 3, Lab 1. **Cr 3.**

CET 360 Construction Cost Estimating
Principles and procedures related to construction cost estimating. Emphasis is on detailed cost estimating used in competitive bidding by contractors. A complete bid estimate is prepared, including quantity takeoff and line item pricing. Manual and computer methods are utilized. A wide range of preliminary techniques are introduced. Prerequisite: CET 320. Lec 3, Lab 3. **Cr 4.**

CET 394 Construction Management Technology Practice
Cooperative work experience at full-time employment for at least a continuous 10 week period. Junior or senior standing in CMT program. Summers only. (Pass/Fail Grade Only.) **Cr 3.**

CET 451 Construction Law
Studies legal aspects relating to engineering and construction. Covers mechanics liens, torts, contracts, liabilities, warranties, remedies, damages , the uniform commercial code, agencies, alternate dispute resolution, billing, fees, land use restrictions, idemnification, ethics and business forms. Prerequisite: CET 124 and junior standing. Lec 3. **Cr 3.**

CET 456 Construction Documents and Administration
A study of documents and administrative procedures relevant to construction and contract administration. Topics include bidding, bonds, letters of credit, insurance, addenda, claims, inspections, reporting, operations, disputes, payments and defaults. (Satisfies the General Education Writing Intensive Requirement.) Prerequisite: CET 451 and ENG 317. Lec 3. **Cr 3.**

CET 458 Management of Construction
The capstone course for Construction Management Technology (CMT) program. Principles and applications taught throughout the program are used by students during a construction project simulation that covers many facets of construction management, engineering and business that are encountered in practice. Format varies. (Satisfies the General Education Capstone Experience Requirement.) Prerequisites: BUA 201, CET 326, CET 451, CET 462. Lec 3. **Cr 3.**

CET 462 Construction Scheduling
A study of design and analysis of construction project schedules using the Precedence Method. Computerized and manual procedures are employed. A complete project is resource loaded and scheduled. Project control systems are studied, including earned value. Line-of-balance scheduling techniques are examined. Prerequisite: CET 360. Lec 2, Lab 3. **Cr 3.**

CET 498 Selected Topics in Construction Management Technology
Topics in Engineering Technology not regularly covered in other courses. Content varies to suit individual needs. May be repeated for credit. Prerequisite: junior or senior standing; permission of instructor. **Cr Ar.**

Courses in Chemical Engineering (CHE)

CHE 111 Introduction to Chemical Engineering
Introduces the fundamentals of chemical engineering studies, career development and professional practice. Includes emphasis on oral and written communication skills and career planning development. Admission: first-year students only. Rec 2. **Cr 2.**

CHE 112 Introduction to Chemical Engineering II
Introduction to the application of computers to chemical engineering problems. Topics inlcude computer programming, the use of packaged software for computations and graphics and general use of PC operating systems. Rec 2. **Cr 2.**

CHE 200 Fundamentals of Chemical Engineering
Applies the principles of material and energy balances to the solution of problems in chemical engineering operations and processes through quantitative correlation of basic concepts of chemistry, physics, and mathematics. Prerequisite: CHY 132 or permission. Lec 4. **Cr 4.**

CHE 330 Engineering Materials
Relationships between the microscopic structure of materials and their macroscopic bulk and engineering properties. Emphasis on metals, polymers and ceramics and the effects of their microstructures on engineering performance and design. Prerequisites: CHE 385. Lec 3. **Cr 3.**

CHE 352 Process Control
Process dynamics described by ordinary differential equations and by linearized approximations. Covers solution of system equations by the use of LaPlace transforms, concepts of feedback control, process dynamics and closed loop system analysis. Prerequisites: MAT 258 or MAT 451 or permission. Rec 3. **Cr 3.**

CHE 360 Elements of Chemical Engineering I
Introduction to rate operations, stage operations, and the principles of molecular and turbulent transport of mass, momentum, and energy including application of these principles to the chemical engineering unit operations. Prerequisite: CHE 200. Rec 4. **Cr 4.**

CHE 361 Chemical Engineering Laboratory I
Applies the principles of the unit operations and process control in the laboratory, using pilot scale equipment with emphasis on formal reports. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: CHE 352, CHE 360. Lab 4. **Cr 2.**

CHE 362 Elements of Chemical Engineering II
A continuation of CHE 360. Prerequisite: CHE 200, CHE 360. Rec 4. **Cr 4.**

CHE 363 Chemical Engineering Laboratory II
Application of the principles of the unit operations and process control in the laboratory, using pilot scale equipment. Emphasis is placed upon formal written and oral reports. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: CHE 352, CHE 362. Lec 1, Rec 1, Lab 2. **Cr 3.**

CHE 368 Kinetics and Reactor Design
The analysis and design of chemical reactors. The fundamental principles of chemical kinetics and of heat and mass transfer are applied to various types of chemical reactors. Rec 3. **Cr 3.**

CHE 385 Chemical Engineering Thermodynamics I
Applications of the first and second laws of thermodynamics to the analysis of systems of interest to chemical engineers. Topics include state equations for both ideal and real gases, heat and energy relationships in chemical reactions, elementary phase equilibria, and simple heat and power cycles. Prerequisite: CHE 200. Rec 3. **Cr 3.**

CHE 386 Chemical Engineering Thermodynamics II
A continuation of CHE 385. Emphasis on homogeneous mixtures, multi-component vapor-liquid equilibria, chemical reaction equilibria and the thermodynamic analysis of chemical processes. Prerequisite: CHE 385. Rec 3. **Cr 3.**

CHE 430 Introduction to Polymer Science and Technology
Concept of macromolecules and synthesis of polymers from monomers. Step-growth and addition polymerization. Polymer structure, molecular size and shape and characterization techniques. Polymer solutions and phase equilibria. Solid state properties. Polymer morphology and transitional phenomena. Crystalline and amorphous states. Glassy, rubbery and viscous behavior. Rheological aspects. Viscoelasticity. Survey of commodity thermoplastics, engineering polymers and uses. Polymer additives and blends. Basic processing techniques. Lec 3. **Cr 3.**

CHE 431 Polymer Chemistry and Reactions
Synthesis and production of polymeric materials from monomers or by modification of natural polymers. Various polymerization reactions, their catalysis and their mechanisms and kinetics are considered as well as industrial systems used for polymerization. Prerequisite: CHY 252. Corequisite: CHY 372. Lec 3. **Cr 3.**

CHE 432 Polymer Structure and Properties
Examines structure and properties of polymeric materials. Polymer structure and morphology, transitional phenomena, crystallinity, solution behavior, characterization, and basic rheology and properties related to chain structure are studied. Prerequisite: CHY 372. Corequisite: CHE 386 or permission. Lec 3. **Cr 3.**

CHE 450 Advanced Process Control I
The use of modern control theory in the analysis and design of multivariable control systems. Introduces state variable methods, with applications to digital controllers. Includes a laboratory project. Prerequisite: CHE 352 or equivalent or permission. Lec 3. **Cr 3.**

CHE 454 Introduction to Digital Computer Process Control
Real-time process programming concepts, the z transformation and design of digital controllers. Advanced control schemes. Dynamic considerations and control of unit operations. Includes laboratory project. Prerequisites: CHE 352. Lec 3. **Cr 3.**

CHE 456 Advanced Process Control I
Examination of dynamic systems in state variable form including state variable models, interaction and decoupling, controllability and observability, multivariable systems. Prerequisite: CHE 352 or permission. Lec 3. **Cr 3.**

CHE 477 Elements of Chemical Process Design
Introduction to chemical process design and engineering economics. Considers principles of design, complex process flow diagrams, heat and material balances, rate equations, and cost estimating techniques as well as principles of engineering economics involving time value of money, taxes, depreciation, profitability indicators, alternative investment and optimization. The nature of failure of process equipment will be discussed including explosion, corrosion, stress corrosion and cracking. Selection of materials for chemical process and equipment will be discussed. Prerequisite: CHE 360, CHE 362 and CHE 386 or permission. Rec 3. **Cr 3.**

CHE 478 Computer Aided Process Design
Deals with four areas where computers are of use in Chemical Engineering Design: Data banks, thermodynamic calculations and phase equilibrium, simulation of individual types of equipment and simulation of processes. Equal time is devoted to each topic. Prerequisites: CHE 360, CHE 362. Lec 3. **Cr 3.**

CHE 479 Process Design Projects
Application of chemical engineering principles to the solution of complex, open-ended, design problems involving feasibility, analysis, design and optimization of chemical processes. Review of methods for estimating thermodynamic and transport properties required in process design. Emphasis on oral and written communications and working in small design groups. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: CHE 477. Rec 1, Lab 3. **Cr 4.**

CHE 480 Pollution Prevention in Industrial Operations
Provides a basic background in pollution science while exploring the role of the engineer in solving pollution problems with an emphasis on pollution prevention. (Satisfies the General Education Human Values and Social Contexts Population and the Environment Requirement.) Prerequisite: Senior status in Chemical Engineering or instructor permission. **Cr 3.**

CHE 493 Chemical Engineering Seminar
Discussion of recent developments in chemical engineering and related fields. Prerequisite: senior chemical engineering standing. **Cr 0-1.**

CHE 494 Chemical Engineering Practice
A cooperative work experience in some commercial operation of the chemical process industry. May be repeated for credit to a maximum of 8 credit hours. Prerequisite: permission. (Pass/Fail Grade Only.) **Cr Ar.**

CHE 497 Independent Study
Individual, independent study of a specialized topic under supervision of an advisor and at least one other faculty member. A formal report is required upon completion of the study. Maximum of 3 accumulated credit hours. Prerequisite: permission. **Cr Ar.**

CHE 498 Special Topics in Chemical Engineering
Class work in selected subjects in the field of chemical engineering, or related areas of science and technology, not covered in other courses. May be repeated for credit. Prerequisite: permission. **Cr 1-3.**

CHE 499 Undergraduate Thesis
Original investigation of a chemical engineering problems. The topic must be chosen prior to the senior year. A committee of at least three faculty member will supervise the thesis and its defense. Maximum of 3-6 accumulated credit hours. Prerequisite: permission. **Cr Ar.**

CHE 510 Introduction to Transport Phenomena
A study of principles of momentum, energy and mass transport including mathematical modeling of transport processes by exact and approximate techniques. **Cr 3.**

CHE 511 Fluid Dynamics
The use of fundamental fluid flow equations will be covered. Newtonian and non-Newtonian fluids are examined. The concepts of modeling of industrial processes in terms of fluid dynamic concepts are included. Prerequisite: CHE 510 or permission. **Cr 3.**

CHE 512 Mass Transfer
The fundamentals principles of diffusion are reviewed and extended to multicomponent and heterogeneous systems using the Stefan-Maxwell approach. Appropriate models for mass transfer processes are developed and applied to the analysis and design of selected seperation processes including adsorption and membrane systems. **Cr 3.**

CHE 520 Colloid Technology
Study and application of chemical and physical factors underlying interfacial phenomena. Includes thermodynamics of absorption, surface tension, capillarity, wetting and spreading, electrical properties of interfaces, electrokinetcs, surfactant, aerosols, emulsions, foams. **Cr 3.**

CHE 530 Polymer Science
Introduces research techniques for synthesis and modification of organic and inorganic macromolecules and analytical methods for relating molecular and phase structure with solubility, transport and interfacial properties. **Cr 3.**

CHE 533 Introduction to Polymer Processing
The application of engineering principles to polymer processing with particular emphasis on applied rheology, extruder design, die design, spinning, molding, and sheet fabrication. Emphasis on mathematical modelling of processes and the effects of processing on the products formed. Prerequisites: CHE 431, CHE 362, CHE 386, CHY 372 or permission. Lec 3. **Cr 3.**

CHE 540 Advanced Chemical Engineering Thermodynamics
Studies of phase and reaction equilibria in multi-component, non-ideal, and complex systems. Flow and non-flow systems. Application of general thermodynamic methods to problems in chemical engineering. **Cr 3.**

CHE 558 Advanced Process Control
Principles and methods of parameter estimation, system identification, and search techniques. Considers advanced process controller and control law design and stochastic systems. Includes applications and examination of current literature. Prerequisites (or concurrent registration): CHE 454, CHE 456 or permission. Lec 3. **Cr 3.**

CHE 561 Advanced Chemical Engineering Kinetics
Examines theory of homophase and heterophase catalysis and chemical transformation as a base for process design. Includes chain reactions, acidbase catalysis, enzymes, and commercial case studies such as

hydrocarbon synthesis, organic oxidations, cracking, and platforming. **Cr 3.**

CHE 575 Paper Surface Science
Deals with the fundamentals of paper surface treatment such as sizing, printing and glueing, with emphasis on paper coating. Issues of such as adhesion, light scattering, rheology, fluid dynamics and film formation will be covered. **Cr 3.**

CHE 580 Chemical Engineering Analysis
Modeling and simulation of chemical engineering processes. Emphasis on the formation of a model using ordinary and partial differential equations, and on the solution of the model using numerical methods. **Cr 3.**

CHE 585 Mathematical Methods in Chemical Engineering
Solutions of the ordinary and partial differential equations encountered in transport phenomena, chemical kinetics and process control. Series solutions involving Bessel functions, Legendre functions and Gamma functions. Use of Laplace transforms and approximate methods. Solution of difference equations for discrete systems. Application of vectors and tensors. **Cr 3.**

CHE 598 Special Topics in Chemical Engineering
Special topics presented as need and interest require. Topics will include studies relevant to fields of application, such as pulp and paper, polymers, process control, materials conversion, and surface properties. Prerequisite: permission. **Cr Ar**

Courses in Child Development and Family Relations (CHF)

CHF 200 Family Interaction
Interpersonal dynamics of dating, courtship, mate selection, and the development of family life. Changing patterns of personal interactions within the family life cycle and a pluralistic society. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions Requirement.) **Cr 3.**

CHF 201 Introduction to Child Development
Influences on human development from conception through middle childhood. Theoretical perspectives, empirical evaluation and practical implications. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions Requirement.) **Cr 3.**

CHF 203 Practicum in Early Childhood Programs
Introductory practicum combining child development and education theory with supervised weekly participation in the Child Development Learning Center. Focuses on the child under six years of age. Prerequisite: CHF 201. Lab 2. **Cr 3.**

CHF 321 Curriculum for Young Children I
Exploration of topics such as selection of developmentally appropriate activities, time management, arrangements of the physical environment, staff management and program administration of early childhood settings. (Satisfies the General Education Demonstrated Writing Competency Writing Intesive Requirement.) Prerequisite: CHF 201, CHF 203 or permission. **Cr 3.**

CHF 322 Curriculum for Young Children II
Students will develop curriculum resource units for an early childhood environment (e.g., preschool-3, daycare centers, play center for the hospitalized child), evolving from the contents structured in CHF 321. Prerequisite: CHF 201, CHF 203, CHF 321 or permission. **Cr 3.**

CHF 331 Cognitive Development
Introduction to the developmental processes involved in the acquisition, organization, and processing of information, with an emphasis on the period between infancy and adolescence. Discussion of current theories and research on cognitive, memory, and language development and their applications and implications for teaching and parenting. Prerequisites: CHF 201, PSY 100. **Cr 3.**

CHF 351 Human Sexuality
Discusses sexuality and its social implications against a background of constantly changing sexual mores, sex role development, alternative conceptualizations of sexuality, and implications for future trends in human interaction. (Satisfies the General Education Ethics and Human Values and Social Context/ Social Contexts and Institutions Requirements.) **Cr 3.**

CHF 373 Supervised Student Teaching
Full semester student teaching in an approved junior or senior high school under direction of the local teacher and University supervisor. Students are expected to live in the school community. Opportunity to achieve competencies in teaching skills, professional role and subject matter concepts. Prerequisite: CHF 372. **Cr 15.**

CHF 381 Family Resource Management
Analysis of the managerial process and its relationship to decision making. Emphasis on the use of resources including time, energy, and money to attain family goals. **Cr 3.**

CHF 385 Personal and Family Finance
Influence of outside economic conditions and personal circumstances on family financial problems. The management process applied to family problems involving finances, economic position, meeting living costs, protection against financial contingencies, credit, developing a savings and investment program. **Cr 3.**

CHF 391 Family Housing
Covers physical and social aspects of the housing environment, including floor plan principles in relation to family life cycle, local government controls, natural problems in housing. **Cr 3.**

CHF 404 Selected Topics in Child Development and Family Life
Review of specific subject areas in the field. Subject areas vary by semester. (May be repeated for credit.) **Cr 1-3.**

CHF 406 Introduction to Research Methods in Child Development and Family Relations
An overview of research methods applicable to the study of children and families. An in-class research project is completed. Prerequisites: CHF 200, CHF 201 or permission. **Cr 3.**

CHF 409 Special Problems in Child Development and Family Life
Prerequisite: permission. **Cr Ar.**

CHF 421 Student Teaching in Early Childhood
Supervised student teaching in one of the following settings; nursery school, day care, or kindergarten through grade three. Prerequisite: senior standing, CHF major. **Cr 6.**

CHF 422 Field Placement in Early Childhood Environments
Individual study in selected early childhood settings such as family day care homes, counselling and mental health centers, child development programs, child and family oriented hospital settings. Includes developmental assessments, planning and implementations of educational programs, family education courses, and assisting in special classes and group sessions. Prerequisites: Senior or graduate student standing and permission of the instructor. (Pass/Fail Grade Only.) **Cr 6.**

CHF 423 Professional Seminar in Individual and Family Studies
An integrated examination of career-related roles, ethics, and responsibilities in research and service to individuals and families. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisite: CHF major; senior standing. **Cr 3.**

CHF 424 Professional Seminar for Early Childhood Specialists
Examination of professional issues such as staff-client roles, professional ethics, employer-employee relationships, decision making in early child service agencies. Prerequisite: Concurrent with CHF 421 and CHF 422 or permission of instructor. (Pass/Fail Grade Only.) **Cr 1.**

CHF 431 Parenting
Parent behavior and the dynamics of parenthood are studied. Emphasis on interpersonal, familial, and societal roles of parents, and factors influencing role behaviors and expectations. Prerequisite: CHF 200, CHF 201. **Cr 3.**

CHF 432 Socialization of the Child
A study of normal development and behavior with emphasis on the impact of peers, school, and family on the developing child. Theory in child development is also examined. Prerequisite: CHF 201. **Cr 3.**

CHF 433 Adolescence
Growth and development during the adolescent years. Conceptual models and recent research are discussed. (Satisfies the General Education Demonstrated Writing Competency Writing Intensive Requirement.) Prerequisite: CHF 200, CHF 201 or permission. Cr 3.

CHF 434 Adult Development and Aging
Developmental processes and transitions from the early to later years of adulthood. Social, physical, cognitive, and familial aspects of adult growth and aging are examined. Prerequisite: CHF 201 or permission. Cr 3.

CHF 451 Family Relationships
The study of traditional and non-traditional family units as a system of interactions between individuals. Prerequisite: CHF 200. Cr 3.

CHF 452 Violence in the Family
Major forms of family violence, including child abuse and neglect, sexual abuse, and spouse abuse, are examined to provide students with an understanding of the development of dysfunctional forms of family interaction, descriptive knowledge on the prevalance of violent relationships at the national and local level, the necessary skills for identifying victims of abuse and the services available to them, and a preliminary understanding of the challenge of designing intervention strategies. (Satisfies the General Education Ethics Requirement.) Prerequisite: Junior or senior standing, CHF 200 or SOC 318 or permission. Cr 3.

CHF 487 The Consumer in the Present Economy
Examination of consumer problems, dimensions of the consumer role, interactions between consumers, government and the market. Appraisal of information sources for consumers and analysis of consumer protection programs. Cr 3.

CHF 488 Family Legal Issues
Issues of legal interest to consumers. Social and economic effects on families will be emphasized. Prerequisite: junior standing Cr 3.

CHF 496 Field Experience in Human Development and Family Studies
An approved program of work experience for department majors that involves the application of theory and research in applied settings. Requires a written proposal outlining the proposed experience, its relation to the student's program of study, plan for faculty supervision and a final written report. No more than 6 credits may be used toward the departmental major and not more than 12 credits may be used toward the graduation requirements. Prerequisite: permission of instructor. Cr 1-6..

Courses in Chemistry (CHY)

CHY 101 Chemistry for Everyday Living
A non-mathematical introduction to the basic principles of chemistry with an emphasis on chemistry relevant to everyday life. Topics will include nuclear, food, agricultural, drug, cosmetic and polymer chemistry. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) May be taken without CHY 102. Lec 3 with dem. Cr 3.

CHY 102 Chemistry for Everyday Living Laboratory
Accompanies CHY 101. Experiments will emphasize chemical topics relevant to everyday living. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Lab 3. Cr 1.

CHY 121 Introduction to Chemistry
Topics include: units and definitions, atomic structure, bonding, chemical change, concentration of solutions, reaction rates and equilibria, acid-base chemistry and summary topics related to applications in materials science, biological chemistry and the environment. Students wishing to pursue a B.A. in Chemistry with an environmental concentration should enroll in the focus section for this area for which summary topics are chosen to relate specifically to the environment. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Corequisite: CHY 123. Lec 3. Cr 3.

CHY 122 The Molecular Basis of Chemical Change
Topics include: atomic and molecular bonding; classes of chemical reactions, reactivity of non-metals and metals; materials chemistry; kinetics; thermodynamics; electrochemistry; nuclear chemistry. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Corequisite: CHY 124. Prerequisite: CHY 121. Lec 3. Cr 3.

CHY 123 Introduction to Chemistry Laboratory
Introduction to experimental techniques and concepts in chemistry. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Corequisite: CHY 121. (Pass/Fail Grade Only.) Lab 3. Cr 1.

CHY 124 The Molecular Basis of Chemical Change Laboratory
A continuation of CHY 123. Experimental techniques and concepts in chemistry. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Corequisite: CHY 122. Prerequisite CHY 121 and CHY 123. (Pass/Fail Grade Only.) Lab 3. Cr 1.

CHY 132 Applications of Chemistry
Topics include: nonmetals, metals, organic chemistry, biological chemistry, polymers and plastics, nuclear chemistry and summary topics such as air chemistry, water chemistry or the chemistry of various industrial processes. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Corequisite: CHY 134. Prerequisite: CHY 121. Not acceptable as a prerequisite for CHY 251. Lec 3. Cr 3.

CHY 134 Applications of Chemistry Laboratory
A continuation of CHY 123. Experimental techniques and concepts in chemistry. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Corequisite: CHY 132. Prerequisites: CHY 121 and CHY 123. (Pass/Fail Grade Only.) Lab 3. Cr 1.

CHY 242 Principles of Quantitative Analysis and Solution Equilibria
Topics covered include gravimetric and titrimetric methods of analysis and acid-base, complex formation, precipitation and oxidation-reduction equilibria. Spectrophotometric, potentiometric and chromatographic methods of analysis will be introduced. Laboratory determinations will provide examples of the above. Prerequisite: CHY 122. Lec 3, Lab 6. Cr 5.

CHY 251 Organic Chemistry I
An introduction to the chemistry of carbon compounds. Prerequisite: CHY 122. Lec 3, Rec 1. Cr 3.

CHY 252 Organic Chemistry II
A continuation of CHY 251 including the study of carbonyl compounds and amines. Prerequisite: CHY 251. Lec 3, Rec 1. Cr 3.

CHY 253 Organic Chemistry Laboratory I
An introduction to the separation, synthesis and analysis of organic compounds in the laboratory. Prerequisite or Corequisite: CHY 251. Lab 4. Cr 2.

CHY 254 Organic Chemistry Laboratory II
A continuation of CHY 253. Prerequisite: CHY 253 and CHY 252 (previously or concurrently.) Lab 4. Cr 2.

CHY 371 Physical Chemistry I
Applications of classical thermodynamics to the study of chemical and electrochemical systems. Prerequisite: CHY 122, PHY 112 or PHY 122, MAT 228 or equivalent. Lec 4. Cr 4.

CHY 372 Physical Chemistry II
Applications of statistical thermodynamics, quantum mechanics and principles of reaction kinetics to the study of chemical systems. Prerequisite: CHY 371. Lec 4. Cr 4.

CHY 374 Physical Chemistry Laboratory II
Aqueous solution equilibria, electrochemistry, reaction kinetics, and spectroscopy. Prerequisite: CHY 372 (previously or concurrently) or permission. Lab 4. Cr 2.

CHY 393 Undergraduate Seminar in Chemistry
Discussion of developments in chemistry and the chemical profession. Oral presentations and written papers required. Required of all chemistry majors in sophomore, junior and senior years. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: CHY 122 Cr 1.

CHY 394 Field Experience/Cooperative Education
Supervised employment with relevance to the study of chemistry in the public or private sector. A proposed program of study, mutually agreed upon by the student, faculty adviser, and "Co-Op" sponsor may be carried out in the summertime or during the academic year. A written report is required. Prerequisites: junior or senior standing with a good academic record, permission. (Pass/Fail Grade Only.) **Cr 1-9.**

CHY 398 Undergraduate Research
Students will conduct a research project under the supervision of a faculty member. A written research report is required. For chemistry majors only. Students must apply throught the Undergraduate Research Coordinator. No more than 2 credit hours can apply to graduation requirements. (Together with CHY 399, this course satisfies the General Education Capstone Experience Requirement.) Prerequisite: Junior standing. **Cr 1.**

CHY 399 Undergraduate Thesis
Written report of an original investigation carried out in the library and laboratory. (Together with CHY 398, this course satisfies the General Education Capstone Experience Requirement.) Prerequisite: senior standing, departmental permission. **Cr 1-3.**

CHY 443 Instrumental Analysis
Emphasis on instrumental methods. Prerequisite: CHY 242 and CHY 372. Lec 2, Lab 6. **Cr 4.**

CHY 450 Introduction to Molecular Modeling
An introduction to the computational investigation of molecular structure and properties. Topics include operation of UNIX workstations and nature and application of molecular mechanics, semi-empirical molecular orbital calculations and *ab initio* molecular orbital calculations. Prerequisites: CHY 252 and CHY 372. Lec 3, Lab 3. **Cr 4.**

CHY 453 Intermediate Organic Chemistry Laboratory
Qualitative organic analysis by chemical and instrumental methods. Prerequisite: CHY 252; CHY 254. Lec 1, Lab 4. **Cr 3.**

CHY 461 Advanced Inorganic Chemistry I
Advanced theoretical and descriptive inorganic chemistry emphasizing periodic relationships. Corequisite CHY 371 or equivalent. Lec 3. **Cr 3.**

CHY 462 Organometallic Chemistry
An introductory course for advanced undergraduate chemistry majors covering the principles and applications of organotransition metal chemistry. Topics include coordination chemistry, group theory, organometallic reaction mechanisms, electrochemistry, photochemistry, bioinorganic chemistry, catalysis, and applications to organic synthesis. Prerequisite: CHY 252; Corequisite or Prerequisite: CHY 372. Lec 3, Lab 3. **Cr 4.**

CHY 483 Introductory Wood Chemistry
Emphases on the chemical and physical properties of cellulose, hemicelluloses, lignin, and extractives. Prerequisite: CHY 252 or permission. Lec 3. **Cr 3.**

CHY 541 Topics in Advanced Analytical Chemistry
Lec 3. **Cr 3.**

CHY 550 Introduction to Molecular Modeling
An introduction to the computational investigation of molecular structure and properties. Operation of UNIX workstations and nature and applications of molecular mechanics, semi-empirical molecular orbital calculations and *ab initio* molecular orbital calculations. Completion of a significant research project is required. Prerequisites: CHY 556 and CHY 575. Lec 3, Lab 3. **Cr 4.**

CHY 551 Topics in Advanced Organic Chemistry
Recent advances in stereochemistry, heterocyclic compounds, natural products, and other graduate level topics. Prerequisite: CHY 555. **Cr Ar.**

CHY 553 Organic Qualitative Analysis
The isolation and identification of organic compounds. Prerequisite: CHY 252. Lab 8. **Cr 4.**

CHY 555 Intermediate Organic Chemistry
Detailed study of preparation of complex organic compounds and newer synthetic methods. Prerequisite: CHY 252. **Cr 3.**

CHY 556 Theoretical Organic Chemistry
Includes topics in electronic theory and reaction mechanisms. Prerequisite: CHY 252. **Cr 3.**

CHY 558 Problem Solving in Organic Chemistry
Discussion and solution of problems in mechanism, synthesis, and structure determination from current chemical literature. Required of all graduate students in organic chemistry once each year for a maximum of four credits. (Pass/Fail Grade Only.) Prerequisite: CHY 252 or equivalent. **Cr 1.**

CHY 560 Physical Methods of Inorganic Chemistry
Applications of the principles of group theory and modern spectroscopic techniques, including x-ray diffraction and photoelectron, infrared and Raman Vibrational, electronic and magnetic resonance spectroscopies in inorganic chemistry. Prerequisites: CHY 461 or CHY 575 or permission. **Cr 3.**

CHY 561 Topics in Advanced Inorganic Chemistry
Advanced level topics such as chemistry of the representative elements, transition metals, organometallic compounds, group theory and chemical bonding in inorganic compounds. Prerequisite: CHY 461, CHY 575 or permission. **Cr Ar.**

CHY 562 Advanced Organometallic Chemistry
An introductory course for graduate students covering the principles and applications of organotransition metal chemistry. Topics include coordination chemistry, group theory, organometallic reaction mechanisms, electrochemistry, photochemistry, bioinorganic chemistry, catalysis, and applications to organic synthesis. Prerequisites: CHY 252 and CHY 372 or equivalents. Lec 3, Lab 3. **Cr 3-4.**

CHY 571 Topics in Advanced Physical Chemistry
Advanced level subjects such as quantum chemistry, molecular spectroscopy, theory of solutions, statistical mechanics of mixtures, applied group theory, structure and bonding. **Cr Ar.**

CHY 572 Molecular Spectroscopy and Dynamics
Theoretical foundations of spectroscopy including time-dependent perturbation theory, interaction of light with matter. Topics may include NMR, Fourier transform methods, laser spectroscopy, Raman and other scattering techniques. The use of spectroscopy to study molecular dynamics emphasized. Prerequisite: CHY 575 or permission. **Cr 3.**

CHY 573 Computer Simulation Methods
Computer simulation using Monte Carlo and molecular dynamics techniques with applications in chemistry, physics, materials science and molecular biology. Prerequisites: CHY 371 or PHY 236 and knowledge of FORTRAN. **Cr 3.**

CHY 575 Intermediate Physical Chemistry I
Introduction to the foundations of quantum theory and molecular quantum mechanics. **Cr 3.**

CHY 583 Advanced Wood Chemistry
Fundamental chemistry of carbohydrates, lignin, and extractives. Prerequisite: CHY 252 or permission. **Cr 3.**

Courses in Civil and Environmental Engineering (CIE)

CIE 100 Introduction to Civil and Environmental Engineering
Introduces first-year and transfer students in Civil Engineering to the multifaceted field of Civil and Environmental Engineering. Each week a different faculty member will conduct the class. Challenging problems will be introduced and team work will be practiced. (Pass/Fail Grade Only.) Lec 1. **Cr 1.**

CIE 110 Materials
The structure, properties, and testing of engineering materials and their use in constructed facilities. Includes metals, woods, concrete, bituminous mixtures, plastics, insulation, adhesives and corrosion of materials. Engineering design is introduced by readings and discussions on creativity.

the design process and the concepts of marginal economic analysis, probability of failure and safety factors. Design problems include design of concrete mixtures and insulating systems to satisfy specific realistic situations taking into account uncertainty, safety, economic factors and intangibles, as well as technical considerations. Prerequisite: MAT 122 or concurrent. Lec 3. **Cr 3.**

CIE 111 Materials Laboratory
Evaluation of material performance under applied loads for engineering applications. Physical properties of concrete, metals, plastics and wood. Exercises include study of the variability of materials, construction of probability density functions from test data and computation of the probability of failure. Prerequisite: Concurrent with CIE 110. Lab 2. **Cr 1.**

CIE 115 Computers in Civil Engineering
Introduces the student to computers and computations by solving examples relevant to civil engineering. The algorithmic aspects of programming as well as the development of simple graphical user interfaces are taught. Approximately one half of the course time is allocated to programming with the remainder involving problems and applications. Specific examples typically include problems from structures, geotechnical, transportation and environmental engineering. Emphasis is placed on examples introducing statistical methods. Also introduces the use of spreadsheets, word processing and a mathematics program. Prerequisite: MAT 126, open to Civil Engineering majors only. Lec 2, Lab 3. **Cr 3.**

CIE 231 Fundamentals of Environmental Engineering
Introduction to environmental engineering including water quality, water and wastewater treatment plant design, solid and hazardous wastes, landfill design, radioactive waste control and air pollution abatement. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: CHY 132, ENG 101, MAT 127. Lec 3. **Cr 3.**

CIE 250 Hydraulics
An elementary course presenting fundamental principles of fluid flow and their applications to engineering problems. Includes study of hydrostatics, liquid measuring devices and channel and pipe flow. Prerequisite: MEE 150. Prerequisite/Corequisite: MAT 258. Lec 3. **Cr 3.**

CIE 251 Hydraulics Laboratory
Application of hydraulic principles in laboratory experiments. Includes experiments on buoyancy and flotation, forces on submerged planes, venturi meter calibration, pipe friction, losses, weirs and others. Prerequisite: CIE 250 or concurrent. Lab 2. **Cr 1.**

CIE 294 Civil Engineering Practice
Work experience in civil engineering. May be repeated for credit. Prerequisite: sophomore standing. **Cr 1-3.**

CIE 325 Transportation Engineering
An introduction to the broad field of transportation with emphasis on the motor vehicle mode. Principles of roadway and urban transportation planning, economic analysis methods, and route design elements are discussed and related to the planning and design of highway transportation routes. Students design a section of roadway and prepare a technical paper on a current transportation engineering problem. Prerequisite: Civil Engineering majors or permission. Lec 3. **Cr 3.**

CIE 340 Introduction to Structural Analysis
The cyclic process of analysis and design. Structure idealization and modeling. Design methodologies and loads considerations. The analysis of determinate trusses, beams and frames. Introduction to indeterminate structures. Prerequisite: MEE 251. Lec 3, Lab 3. **Cr 4.**

CIE 365 Soil Mechanics
An introduction to fundamental physical properties, engineering behavior and performance of soils and rocks. Prerequisite or Corequisite: MEE 251. Lec 3 **Cr 3.**

CIE 366 Soil Mechanics Laboratory
Covers geotechnical laboratory testing including classification, density, permeability, shear strength, and consolidation tests. Design project reports are also submitted to ENG 317. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Corequisites: CIE 365, ENG 317. Lab 2. **Cr 1.**

CIE 411 Engineering Project Design
Student design teams develop the conceptual design of an active civil engineering project. Topics include: consulting firm practice, the design process, evaluation of alternatives, regulatory constraints and the permit process, legal, ethical and social aspects of professional engineering practice, cost and scheduling estimations. Oral presentations and written technical reports are required. Open only to civil engineering students during their last spring semester. (Satisfies the General Education Capstone Experience Requirement.) Lec 2, Lab 3. **Cr 3.**

CIE 412 Engineering Decisions
Application of various analysis methods to engineering design decisions. Evaluation of economic, financial, legal, and ethical factors affecting engineering design. Topics include: engineering economy, consideration of risk and uncertainty, and evaluation of ambiguous and intangible factors in engineering design. Prerequisite: Senior standing or permission of instructor. Lec 3. **Cr 3.**

CIE 424 Urban Transportation Planning
Basic concepts and practices in the field of transportation planning, including the process and policy surrounding urban transportation planning. characteristics of urban travel, air quality - noise, energy - land use, the elements of decision making, data management and diagnosis, demand and supply analysis, project evaluation and implementation. A transportation demand management study constitutes a major part of the course. (2.0 ED/ 1.0 ES) Prerequisite: CIE 325. Lec 3. **Cr 3.**

CIE 425 Transportation Safety
Fundamental theory on transportation safety processes and evaluation methodology. Topics: vehicle/road/driver interaction, countemeasure effectiveness, enforcement, education and engineering measures. (1.0 ED/2.0 ES) Prerequisite: CIE 325. Lec 3. **Cr 3.**

CIE 426 Advanced Roadway Design
Principles of highway location, design of vertical and horizontal alignment, design and construction of surface treatments, pavement structures and roadway drainage systems. Student project preparing necessary plan-profile and cross section drawings required to construct a 3, 000 foot section of roadway, which is evaluated with respect to road-user travel time, comfort and safety; impact on surrounding environment including aesthetical aspects; and construction cost. (3.0 ED/0.0 ES) Prerequisite: CIE 325 and SIE 211. Lec 3. **Cr 3.**

CIE 431 Pollutant Fate and Transport
Introduction to environmental transformation processes which controls the fate and transport of contaminants in the environment and in engineered systems. Topics include reaction energetics and kinetics, reactor engineering concepts, interphase mass transfer and phase partitioning. (3.0 ED/1.0 ES) Prerequisite: CIE 231 and MAT 258 or permission. Lec 3, Lab 3. **Cr 4.**

CIE 432 Water and Wastewater Process Design
Theory and design of water supply and wastewater treatment facilities. Design projects cover processes such as sedimentation, coagulation and filtration, biological treatment and disinfection. (4.0 ED/0.0 ES) Prerequisites: CIE 231 and CIE 250. Lec 3, Lab 3. **Cr 4.**

CIE 440 Structural Analysis I
Classical and matrix methods in the analysis of linear redundant systems. The basic concepts of equilibrium, stress-strain relations, and compatibilitiy are emphasized. Manual and introductory computer aided solution techniques are utilized. (0.0 ED/4.0 ES.) Prerequisite: CIE 340. Lec 3, Lab 3. **Cr 4.**

CIE 442 Reinforced Concrete Design
The behavior design and detailing of reinforced concrete structures: beams, columns, beam-columns, slabs, footings, retaining walls. Microcomputer aided design project. (4.0 ED/0.0 ES.) Prerequisite: CIE 340. Lec 3, Lab 3. **Cr 4.**

CIE 443 Structural Steel Design
The design and detailing of steel structures: tension members, beams, columns, beam columns, and connections. Covers composite construction. Introduces the Load and Resistance Factor Design concept. Microcomputer aided design project. (4.0 ED/0.0 ES.) Prerequisite: CIE 340. Lec 3, Lab 3. **Cr 4.**

CIE 450 Open Channel Hydraulics
Covers uniform and nonuniform flow in open channels, gradually and rapidly varying flow, computational methods for flow profiles, open channel flow structures. (1.0 ED/2.0 ES.) Prerequisite: CIE 250 or equivalent. Lec 3. **Cr 3.**

CIE 455 Hydrology
Application of statistical analysis of rainfall and runoff processes for the development of design parameters of water resources projects, including uncertainty of these parameters. Includes collection and presentation of rainfall and runoff data, methods for developing hydrographs and flood control, development of design hydrographs for urbanizing watersheds. (1.0 ED/2.0 ES.) Prerequisite: CIE 250. Lec 3. **Cr 3.**

CIE 456 Groundwater Hydrology and Hydraulics
Fundamentals of the hydrodynamics of flow through porous media, and the development of methodology for solving the many open-ended problems of groundwater flow, supply and pollution. Concepts of groundwater modeling design. Aspects of field variability and uncertainty. (1.0 ED/2.0 ES.) Prerequisites: CIE 250 and MAT 258 or MAT 451 or permission. Lec 3. **Cr 3.**

CIE 460 Geotechnical Engineering
The application of geotechnical engineering to practical engineering design and construction problems including consideration of economic and safety constraints. (3.0 ED/0.0 ES.) Prerequisite: CIE 365. Lec 3. **Cr 3.**

CIE 470 Construction Management and Estimating
Management of construction activity with emphasis on cost estimating and bid preparation. Topics include: construction business management, advertising and contracting process, construction plans and specifications, quantity take-off, unit costs, and bid proposals. (1.5 ED/1.5 ES.) Prerequisites: CIE 110, CIE 325. Lec 2, Lab 3. **Cr 3.**

CIE 498 Selected Studies in Civil Engineering
Topics in civil engineering not regularly covered in other courses. Specific topics vary. May, with permission of the department, be repeated for credit. Prerequisite: permission. **Cr 1-3.**

CIE 533 Environmental Aquatic Chemistry
Fundamental aspects of aquatic chemistry emphasizing environmental engineering applications. (0.0 ED/3.0 ES.) Prerequisite: CIE 231. Lec 2, Lab 3. **Cr 3.**

CIE 534 Environmental Microbiology
Fundamentals of microbiology and biochemistry as related to natural and engineered treatment processes; microbial ecology, physiology, metabolism and genetics; energetics and kinetics of microbial growth; public health microbiology; introduction to pollution microbiology. (0.0 ED/3.0 ES). Prerequisite: CIE 231. Lec 3. **Cr 3.**

CIE 535 Environmental Engineering Laboratory Methods
Fundamental aspects of chemistry applied to sample collection, handling protocol, biological and chemical analyses and laboratory techniques are emphasized. (0.0 ED/3.0 ES) Prerequisite: CIE 231. Lec 2, Lab 3. **Cr 3.**

CIE 536 Hazardous and Solid Waste Engineering
Process and design approaches for the remediation, minimization and disposal/treatment of waste materials including both hazardous and solid waste engineering considerations; topics to be covered include hazardous waste definition, regulatory impacts on engineering processes, treatment technologies, solid waste recycling, incineration, and landfill design. (1.0 ED/2.0 ES.) Prerequisites: CIE 231, CIE 365. Lec 3. **Cr 3.**

CIE 540 Experimental Analysis of Structures
Stress and strain measurement techniques. Applications to small and full scale structures, dynamic measurements, modal analysis, fracture toughness, nondestructive evaluation. (0.0 ED/3.0 ES). Prerequisite: CIE 440. Lec 3. **Cr 3.**

CIE 542 Advanced Reinforced Concrete Design
Continuous concrete structures; torsion; serviceability; slender and biaxially loaded columns; design of two-way floor systems; joints; shear walls; limit analysis; computer-aided building design project. (3.0 ED/0.0 ES.) Prerequisite: CIE 442. Lec 3. **Cr 3.**

CIE 544 Design of Wood Structures
Study of unique mechanical and design characteristics of structural wood and wood composite members and design of systems containing these members. (4.0 ED/0.0 ES.) Prerequisite: CIE 340 or WSC 425. Lec 3, Lab 3. **Cr 4.**

CIE 545 Structural Dynamics
Examines free vibration and response to harmonic and general dynamic loading of the single degree of freedom system, Fourier analysis and response in the frequency domain, response spectra, framed structures modeled as discrete multi-degree-of-freedom systems, dynamic analysis of nonlinear systems. Response of structural systems to earthquake excitation. (0.0 ED/3.0 ES.) Prerequisite: CIE 440. Lec 3. **Cr 3.**

CIE 547 Prestressed Concrete Structures
Design and behavior of prestressed concrete components and structures; pretensioning and post-tensioning technology. (3.0 ED/0.0 ES.) Prerequisite: CIE 442. Lec 3. **Cr 3.**

CIE 548 Bridge Engineering
History and aesthetics of bridges, construction materials, bridge shapes and types, bridge components, design philosophies, loads on bridges, slab-on-steel beam bridges, plate girder bridges, composite design, box girder bridges, overview of arch, truss, cable-stayes and suspension bridges, bridge evaluation and maintenance. (3.0 ED/0.0 ES) Prerequisite: CIE 443 or equivalent. Lec 3. **Cr 3.**

CIE 555 Environmental Hydrology
A comprehensive qualitative and quantitative treatment of hydrologic processes above and below the land surface, including an understanding of approaches to hydrologic measurements and the uncertainties involved in those measurements and hydrologic perspectives of surface and subsurface pollution. Prerequisite: at least one semester of calculus (not open to engineering majors). Lec 3. **Cr 3.**

CIE 556 Advanced Groundwater Hydrology and Modelling
Advanced topics in the groundwater system and flow through porous media pertaining to the modelling of fluid flow and mass transport in the groundwater environment. (1.0 ED/2.0 ES.) Prerequisite: CIE 456 or equivalent. Lec 3. **Cr 3.**

CIE 558 Coastal Engineering
The principles of hydraulics applied to civil engineering problems in lakes and coastal areas. Topics include: wave forecasting, shoaling, refraction, sediment transport, stability of rubble mound structures and design of coastal structures. (2.0 ED/1.0 ES.) Prerequisite: MAT 258 or MAT 451 or permission. Lec 3. **Cr 3.**

CIE 559 Numerical Modeling of Lake and Estuarine Processes
Using various numerical models as case studies, strategies for environmental modeling are discussed. Emphasis on calculation of flows and transport of water-borne material and pollutants. Topics include the relative validity of different numerical formulations as well as considerations of stability, economy, and accuracy. Discussion of model verification using field data and measurement techniques. (0.0 ED/3.0 ES.) Prerequisite: MAT 258 or MAT 451. Lec 3. **Cr 3.**

CIE 562 Earthwork Design
Design and construction of earth structures including earth dams, landfill liners and roadway embankments. Economic, safety, reliability, ethics, social impact, and legal constraints are considered in design decisions. (3.0 ED/0.0 ES.) Prerequisite: CIE 365. Lec 3. **Cr 3.**

CIE 563 Thermal Soil Mechanics
A study of the thermal properties of soils, heat transfer, and methods for predicting soil temperature under freezing conditions. Design of pavements,

foundations, and excavations to resist the effects of freezing. (1.0 ED/1.0 ES.) Prerequisite: CIE 365. Lec 2. **Cr 2.**

CIE 564 Deep Foundations
The theories, design concepts, and construction of pile and caisson foundations for buildings and bridges. Economic, safety, and reliability constraints are considered in design decisions. (3.0 ED/0.0 ES.) Prerequisite or Corequisite: CIE 460. Lec 3. **Cr 3.**

CIE 565 Foundations and Underground Structures
Covers design of shallow foundations for buildings and bridges including effect of economics and reliability on choice of foundation system. Design of dewatering systems, buried pipes, and tunnels. Legal and ethical aspects of geotechnical practice. Intended for structural and soils students. (3.0 ED/0.0 ES.) Prerequisite or Corequisite: CIE 460. Lec 3. **Cr 3.**

CIE 566 Retaining Earth Structures
Geotechnical analysis and design for structures which retain earth. Economic, safety and reliability constraints are considered in design decisions. (3.0 ED/0.0 ES.) Prerequisite: CIE 460. Lec 3. **Cr 3.**

CIE 567 Ground Improvement Techniques
Practical techniques to overcome unfavorable ground conditions applied to foundation, roadway, and embankment design. Covers compaction, in-situ densification, stone columns, chemical stabilization, reinforced embankments, preloading, sand drains, and wick drains. (3.0 ED/0.0 ES.) Prerequisite: CIE 460. Lec 3. **Cr 3.**

CIE 592 Civil Engineering Seminar I
Individual oral Individual oral presentation and discussion of current research and topics of civil engineering interest. Required of all civil engineering graduate students. **Cr 1.**

CIE 593 Civil Engineering Seminar II
Individual oral presentation and discussion of current research and topics of civil engineering interest. Required of all civil engineering graduate students. **Cr 1.**

CIE 598 Selected Studies in Civil Engineering
Advanced topics in Civil Engineering not regularly covered in other courses. Content varies to suit individual needs. May be repeated for credit with permission of department. Prerequisite: permission. **Cr 1-3.**

Courses in Classics (CLA)

CLA 101 Greek Literature in English Translation
A survey of Greek literature. No knowledge of Greek is necessary. (Satisfies the General Education Human Values and Social Contexts Cultural Diversity and International Perspectives, the Western Cultural Traditions and the Demonstrated Writing Competency Requirements.) **Cr 3.**

CLA 102 Latin Literature in English Translation
A survey of Latin literature. No knowledge of Latin is necessary. (Satisfies the General Education Human Values and Social Contexts Cultural Diversity and International Perspectives, the Western Cultural Traditions and the Demonstrated Writing Competency Requirements.) **Cr 3.**

CLA 201 Women in the Ancient World
Investigates the social and literary context of the lives of women in several ancient Mediterranean cultures; Near East, Hebrew, North Africa, Greece and Rome. **Cr 3.**

CLA 202 Mythology of the Ancient Near East, North African and Greece
Surveys the mythologies of the ancient Mediterranean Basin, including Hebrew Mythology. Through lectures, reading and video the major deities and heroes of each culture will be presented within their cultural context, including the stories associated with them. **Cr 3.**

Courses in Communication (COM)

COM 102 Fundamentals of Interpersonal Communication
The basic elements of interpersonal communication, with special emphasis on developing knowledge and skills applicable to face-to-face interactions between individuals and in small groups. Participation in research to a maximum of 3 hours is expected. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) **Cr 3.**

COM 103 Fundamentals of Public Communication
The nature and problems of public speech communication, with practical experience in representative speaking situations. Participation in research to a maximum of 3 hours is expected. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) **Cr 3.**

COM 106 Oral Communication of Literature
An introduction to the oral communication of literature (storytelling, prose, and poetry) to an audience. Emphasis on gaining greater sensitivity and expressiveness as a communicator. Participation in research to a maximum of 3 hours is expected. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) **Cr 3.**

COM 201 Communication Studies I
Introduction to historical and philosophical approaches to the study of communication. The course examines communication from the classical, modern and contemporary perspectives, with specific attention to the rhetorical theorists and theories that have been dominant in the history of communication. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) **Cr 3.**

COM 202 Communication Studies II
Introduction to social and human science approaches in communication studies. The course examines communication theories and models, the function of language and symbolic behavior in society and culture, and the nature of interaction and interpretation. Not open to first-year students. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) **Cr 3.**

COM 257 Business and Professional Communication
Advanced study and practice in specialized audience analysis, strategies and tactics, conference procedures, interviewing techniques, and delivery of professional presentations. Prerequisite: Junior or Senior standing. 3 hours of COM courses or permission. **Cr 3.**

COM 267 Public Relations: Oral Communication Strategies
The study of those activities which help to create public understanding and acceptance of an organization's policies and programs. Prerequisite: Junior or Senior standing. 3 hours of COM courses or permission. **Cr 3.**

COM 324 Interpersonal Communication in Everyday Life
The advanced study of interpersonal communication as it functions across a range of human relationship, such as family, friends, professions and organizations. Examines perspectives, theories, and research on communication in everyday life. Prerequisite: COM 102 or permission. **Cr 3.**

COM 345 Small Group Communication
An introduction to the principles of the small group processes as involved in decision making, problem solving and negotiation. Practical application of these principles through classroom experiences. Prerequisite: 3 hours of COM courses or permission. **Cr 3.**

COM 347 Argument and Critical Thinking
An introduction to the principles of decision-making through critical thinking applied to reasoned advocacy. Practical application of these principles through classroom experience. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: 3 hours of COM courses or permission. **Cr 3.**

COM 356 Speech Play and Performance
Study of creative and aesthetic dimensions of communication and language. Examines how people use speech play and performance (e.g. word play, joking, storytelling, performing literature) and what happens when they do.

Focus on performance as a cultural event in everyday life as well as in society and the media. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives and Artistic and Creative Expression Requirements.) Prerequisites: 3 hours of COM courses or permission. **Cr 3.**

COM 360 Nonverbal Communication
Examines important non-linguistic variables related to human interactions. Specific emphasis on the effects of kinesics, proxemics, paralanguage and other code systems as they affect meaning in communication efforts. Not open to first-year students. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 3.**

COM 401 Rhetorical Criticism
Critical analysis of public messages using criteria as aesthetics, effects, truth, and ethics. Covers rhetor's use of strategies and evidence to adapt to constraints arising from the subject, the audience and/or the rhetor. Traditional and non-traditional kinds of persuasive approaches will be explored. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisite: Not open to first-year students. **Cr 3.**

COM 402 Communication Research
An introduction to social science inquiry into the nature, forms and functions of human communication. Focuses on conceptualizing communication research problems and selecting appropriate methodologies and analyses for examining communication data. (Satisfies the General Education Mathematics, Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisite: COM 202 or permission. **Cr 3.**

COM 403 Persuasion and Social Influence
Study of the theory and principles involved in the process of influencing the beliefs, attitudes and values of others. Focus on social science and humanistic explanations of what makes messages persuasive in interpersonal and public contexts. Prerequisite: 3 hours in COM courses or permission **Cr 3.**

COM 405 Women and Communication
A systematic study of research by and about women with regard to language, speech, and communication pragmatics, discussed within a variety of communication contexts. Not open to first-year students. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: COM 102 or WST 101. **Cr 3.**

COM 410 Social Influence of Mass Communication
A study of the communicative impact of mass media (e.g., television, radio, newspapers), and uses of the media in other communicative contexts (e.g., small group and interpersonal situations.) Current mass communication theories and research studies are explored. (Satisfies the General Education Human Values and Social Contexts/ Social Contexts and Institutions Requirement.) Prerequisite: 3 hours of COM courses or permission. **Cr 3.**

COM 420 Health Communication
Study of the theories and issues in health communication research, including provider-client communication, support groups, organizational and intercultural communication issues in health care. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Prerequisite: Juniors or Seniors. **Cr 3.**

COM 444 Political Rhetoric
Examines the nature and impact of diverse communication strategies in political campaigns. Emphasis on Congressional and Presidential campaigns. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: COM 201 or permission. **Cr 3.**

COM 450 Communication and Technology
Examines and analyzes the characteristics of and influences on human communication mediated by technology such as computer networks, video teleconferencing. Prerequisite: Juniors or Seniors. **Cr 3.**

COM 466 Narrative and Communication
A study of narrative, or storytelling, as a way of communicating in conversation, oral performance and literature: what stories are told to whom, how stories are told, and the forms and functions of narrative. Considers narrative in a variety of communication settings. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression and Demonstrated Writing Competency Requirements.) Prerequisites: 3 hours of COM courses or permission. **Cr 3.**

COM 470 Communication in Organizations
Examines research and theory of communication behavior in organizations with focus on recurring communication problems in complex organizations (including business, industrial, educational and service agencies.) Attention is given to communication training and assessment in organizations. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: Juniors or seniors. **Cr 3.**

COM 493 Topics in Communication
In-depth analysis of selected subjects, designed to explore new areas of research and/or current issues. Specific topics vary. Prerequisite: Sophomore standing and permission of Department Chairperson. **Cr 1-3.**

COM 496 Field Experience in Communication
Approved work experience for departmental majors in the application of communication to practical, theoretical or research problems in any public service agency, business, or other setting approved by the department. Requirements include an initial written application showing the projected experience and its relevance to communication, conferences with faculty supervisor, periodic logs or summaries, plus a final written report. May be repeated up to 6 hours. Prerequisites: 2.0 overall grade point average with at least a 2.5 in COM courses, 9 hours beyond 100 level courses in COM and permission of the departmental field experience committee. (Pass/Fail Grade Only.) **Cr 1-3.**

COM 497 Problems in Communication
For the advanced student desiring to study a particular problem under the guidance of a member of the staff. May be repeated up to 6 credits. Prerequisite: permission of Department Chairperson. **Cr 1-3.**

COM 510 Seminar in Mass Communication
Advanced study of mass communication theory and research, with emphasis on the relationship of human communication and mass media in structuring behavior and experience. Prerequisites: COM 410 or permission. **Cr 3.**

COM 524 Seminar in Interpersonal Communication
An advanced consideration with emphasis on the implications of various theories and research traditions for understanding interpersonal traditions. Prerequisite: Permission **Cr 3.**

COM 555 Seminar in Selected Contemporary Rhetoric
A critical analysis of the materials, structure, style, and historical significance of selected rhetoric (primarily American) from colonial times to the present. May focus on specific topics, periods, social movements, or speakers. Prerequisite: Permission. **Cr 3.**

COM 566 Seminar in Aesthetic Communication
Advanced study of theory and research in aesthetic communication, for example, topics on gender and aesthetic communication, narrative as human communication, reading and cultural performance, the politics of literature and performance. Prerequisite: permission. **Cr 3.**

COM 579 The Theory of Composition
A study of rhetorical stylistic and cognitive perspectives—from classical formulations to current research—on the nature of written composition and issues in composition teaching. (This course is identical with ENG 579). Prerequisite: permission. **Cr 3.**

COM 593 Topics in Communication
Advanced study of selected topics. Prerequisite: Permission. **Cr 3.**

Courses in Computer Science (COS)

COS 100 Introduction to Personal Computers
Using and operating a personal computer. Topics include: types, care and maintenance of equipment; types of programs; introduction to IBM-compatible operating systems; word processing; use of a spreadsheet; introduction to database management systems, introduction to communications and the Internet. Does not meet Bachelor of Arts Core Distribution Area III requirement. Credit does not count towards the computer science major. **Cr 3.**

COS 110 Introduction to Personal Computers Using the Macintosh
Investigates the friendly interface of the Apple Macintosh personal computer. A number of software systems will be explored including spreadsheets in Excel, wordprocessing in MSWORD, Superpaint and MacDraw for graphical operations and authoring in hypercard. Considerable overlap in content with COS 100. **Cr 3.**

COS 120 Introduction to Programming
The development of programming skills in the novice. Description and use of those features of programming languages common to a wide range of popular languages through instruction in one or two specific languages. This includes basic description and use of computer hardware. Credit does not count towards the computer science major. (Satisfies the General Education Mathematics Requirement.) Lec 2, Lab 1. **Cr 3.**

COS 203 Programming in COBOL
An introduction to the COBOL language for those with programming experience in another language. Does not count for credit in the major. Prerequisite: COS 220 or equivalent. **Cr 1.**

COS 204 Programming in FORTRAN
An introduction to the FORTRAN language for those with programming experience in another language. Does not count for credit in the major. Prerequisite: COS 220 or equivalent. **Cr 1.**

COS 211 Principles of Data Processing
Presents basic concepts in database management systems using a microcomputer database system and basic theory of database design. Students will construct systems in various application area. Credit does not count toward the computer science major. **Cr 3.**

COS 215 Introduction to Computing Using FORTRAN
Programming logic and techniques using FORTRAN including introductory hardware concepts. Students are assigned programs from various areas of application. Credit does not count towards the computer science major. Degree credit will not be given for both COS 215 and COS 220. (Satisfies the General Education Mathematics Requirement.) **Cr 3.**

COS 220 Introduction to Computer Science I
Stresses programming logic and techniques with a brief introduction to hardware concepts. Students are assigned programs emphasizing numerical algorithms for implementation in a higher level language. (Satisfies the General Education Mathematics Requirement.) **Cr 3.**

COS 221 Introduction to Computer Science II
Continuation of COS 220 with emphasis on the development of non-numeric algorithms. Topics include program efficiency, text processing, sorting and data structures. Prerequisite: COS 220. **Cr 3.**

COS 230 Computer Architecture and Assembly Language
Introduction to concepts of modern computers, instruction formats, addressing techniques. Covers input-output processes and interrupt handling. Programming aspects include assembler program segmentation and linkage. A specific assembler used to illustrate various topics. Prerequisite: COS 220 or equivalent. **Cr 3.**

COS 231 Introduction to UNIX
An introduction to the UNIX operating system from the user's point of view. Covers the basic structure of UNIX, basic commands, file system, editing, utilities, shell programming, programming environment and customization. Prerequisite: COS 220 or equivalent proficiency in PASCAL or C. **Cr 3.**

COS 250 Discrete Structures
Introduction to discrete structures used in various areas of computer science. Topics include logic, sets, relations, functions, cardinality, enumeration, and computability. Prerequisites: COS 221, MAT 127 or MAT 115 or permission. **Cr 3.**

COS 298 Topics in Computer Science
Introductory topics in computer science not regularly covered in other courses. Content varies to suit current needs. May be repeated for credit. Prerequisite: COS 220. **Cr 1-3.**

COS 301 Programming Languages
Formal description of programming languages including specification of syntax and semantics. Discussion of infix, prefix, and postfix notation with translation techniques. Topics include branching, grouping of statements, storage allocation, list and string processing, relation of language design to efficiency. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: COS 250. **Cr 3.**

COS 335 Computer Organization and Architecture
The internal organization of both microcomputers and mainframes. Topics include addressing modes, computer arithmetic, introduction to digital logic. Prerequisite: COS 431. **Cr 3.**

COS 350 Data Structures and Algorithms
Introduction to abstract data types as a unifying concept in the study of data structures. Topics include lists, queues, multi-linked lists, priority queues, trees, and graphs. The impact of these structures on algorithm design is explored. External memory management is discussed. Prerequisite: COS 301 or equivalent. **Cr 3.**

COS 398 Topics in Computer Science
Topics not regularly covered in other courses. Content varies to suit current needs. May be repeated for credit. Prerequisite: permission. **Cr 1-3.**

COS 400 Introduction to Compiler Construction
Basic concepts of programming language translation, compiler design and construction. Topics include the compilation process, language definition, lexical analysis, syntax analysis, error detection and recovery, grammars, compiler design issues, symbol tables, storage allocation, code generation and machine-independent code improvement. Programming projects illustrate various concepts. Prerequisite: COS 350. **Cr 3.**

COS 410 Computing Management
Introduces diverse executive and administrative techniques useful in making managerial decisions in a computing environment and their interrelations. Prerequisite: COS 420. **Cr 3.**

COS 415 Computer Simulation and Modeling, from Development to Diplay
The process of designing and using a computer model is examined in detail. The development of the model equations, numerical techniques for solving them, and basic graphical techniques for displaying the results of the calculations will be presented. Prerequisite: Familiarity with a programming language and/or permission **Cr 3.**

COS 416 Parallel Programming
Introduces the students to a realistic programming environment where they can experience the differences and difficulties of programming in a multi-processor or multi-computer architecture. Prerequisite: Permission. **Cr 3.**

COS 420 Introduction to Software Engineering
A broad view of software engineering which introduces a variety of software engineering techniques which can be applied to practical software projects. Topics include process models, human factors, software specification; software design, programming techniques and tools, and validation. Prerequisite: Junior standing and COS 221. **Cr 3.**

COS 431 Operating Systems
Study of the structure of current computer operating systems. Topics include I/O management, memory management, multiprogramming, linking loaders, real and virtual systems, batch and time sharing. Prerequisite: COS 221, COS 230 or permission. **Cr 3.**

COS 440 Computer Networks I
Covers data and computer communications using ISO model. Discussion of physical media, communication protocols, and network architectures including wide area and local area networks. Includes examples of networks currently in use. Prerequisite: COS 431. **Cr 3.**

COS 441 Computer Networks II
A continuation of COS 440. An in-depth study of computer network protocols and certain network applications. Concentration is on network to application layers of the OSI model. Presently specific emphasis is on the Internet Protocol TCP/IP with examples from Appletalk and Novell protocols. Prerequisite: COS 440. **Cr 3.**

COS 460 Interactive Computer Graphics
Topics include graphic I/0 devices: plotter, CRT, and light pen; vector generation; transformation of two/and three-dimensional objects; clipping and windowing; hidden line removal; interrupt handling; interactive techniques; data structures for graphics; and various display algorithms. Prerequisite: COS 215 or COS 220 or equivalent, MAT 126 and junior standing. **Cr 3.**

COS 461 Advanced Computer Graphics
Topics include three dimensional transformations, hidden line and surface algorithms, color and raster graphics. Prerequisites: COS 460, MAT 126. **Cr 3.**

COS 470 Introduction to Artificial Intelligence
Surveys fundamental areas of research in Artificial Intelligence including knowledge representation, vision, planning, logic, learning, expert systems, and natural language comprehension as well as techniques including predicate calculus, backtracking, tree searching, and semantic networks. Also covers LISP, a principal Artificial Intelligence programming language. Prerequisites: COS 350 or permission. **Cr 3.**

COS 480 Database Management Systems
Provides the knowledge necessary to understand and use existing DBMS technology following the data model approach with emphasis on the relational model. Topics include DBMS architecture and underlying file organization, integrity, relational algebra and calculus, query optimization, and normalization. Students design and manipulate a system using an existing DBMS. Prerequisite: COS 350. **Cr 3.**

COS 490 Computers and Society
Consideration of the human and social consequences of technological development and application of computers from the perspectives of the computer customer, the computer specialist, and the public. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: COS 221 and junior standing. **Cr 3.**

COS 495 Field Experience
A pre-planned work experience of no less than ten and preferably more weeks in a commercial environment, with faculty supervision. This is normally a paid work experience. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: completion of junior year, required point average and permission. (Pass/Fail Grade Only.) May be repeated for a maximum of 3 credit hours. **Cr 1-3.**

COS 498 Topics in Computer Science
Topics not regularly covered in other courses. Content varies to suit current needs. May be repeated for credit. Prerequisite: Semester of programming. **Cr 1-3.**

COS 499 Senior Project
An undergraduate research project in computer science under the direction of an approved advisor. An individual or small group will work on the conception, design and implementation of a significant computer science project. A presentation, open to interested faculty, staff and students may be required at the completion of the project. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: permission. **Cr 3.**

COS 515 Topics in Scientific Computation: Simulation and Modeling
The purpose of designing and using a computer model is examined in detail. The development of the model equations, numerical techniques for solving them, and basic graphical techniques for displaying the results of the calculations will be presented. Prerequisite: Familiarity with a programming language and/or permission. **Cr 3.**

COS 516 Topics in Scientific Computation: Parallel Programming
Introduces the students to a realistic programming environment where they can experience the differences and difficulties of programming in a multi-processor or multi-computer architecture. Prerequisite: permission. **Cr 3.**

COS 520 Software Engineering I
Specification, design, implementation, and maintenance of reliable software. Various methodologies will be explored with Ada as the implementation tool. Prerequisites: COS 350 and COS 431. **Cr 3.**

COS 521 Topics in Software Engineering
May be repeated. Prerequisite: permission. **Cr 3.**

COS 550 Theoretical Computer Science I
A survey of automata theory, formal languages, undecidability and computational complexity. Prerequisites: COS 301 and COS 250. **Cr 3.**

COS 551 Topics in Theoretical Computer Science
May be repeated. Prerequisite: permission. **Cr 3.**

COS 554 Algorithms
Important algorithms and their application to solving problems. Prerequisite: COS 350 **Cr 3.**

COS 570 Topics in Artificial Intelligence
May be repeated. Prerequisite: permission. **Cr 3.**

COS 580 Topics in Database Management Systems
May be repeated. Prerequisite: permission. **Cr 3.**

COS 598 Advanced Topics in Computer Science
Topics in computer science not regularly covered in other courses. May be repeated for credit. Prerequisite: Permission. **Cr 1-3.**

COS 599 Graduate Project **Cr Ar.**

Courses in Dance (DAN)

DAN 101 Beginner Modern Dance
Fundamental concepts and practice of modern dance technique: body alignment, stretch/strengthening, movement vocabulary, body coordination, musicality and spatial awareness. For the general student at the beginning dance level. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) **Cr 2.**

DAN 102 Beginner Ballet
An introduction to classical ballet dance training. Traditional exercises at the barre and on center floor emphasize body placement, flow of energy, and the creation of expressive movement in space. For the performing artist or general student. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) **Cr 2.**

DAN 103 Beginner Jazz
Fundamentals of jazz dance technique with emphasis on body alignment, coordination and movement vocabulary. Preparation for expressive movement in relation to modern jazz music. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) **Cr 2.**

DAN 112 Production/Rehearsal
Dance production and performance with emphasis on repertory, costuming, lighting in relation to choreography, staging, publicity and rehearsal. May be repeated with permission. Prerequisite: audition or permission. (Pass/Fail Grade Only.) **Cr 1.**

DAN 201 Intermediate Modern Dance
Continuation of DAN 101. Emphasis on solving more complex movement

problems. Provides an enhanced movement vocabulary and further principles of body alignment, stretch/strengthening and musicality and expressiveness. May be repeated for credit. Prerequisite: DAN 101 or permission. **Cr 2-3.**

DAN 202 Intermediate Ballet
A detailed study of ballet form for the student with some previous training. Students master the execution of exercises and steps with speed, clarity and grace in order to achieve a fuller kinesthetic awareness. Can be used as a base for professional training or general artistic enrichment. May be repeated for credit. Prerequisite: DAN 102 or permission. **Cr 2-3.**

DAN 203 Intermediate Jazz
A continuation of DAN 103. Further development of principles of movement within the jazz idiom: body alignment, musicality, phrasing, stylistic form and performance awareness. May be repeated for credit. Prerequisite: DAN 103 or permission. **Cr 2.**

DAN 250 Dance Composition I
Study of the principles and elements of choreography. Provides guided practice in the construction of movement phrases, and studies for solo and group dances. Includes an informal studio presentation of student pieces. Prerequisite: Prior dance experience or permission. **Cr 3.**

DAN 266 Dance History
Religious, social and cultural aspects of dance from lineage-based ritual to the present century. **Cr 3.**

DAN 301 Advanced Modern Dance
A continuation of DAN 201. Emphasis on performance quality, phrasing, and musicality. The advanced dancer may develop and expand his/her style and vocabulary. May be repeated for credit. Prerequisite: DAN 201 or permission. **Cr 2-3.**

DAN 302 Advanced Ballet
A continuation of DAN 202. Emphasis on performance quality, an expansion of balletic and choreographic vocabulary. May be repeated for credit. Prerequisite: DAN 202 or permission. **Cr 2-3.**

DAN 303 Advanced Jazz
A continuation of DAN 203. Further emphasis on musicality, movement vocabulary and phrasing of advanced floor combinations. May be repeated for credit. Prerequisite: DAN 203 or permission. **Cr 2.**

DAN 398 Dance Project
For the Intermediate level student who wishes to work on a special project in jazz, ballet or modern dance. The special project may be teaching, choreography, repertory, research, and/or technique. Prerequisite: Intermediate level technique or permission. **Cr 2.**

DAN 498 Dance Project/Thesis
(1) A supervised practicum in choreographic process and/or performance accompanied by a written analysis of this practicum, (2) an advanced level research topic, designed jointly by the student and the instructor. Prerequisite: Advanced level technique or permission. **Cr 3.**

Courses in Disability Studies (DIS)

DIS 400 Introduction to Interdisciplinary Disability Studies
Explores the experiences of individuals with disabilities across the lifespan and the philosophies, values and practices that shape current services and supports. Specific issues to be addressed include: services for infants and preschool children, inclusive schools, the role of various disciplines, recent developments in employment and community living services and advances in medical interventions. (Satisfies the General Education Human Values and Social Contexts Social Contexts and Institutions and Ethics Requirements.) Prerequisite: 6 credits of coursework in human development and permission. **Cr 3.**

DIS 450 Seminar in Interdisciplinary Disability Studies
Examines the current trends in services and supports for people with disabilities. Students are required to take an active role in researching course content and making class presentations. (Satisfies the General Education Human Values and Social Contexts Social Contexts and Institutions Requirement.) Prerequisite: DIS 400 or permission of instructor. **Cr 3.**

DIS 470 Practicum in Disability Studies
Field experience in university, school and community agencies provides students with opportunities to observe and participate in services and supports for people with disabilities. For students enrolled in the Interdisciplinary Concentration in Disability Studies. Prerequisite: DIS 400 **Cr 1-6.**

DIS 480 Independent Project in Disability Studies
Individual work on a topic or problem selected by the student. Primarily for students in the Interdisciplinary Concentration in Disability Studies. Prerequisite: DIS 400. **Cr 1-6.**

DIS 490 Selected Topics in Interdisciplinary Disability Studies
Faculty and students identify and work on selected topics and/or problems related to the area of disability. Focuses on related literature, research, services/supports and materials. **Cr 1-6.**

Courses in Education: Administration (EAD)

EAD 500 Fundamentals of Administration
A required introductory examination of the fundamentals and responsibilities of personnel supervision in educational organizations, including establishment of mission, staff roles, supervision and evaluation practices, and staff development. **Cr 3.**

EAD 510 Educational Supervision
Includes creative supervision, techniques of working with professional staff, improvement of curriculum, observational and evaluation techniques. Prerequisites: EDB 202, EDB 204 or equivalents. **Cr 3.**

EAD 531 School Law for Administrators
The Constitutional framework, legal issues and state statutes affecting the practice of school administration. Special emphasis on the impact of recent court decisions. **Cr 3.**

EAD 532 Staff Development for School Leaders
Provides school board members, administrators, teachers and staff the opportunity to further skills and knowledge of staff development. Participants examine the theory and practice of staff development, explore underlying beliefs and assumptions and apply evolving insights in a staff development project that is situated within their own schools and practice. **Cr 3.**

EAD 550 Theories of Administration I
Introduces concepts and research findings in social and behavioral sciences basic to the educational administrator. Interdisciplinary analysis of administrative problems and organizational behavior. Prerequisites: EDB 202, EDB 204 or equivalents. **Cr 3.**

EAD 560 Functions and Theories of Educational Leadership
The philosophical foundations for schools and leadership; organizational theories underlying school management and leadership; and the inter- and intrapersonal dimensions of leadership. **Cr 3-6.**

EAD 561 Leadership of Planning and Evaluation
Examination and application of the evaluation and planning cycle in schools through preparation and execution of a program evaluation with colleagues; includes collection of data on programs, personnel and student outcomes. Prerequisites: EAD 560 and EDS 520 or permission. **Cr 3.**

EAD 562 Group Leadership and Decision-Making in Schools
Introduction to and the application of group dynamics, group leadership and group decision-making in the many contexts encountered by school leaders. Prerequisites: EAD 560 and EAD 561 or permission. **Cr 3.**

EAD 563 Individual Leadership: Problems, Paradoxes and Possibilities
Provides students a forum to examine interpersonal aspects of school leadership. Students research and prepare strategies in response to leadership dilemmas, then carry them out in simulated situations. Prerequisites: EAD 560, EAD 561 and EAD 562 or permission. **Cr 3.**

EAD 564 Educational Organizations from a Personal, Social and Political Perspective
Organizational analysis; investigation of the social, political, economic context of organizations; strategies surrounding strategic planning, goal setting and visioning; and change theory and its application. Prerequisites: EAD 560, EAD 561, EAD 562 and EAD 563 or permission. **Cr 3.**

Courses in Education: Adult Education (EAE)

EAE 523 Introduction to Adult/Continuing Education
Overview of purposes, clientele, origins, forms, content, sponsors and organizations of adult/continuing education. **Cr 3.**

EAE 524 Adult Development and Learning
Examination of learning theory, life span development and aging. Focus on the psychological, sociological, physiological and environmental factors which distinguish adult learners. The concepts and theories studied will be related to adult education and counseling. Prerequisite: permission. **Cr 3.**

EAE 525 The Teaching/Learning Process with Adults
A critical examination including characteristics of adult learners, needs assessment, methods, group process and resource identification and development. Focus on individual and group instruction. **Cr 3.**

EAE 526 Community Processes and Leadership in Adult/Continuing Education
An applied examination of the process and strategies of community development in relation to Adult/Continuing Education. Prerequisite: EAE 523 **Cr 3.**

EAE 527 Program Development and Evaluation in the Education of Adults
The application of theory principles and concepts in program development and evaluation to the social, economic and environmental problems of people and communities, studies through simulation, case study, role playing. Prerequisite: EAE 523 or permission. **Cr 3.**

EAE 528 Management of Adult/Continuing Education Organizations
An introduction to the concept, functions and tasks of management in relation to adult/continuing education organizations. Also examines managerial behavior and style. Prerequisite: EAE 523. **Cr 3.**

EAE 551 Workshop in Adult/Continuing Education
Focus on development of products useful to adult education administrators, teachers, or counselors. Competency of skill development is stressed. Specific activities, such as simulation design, grant proposals, instructional design and staff development, will be determined as registration. Prerequisite: EAE 523 or permission. **Cr 3.**

Course in Education: Bilingual Education (EBI)

EBI 390 Introduction to Bilingual Education
Reviews bilingual education from an international perspective and examines the purposes and components of various educational models used globally and nationally. Maine's native French-speaking population provides the focus for case studies. **Cr 3.**

Courses in Electrical and Computer Engineering (ECE)

ECE 101 Introduction to Electrical and Computer Engineering
Introduction to the engineering profession as well as information and concepts of general use in Electrical and Computer Engineering. Topics include: exploration of career paths and professional responsibilities, basic use of personal computers, mathematical concepts, development of problem solving skills and professional communication. Student work in teams on projects involving digital and motor control. Prerequisite: ECE majors only or permission. Corequisite: PHY 121. Rec 3, Lab 1, 1 Design Cr. **Cr 4.**

ECE 172 Logic Systems
Logic design using integrated circuit implementations of combinational logic. Microcomputer and its component parts explored. Basic microcomputer programming and applications investigated. Prerequisite: ECE 101 or permission. Lec 3, Lab 3. 2 Design Cr. **Cr 4.**

ECE 210 Electrical Networks I
Basic circuit laws and solution techniques, operational amplifiers, first and second order transients, sinusoidal steady state analysis, power and polyphase circuits, ideal transformers. Prerequisite: MAT 127, PHY 122. Lec 3. **Cr 3.**

ECE 211 Electrical Networks II
Frequency domain concepts, mutual inductance, resonance, active and passive filters, Laplace transform applications, Fourier series. Prerequisite: ECE 210. Lec 3, Lab 3, 1 Design Cr. **Cr 4.**

ECE 262 Solid State Electronic Devices
Examines basic characteristics of materials important to device applications. Introduces the theory of pn junctions, bipolar and field effect transistors. Prerequisites: CHY 121. Lec 3. **Cr 3.**

ECE 300 Seminar
Exploration of career opportunities, organizational structure of industry and professional responsibilities. Prerequisite: Junior standing. (Pass/Fail Grade Only.) Lec 1. **Cr 1.**

ECE 314 Linear Circuits and Systems
Analysis of continuous and discrete linear systems including Fourier series, Fourier transforms, and Laplace transform techniques; convolution, transfer functions and state variable system representations; discrete Fourier transform and Z-transform techniques. Prerequisites: MAT 258, ECE 211, COS 220. Rec 3. **Cr 3.**

ECE 323 Electric Power Systems I
Three-phase power, power system supply and distribution, magnetic circuits and transformers, theory and operation of DC machines, fundamentals of industrial control and ladder logic, per unit system, radial line voltage, power factor and loss calculations. Prerequisite: ECE 211. Lec 3, Lab 3, 2 Design Cr. **Cr 4.**

ECE 342 Electronics I
Covers the fundamentals of digital electronic devices and circuits, diodes, FET's, BJT's, monolithic IC fabrication, LSI Fundamentals, design of logic gates and families, combinational and sequential logic circuits. Prerequisites: ECE 211, ECE 262. Lec 3, Lab 3. 2 Design Cr. **Cr 4.**

ECE 343 Electronics II
Covers the fundamentals of analog electronic circuits and systems, design of analog semiconductor circuits, amplifiers, frequency response, op amp characteristics and applications feedback. Prerequisite: ECE 342. Lec 3, Lab 3. 2 Design Cr. **Cr 4.**

ECE 351 Fields and Waves
Topics include: static electric and magnetic fields, field mapping, properties of dielectric and ferromagnetic materials, time varying fields, Faraday's law, Maxwell's equations, plane waves in dielectric and conducting media, calculation of the fields and other properties of common transmission lines. Prerequisite: MAT 258, PHY 122. Lec 3. .5 Design Cr. **Cr 3.**

ECE 383 Communications Engineering
A study of basic principles of modern communication engineering including methods of analysis, modulation techniques, effects of noise, information transmittal. Prerequisite: ECE 314. Lec 3. **Cr 3.**

ECE 394 Electrical and Computer Engineering Practice
Work experience in electrical engineering and/or computer engineering. May be repeated for credit. Prerequisite: sophomore standing and permission. (Pass/Fail Grade Only.) **Cr 1-3.**

ECE 401 Electrical and Computer Engineering Design Project
First of a three semester sequence of courses involving the design, implementation and reporting of an engineering device, system or software package by an individual student or small group. Part one: project selection, feasibility studies and proposal writing. Prerequisites: ECE 314 and ECE 342. 1 Design Cr. **Cr 1.**

ECE 402 Electrical and Computer Engineering Design Project
Second of a three semester sequence of courses involving the design, implementation and reporting of an engineering device, system or software package by an individual student or small groups. Part two: resource location, module debugging, prototype testing. Prerequisites: ECE 401. 4 Design Cr. **Cr 4.**

ECE 403 Electrical and Computer Engineering Design Project
Third of a three semester sequence of courses involving the design, implementation and reporting of an engineering device, system or software package by an individual student or small group. Part three: written and oral presentation of the completed project. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisite: ECE 402. 2 Design Cr. **Cr 2.**

ECE 414 Feedback Control Systems
Analysis and design of continuous and discrete control systems using transfer function and state variable system representations. Covers signal flow graphs and Mason's gain formula, decomposition of transfer functions, controllability and observability, root locus techniques, Routh-Hurwitz criterion, Nyquist criterion, controller design in time and frequency domains, State feedback, phase lead and lag controllers, PID type controllers. Occasional laboratory experimentation. Prerequisite: ECE 314, basic knowledge of matrix algebra. Lec 3, 2 Design Cr. **Cr 3.**

ECE 416 Design of Control Systems
Continuation of topics covered in ECE 414 including control system design using the LAM method, design of DC servomotor systems, modeling and analysis of nonlinear systems. Includes laboratory experimentation and computer simulation. Prerequisite: ECE 414. Lec 1, Lab 6, 2 Design Cr. **Cr 3.**

ECE 417 Introduction to Robotics
Introduces robotics and operation of microcomputer-controlled manipulators with their applications in automation. Includes a general review of robot structure, current application of robots in automation, spatial descriptions and coordinate transformations, manipulator kinematics and solutions, robot control and path planning, dynamics, vision in robot application. Prerequisite: COS 215 or COS 220; MAT 228; knowledge of matrix algebra and some familiarity with basic control and rigid body mechanics suggested. Lec 2, Lab 3. 1.5 Design Cr. **Cr 3.**

ECE 427 Electric Power Systems II
Induction and synchronous machines, transmission line models, bus admittance and impedance analysis methods. Prerequisite: ECE 323. Lec 2, Lab 3. 2 Design Cr. **Cr 3.**

ECE 428 Electric Power Systems III
Electric power system control, load flow analysis, power system faults and unbalances, system protection. Prerequisite: ECE 427. Lec 2, Lab 3. 2 Design Cr. **Cr 3.**

ECE 441 Micro-Electronics Filter Theory and Design
Design of inductorless electric filter stressed. Standard forms of lowpass, bandpass, highpass, and bandstop realized with op-amps. Applications include data and voice communication systems in modern micro-electronic engineering. Prerequisite: ECE 314 and ECE 342. Lec 3. 2 Design Cr. **Cr 3.**

ECE 444 Analog Integrated Circuits
Considers topics in the internal circuit design and system applications of analog integrated circuits; current sources, differential amplifiers, level shifters, op amps, regulators, high frequency considerations; digital-to-analog and analog to digital converters, phase-locked loops. Prerequisite: ECE 314 and ECE 343. Lec 3. 2 Design Cr. **Cr 3.**

ECE 445 Analysis and Design of Digital Integrated Circuits
Analysis and design of digital circuits for compatibility with integrated circuit processing technology. Reviews device physics with emphasis on switching behavior. Includes computer device models, analysis of inverters and basic gates, logic families, regenerative logic circuits, memory technologies. Brief introduction to circuit design for LSI and VLSI. Overview of gallium arsenide digital IC's. Prerequisite: ECE 342. Lec 3. 2 Design Cr. **Cr 3.**

ECE 453 Microwave Engineering
Toics include: high-frequency transmission lines, impedance matching, graphical methods, microwave circuits, measurement techniques, microwave components, rectangular and cylindrical waveguides, antennas. Prerequisite: ECE 351. 1 Design Cr. **Cr 3.**

ECE 464 Microelectronics
Emphasis on fabrication topics, process design. Prerequisite: ECE 262. Lec 3 with an occasional laboratory period substituted for equivalent class time. 2 Design Cr. **Cr 3.**

ECE 465 Introduction to Sensors
Various types of conductometric, acoustic, magnetic, thermal and optical sensors are presented. Techniques for interfacing the sensors using microprocessor control systems and signal processing are discussed. Applications of sensor systems in medicine, environmental monitoring, the automotive industry, the chemical industry, manufacturing and construction are given. Prerequisite: junior level standing in engineering. 1 Design Cr. **Cr 3.**

ECE 466 Sensor Technology and Instrumentation
Design and fabrication techniques for piezoelectric, thin film, fiber optic and silicon based sensors. Topics include: cutting, polishing and cleaning crystals, the deposition of electrodes and sensing elements and sensor characterization. Students will design, fabricate and test a sensor. Prerequisite: ECE 465 or permission. Lec 3, Lab 3, 2 Desgin Cr. **Cr 4.**

ECE 471 Microprocessor Applications Engineering
Application of micro-processors to the solution of design problems, including hardware characteristics, peripheral control techniques and system development. Prerequisites: ECE 172. Lec 2, Lab 3. 2 Design Cr. **Cr 3.**

ECE 473 Computer Architecture and Organization
Historical computers and topics of importance in the design of modern computer systems including memory technology, memory system design, and parallel processing. Prerequisite: ECE 471. Lec 3, 1 Design Cr. **Cr 3.**

ECE 475 Sequential Logic Systems
Methods of design and testing for logic systems with memory. Includes sequential machine flow charting and algorithmic approaches to design, test procedures and the design of system tests. Prerequisite: ECE 172. Lec 3. 2 Design Cr. **Cr 3.**

ECE 477 Hardware Applications Using C
Programming examples will include hardware application, timing, sound generation and instrumentation interfacing. Review of the necessary features of the C programming language will be included. Prerequisites: ECE 172, COS 220. Lec 3, 1 Design Cr. **Cr 3.**

ECE 478 Industrial Computer Control
Design of computerized systems for industrial applications. These include programmable logic controllers, personal computers and embedded controllers. Interface electronics, communication strategies, design for hostile environments, fault tolerance and fail safe design will also be covered. Prerequisite: COS 220 or instructor's permission. Lec 3, 2 Design Cr. **Cr 3.**

ECE 480 Quantization and Digital Techniques
The concept of quantization is studied with regard to ideal properties and actual implementation i Analog-to-Digital Converters (ADCs), CMOS Switched Capacitor Circuits and Digital to Analog Converters (DACs). Successive approximation, algorithmic and flash converter architectures are studied along with emphasis on applications for detection and spectral analysis. Prerequisite: ECE 383 or instructor permission. Design Cr 1. **Cr 3.**

ECE 486 Digital Signal Processing
A study of processing signals in descrete form. Review of z-transforms, discrete Fourier series and transforms. Covers flow graph and matrix representations of digital filters, digital filter design techniques and fast Fourier transforms. Emphasis on using the computer both to design and to realize various signal processors. Prerequisites: ECE 383. Lec 3. 1. 5 Design Cr. **Cr 3.**

ECE 487 Digital Image Processing
Introduction to optical and computer image processing techniques and their applications including the physics of images and sensors, image digitizer organization and computer communication; image generation, sampling and quantization; thresholding, binary images, gray level images, pseudo-color, coding techniques; image processing mathematics, two dimensional discrete Fourier transform, convolution and correlation, image transforms; masking, image smoothing, image sharpening, highpass and lowpass filters, histogram, image enhancement. Use of image processing facilities and laboratory. Prerequisite: ECE 314. Lec 2, Lab 3. 1.5 Design Cr. **Cr 3.**

ECE 498 Selected Topics in Electrical and Computer Engineering
Topics in electrical engineering not regularly covered in other courses. May include advanced micropocessor applications, robot applications, instrumentation semiconductor technology, introduction to VLSI design and microwave acoustics. Content can be varied to suit current needs. May be repeated for credit, with departmental permission. Prerequisite: permission. **Cr 1-3.**

ECE 512 Linear Systems Analysis
Analysis of linear dynamic systems using matrices and linear vector spaces, internal and external models, state variable analysis, controllability and observability, stability. Prerequisites: ECE 314, MAT 262. **Cr 3.**

ECE 515 Random Variables and Stochastic Processes
Engineering applications of probability theory. Analysis of random variables, random processes and stochastic models. Introduction to the analysis and optimization of linear systems with random inputs. Prerequisite: graduate standing, ECE 383 or equivalent. Lec 3. **Cr 3.**

ECE 521 Transient Phenomena in Power Systems
Switching transients, damping, transients in three-phase circuits, transients in dc circuits, power conversion equipment, transient modeling of power system components, insulation coordination, protection of power systems against transient overvoltages. Prerequisite: ECE 323 or permission. Lec 3. **Cr 3.**

ECE 523 Mathematical Methods in Electrical Engineering
Application of advanced mathematical methods to problems in electrical engineering. Topics include conformal mapping, calculus of variations, and difference equations. Prerequisite: ECE 512 or permission. Lec 3. **Cr 3.**

ECE 527 Advanced Faulted Power System Analysis
Static and dynamic representation of power system equipment during series and shunt power system faults. Analysis in the three phase abc, symmetrical component, or dq reference frame. Selected protective relaying topics. Prerequisite: ECE 428 and permission. Lec 3, 1 Design Cr. **Cr 3.**

ECE 533 Advanced Robotics
Introduces intelligent robot control system and programming. Robot dynamical equations, path planning and trajectory generation, control system, off-line simulations, robot languages, and vision integration in robot applications will be discussed. Prerequisite: ECE 417. Lec 2, Lab 3. 1 Design Cr., 2 Science Cr. **Cr 3.**

ECE 535 Computer Vision
Topics include: image generation, the physics of images and sensors, binary images, image processing and understanding, computational methods for recovery and representation of visual information, review of available vision systems and their applications in automation. Prerequisite: COS 215 or COS 220 and ECE 314 or equivalent. Lec 2, Lab 3. 1 Design Cr., 2 Science Cr. **Cr 3.**

ECE 550 Electromagnetic Theory
Reviews of Maxwell's Equations and waves in dielectric and lossy media. Covers Image Theory, Induction Theorem and Green's Functions; plane cylindrical and spherical wave functions; radiation and antennas; rectangular, cylindrical and spherical waveguides and cavities; perturbational and variational techniques. Prerequisite: ECE 351 or equivalent. Lec 3. **Cr 3.**

ECE 552 Wave Propagation
Considers theory of propagation of electromagnetic waves, sound waves and unbounded media. Presents theoretical techniques and their applications to wave propagation in the ocean, ionosphere and the earth. Prerequisite: ECE 453 or equivalent. Lec 3. **Cr 3.**

ECE 562 Microwave Acoustics
A study of the theory of acoustic wave propagation in nonpiezoelectric and piezoelectric media. Focus on bulk acoustic waves, surface acoustic waves, plate modes, psuedo surface acoustic waves and Bleustein-Gulyaev waves and use of these waves may be utilized in microwave acoustic devices. Prerequisite: ECE 550 or permission. Lec 3. 1 Design Cr., 2 Science Cr. **Cr 3.**

ECE 563 Design and Fabrication of Surface Wave Devices
Covers the design, fabrication and measurement of surface acoustic wave (SAW) devices, e.g. delay lines, filters, resonators, oscillators, convolvers, and sensors. Topics include: planar fabrication techniques, surface properties of piezoelectric crystals, photolithography, vacuum technologies for thin film deposition, electronic systems for the measurement of impulse and frequency response, phase and group velocity, insertion loss, distortions, and spurious effects. Prerequisites: ECE 550, ECE 562 or permission. Lec 2, Lab 3. 2 Design Cr., 1 Science Cr. **Cr 3.**

ECE 565 Semiconductor Devices I
A study of physical principles underlying device operation. Topics include: elementary excitation in semiconductors such as phonons, photons, conduction holes and electrons, carrier trapping and recombination, effect of high doping, contacts. Prerequisite: ECE 463 or equivalent. Lec 3. **Cr 3.**

ECE 566 Semiconductor Devices II
Application of the principles of ELE 565 to specific devices. Prerequisite: ECE 565. Lec 3. **Cr 3.**

ECE 571 Advanced Microprocessor-Based Design
Includes techniques for developing software and hardware for microprocessor-based systems, computer aided design using a multistation logic development system, use of components commonly found in microprocessor-based systems. Prerequisite: ECE 471 or permission. Lec 2, Lab 3. 1 Design Cr., 2 Science Cr. **Cr 3.**

ECE 573 Microprogramming
Fundamentals of microcoding and the design of microcoded systems including bit slice design. Prerequisites: ECE 471, ECE 475. Lec 2, Lab 3, 2 Design Cr. **Cr 3.**

ECE 578 Advanced Industrial Computer Control
Advanced topics including distributed control systems, interoperability and networking of a variety of computers and embedded controllers. Prerequisite: ECE 478 or instructor permission Design Cr 1. **Cr 3.**

ECE 580 Communications Engineering III
Topics include: probability theory, random processes, optimum receivers, vector channels, matched filters, block orthogonal signaling, time-bandwidth product, channel capacity, and implementation of coded systems. Prerequisite: ECE 383 or equivalent. Lec 3. **Cr 3.**

ECE 581 Estimation and Detection Theory
Mathematical fundamentals of optimal signal processing strategies. Neyman-Pearson and Bayes Dectectors applied to radar and sonar systems. Maximum Likelihood and Bayes Estimators and applications. Prerequisite: ECE 515. **Cr 3.**

ECE 582 Modern Filters
Modern statistical approach to filter theory and signal analysis. Discrete time signals and systems emphasized. Wiener filters, linear smoothing and prediction, Kalman filters and applications. Prerequisites: ECE 512, ECE 515. **Cr 3.**

ECE 590 Neural Networks
Introduces artificial neural networks. Provides supervised and unsupervised learning in single and multi-layer networks, software implementation, hardware overview. Applications in pattern recognition and image analysis. Prerequisite: permission. 1 Design Cr., 2 Science Cr. **Cr 3.**

ECE 598 Selected Advanced Topics in Electrical and Computer Engineering
Advanced topics not regularly covered in other courses. Content varies. May

be repeated for credit. Prerequisite: permission. Design Cr. varies, 1-3 Science Cr.

Cr 1-3.

ECE 599 Selected Study in Electrical and Computer Engineering
Advanced independent study for qualified students who present suitable projects for intensive investigation in the area of faculty interest. Prerequisite: permission.

Cr 1-3.

Courses in Economics (ECO)

ECO 101 Introductory Topics in Economics
Exploration of a major economic issue for students with no prior exposure to economics. Introductory application of the analytical and empirical tools of economics to help understand such issues as poverty, race and gender discrimination, ecological problems, the role of the U.S. in the international economy, the development of less developed countries and the growth of the U.S. economy. This course does not substitute for either ECO 120 or ECO 121. Enrollment limited to first and second year students. Course does not yield credits toward the requirements of the economics major. Cr 3.

ECO 120 Principles of Microeconomics
Principles of microeconomics and their application to economic issues and problems. Analysis of the economic decision-making of individuals and firms; markets and pricing; monopoly power; income distribution; the role of government intervention in markets. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.)

Cr 3.

ECO 121 Principles of Macroeconomics
Principles of macroeconomics and their application to modern economic issues and problems. Analysis of national income and employment; fluctuations in national income; monetary and fiscal policy; control of inflation, unemployment, and growth; and international aspects of macroeconomic performance. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Cr 3.

ECO 200 Research Skills
Teaches students research skills for social science research, including library research, data acquisition, computer research skills and research presentation. Prerequisites: basic personal computer skills and one 100-level economics course or permission. Cr 3.

ECO 310 Introduction to Economics/Accelerated
An accelerated introduction to the principles of micro- and macro-economics for those preparing for graduate school who have not taken an introductory economics course. Theories of business and consumer behavior. Competitive and non-competitive markets. The determination of national income. Monetary theory and policy. Government regulatory, budgetary and fiscal policy. Principles of international trade and finance. Prerequisite: baccalaureate degree or senior standing and permission of the instructor.

Cr 3.

ECO 329 Global Political Economy
Description, analysis and evaluation of the newly emerging global economy. Systematic and holistic assessment of the origins, characteristics and institutions of the global economy in light of economic and other social science theories. Topics include political, economic and technological changes at the global level, transnational corporations, international monetary institutions (World Bank, International Monetary Fund) and the implications of globalization for the relevance of traditional economic theory and policy. (Satisfies the General Education Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisites: ECO 120 and ECO 121 or equivalent with permission. Cr 3.

ECO 333 Labor Markets and Human Resource Development
Topics include: labor market dynamics, the structure of labor markets, preparation for employment, labor market problems of special groups, remedial manpower programs, labor markets and public policy. (Satisfies the General Education Ethics Requirement.) Prerequisite: ECO 120 and ECO 121 or equivalent with permission. Cr 3.

ECO 335 History of Economic Thought
Survey of basic economic principles and theories from preindustrial times to present. Emphasis on the Classical School (Smith, Ricardo, and Malthus) and its critics, the development of the Austrian School, the synthesis of Neo-Classicism and emergence of macroeconomics. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: ECO 120 and ECO 121 or the equivalent with permission.

Cr 3.

ECO 336 Marxian Economics
A dynamic macro-analytical critique of the functioning of a capitalist society. Covers theoretical comparisons with orthodox economic theory and an introduction to American radicals (neo-Marxian) and their thought. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: ECO 120 and ECO 121 or the equivalent with permission. Cr 3.

ECO 337 Comparative Economic Systems
Examination, evaluation and comparison of socio-economic structures and operating principles of the major contemporary economic systems. Special emphasis on Western Europe, Japan, China and post-communist economics. The controversial notions of "economic democracy" and "free international trade" will also be discussed. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: ECO 120 and ECO 121 or equivalent with permission. Cr 3.

ECO 338 Economic Development
Theories and practices of interregional and international economic development. Emphasis on development problems of emerging nations. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: ECO 120 and ECO 121 or equivalent with permission. Cr 3.

ECO 340 Canadian Economics: Issues and Policies
Survey of the structure and functioning of the Canadian economic system, its problems and the policies used to solve them. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: ECO 120 and ECO 121 or equivalent with permission. Cr 3.

ECO 347 Canadian Labor Markets
Evaluates the Canadian labor market and its institutions against those of similar economies, mainly the United States. Topics include: labor demand and supply, measurement of unemployment and unemployment policies, migration and immigration, retirement and pensions, earnings determination, unionization, and the effect of social programs. Prerequisites: ECO 120 and ECO 121 or equivalent with permission. Cr 3.

ECO 353 Money and Banking
Examines the American banking and financial system including monetary theory and policy. Prerequisite: ECO 120 and ECO 121 or equivalent with permission. Cr 3.

ECO 367 Health Care Economics
Description and evaluation of the structure and performance of the health care sector in the United States. Topics include: the contribution of health care services to health status; description and evaluation of the health services sector including the markets for hospital and physicians' services, health insurance, medical education, and drugs; public policies for improving economic efficiency and maintaining access and quality of care in health services delivery systems; the role of the market and the role of government. (Satisfies the General Education Ethics Requirement.) Prerequisite: ECO 120 and ECO 121 or equivalent with permission. Cr 3.

ECO 368 Economics of Regulation
Examination of the institutions and economic issues related to public utility regulation in the United States. (Satisfies the General Education Social Contexts and Institutions Requirement.) Prerequisite: ECO 120 and ECO 121 or equivalent with permission. Cr 3.

ECO 370 Topics in Economics
Includes readings, research and discussions. Topics vary depending on faculty and student interests. Prerequisites: ECO 120 and ECO 121 or permission. **Cr 1-3.**

ECO 372 State and Local Government Finance
Topics include: development of the federal system, fiscal performance, intergovernmental fiscal relations, state and local revenue systems, budgetary practices, state and local debt. Prerequisite: ECO 120 and ECO 121 or equivalent with permission. **Cr 3.**

ECO 399 Readings in Economics
Supervised readings or research in topics not covered by regular course offerings. Prerequisites: ECO 120 and ECO 121 and permission. Junior or senior standing required. **Cr 3.**

ECO 420 Intermediate Microeconomics
A study of theories of consumer behavior, markets, the firm, and distribution. Prerequisite: ECO 120 and ECO 121, or equivalent with permission. **Cr 3.**

ECO 421 Intermediate Macroeconomics
Analysis of the basic forces that cause fluctuations in economic activity and their effects on employment, investment, and business firms. Stabilization proposals examined and evaluated. Prerequisite: ECO 120 and ECO 121 or equivalent with permission. **Cr 3.**

ECO 439 International Trade and Commercial Policy
Principles and practices of international trade and finance including current trends in the international economy and United States commercial policy. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: ECO 421 or ECO 420. **Cr 3.**

ECO 445 Urban-Regional Economics
Economics of business and household location decisions and the formation and spatial distribution of urban places. Economics of land rent, intraurban land use allocation, and the suburbanization of households and businesses. Economics of urban and regional growth and decline and the effects of public policies involving taxation, industry subsidies, public service and infrastructure supply and environmental regulations and quality. Prerequisite: ECO 420 or the equivalent with permission. **Cr 3.**

ECO 470 Topics in Economics
Includes readings, research, and discussions. Topics vary depending on faculty and student interests. (Satisfies the General Education Writing Intensive and Capstone Experience Requirements.) Prerequisite: ECO 420 and ECO 421 or permission. **Cr 1-3.**

ECO 471 Public Finance and Fiscal Policy
Covers public expenditure theory, principles of taxation, the federal budget and alternative budget policies, federal tax policy, fiscal policy for stabilization, federal debt. (Satisfies the General Education Social Contexts and Institutions, Writing Intensive and Capstone Experience Requirements.) Prerequisite: ECO 420. **Cr 3.**

ECO 474 Economics of Higher Education
Focuses on a variety of issues confronting institutions of higher education and students. Issues to be discussed include: changes in enrollment patterns and the role of tuition, the impact of financial aid on enrollment choices, trends in revenues and expenditures in colleges and universities and tuition increases relative to inflation. Students will select a specific topic and conduct a research project. (Satisfies the General Education Social Contexts and Institutions, Demonstrated Writing Intesive and Capstone Experience Requirements.) Prerequisite: ECO 420. **Cr 3.**

ECO 475 Industrial Organization
Explores the relationship between market structure, conduct and performance. Development of a general analytical framework to assess performance in existing markets and evaluation of current public policy on this basis. (Satisfies the General Education Social Contests and Institutions, Writing Intensive and Capstone Experience Requirements.) Prerequisite: ECO 420. **Cr 3.**

ECO 480 Introduction to Mathematical Economics
Mathematics used as a language in presenting concepts of economic theory. (Satisfies the General Education Mathematics Requirement.) Prerequisite: ECO 420, ECO 421, MAT 114 or MAT 126. **Cr 3.**

ECO 485 Introduction to Economic Statistics and Econometrics
Surveys the application of probability and statistics to economic problems. Emphasis on construction and testing of economic hypotheses. Practical application of regression techniques, including use of computer, occupies second half of course. Strong algebra skills required. (Satisfies the General Education Mathematics, Writing Intensive and Capstone Experience Requirements.) Requirement.) Prerequisites: ECO 420 or ECO 421, MAT 215. **Cr 3-4.**

ECO 496 Field Experience in Economics
Supervised employment in either the public or private sector. Requirements include initial proposal showing relevance of job and final report or paper. Prerequisite: 400-level economics course in relevant area of work. **Cr 3.**

ECO 499 Readings in Economics
Supervised readings or research in topics not covered by regular course offerings. Offered at student request. Prerequisite: ECO 420 and ECO 421 and permission. Junior or senior standing required. (May be repeated for credit.) **Cr 3.**

ECO 511 Macroeconomic Theory
An examination of the development of modern economic analysis with regard to employment, income distribution, and stabilization policies. Prerequisite: permission. **Cr 3.**

ECO 512 Alternative Economic Theories and Perspectives
Applies alternative schools of thought (e.g. Marxist, post-Keynesian, institutionalist) to theoretical and policy issues in contemporary microeconomics and macroeconomics. Prerequisites: ECO 420 and ECO 421 or permission. **Cr 3.**

ECO 523 Advanced International Trade and Commercial Policy
Analysis of the determinants of international trade and specialization. Considers impact of trade on growth, income distribution and welfare as well as consequences of national policies upon trade. Introduction to international economic institutions and alternative theories of trade. Prerequisite: ECO 420 and permission. **Cr 3.**

ECO 524 Advanced International Finance
Analysis of the fundamental characteristics of an open macroeconomy including exchange rate determination, balance of payments adjustment, income determination, financial flows, effect of monetary and fiscal policies, economic integration, and global monetary issues. Prerequisite: ECO 421 and permission. **Cr 3.**

ECO 525 Advanced Topics in Economic Development
Presents concepts, tools and models in contemporary economic theory relevant to development problems. Also explores applications to public policy. Prerequisites: ECO 420, ECO 421 and permission. **Cr 3.**

ECO 529 Readings in Economics
Specialized topics in economics pursued by the student on an independent basis. Prerequisite: permission. **Cr 3.**

ECO 533 Economics of Human Capital
Considers the role of human capital theory in understanding labor market outcomes and in policy decisions involving the allocation of funds to education and training programs. Prerequisite: ECO 420 and permission. **Cr 3.**

ECO 545 Advanced Regional Economics
Theories of the development of subnational economic regions, principally in the United States. Factors that influence firm and household interregional location and migration decisions. The impact of public policy on growth and adjustment. Attention to econometric evidence is emphasized. Prerequisite: INT 514. **Cr 3.**

ECO 546 Research Seminar in Regional Economics
An in-depth treatment of the scholarly literature, data sources and empirical

methods in selected areas of regional economics; e.g., regional economic growth and adjustment, regional economic integration, regional labor and demographic economics, regional economic policies. Students conduct and present individual research projects on selected topics. Prerequisite: ECO 545 or permission. **Cr 3.**

ECO 565 Graduate Economics Practicum
The application of economic techniques to current economic issues emphasizing applied research with appropriate analysis of issues and regular oral and written reports of the results. Prerequisite: permission. **Cr 3.**

ECO 590 Advanced Topics in Economics
Theoretical and empirical analysis of one or more major economic policy issues. Prerequisites: ECO 420 and ECO 421 and permission. **Cr 3.**

ECO 595 Graduate Internship in Economics
Limited to graduate students who choose the internship option. Internships in public or private institutions in situations requiring application of economic theories and methodologies. Written report(s) are required. Prerequisites: Prior approval of student's graduate committee. **Cr 3-6.**

Courses in Education: Measurement and Testing (EDA)

EDA 521 Evaluation of Instruction
A basic course for elementary and secondary school teachers. Emphasis on utilizing various strategies of evaluation in classroom and school. Prerequisite: EDB 202 or permission. **Cr 3.**

EDA 570 Models of Educational Evaluation
A study of the different models of educational evaluation including procedures for designing and implementing both formative and summative evaluation studies. Prerequisite: EDA 520 or equivalent. **Cr 3.**

Courses in Education: Basic Professional (EDB)

EDB 202 Schools, Students, and Society
An interdisciplinary examination of the school-society relationship in the United States. Examines and evaluates the political, economic, social, and academic purposes and ethical issues that shape teaching and schooling practices and policies. (Satisfies the General Education Human Values and Social Context, Ethics and the Demonstrated Writing Competency Requirements.) Prerequisite: ENG 101 or equivalent. **Cr 3.**

EDB 204 The Teaching Process
Examines procedures of instructional planning, including improved use of small groups, classroom space, and appropriate teaching materials; measurement, evaluation, and reporting of pupil learning. Prerequisite to student teaching in all regular undergraduate programs. (Satisfies the General Education Ethics Requirement.) Prerequisite: Sophomore standing or permission. **Cr 3.**

EDB 221 Educational Psychology
A scientific study of human development, learning, cognition and teaching. Emphasis on theory and research and their application to educational problems. (Satisfies the General Education Ethics Requirement.) Prerequisite: PSY 100 and sophomore standing. **Cr 3.**

Courses in Education: Curriculum (EDC)

EDC 333 Curriculum Development and Evaluation
Provides the prospective teacher with an overview of theory and research in the field of curriculum, plus "hands-on" experience in curriculum development. Historical, philosophical and sociological perspectives on both the explicit and the hidden curriculum. Exploration and guided practice in the processes of writing and evaluating curricula for local school districts. Prerequisites: EDB 202, EDB 204, EDB 221. **Cr 3.**

EDC 524 Curriculum and Organization of Middle Schools and Junior High Schools
A thorough exploration of the educational program for pre and early-adolescents, including growth and development issues, curriculum planning processes, curriculum development in various subject areas and across subjects, and organizational issues. **Cr 3.**

EDC 533 Dynamics of the Curriculum
Examines problems and issues of curriculum development common to all areas of instruction and all educational levels. Provides an opportunity to acquire concepts and skills which may be applied to the curriculum development process in local school districts. Prerequisites: EDB 202, EDB 204, EDB 221 or equivalents. **Cr 3.**

EDC 595 Leadership in Curriculum Design for Administrators/ Supervisors
Role function and practices for the curriculum leader. Prerequisite: EDC 533 or permission. **Cr 3.**

Courses in Education: Liberal Education (EDF)

EDF 201 Great Ideas, Critical Issues
A selective introduction to the liberal curriculum through multidisciplinary studies of recurring ideological tensions in western civilization, especially as reflected in conflicts between the individual and society. Emphasis on close reading and critical discussion through extensive prose writing. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) **Cr 3.**

Courses in Education: General (EDG)

EDG 298 Professional Preparation Team Field Experience
Only for first and second year students in the Professional Preparation Team (PPT) program. Students will observe in public school classrooms, complete activities, and assist the teachers. To be taken simultaneously with EDB 202, EDB 204. May be repeated for a total of four semesters. **Cr 1.5 - 3.**

EDG 399 Professional Preparation Team Senior Seminar
Only for seniors in the Professional Preparation Team (PPT) program, in the semester preceding internship. Students learn about issues of professional interest, identify and research a particular issue in depth and become oriented to the particular teacher and class with whom they will be doing their internships. **Cr 1.**

EDG 400 Field Observation (Activity)
Study of education programs through visits, consultation and appraisal of practices in selected schools, instructional centers, clinics, laboratories and community agencies. Observations are considered in relation to research theory and practice. Corequisite: To be taken in conjunction with methods course(s). **Cr 1-6.**

EDG 498 Problems in Education
Individual work on a problem selected by the student. Primarily for Education majors. **Cr Ar.**

EDG 499 Alternative Practicum and Seminar in Education
A combined practicum and seminar course drawing upon academic and professional course work. Students examine and reflect on their understandings about teaching and learning, apply integrated educational skills and knowledge in contexts other than K-12 classrooms and fitness settings, and develop projects that synthesize academic and professional experiences. Prerequisite: At least senior standing required and completion of all other program requirements or permission. **Cr 3-6.**

EDG 595 Educational Research
Evaluates selected research in education in relation to the appropriateness of the design to the stated purpose of the study. Students select and present research problem with special attention to design and studies related to it. Prerequisite: EDS 521. **Cr 3.**

Courses in Education: History and Philosophy (EDH, EDL, EDM)

EDH 500 Social Context of Education
Considers competing interpretations of the relationship between schools and society, the impact of race, class, and gender on education, and issues of continuity and change in policy and practice. **Cr 3.**

EDH 540 Students at Risk and Their Families
Examines the roles of educational personnel in addressing the needs of students at risk in the context of contemporary schooling and family life. Identifies various "at risk" categories. Considers implications for school improvement programs, individual intervention, referrals to community services and community action coalitions. **Cr 3.**

EDL 420 Changing Roles of Men and Women in Education
Provides an understanding of changing sex roles in the U.S.and implications for all educational levels, theories and research related to the school's place in sex-role socialization, identification of sex-role stereotyping, and an overview of innovative approaches, programs and practices. **Cr 3.**

EDM 520 Teaching in Middle School/Junior High School
Reviews the unique demands that children in grades five through eight place on teachers as a direct result of normal developmental patterns. Focus on specific teaching behaviors that deal effectively with each of these demands, with special attention to problems of peer influences, periodicity of brain growth, and effects of uneven growth patterns. Prerequisite: teaching experience or permission. **Cr 3.**

Courses in Education: Research (EDS)

EDS 500 Directed Readings (area)
Opportunity to read in a particular area of education under faculty direction. Prerequisite: Masters and CAS level and permission. **Cr Ar.**

EDS 510 Introduction to Educational Research
For graduate students in education and related fields. Topics include: locating educational research reports, abstracting and evaluating sources, understanding statistical symbols, examining inquiry methodology and communicating about research. Designed for consumers of research. Prerequisite: graduate status or permission. Lec 3. **Cr 3.**

EDS 520 Educational Measurement
Covers basic measurement theory, construction of test items in achievement and aptitude, evaluation of teacher-made and standardized tests, descriptive statistical techniques used in educational measurement. **Cr 3.**

EDS 521 Statistical Methods in Education
Introduction to descriptive and inferential statistics as applied to education and human behavior. Emphasis on parametric statistics. **Cr 3.**

EDS 530 Naturalistic Observation Research in Learning Environments
The acquisition of foundational knowledge and practical application of ethnography, interaction analysis, duration recordings and other naturalistic observation techniques for the study of learning environments. Specific focus on current trends in classroom research methodologics, literature reviews and proposal designs. **Cr 3.**

EDS 569 Seminar in Educational Leadership
Discussion and reports structured around a series of topics on organizational theory, educational leadership practice and a list of readings. **Cr 3.**

EDS 571 Qualitative Research: Theory, Design and Practice
Examination and use of phenomenological approaches to social science research, emphasizing ethnographic methods in education and human service settings. Field work required. Typically offered over two semesters. Prerequisites: EDS 521, EDS 530 or equivalent and permission. **Cr 3.**

Courses in Education: Telecommunications (EDT)

EDT 520 Technology Tools for K-12 Schools
Provides practical and understandable information about integrating technology in K-12 classrooms. Examines tool applications (WD, DB, SS and Telecommunications), multimedia and categories of software. Explores ways these support learning. Prerequisites: EDT 400 or permission. **Cr 3.**

EDT 525 Telecommunication in K-12 Classrooms
Telecommunications used to support teaching and learning in K-12 environments. Prerequisites: EDT 400 or EDT 520 or permission. **Cr 3.**

EDT 530 Introduction to Hypermedia in Education
Presents hypermedia tools for Macintosh and/or PC platforms. Emphasizes writing code for Hypermedia applications. Prerequisites: EDT 400 or EDT 520. **Cr 3.**

EDT 535 Multimedia Design for Teaching and Learning
Develops knowledge, skills and tools in the area of multimedia design: including educational multimedia, multimedia authoring tools, instructional design and presentation design. Prerequisite: EDT 530. **Cr 3.**

Courses in Education: General (EDU)

EDU 400 Computers in Education
An introduction for students majoring in education. Nature and use of the computer and its impact on the curriculum and other areas of education are studied. Laboratory experience in developing practical programs using the computer included. Prerequisite: permission. **Cr 3.**

EDU 481 Educational Travel (Area)
A summer session study tour investigates the educational, social, economic, historical, and geographic aspects of the locale visited, particularly of areas that have made major contributions to our cultural heritage. Tours currently conducted in U.S., Europe, Maritime Provinces and Québec **Cr 3-6.**

EDU 580 Educational Institute (Activity)
Provides understanding and insight into areas of special concern including education of teachers of the disadvantaged and retarded, guidance counselors, reading specialists, social studies teachers and school administrators. Attention given to literature, research, practices and materials. **Cr 1-6.**

EDU 590 Topics in Education
Concentrated study of designated topics in education. Topics may vary depending on faculty and student interest. May be repeated for credit. Some sections may have prerequistes beyond the following. Prerequisite: Graduate student or permission. **Cr 1-3.**

Courses in Education: Workshops (EDW)

EDW 462 Workshop in Elementary Education (Activity)
Designed to increase the competence of the elementary school teacher, supervisor, curriculum director, administrator, and other school personnel. Considers literature, research and materials concerned with a special aspect of elementary education. **Cr 1-6.**

EDW 472 Workshop in Secondary Education (Activity)
Designed to increase competence of the teacher, administrator, and other school personnel. Considers literature, research and materials concerned with a special aspect of secondary education. **Cr 1-6.**

Courses in Education: Early Literacy (EEL)

EEL 531 Observing Young Learners to Inform Instruction
Observation of student performance, classroom management, literacy instruction, instructional materials and building a K-2 team. Emphasis is on teacher decision-making to assist literacy growth in the lowest achieving students. Prerequisite: Must currently be teaching at the K-2 level and permission. **Cr 3.**

Course in Ecology and Environmental Science (EES)

EES 590 Special Topics in Ecology and Environmental Science
Study of advanced topics in ecology and environmental science, with particular focus on interdisciplinary analysis of ecological interactions at the population, community, ecosystem and landscape levels. Prerequisite: permission. **Cr 1-3.**

Courses in Electrical Engineering Technology (EET)

EET 100 Electrical Engineering Technology Seminar
Exploration of topics important to the career development of EET students, such as career opportunities, structure and organization of industry, and professional responsibilities. Students must also satisfactorily complete writing assignments. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Corequisite: ENG 101 or equivalent. Lec 1. **Cr 1.**

EET 111 Circuit Analysis I
A non-calculus based introduction to elementary circuit analysis techniques as applied to d-c networks including the basic laws and theorems used in linear circuit analysis. Students are taught basic personal computer skills and are required to use circuit analysis and numerical computation programs. Corequisite: TME 151. Lec 3, Rec 3, Lab 3. **Cr 5.**

EET 211 Circuit Analysis II
Continuation of EET 111. A non-calculus introduction to a-c circuits, including the study of reactive components and the application of phasor analysis to singlephase and polyphase a-c circuits in the steady state. Prerequisite: EET 111 and TME 151. Lec 3, Rec 3, Lab 3. **Cr 5.**

EET 241 Linear Electronics I
Topics include: principles of operation of semiconductor diodes, transistors, and FETs, application to rectifier and filter circuits, d-c analysis and design of transistor and FET amplifiers, a-c analysis and design of transistor amplifiers. Prerequisite: EET 211. Lec 3, Lab 3. **Cr 4.**

EET 312 Linear Systems I
A rigorous treatment of waveform analysis, voltage-current relationships of circuit components, the basic time domain circuit, circuit analysis by Laplace transforms, and system considerations. Prerequisites: EET 211, TME 354. Lec 3. **Cr 3.**

EET 321 Electrical Power Systems I
The first in a three course sequence covering electrical machinery and power systems. Covers three-phase power, power system supply and distribution, magnetic circuits and transformers, theory and operation of DC machines, industrial control and ladder logic, programmable controllers and the per unit system. Prerequisite: EET 211. Corequisite: TME 354. Lec 3, Lab 3. **Cr 4.**

EET 330 Electrical Applications
Introduces the basics of AC and DC circuits. Focuses on applications of interest to students in the mechanical field, such as electrical measurements and instrumentation, motors and generators and their control, feedback control systems and programmable logic controllers. Prerequisite: MET juniors or permission. Lec 2, Lab 2. **Cr 3.**

EET 342 Linear Electronics II
A continuation of EET 241. Topics include: amplifier frequency analysis, power amplifiers, PNPN devices, voltage regulators, oscillators and operational amplifiers. Prerequisite: EET 241. Lec 3, Lab 3. **Cr 4.**

EET 371 Digital Electronics I
A study of combinational and sequential digital logic design with SSI, MSI and programmable devices. Major topics are Boolean algebra, Karnaugh maps, variable entry maps (VEM's) and ASM charts. Lec 3, Lab 3. **Cr 4.**

EET 374 Introduction to Microcomputers
Introduction to the programming of the microcomputer in machine and assembly language. The basic architecture of the microcomputer is introduced, including microprocessors, registers, control units, memory and I/O. Corequisite: COS 220. Lec 3, Lab 3. **Cr 4.**

EET 394 Electrical Engineering Technology Practice
Cooperative work experience at full-time employment for at least a ten-week period. May be repeated for credit. Prerequisite: Junior standing and permission. (Pass/Fail Grade Only.) **Cr 1-3.**

EET 422 Electrical Power Systems II
The second course in a three course sequence covering electrical machinery and power systems. Introduces induction and synchronous machines, transmission line models, bus admittance and impedance analysis. Prerequisite: EET 321. Lec 3. **Cr 3.**

EET 423 Electrical Power Systems III
The third course in a three course sequence covering electrical machinery and power systems. Introduces electric power systems control, load flow analysis, power system faults and unbalances and system protection. Prerequisite: EET 422. Lec 3. **Cr 3.**

EET 425 Linear Systems II
Classical design, simulation and analysis of closed-loop control systems, emphasizing industrial process control applications and real-world product design examples and practices. Emphasis on frequency-response methods, including Bode plots and root-locus methods. Prerequisite: EET 312. Lec 3, Lab 3. **Cr 4.**

EET 451 Senior Design Project I
The first of a two-course sequence intended to provide EET seniors with a capstone learning experience. Requirements include selection of a design project, submission of a proposal, completion of a preliminary design and written and oral presentations of project status. (Together with EET 452, this course satisfies the General Education Capstone Experience Requirement.) Prerequisite: permission. Lec 1. **Cr 1.**

EET 452 Senior Design Project II
A continuation of EET 451 and the second of a two-course sequence intended to provide EET seniors with a capstone learning experience. Requirements include completion of a final design for the project started in EET 451, construction of the project, a final written project report and an oral presentation of the completed project. (Together with EET 451, this course satisfies the General Education Capstone Experience Requirement.) Prerequisite: EET 451. Lab 3. **Cr 2.**

EET 498 Selected Topics in Electrical Engineering Technology
Topics in engineering technology not regularly covered in other courses. Content varies to suit the needs of individuals. May be repeated for credit. Prerequisite: permission. **Cr 1-4.**

Course in Education: Gender Studies (EGS)

EGS 500 Seminar in Gender Studies in Education
An introductory survey of educational theory and research aimed at gender-sensitive educational policies and practices. **Cr 3.**

Courses in Education: Mathematics (EMA)

EMA 314 Teaching Mathematics in Elementary School
An instruction to methods and techniques in teaching mathematics, arithmetic readiness program, instructional and evaluation material. Prerequisite: MAT 107 and PSY 100. **Cr 3.**

EMA 551 Newer Practices in Mathematics Education
Covers objectives, materials and procedures for improvement of teaching fundamentals of arithmetic and a mathematics readiness program, a sensible drill load, and development of meaningful problem units. Prerequisite: EMA 314 or equivalent. **Cr 3.**

EMA 555 Problem Solving in Secondary School Mathematics
Considers problem generation, problem posing and problem solving in a wide variety of situations, applications and recreational mathematics. Prerequisite: MAT 305 or equivalent. **Cr 3.**

Courses in Education: Middle Level (EML)

EML 595 Seminar in Middle Level Education
Examines current issues in middle level education research and practices: curriculum, communicating with the public, the middle level school in the K-12 spectrum, parent programs and staff development. Prerequisite: EDC 524 or permission. **Cr 3.**

Courses in English (ENG)

ENG 001 Writing Workshop
Designed for students who need to develop and to practice the basic writing habits necessary for successful university-level writing. Taught largely on a small group basis. Students will be selected on the basis of their SAT verbal scores and a written diagnostic essay, or on the recommendation of faculty members. See the paragraph "Placement in Writing Courses" above. Credit does not count toward graduation. (Pass/Fail Grade Only.) **Cr Ar.**

ENG 101 College Composition
Students practice the ways in which writing serves to expand, clarify, and order experience and knowledge, with particular attention to persuasive writing. Satisfactory completion of the course depends upon quality of weekly writing assignments as well as demonstration of proficiency in college-level writing. See the paragraph "Placement in Writing Courses" above. **Cr 3.**

ENG 121 Introduction to the Drama
Close reading and analysis of a dozen to fifteen masterpieces of the drama. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Artistic and Creative Expression Requirements.) Prerequisites: open only to first and second year students; ENG 101 is strongly recommended. **Cr 3.**

ENG 122 Introduction to Poetry
Close reading and analysis of the various kinds of poetry (lyric, narrative, elegiac, occasional; the sonnet, the ode, the epic; etc.) and an examination of the techniques (rhythm, pattern, sound, tone, imagery, metaphor, allusion, for example) used by poets of note. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Artistic and Creative Expression Requirements.) Prerequisite: open only to first and second year students; ENG 101 is strongly recommended. **Cr 3.**

ENG 123 Introduction to Fiction
Close reading and analysis of selected short stories, novellas, and novels. By considering the elements of fiction such as theme, character, plot, image, and point of view, students increase their ability to understand and appreciate the art of fiction. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Artistic and Creative Expression Requirements.) Prerequisites: open only to first and second year students; ENG 101 is strongly recommended. **Cr 3.**

ENG 129 Topics in English
Offers small-group discussions of literature focusing on a common theme. Each division takes up a different theme, such as utopianism, the quest myth, growing up in America and the like. Students can expect to read texts closely and write regularly about them. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: Open to first-year students only. May be taken before or after ENG 101 or concurrently with permission. **Cr 3.**

ENG 131 The Nature of Story
Explores the fundamental activity of why and how we create, tell and read/listen to stories. Readings may include selections from folk tale and myth, saga and epic, drama and novel, film and song, poetry and essay—from the ancient world to the modern, from the western cultural tradition and from a variety of other cultures. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives and Artistic and Creative Expression Requirements.) **Cr 3.**

ENG 170 Foundations of Literary Analysis
An introduction to the close reading of literature. Students write frequently, exploring how conventions of genre, form, and style work in literature. Required of English majors. Prerequisites: ENG 101 is strongly recommended. **Cr 3.**

ENG 205 An Introduction to Creative Writing
Offers students experience in writing in three major forms: autobiographical narrative, fiction, and poetry. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Prerequisite: ENG 101 or equivalent. **Cr 3.**

ENG 206 Descriptive and Narrative Writing
Special emphasis on the informal, autobiographical essay. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Prerequisite: ENG 101 or equivalent. **Cr 3.**

ENG 212 Persuasive and Analytical Writing
Designed for students wanting practice in those forms of expository, analytical, and persuasive prose required in writing answers to essay test questions, term papers, research projects, and extended arguments. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: ENG 101 and at least sophomore standing. **Cr 3.**

ENG 225 Topics in Language
Looks at texts and rhetorical issues which would fall outside traditional genres of literature. Topics are announced in advance. Recent topics have included Language and the Creation of Public Worlds and The Language of Television and Periodicals. Prerequisite: ENG 101. **Cr 3.**

ENG 229 Topics in Literature
Recent topics have included: science fiction, literature and the arts, utopian fiction, literature and the law, nature and literature, literature of the third world and literature of the Vietnam war. (Literature and the Arts and Nature and Literature satisfies the General Education Western Cultural Tradition Requirement.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 230 The Bible as Literature
An exploration of the literature of the Old and New Testaments as they relate to Western culture. The first half of the semester covers the primary books of the Old Testament; the second half of the semester covers most of the New Testament. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Artistic and Creative Expression and Ethics Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 231 Western Tradition in Literature: Homer Through the Renaissance
Survey of the major writers in the Western literary tradition. The development of our cultural heritage and the evolution of major literary forms. Recommended for English majors. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Artistic and Creative Expression Requirements.) Prerequisite: 3 hours of literature or permission. (This course is identical with MLC 231.) **Cr 3.**

ENG 232 Western Tradition in Literature: Enlightenment to 20th Century
Survey of the major writers in the Western literary tradition. The development of our cultural heritage and the evolution of major literary forms. Recommended for English majors. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Artistic and Creative Expression Requirements.) Prerequisite: 3 hours of literature or permission. (This course is identical with MLC 232.) **Cr 3.**

ENG 235 Literature and the Modern World
An examination of the modern sensibility as it has manifested itself in 20th century literature. Some attention also to the history, music, visual arts, social thought, and science of the contemporary epoch. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Artistic and Creative Expression and Ethics Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 236 Canadian Literature
A survey of Canadian literature from 1850 to the present. Interpretation and analysis of the poetry and prose of major literary figures. Some examination of the impact of British and American models upon the tradition of Canadian literature. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives, Artistic and Creative Expression and Ethics Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 238 Nature and Literature
Looks at the many different ways people have looked at nature and examines the philosophies and values which inform humans' interactions with their environment. Authors will be drawn from traditional literary figures, American nature writers, environmentalists and especially, authors from Maine. Assignment may include field experience. (Satifies the General Education Ethics Requirement.) Prerequisite: ENG 101. **Cr 3.**

ENG 241 American Literature Survey: Beginnings Through Romanticism
The major themes, ideas, attitudes and techniques which have developed in our national poetry, fiction, drama, and essay and which have defined them as particularly American. Recommended for English majors. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Artistic and Creative Expression Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 242 American Literature Survey: Realism to The Present
The major themes, ideas, attitudes and techniques which have developed in our national poetry, fiction, drama, and essay and which have defined them as particularly American. Recommended for English majors. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Artistic and Creative Expression Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 243 Topics in Multicultural Literature
Topics will vary, including such titles as Ethnicity and Race in American Literature; Caribbean Literature; Third World Literature; and other topics in African, Asian, Francophone, Native American, Chicano and ethnic literatures in the English language. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives and Ethics Requirements.) Prerequisite: 3 hrs of literature or permission. **Cr 3.**

ENG 244 Writers of Maine
The Maine scene and Maine people as presented by Sarah Orne Jewett, E. A. Robinson, Edna St. Vincent Millay, Mary Ellen Chase, R. P. T. Coffin, Kenneth Roberts, E. B. White, and others. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Artistic and Creative Expression and Ethics Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 245 American Short Fiction
A study of genre, form, and theme in representative works of American short fiction from Irving to the present. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Artistic and Creative Expression and Ethics Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 246 American Women's Literature
A survey of the main traditions and writers in American women's literature from the origins to the present. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives, Artistic and Creative Expression and Ethics Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 249 American Sports Literature and Film
Uses readings in fiction, poetry, drama, essays and films to explore social, humanistic, ethical and aesthetic issues in sports and its literature. Examines ways writers capture physical action and the role of sports in various genres and media. (Satisfies the General Education Ethics and Human Values and Social Context Artistic and Creative Expression Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 251 English Literature Survey: Beginnings Through Neoclassicism
The major patterns of development within the English literary tradition, with emphasis on the cultural and historical forces which have shaped this tradition. Recommended for English majors. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Artistic and Creative Expression Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 252 English Literature Survey: Romanticism to the Present
The major patterns of development within the English literary tradition, with emphasis on the cultural and historical forces which have shaped this tradition. Recommended for English majors. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Artistic and Creative Expression Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 253 Shakespeare: Selected Plays
A study of ten to twelve plays, selected to represent the range of Shakespeare's achievement as a playwright. Recommended for non-majors. Not open to students who have taken ENG 453. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Artistic and Creative Expression and Ethics Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 256 British Women's Literature
A survey of British women writers and their traditions from the origins to the present. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, and Cultural Diversity and International Perspectives and Artistic and Creative Expression Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 280 Introduction to Film
A survey of the history of motion pictures and an exploration of the rhetoric of film, designed to give students with no prior film study an integrated approach to understanding the moving image and how it functions. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Social Context and Institutions and Artistic and Creative Expression Requirements.) Prerequisite: 3 hours of literature or permission. **Cr 3.**

ENG 301 Advanced Composition
The exposition and argument that combines a study of rhetorical theory and practice in developing a command of various expository styles. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: ENG 101 and ENG 212 or permission **Cr 3.**

ENG 307 Writing Fiction
The writing of fiction, for students of demonstrated ability. Submission of writing sample. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: ENG 205 or ENG 206 and approval of a portfolio. **Cr 3.**

ENG 308 Writing Poetry
A course in the writing of poetry, for students of demonstrated ability. Submission of writing sample. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: ENG 205 or ENG 206 and approval of a portfolio. **Cr 3.**

ENG 310 Writing and Careers in English
Students research, write, and revise scholarly projects in language and literary study, using methods and sources common to the profession, while exploring issues in the future of the discipline. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: ENG 270 and junior standing. **Cr 3.**

ENG 317 Business and Technical Writing
Supervised practice in the writing of business and technical reports, professional correspondence, and related materials. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: ENG 101 or equivalent and junior or senior standing. **Cr 3.**

ENG 395 English Internship
An advanced course in writing and collaborative learning. Students first experience collaborative work in essay writing, critical reading of peers'

essays, and rigorous practice in written and oral criticism. They participate in supervised tutoring in the English Department's writing center. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: ENG 101 or equivalent and at least one other writing course (ENG 212, ENG 205, ENG 206, ENG 301, ENG 310, ENG 317), a recommendation from a UM faculty member, submission of a writing sample and permission. **Cr 3.**

ENG 401 Topics in Writing
Special topics in expository writing for advanced undergraduate and graduate students. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: A 300-level writing course or permission. **Cr 3.**

ENG 405 Directed Writing
Supervised practice in the writing of the novel, drama, short story, poetry, essay, literary criticism, technical or professional writing. Individual projects for students with demonstrated ability, usually seniors concentrating in writing. Prerequisite: Admission by permission of instructor only. ENG 405 and/or ENG 406 may be taken for credit up to a total of 6 credit hours. (Satisfies the General Education Demonstrated Writing Competency Requirement.) **Cr 3.**

ENG 406 Advanced Creative Writing
A workshop in fiction and poetry at the advanced level. Prerequisite: Admission by permission of instructor only. ENG 406 and/or ENG 405 may be taken for up to a total of 6 credit hours. (Satisfies the General Education Demonstrated Writing Competency Requirement.) **Cr 3.**

ENG 417 Advanced Professional Writing
Advanced strategies for researching and analyzing communication problems in the workplace and for adapting documents to a multiple audience. Each student will undertake a major communication project resulting in a professional document. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: 6 credits in writing, including ENG 317, and permission. **Cr 3.**

ENG 418 Topics in Professional Writing
Topics vary according to changes in the field, expertise of the faculty, and needs of the students. Possible topics include editing, document design and desktop publishing, and professional writing in intercultural contexts. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: 6 credits in writing, including ENG 317, and permission of instructor. **Cr 3.**

ENG 429 Topics in Literature
Recent topics have included Contemporary American poetry, Representing the Holocaust, and Black Women Writers. Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 430 Topics in European Literature
Varies in content from generic studies (the novel, the drama) to period studies (the Renaissance, Neo-Classicism.) (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. (This course is identical with MLC 430.) **Cr 3.**

ENG 435 The Bible and Near Eastern Literature: A Multicultural Perspective
Focuses on the Bible as an anthology of fiction, myth, and polemic arising out of specific cultural and philosophical contexts; exploration of the relationship between Hebrew, Canaanite, Egyptian, Mesopotamian, Greek, Roman, and Christian literature. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 436 Topics in Canadian Literature
An intensive study of a major Canadian writer or a small group of Canadian writers, or an examination of a major theme in Canadian literature. Specific topic varies from semester to semester. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 440 Major American Writers
An in-depth study from one to three major American writers. Topics vary, depending on the professor. May be repeated for credit when writers differ. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 442 Native American Literature
Surveys literature by Native American authors from a wide range of tribal backgrounds. Considers the development of a written tradition over time in relation to oral genres. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours literature or permission. **Cr 3.**

ENG 443 The American Romantics
Major works of such early and mid-19th century writers as Irving, Cooper, Emerson, Fuller, Thoreau, Whitman, Poe, Hawthorne, and Melville. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 444 Contemporary American Fiction
A survey of major trends in American fiction since 1945, such as the continuing tradition of realism, black humor, metafiction and postmodernism, magical realism, hyper-realism, and fiction from African-American, Asian-American, and Native American writers. (Satisfies the General Education Ethics Requirement.) **Cr 3.**

ENG 445 The American Novel
Readings from the major American novelists: Stowe, Melville, James, Twain, Dreiser, Wharton, Hemingway, Fitzgerald, Cather, and Faulkner, among others. Focus on thematic, technical, and narrative developments in the 19th and 20th century American novel. Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 446 American Poetry
Readings from the major American poets. One third of the course is devoted to the 19th century and earlier. The last two thirds covers the 20th century: Robinson, Frost, Pound, Eliot, Williams, H.D., Moore, Stevens, H. Crane. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 447 American Drama
A study of 20th-Century American dramatists, including O'Neill, Hellman, Williams, Miller, Albee, Shepard, Mamet, and Henley. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 449 Contemporary American Poetry
American poetry written after World War II. Provides students of poetry with both an historical context for the present practice of poetry in the United States and an introduction to the diverse schools of contemporary poetry and poetics. Prerequisite: 6 hours literature or permission. **Cr 3.**

ENG 451 Chaucer and Medieval Literature
Readings from Chaucer and his English contemporaries. Focus on understanding the nature of the Medieval world and its expression in the literature of the time, and on developing reading skill in Middle English. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 453 The Works of Shakespeare
Readings in the plays of Shakespeare, with some additional attention to his sonnets and narrative poems. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 454 Elizabethan and Seventeenth Century Lyric and Narrative Poetry
Readings in the lyric and narrative poets, with particular emphasis on the Elizabethan sonnet, the erotic and religious verse of Donne, the narrative poetry of Spenser and Milton, and the metaphysical and Cavalier poetry of the 17th century. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 455 Eighteenth-Century Fiction, Satire, and Poetry
Readings from the major 18th-century prose writers, such as Defoe, Richardson, Fielding, Sterne, Smollett, Burney, Addison, Steele, Boswell, Johnson, and Goldsmith; the poets and satirists, Dryden, Swift, Pope and

Gray, among others. Focus on the legitimation of emotion and of individualism in literature. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 456 The English Romantics
The works of the major Romantic poets including Blake, Coleridge, Wordsworth, Byron, Shelley, and Keats, with some attention to their critical writing. Focus on close reading of texts as well as on developing a sense of the historical and intellectual context of Romanticism. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 457 Victorian Literature and Culture
Readings from the major Victorian British poets, such as Tennyson, Browning, and Arnold; the major essayists, such as Carlyle, Mill, Newman, and Pater. Focus on the major literary and intellectual issues from Romanticism to the beginning of modernism. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 458 British Modernism
Readings from British fin de siecle and modernist writers such as Thomas Hardy, Oscar Wilde, George Bernard Shaw, W.B. Yeats, D.H Lawrence, Wilfred Owen, Edith Sitwell, H.G. Wells, Rebecca West, Joseph Conrad, Ford Madox Ford, James Joyce, and Virginia Woolf. The course studies the evolution of British modernism from its roots in the late nineteenth-century through and beyond its climax in the early 1920's. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 459 Contemporary British Literature
Readings from contemporary British writers such as Auden, Orwell, Beckett, Pinter, Spark, Lessing, Stevie Smith, Murdoch, Dylan Thomas, Seamus Heaney, and Hugh MacDiarmid. Studies the various traditions that have emerged since the advent of modernism and their place in the English tradition. Examines the concepts of "modernism" and "postmodernism," in particular. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 460 Major British Authors
An in-depth study of from one to three major British writers. Topics vary, depending on the professor. May be repeated for credit. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 465 The English Novel
Readings from the major English novelists: Defoe, Richardson, Fielding, Austen, The Brontes, Gaskell, Eliot, Dickens, and Hardy, among others. Focus on the development of the genre, its characteristic themes and methods, from "low entertainment" to respectable art form. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 467 British Drama
Readings in the major British dramatists, such as Marlowe, Jonson, Middleton, Webster, Congreve, Sheridan, Wilde, Shaw, Synge, Beckett, and Stoppard. Focus on Renaissance tragedy, Restoration comedy, and modern absurdist drama with some attention to the historical/generic shifts from tragedy to melodrama and from comedy to farce and tragic farce. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature or permission. **Cr 3.**

ENG 470 Topics in Literary Theory and Criticism
Studies in the history of literary criticism, in selected theoretic perspectives, or in the application of specific critical approaches. Specific topic varies from year to year. Prerequisite: 6 hours of literature or permission. (This course is identical with MLC 473.) **Cr 3.**

ENG 471 Feminist Literary Criticism
An examination of the major theoretical tendencies in contemporary feminist criticism, stressing connections with Marxist criticism, Freudianism, existentialism, and poststructuralism. Includes a section on feminist aesthetics. Prerequisite: 6 hours of literature. **Cr 3.**

ENG 472 The Teaching of English in the Secondary School
Principles and practices in the teaching of literature, language, and composition. Prerequisite: 15 hours of literature. INT 410 recommended. **Cr 3.**

ENG 476 History of the English Language
Main aspects of the development of Modern English from Old and Middle English; words and their backgrounds; changes in sound, form, and meaning. Prerequisite: INT 410 or equivalent. **Cr 3.**

ENG 477 Modern Grammar
Generative-transformational grammar of English, with emphasis on syntax and semantics. Attention is given to the relation of a transformational to structural grammar. Prerequisite: INT 410 or equivalent. **Cr 3.**

ENG 480 Topics in Film
A study of film topics at a more advanced level than ENG 280. Specific topics vary from year to year but might include study of a major director(s), of a national cinema, of certain film genres, of aspects of film theory, or of women in films. Prerequisite: 6 hours of literature. **Cr 3.**

ENG 481 Topics in Women's Literature
An advanced study of specific areas of women's literature: for example, African-American Women's Literature, Women and the Rise of the Novel, Emily Dickinson, etc. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of literature. **Cr 3.**

ENG 490 Senior Seminar in Literature
A seminar course on a small body of primary literary texts and the critical communities concerned with them. Students propose and write original researched papers that demonstrate knowledge of current research in the field, using appropriate research methods and conventions of scholarly bibliography. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisite: Senior English majors. **Cr 3.**

ENG 496 Field Experience in Professional Writing
Students work with businesses, professions, and other organizations approved by the department. The work in the course varies with each student enrolled and with the needs of the cooperating employer but normally involves either research, public relations, reporting, editing, interviewing, indexing, or other allied activity requiring skill in reading and writing. Prerequisite: 24 hours in English, including ENG 212 or ENG 317 and permission. In special cases, some of the prerequisites can be waived. May be repeated for credit up to 6 credit hours. **Cr 1-6.**

ENG 500 Introduction to Graduate Study of Literature
Required of but not limited to all first-year graduate students in English. Sustained practice in methods of inquiry, expression, and research essential in literary criticism. **Cr 3.**

ENG 505 Creative Writing Workshop
Discussion of work in progress by students working under faculty direction on extended literary projects. Limited to the creative writing MA concentration. Others by permission. **Cr 3.**

ENG 529 Studies in Literature
Intended to supplement and allow occasional experiments within the existing curriculum at the 500 level. **Cr 3.**

ENG 541 American Literature from Colonial through Romantic
A study of major and representative figures in American LIterature up to 1865, with emphasis on Romantics such as Cooper, Emerson, Hawthorne, Poe, Melville, Thoreau, Fuller, Stowe and Whitman. **Cr 3.**

ENG 545 American Realism and Naturalism
Emphasis on fiction, and especially on the novels of Twain, Howells, James, Crane, Dreiser, and Wharton. **Cr 3.**

ENG 546 Modern American Literature
A study of significant themes, literary and cultural, and the esthetics of such

authors as Frost, Williams, Pound, Eliot, Stein, Moore, Crane, Cather, Fitzgerald, Hemingway, Porter, Dos Passos, Faulkner. Cr 3.

ENG 549 Studies in Women's Literature
In depth study of works by and about women focusing on a particular period, group, movement, issue, or individual; e.g., the New England local color school, early women novelists, the Brontes, 20th century African-American literature, contemporary women dramatists. Cr 3.

ENG 551 Medieval English Literature
The major works of the Medieval period, including works by Chaucer, Langland, Malory and the Pearl Poet. Cr 3.

ENG 553 Shakespeare and His Contemporaries
Plays by Shakespeare, Jonson, Middleton, Webster, and Ford, among others. To test dramatic effects and critical principles, the course emphasizes revenge tragedy, city comedy, and tragic farce. Cr 3.

ENG 554 Renaissance and 17th-Century Literature
Readings in the lyric and narrative poetry and in the prose of the period from 1520 to 1660. Special emphasis on Sidney, Spenser, Donne, and Milton. Cr 3.

ENG 555 Literature of the Enlightenment
Investigates unique features of 18th-century literature: e.g., prose satire, the gothic novel, domestic tragedy, the biography, periodical literature, etc. Cr 3.

ENG 556 English Romanticism
A survey of the six major romantic poets with attention to the critical writings of the period. Cr 3.

ENG 557 Victorian Literature
A study of Victorian poetry, prose, and fiction by the major authors: Carlyle, Tennyson, Browning, Dickens, Newman, Ruskin, Morris, Hardy and Yeats. Cr 3.

ENG 558 Modern British Literature
Readings in such major poets as Hardy, Yeats, Auden, and Dylan Thomas; and such novelists as Conrad, Ford, Forster, Woolf, Joyce, Lawrence and Beckett. Cr 3.

ENG 570 Critical Theory
Readings in the theoretical traditions that have determined the possibilities for scholarship and interpretation in literary criticism, and a consideration of significant contemporary experiments that have redefined these possibilities. Cr 3.

ENG 579 The Theory of Composition
A study in the rhetorical, stylistic and cognitive perspectives— from classical formulations to current research—on the nature of written composition and issues in composition teaching. (This course is identical with COM 579.) Prerequisite: permission. Cr 3.

ENG 593 Workshop for Humanities Teachers
Emphasizes critical reading and writing as central to the study of literature, history and art. Introduces theory and approaches to humanities study by engaging participants in studying a specific historical period. Students plan teaching units with full rationales or complete research necessary for curricular revision. May be repeated for credit. Cr 3.

Courses in Education: Advanced Educational Psychology (EPT)

EPT 522 Advanced Educational Psychology
A seminar to explore theoretical and empirical issues in educational psychology. Prerequisites: EDB 221 and EDS 521 or equivalents. Cr 3.

Courses in Education: Literacy (ERL)

ERL 313 Teaching of Reading in the Elementary School
Provides the general background including early literacy, relationships between reading and writing, comprehension, word analysis skills, guided reading lessons, literature based reading and writing programs, recreational reading and evaluation. Prerequisite: PSY 100, junior or senior standing. Cr 3.

ERL 317 Children's Literature
An overview of literature written for children between the ages of four and twelve. Emphasis on developing criteria for evaluating various types of books and selecting for individual children. Prerequisite: Junior standing and at least one literature course. May be taken concurrently with ERL 313 and ERL 318. Cr 3.

ERL 318 Teaching Language Arts in the Elementary School
Current methods and materials in teaching the writing process including the relationships between reading and writing; conferencing procedures; handwriting, spelling, and oral language development; analysis and correction of basic difficulties. Prerequisite: PSY 100, junior or senior standing. Cr 3.

ERL 418 Teaching Young Adult Literature
Explores the field and characteristic works of young adult literature, its curricular and recreational uses, critical issues surrounding its use, ways of sharing and encouraging reading of a variety of this literature with students, and ways to teach effectively and integrate adolescent literature into various instructional environments. Cr 3.

ERL 440 Teaching Reading in the Secondary School
An exploratory course for high school teachers who wish to develop competence in teaching reading. Includes the nature of the reading process, rationales for continuing reading instruction in junior and senior high schools, reading and study strategies, improving rates of reading, organization, evaluation. Cr 3.

ERL 450 Newer Practices in Reading
Objectives, materials, and procedures for improving teaching of reading including methods and materials used in evaluating the reading program, comparison of current practices in reading instruction. Prerequisite: ERL 313 or ERL 440 or their equivalents. Cr 3.

ERL 517 Literature for Children
A continuation of ERL 317 including a study of the historical development of children's literature; principles, techniques and curriculum planning for the guidance of children's reading; book selection for elementary schools and public libraries. Extensive reading and evaluation of children's books. Prerequisite: ERL 317 or its equivalent. Cr 3.

ERL 518 Literature for Young Adults
Study of the development of literature for adolescents and young adults as it is used in the junior high, secondary school, and public library. Emphasis on recently published books of this nature and the important contributions of the past. Cr 3.

ERL 534 Literacy and Language Development
Examines how oral and written language are acquired; sociocultural linguistic variations, connections between language acquisition and print awareness and classroom practices that promote language development. Cr 3.

ERL 535 Developmental Literacy
Exploration of the fundamentals of literacy instruction including history of approaches to literacy instruction, early literacy, and current issues in literacy instruction. Cr 3.

ERL 536 Writing Process in Schools
Process approach to teaching writing with emphasis on language acquisition, cognition, components of a writing program, conferencing and modeling strategies, classroom management, evaluation, researcher and implementer. Cr 3.

ERL 537 Literacy Across the Curriculum
Examines reading, writing, studying and thinking as elements of content discipline instruction. Cr 3.

ERL 552 Teacher As Researcher
History of the teacher as researcher movement. Presents basic research strategies for classroom teachers. Students will test research techniques in classrooms and design a research study. Prerequisites: ERL 534, ERL 535, ERL 536. Cr 3.

ERL 553 Literacy Assessment
Discussion of both literacy process and product assessment measures and

factors affecting these areas. Exploration of past, present and current issues in literacy assessment. Prerequisites: ERL 535 and ERL 536 or equivalents or permission. Cr 3.

ERL 569 Literacy Assessment Internship
Internship in literacy assessment and instruction for small groups of students (K-12.) Analyses and interpretation of assessment data and preparation of case report writing. Prerequisite: ERL 553 or or permission. Cr 6.

ERL 590 Special Topics in English Language Arts and Related Fields
Offered as need, interest, and research require. Specific topics might include: word processor and writing instruction, comprehension and cohesion, reading and writing in the content areas, vocabulary development, reading and cognition, ethnographic research in the language arts, and teacher as researcher. May be repeated for credit. Prerequisite: Permission. Cr 1-3.

Courses in Education: Reading Recovery (ERR)

ERR 535 Reading Recovery Teacher Training I
Prepares teachers through school-based outreach centers to implement Reading Recovery procedures with first grade children with reading difficulties: tutoring four children daily; tutoring a child behind the one-way mirror one or two times per semester. Prerequisite: Prior acceptance into Reading Recovery Teacher certification program. Cr 3.

ERR 536 Reading Recovery Teacher Training II
A continuation of ERR 535. Prerequisite: ERR 535. Cr 3.

Courses in Education: Science (ESC)

ESC 316 Teaching Science in the Elementary School (K-8)
Presents information and activities designed to encourage students to learn and develop goals and objectives, instructional strategies, selection of curriculum materials K-8, effective management and evaluation techniques. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: EDB 204, EDB 221 and 2 science courses (preferably from different disciplines e.g., Life or Earth or Physical Science.) Cr 3.

ESC 340 Studies in the Physical Sciences I
An interdisciplinary study of the physical sciences intended to build science attitudes and knowledge of physical science at pre-service and inservice stages for elementary and junior high school teachers. Laboratory-centered investigations in such areas as light, structure of crystals, liquids and gases, motion and forces, and energy. Cr 3.

ESC 342 Studies in the Earth Sciences I
For elementary/middle school teachers. A series of elementary laboratory and field studies in astronomy and meteorology. Topics will be explored through direct observation and study. (Satisfies the General Education Science Applications of Scientific Knowledge Requirement.) Cr 3.

ESC 343 Studies in the Earth Sciences II
An introduction to geology and soil sciences for elementary/middle teachers. Where possible, the studies will be undertaken in a natural setting using equipment and materials appropriate to the learning tasks. Cr 3.

ESC 348 Natural History-Inland (K-12)
Introductory field studies for pre-service or in-service teachers focusing on the natural habitats found in areas surrounding the Orono campus. Emphasis on plants and animals in their environment, their behavior and structural adaptations. Cr 3.

ESC 426 Methods of Teaching Environmental Education (K-12)
Classroom and field-based studies of a broad spectrum of up-to-date environmental teaching methods and resources. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) Prerequisites: ESC 316 or ESC 452 and permission. Cr 3.

ESC 444 Basic Field Ecology
For teachers (K-12) who wish to learn about the natural environment by carrying out field studies in a variety of biotic communities. Emphasis on experimental procedures and important concepts of ecology. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Cr 3.

ESC 446 Marine Education for Elementary and Middle School Teachers (K-8)
Designed to help elementary/middle school teachers learn about the world's oceans from a multidisciplinary perspective. Particular focus on the Gulf of Maine. Course topics include geology, physical and chemical oceanography, ecology, natural resources. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) Cr 3.

ESC 452 Teaching Science in the Secondary School
Instructional strategies and general approaches to teaching science in grades 7-12. Emphasis on professional literature, curriculum development, teaching and learning styles and reflective teaching. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: EDB 204 and EDB 221. Cr 3.

ESC 516 Advanced Studies in Science Instruction (Elementary and Middle Schools)
Examines instructional strategies for science education in elementary and middle schools. Prerequisite: ESC 316 or equivalent. Cr 3.

ESC 525 Planning the Environmental Curriculum
Designed to develop skills necessary for curriculum design based on content analysis of student knowledge. A specific topic, such as acid rain or pollution, is selected for group investigation. Cr 3.

ESC 542 Advanced Studies in Science Education (Secondary)
Critical appraisals of curriculum and instructional practices at middle and secondary school levels. Cr 3.

Courses in Education: Social Studies (ESS)

ESS 315 Teaching Social Studies in the Elementary School
Examines methods and materials for social studies in the elementary school and ways of relating the work of the social studies class to an understanding of practical problems of the community. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Not open to first-year students. Cr 3.

ESS 441 Teaching Social Studies in the Secondary School
Covers current practices in teaching social studies, selection and use of instructional materials, modern trends in curriculum construction for social studies in the secondary school. Not open to first-year students. Cr 3.

ESS 515 Contemporary Issues in Social Studies Education
Focus on current trends in social studies education in relation to its historical and philosophical foundations and to implications for practice. Prerequisites: ESS 315, ESS 441 or equivalent. Cr 3.

ESS 541 Social Studies Curriculum
Studies in development of the curriculum, materials, resources and methods of social studies instruction. Prerequisites: ESS 315, ESS 441 or equivalent. Cr 3.

Courses in Franco-American Studies (FAS)

FAS 201 Franco-Americans of the Northeast: Introduction to an Ethnic Community
Introduces students to issues involving ethnicity and cultural identity by focussing on the evolution and current realities of Franco-Americans in the northeast region. The course will be taught in English; no knowledge of the French language is presumed. (Satisfies the General Education Western Cultural Tradition, Social Context and Institutions and Cultural Diversity and International Peerspectives Requirements). Prerequisite: Sophomore standing or permission. Cr 3.

FAS 329 Topics in Franco-American Studies
Focuses on themes and issues drawn from, or related to, the history, traditions, and contemporary experience of the Franco-American community of Maine and the northeast region. Prerequisite: FAS 201 or permission. **Cr 3.**

Courses in Forest Ecosystem Science (FES)

FES 100 Introduction to Forest Biology
Introductory concepts related to forest plants, animals, environment and ecology. Lec 2, Rec 2, Lab 4. **Cr 4.**

FES 345 Special Problems
Original investigation and/or readings in forest ecosystem science areas; subject to be chosen in consultation with one or more departmental faculty. May be repeated for credit. **Cr 1-6.**

FES 407 Forest Ecology
Biological principles and environmental factors governing the natural establishment and development of forest trees and stands. Prerequisite: BIO 233 or BIO 464 or permission. Lec 3. **Cr 3.**

FES 408 Silviculture
Theory and practice of controlling the composition, growth, quality and regeneration of forest stands. Corequisite: FES 407 or equivalent. Lec 3. **Cr 3.**

FES 409 Forest Ecology and Silviculture Field Laboratory
Measurement, assessment and analysis of forest vegetation from a biological and silvicultural perspective. Designed to develop understanding and proficiency in: silvical properties of northeastern tree species; forest regeneration, succession and stand dynamics; prescribing silvicultural treatments; and formulating silvicultural systems. Weekly labs and several one-day field trips. Prerequisites: Concurrent enrollment in FES 408; WLE 200 or concurrent enrollment in FES 407. **Cr 2.**

FES 410 Artificial Regeneration
Production of planting stock, establishment of forest plantations and application of tree improvement in artificial regeneration. Lec 3. **Cr 3.**

FES 498 Senior Research I
An original investigation of a problem in Forest Ecosystem Science, under the guidance of a faculty member. Students will select an area of study, perform a literature search and prepare a written study plan for their research. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirement.) Prerequisite: Permission and junior or senior standing in Forest Ecosystem Science. **Cr 2.**

FES 499 Senior Research II
Students will complete the research initiated in FES 498 and prepare a written final report. The completed project should demonstrate the student's ability to understand and apply scientific principles in research. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirement.) Prerequisite: FES 498 and senior standing. **Cr 2.**

FES 508 The Industrial Spruce-Fir Ecosystem
Biological and socioeconomic issues related to the ecology and management of Maine's spruce-fir resource. Lec 3. Four 1-2 day field trips. **Cr 4.**

FES 510 Forest Tree Improvement
Investigates the distribution of genetic variation in forest tree populations. The principles and practices of individual tree selection, progeny testing, seed orchard establishment, inter-species hybridization, provenance testing, and the introduction of exotic species are examined. Prerequisites: FES 408, FES 410 or permission. Lec 3. **Cr 3.**

FES 515 Research Techniques in Wood Anatomy
Preparation of woody tissue for microscopic examination and recording, including microtechniques and photomicrographic methods. Introduction to electron microscopy and interpretation of wood ultrastructure. Prerequisites: WSC 416 or permission. Lec 2, Lab 4. (4 credits with project.) **Cr 3-4.**

FES 519 Functional Structure of Woody Plants
Focuses on how cambial activity determines basic structure and biophysical properties of wood. Explores practical applications in areas such as stand management for wood quality and dendroecology. Prerequisite: Permission. **Cr 2 (or 3 with lab.)**

FES 520 Developmental Physiology of Woody Plants
Understanding plants as production systems for foliage, fruits, and wood. Structure and function of apical meristems and the cambium, reproductive biology and embryogenesis, developmental changes. Developmental physiology of organogenesis both natural and in vitro, with an introduction to gene expression as it relates to development. Prerequisite: BIO 452, BIO 453 or permission. Offered alternate years (odd.) Lec 2, Rec 1. **Cr 3.**

FES 521 Research Methods in Forest Resources
Prerequisite: Permission. **Cr 3.**

FES 530 Sustainable Production in Tropical Forests
An exploration of strategies for producing and extracting products from tropical forests in sustainable ways which will provide maximum employment for indigenous people and cause the least environmental harm. Prerequisite: INT 525 or instructor's permission. **Cr 2.**

FES 536 Forest Stand Dynamics
Tree growth and stand development from a quantitative ecological and silvicultural perspective. Critical review of representative growth simulation models in terms of biological realism. Prerequisites: prior instruction in silviculture/forest ecology and forest biometry, or permission. Lec 2, Lab 1. **Cr 3.**

FES 538 Forest Modeling
Mathematical and statistical techniques for representing forest vegetation structure, forest dynamics and ecosystem function. Examples from growth and yield models, ecosystem compartment models, succession models and models of stochastic spatial processes. Prerequisites: MAT 126 or MAT 151 and MAT 437 or permission. **Cr 3.**

FES 549 Wood Supply Analysis
An applications-oriented review of forest dynamics (growth, mortality, harvesting, management) in the context of predicting and analyzing wood supply. Student projects and seminars provide experience with microcomputer models used in Maine and eastern Canada. Prerequisite: FTY 475 or equivalent. Lec 2, Lab 1. **Cr 3.**

FES 556 Diseases and Stress in Forest Ecosystems
Principles and concepts of forest pathology emphasizing natural forests and modern practices in forest management. Prerequisite: INT 256 or AES 457 or permission. **Cr 3.**

Courses in Forest Engineering (FOE)

FOE 206 Photogrammetry and Remote Sensing
Vertical and horizontal measurements from air photos and topographic maps. Construction of planimetric map, interpretation and mapping of forest types, introduction to non-photographic remote sensing systems. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) **Cr 3.**

FOE 345 Special Problems
Original investigation in forest engineering, the subject to be chosen after consultation with the staff. Open to high-ranking juniors and seniors. **Cr Ar.**

FOE 394 Cooperative Education
Practical experience for the undergraduate student, combining work in a business firm or public agency with academic courses and supervision. Opportunity for student to gain experience, to integrate classroom learning with job performance, and to develop future placement possibilities. Prerequisite: junior standing and permission. (Pass/Fail Grade Only.) **Cr 1-16.**

FOE 395 Internship
A professional activity under the general supervision of an experienced professional with a high degree of responsibility placed on the student. Learning objectives are pre-established and agreed upon between the faculty coordinator and the placement supervisor. Not normally repeated. **Cr Ar.**

FOE 396 Field Experience
A field experience is a professional activity participated in by students under the supervision of a practicing professional in the field. A high degree of responsibility is placed on the student for developing learning objectives and securing the approval of a faculty member for academic credit for the learning involved. May be repeated. **Cr Ar.**

FOE 453 Harvesting of Forest Crops
Harvesting methods in the United States and Canada, with special emphasis on Maine. Discussion on organization, equipment, forest road construction and regulations. Lec 2, Lab 3. **Cr 3.**

FOE 471 Production Analysis in Forestry
Concepts and procedures used in the evaluation of timber production and forest product manufacturing. Organization, work measurement, inventory control, capital budgeting, cost control, network analysis and schematic models. Prerequisites: MAT 126 or MAT 151 and BRE 122 or COS elective. Seniors, graduate students, or permission of instructor. Rec 2. **Cr 2.**

FOE 472 Planning and Control of Forestry Operations
Applications of scientific methods to management decision problems of forestry operations. Mathematical programming, markov processes, waiting-line analysis, sequencing, simulation, and competitive strategies. Prerequisites: MAT 126 or MAT 151 and BRE 122 or COS elective. Seniors, graduate students, or permission of instructor. Rec 2. **Cr 2.**

FOE 473 Forest Roads and Structures
Design, construction, and maintenance of improvised road systems and bridges; road-vehicle interactions; design and construction of light buildings for forest and recreational use. Prerequisite: PHY 121, MAT 127 and MEE 251 or permission. Lec 2, Lab 3. **Cr 3.**

Courses in French (FRE)

FRE 101 Elementary French I
A systematic study of the basics of the French language. Equal emphasis is placed on developing reading, comprehension, speaking and writing skills. For students with no previous study of French or fewer than two years in high school. **Cr 3-4.**

FRE 102 Elementary French II
Continued study of the basics of the French language with equal emphasis on developing reading, comprehension, speaking and writing skills. For students with no previous study of French or fewer than two year in high school. Prerequiste: FRE 101 or equivalent. **Cr 3-4.**

FRE 199 Review French
For students who have taken 2 or more years of high school French, but do not feel ready to complete the FRE 203-204 sequence. Fast-paced review of basic grammar, pronunciation and vocabulary, with strong emphasis on oral communication. This is not the equivalent of FRE 203/204 level language courses. 2 class meetings per week, with substantial listening and writing assignments. Prerequisite: 2 years of high school French or permission. Lec 2 **Cr 2.**

FRE 203 Intermediate French I
An integrated approach. Reading texts of a literary and/or cultural nature, and audio-visual materials will be employed to strengthen reading, writing and especially speaking and comprehension skills. Includes a systematic but gradual review of the essentials of French grammar. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 102 or equivalent. **Cr 3-4.**

FRE 204 Intermediate French II
A continuation of FRE 203. Designed to strengthen reading, writing, speaking and comprehension skills. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 203 or equivalent. **Cr 3-4.**

FRE 205 French Conversation and Composition I
Systematic training in the correct usage of spoken and written French through a broad range of conversational situations and writing topics. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 204 or equivalent. **Cr 3.**

FRE 206 French Conversation and Composition II
Continued training in the correct usage of spoken and written French. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 205 or equivalent. **Cr 3.**

FRE 208 French Play Production
Participation in the acting and production of plays in the foreign language. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: permission of the instructor. May be repeated for credit. **Cr 3.**

FRE 209 Readings in French Literature I
Practice in reading French. Also prepares students for literature and civilization courses at the 400 level. Discussion in French. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 204 or the equivalent. **Cr 3.**

FRE 210 Readings in French Literature II
Continued practice in reading and discussion in French. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 204 or the equivalent. **Cr 3.**

FRE 215 Advanced French Conversation
Oral practice for the advanced language student. Course work revolves around the discussion of cultural and intellectual issues, as well as current political and social events, with a view toward increasing idiomatic and abstract vocabulary. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 204 or equivalent. **Cr 3.**

FRE 250 Multidisciplinary Readings in French
Intended to be taken in conjunction with a course from another department, this course supplements the content areas of the course to which it is attached and promotes increased proficiency in French through reading and discussion in French. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 204 or permission. May be repeated for credit. **Cr 1.**

FRE 256 French Canadian Civilization
An introductory course which examines the literature and social history of French Canada, and will attempt to explain the contemporary culture of Québec (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 204 or equivalent. **Cr 3.**

FRE 297 French (May Term)
Total Immersion Program. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 204 or permission of instructor. **Cr 3.**

FRE 400 Advanced French Grammar
An exposition of grammatical and syntactical principles through conceptual presentations along with demonstrations and practice through exercises. Designed to enhance French language competency. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 205 or FRE 206 or permission. **Cr 3.**

FRE 401 Translation and Comparative Stylistics
An exposition of the principles of translation and comparative stylistics with practice via exercises and the translation of texts in both English and French. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 400 or permission. **Cr 3.**

FRE 404 Medieval and Renaissance French Literature
Origin, formation and development of a national literature as seen through prose, poetry and theater through the 16th century. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 209 or FRE 210 or permission of instructor. **Cr 3.**

FRE 405 Seventeenth Century French Literature
Literary trends in French classicism: Descartes, Pascal, Corneille, Racine, Moliere, La Fontaine, Lafayette. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 209 or FRE 210 or permission. **Cr 3.**

FRE 406 Eighteenth Century French Literature
Readings from the works of Montesquieu, Voltaire, Rosseau, Diderot, etc., with special attention to Enlightment thought and to the novel genre. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisites: FRE 209 or FRE 210 or permission of instructor. **Cr 3.**

FRE 407 19th Century French Literature
Readings of major 19th century figures, including Chateaubriand, Hugo, Flaubert, Zola, Balzac, Stendhal, Sand, and Baudelaire, with particular attention to social and philosophical themes as well as concepts of language. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 209 or FRE 210 or permission of instructor. **Cr 3.**

FRE 408 Twentieth Century French Literature
Readings in the novel, poetry or drama (content varies.) (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 209 or FRE 210 or permission of instructor. May be repeated for credit, with permission of instructor. **Cr 3.**

FRE 413 Advanced Composition and Stylistics
An exposition of the fundamentals of French stylistics with practice of these prinicples via compositions and exercises. Designed to enhance competence in written idiomatic French. Prerequisite: FRE 400 or permission. **Cr 3.**

FRE 420 French Phonetics
A formal study of the French sound system with considerable practice in phonetic transcription. Practical and remedial work in pronunciation. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 204 or the equivalent. **Cr 3.**

FRE 440 Franco-American Civilization
An interdisciplinary study of the French heritage in North America. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 3.**

FRE 442 French Language of North America
A historical, linguistic and socio-linguistic approach to the study of the Franco-Québecois and the Franco-American languages. Emphasis on the morphology, syntax, vocabulary and phonetic system in order to understand the present status of the languages. Research in the areas of the spoken and written language. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 209 or FRE 210 or permission. **Cr 3.**

FRE 452 The Novel of Québec
An examination of the evolution of the novel in Québec from 1915 to the present: roman de la terre, the urban novel, the new novel. Authors studied will include Hemon, Grignon, Guevremont, Ringuet, Roy, Hebert and Aquin. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 209 or FRE 210 or permission. **Cr 3.**

FRE 456 Seminar in Québec Studies
An advanced study of the more complex issues which Québec has had to confront. Students will be expected to conduct some research and to report their findings. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 256 or permission. **Cr 3.**

FRE 457 French Civilization
Readings, discussions, lectures, written and oral reports on varied aspects of French Civilization, its people, attitudes, institutions, and culture. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 204 or the equivalent. **Cr 3.**

FRE 490 Topics in French
Topics in French and French-Canadian literature may include: contemporary cinema, surrealism, contemporary French thought, modern French critical theory, semiotics, symbolism, literature of commitment, images of women, women writers. Topics vary. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: FRE 209 or FRE 210 or permission. **Cr 1-3.**

FRE 497 Independent Projects I
(Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 1-3.**

FRE 498 Independent Projects II
(Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 1-3.**

FRE 500 History of the French Language
Study of the evolution of standard and regional French from the earliest times to the present. **Cr 3.**

FRE 504 Seminar in Medieval and Renaissance Literature
History and development of literary ideas expressed through the epic, theater, romance and poetry of the Medieval period. Readings from the major writers of the French Renaissance: Rabelais, Montaigne, DuBellay, Ronsard. **Cr 3.**

FRE 505 Seminar in French Classicism
Aspects, groups, and genres in literature of the 17th century. Special emphasis on Corneille, Descartes, Pascal, Racine and Moliere. **Cr 3.**

FRE 506 Seminar in Literature of the Eighteenth Century
Individual writers, genres, or themes. Special emphasis on Montesquieu, Prevost, Voltaire, Rousseau and Diderot. **Cr 3.**

FRE 507 Seminar in Literature of the Nineteenth Century
Individual writers, genres, or themes. Special emphasis on Hugo, Stendhal, Balzac, Flaubert, Zola, and Baudelaire. **Cr 3.**

FRE 508 Seminar in the Novel
Trends and periods in development of the novel and narrative form in France. Content varies from year to year. May be repeated for credit. **Cr 3.**

FRE 509 Seminar in Poetry
Movements in French poetry. The periods, groups and trends studied vary year to year. Course may be repeated for credit. **Cr 3.**

FRE 510 Seminar in the Theatre
Content varies year to year. Course may be repeated for credit. **Cr 3.**

FRE 520 French Linguistics
French phonology and morphology studied from the generative transformational viewpoint. Analysis of selected areas of French grammar. Attention given to historical development of the language in relation to its present structure. Prerequisite: INT 410 or FRE 420 or permission. **Cr 3.**

FRE 550 Seminar in French-Canadian Literature and Language
Lectures, readings and analyses of representative literature of modern French Canada, with emphasis on the novel. Attention given to linguistic and cultural patterns, including those affecting New England. Prerequisite: at least one course in French literature or permission. **Cr 3.**

FRE 597 Projects in French I **Cr 3.**

FRE 598 Projects in French II **Cr 3.**

First-Year Student Book Course (FSB)

FSB 290 First-year Student Book Course
Interdisciplinary experimental course for B.A. degree new students. **Cr 1.**

Courses in Food Science and Nutrition (FSN)

FSN 101 Introduction to Food and Nutrition
A survey of food and nutrition principles, including the influence of food patterns on health and physical performance; description of a balanced diet; study of the nutrients, interrelationships, sources, effects of processing and storage, food safety, fads, controversies. (Satisfies the General Education Science Applications of Scientific Knowledge Requirement.) **Cr 3.**

FSN 103 Science of Food Preparation
Basic food preparation skills. The relationship between structure, composition and nutritive value of foods. Prerequisite: FSN 101. Lec 2, Lab 2. **Cr 3.**

FSN 200 Quantity Food Production
Basic principles of quantity food production and service. Emphasis on techniques to retain nutritive value and yield quality products, recipe standardization, portion control, sanitation, and use and care of equipment. Other areas include organizational structure, efficient methods and controls in menu planning, purchasing, receiving, and storing of food, beverages, and supplies. Prerequisite: FSN 103 and FSN 238. Lec 3, Lab 4. **Cr 4.**

FSN 201 Food Service Systems Management
Application of management theories in a food service. Study of selected food service systems with emphasis on quality assurance, cost control, and training personnel. Prerequisite: INT 110, COS 100 and FSN 200 or permission. Lec 3. **Cr 3.**

FSN 230 Nutritional and Medical Terminology
Fundamentals of vocabulary for nutritionists and other health professionals. Prerequisite: FSN 101. **Cr 1.**

FSN 238 Applied Food Microbiology and Sanitation
Microbiology as it applies to the causes and control of food spoilage; issues of food safety and sanitation in food systems. Upon completion of the course, students will be eligible for an Educational Foundation SERSAVE certification. **Cr 3.**

FSN 270 World Food and Nutrition
Investigation of the adequacy of world food supplies, and of the contributions to malnutrition made by poverty, government policies, and population growth. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 3.**

FSN 280 Human Nutrition for the Health Professions
Designed for nursing, premedical students and others in the health professions. Discussion of both nutrition, health and disease, nutrient metabolism and nutritional assessment. Prerequisites: BMB 208 and BIO 208. **Cr 3.**

FSN 301 Life Cycle Nutrition
Principles of nutrition applied to needs of individuals throughout life. Study of relationship among nutrition, growth, development, and aging with emphasis on physical and psychosocial influences on nutritional status. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: FSN 101, CHY 121 BIO 208 or equivalent and junior standing or permission. Lec 3. **Cr 3.**

FSN 330 Introduction to Food Science
Covers general characteristics of raw food materials, principles of food preservation, processing factors which influence quality, packaging, water and waste management and sanitation. Prerequisites: BIO 100 and CHY 121 or permission. Lec 3. **Cr 3.**

FSN 340 Food Processing Laboratory
An introduction to thermal processing, freezing, dehydration, extrusion and curing as applied to food products in the laboratory. Corequisite: FSN 330. Lab 3. **Cr 1.**

FSN 382 Introductory Food Chemistry
Introduction to the composition, structure, and properties of foods and chemical changes occurring during processing and utilization. Prerequisite: BMB 322 or CHY 252. Lec 3, Lab 3. **Cr 4.**

FSN 396 Field Experience in Food Science and Human Nutrition
An approved program of work experience which contributes to the academic major and for which academic credit is given. Students may work part time or full time for a semester in a job related to their professional career goals. Prerequisite: junior standing and permission. (Pass/Fail Grade Only.) **Cr 1-16.**

FSN 397 Independent Studies
Independent studies in specific areas of food management, food science and human nutrition. Prerequisite: Permission of department. **Cr 1-6.**

FSN 401 Community Nutrition
Examines human needs and delivery systems within community setting. Focus on designing, implementing, and evaluating nutrition education programs or intervention projects. Field experience. Satisfies the General Education Capstone Experience Requirement. Prerequisites: FSN 301 and senior standing or permission. Lec 2, Lab 4. **Cr 4.**

FSN 410 Human Nutrition and Metabolism
Science of human nutrition is studied, stressing body metabolism as integrated with organ function for normal individuals, and requirements for energy and nutrients. Prerequisite: BMB 322 and BIO 377 or equivalent. **Cr 3.**

FSN 420 Abnormal Nutrition
Metabolic and physiological alterations of disease processes. Modification of normal diets to treat specific diseases. Development of nutrition care plans. Prerequisites: FSN 410 and BIO 377 or NUR 303. Lec 4. **Cr 4.**

FSN 436 Food Law
Examination and discussion of federal laws and regulations applying to the processing, handling, distribution and serving of food products. Prerequisite: FSN 330 or permission. **Cr 3.**

FSN 438 Food Microbiology
Examines the importance of microorganisms in food processing, spoilage, and preservation; the role of microorganisms in fermentation and production of protein, enzymes, and other products; food as vehicle of infection and intoxication. Prerequisites: BMB 300. Lec 3, Lab 4. **Cr 4.**

FSN 440 Utilization of Aquatic Food Resources
Utilization and food quality of wild and farmed aquatic animals including production, chemical/physical properties, nutritional value, post-harvest changes, processing systems, regulatory issues, by-product utilization and food safety. Prerequisites: BIO 100 and CHY 121 or permission. Lec 3. **Cr 3.**

FSN 489 Senior Project in Food Science and Human Nutrition
A research project will be conducted under the supervision of a faculty member. Written reports and an oral presentation of results are required. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: senior standing and permission. **Cr Ar.**

FSN 501 Advanced Human Nutrition
Basic nutrition science with emphasis on protein, vitamin, macromineral and endocrine function and metabolism. Relationships of diet to human health and well-being. Prerequisite: FSN 410 or permission. **Cr 3.**

FSN 502 Food Preservation
Chemicals and processes (freezing, dehydration, canning, irradiation, extrusion) used to extend food quality and safety. Prerequisite: FSN 330 or permission. **Cr 3.**

FSN 503 Nutrition and Food-Related Behavior
Physiological, psychological and sociocultural influences on food-related behavior of individuals. Understanding regional food patterns and multiple influences that have a role in changing food behavior. Prerequisites: FSN 401 or permission. **Cr 3.**

FSN 504 Nutrition Education
Principles, theories, and research methods for the design, implementation, and evaluation of nutrition education programs. Prerequisite: permission. **Cr 3.**

FSN 505 Maternal and Infant Nutrition
In-depth study of the nutritional impact during prepregnancy, pregnancy, lactation and infancy. Prerequisite: FSN 401. **Cr 3.**

FSN 510 Trace Minerals
A study of trace mineral metabolism with special emphasis on digestion and absorption. Covers excretion, storage and homeostatic mechanisms and the interactions of trace minerals to other dietary inorganic and organic components. Emphasis on clinical conditions. Prerequisites: FSN 410 and BIO 377 or permission. **Cr 3.**

FSN 513 Food and Beverage Fermentations
Introduction to microbiology and biochemistry of food and beverage fermentation processes. Prerequisites: BMB 300 and BMB 322. **Cr 3.**

FSN 571 Technical Presentations
Introduction to technical presenations. Computer graphics, slide making and presentation skills are emphasized. Students present one 15-20 minute talk. **Cr 1.**

FSN 581 Problems in Food Science and Human Nutrition
Special topics - Opportunity is provided to pursue an individualized topic in the food science or human nutrition area. Prerequisite: permission. **Cr Ar.**

FSN 582 Major Food Constituents
Composition, structure and properties of foods and the chemistry of changes occurring during processing and utilization. Prerequisite: BMB 322 or CHY 252 or permission. **Cr 3.**

FSN 583 Microbial Ecology of Foods
Control of microorganisms in food by temperature, UV light, ionizing radiation, water activity, pH, redox potential, organic acids, curing salts, antibiotics, gases and packaging and on processing equipment by sanitation. Instruments used for rapid estimation of bacterial concentration and application of commercial testing kits. Prerequisite: BMB 300 and permission. **Cr 3.**

FSN 584 Lipids in Health and Disease
Lipid metabolism and the effect of dietary lipids on cardiovascular disease. Includes lipid classification, digestion, absorption and metabolism, with emphasis on cholesterol and lipoproteins. An in-depth look at recent research advances in lipids, particularly as they relate to atherosclerosis. Prerequisites: FSN 410 and BIO 377. **Cr 3.**

FSN 585 Sensory Evaluation of Foods
Methods and techniques including experimental design and statistical analysis. Prerequisite: MAT 232 or permission. **Cr 3.**

FSN 587 Food Analysis
Nutrient composition, residues and natural toxicants, with emphasis on the use of GC and HPLC. Prerequisite: BMB 322 or FSN 582 or permission. Lec 1, Lab 6. **Cr 3.**

FSN 588 Chemistry of Minor Food Constituents
Composition, structure and function of minor food constituents (enzymes, minerals, vitamins, natural toxins, chemical residues) and changes in their chemistry during processing and utilization. Prerequisites: BMB 322 or CHY 252 or permission. **Cr 2.**

FSN 596 Nutrition Education Practicum
A planned program of nutrition education experiences in community, state and federal agencies and in an educational setting selected to meet individual needs. Prerequisite: FSN 503. **Cr 1-6.**

Courses in Forestry (FTY)

FTY 101 Introduction to Forest Resources
A writing-intensive seminar intended to enhance communications skills while introducing students to current issues affecting the forestry profession. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Lec 2. **Cr 2.**

FTY 105 Introduction to Forest Measurements
Basic field measurements for determining the volume of standing and felled timber. Basic field data collection methods and data recording techniques. **Cr 3.**

FTY 208 Forest Surveying and Mapping
An introductory course presenting fundamental plane surveying concepts and mapping techniques including: distance and angular measurements, traverse computations, area determination, land surveying and recording systems, basic skills of map preparation, and computer-assisted cartography. Prerequisite: Algebra and trigonometry. Lec 3, Lab 4. **Cr 3.**

FTY 210 Wildland Fire Management
Forest fire behavior as influenced by fuels, weather, topography. Ecological effects of fire. Methods of preventing and controlling fires. Use of fire in forest management. Rec 2. **Cr 2.**

FTY 241 Field Practice in Forest Management
Three-week intensive field training in the skills needed for professional, integrated management of productive woodlands. Reinforces basic skills in forest mensuration; stresses the multi-dimensional nature of forest resources and introduces the disciplines of forest protection, forest roads, forest products, forest ecology, GPS and Geographic Information Systems. Field work includes an in-depth training in forest harvesting techniques, red card fire training and field trips on selected forestry topics. All activities are conducted at the University of Maine and Acadia National Park. Prerequisites: First-year student and American Red Cross Adult First Aid/CPR current certification. **Cr 3.**

FTY 345 Special Problems
Original investigation and/or readings on forest resources problems, the subject to be chosen after consultation with staff. Open to high-ranking juniors and seniors. **Cr Ar.**

FTY 349 Principles of Forest Management
A survey of forest management designed for students majoring in related fields. Emerging technologies, conflicts and issues are presented relative to defining and achieving land management goals and objectives. Lectures apply forest ecology, biology, silviculture, harvesting, and economics to the protection and management of public and private forest land. Laboratories reinforce practical field skills in locating, inventorying and assessing stands and forests. Closed to majors in programs leading to a B.S. in Forestry or Forest Engineering. Prerequisites: BIO 233 or BIO 464 and WLE 250 or INT 219. Lec 2, Lab 2. **Cr 3.**

FTY 355 Forest Inventory and Growth
Principles and exploration in detail of approaches to inventory and growth of forest resources. Prerequisite: FTY 105, FOE 206, FTY 208, MAT 232. **Cr 3.**

FTY 394 Cooperative Education
Practical experience for the undergraduate student, combining work in a business firm or public agency with academic courses and supervision. Opportunity for student to gain experience, to integrate classroom learning with job performance, and to develop future placement possibilities. Prerequisite: junior standing and permission of the Forestry Curriculum Committee. (Pass/Fail Grade Only.) **Cr Ar.**

FTY 396 Field Experience
A field experience is a professional activity participated in by students under the supervision of a practicing professional in the field. A high degree of responsibility is placed on the student for developing learning objectives and securing the approval of the Forestry Curriculum Committee for academic credit for the learning involved. May be repeated. (Pass/Fail Grade Only.) Prerequisite: permission. **Cr Ar.**

FTY 430 Urban and Community Forest Management
Introduces the culture, management and importance of trees in urban environments. Special emphasis on the interactions between vegetation and human resources. Topics include: urban vegetation and ecosystems; plant selection, care and maintenance; diagnosing disease and insect-related problems; pruning and preventative maintenance; tree valuation; safety; modification of urban environments; and ordinances and law. Lec 2, Lab 2. **Cr 3.**

FTY 444 Forest Resources Economics
Economics of domestic and international forest resources production, processing and distribution. Contributions of forest resources to local, regional, and national economies. Fundamentals of financial analysis. Evaluation of priced and unpriced forest resources for acquisition, taxation, management, and disposal. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions Requirement.) Prerequisite: INT 110 or equivalent. Lec 3, Lab 2. **Cr 4.**

FTY 446 Forest Resources Policy
The process of forest policy formation. Development of national, state, and private forest policies in the United States and selected foreign countries. Some current policy issues. Technical and ethical considerations of strategic planning. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions Requirement.) Lec 3. **Cr 3.**

FTY 457 Forest Watershed Management
Relationship between forests and the water resource. Effects of forest activities and other aspects of land use on water yield and quality. Overview of current water resource problems and conflicts. Prerequisite: AES 250, FES 407. **Cr 3.**

FTY 465 Woodlot Management
Preparation of a management plan for an actual parcel of forest land. Exercise designed to accompany FTY 475, which must be taken concurrently or have been taken previously. (Together with FTY 475, satisfies the General Education Capstone Experience Requirement.) Rec 1, Lab 1. **Cr 2.**

FTY 466 Timber Management
Principles of managing forests to sustain continuous wood supplies; application to small properties, large public and private forests and regions. Prerequisite: FES 408. **Cr 2.**

FTY 475 Forest Ecosystem Management
Integration of biophysical and socioeconomic sciences for the multiple use management of the products and services of forest lands. Application of modern analytical procedures for strategic, tactical and operational forest management planning up to the landscape level. (Together with FTY 465, satisfies the General Education Capstone Experience Requirement.) Prerequisites: FES 408, FTY 355, FTY 444, FTY 466. Lec 3. **Cr 3.**

FTY 480 Applied Geographic Information Systems
An introduction to the methods and processes for the application of geographic information system to natural resource management. Emphasis is placed on project planning and hands-on experience in system operation. Prerequisites: FTY 208 or SIE 211 and permission of instructor. Lec 3, Lab 2. **Cr 3.**

FTY 485 Forestry Administration
Principles for establishing and operating a small forestry business. Administration of private, state and federal forestry enterprises. Prerequisite: Senior standing in Forestry or Forest Engineering or permission of instructor. Lec 2. **Cr 2.**

FTY 526 Image Processing for Natural Resource Monitoring
Advanced remote sensing concepts, characteristics of satellite multispectral scanner systems, geo-based digital image processing and natural resource applications. Environmental monitoring case studies. Lec 3, Lab 1. **Cr 4.**

FTY 532 Forest Influences
Effects of forest vegetation on climate, soil water, stream flow, erosion and soil productivity. Prerequisite: FES 407 and AES 140. **Cr 2.**

FTY 540 Forest Products Marketing
Development of market segments and marketing strategies for domestic and international forest products markets including pulp and paper, hardwood lumber, softwood lumber, logs and in wood-based composites. Prerequisites: permission. Lec 3. **Cr 3.**

FTY 546 Forest Policy Analysis
Methods of economics and management science suitable for the assessment of priced and unpriced forest resource values. Analytical methods for individual and social decision making in the allocation and management of forest resources. Applications to problems posed by current Maine, U.S. and international forest management problems and forest policy issues. Prerequisite: permission. **Cr 3.**

FTY 575 Advanced Forest Management
Application of advanced strategic, tactical and operational planning concepts and models to the multiple-use management of public and private forest lands. Prerequisite: FTY 475 or equivalent or permission. **Cr 3.**

Courses in General Engineering (GEE)

GEE 101 Introduction To Engineering Design I
Graphic principles, concepts, and techniques involving applied problems and creative exercises in orthographic projection, dimensioning, and data analysis. Exercises will be done in the form of sketches or created in 2D/3D form using CADD software. Lec 1, Lab 2, Rec 1. **Cr 3.**

GEE 284 Engineering Economics
A study of economic theory and applications in engineering and industrial organizations including capitalization, amortization, time value of money, cost comparision anslysis, and breakeven value. Also included are personal finance topics as applied to engineering situations and case study. (This course is identical to MET 484.) Prerequisite: permission of instructor. Lec 3. **Cr 3.**

GEE 302 Introduction to Microcomputer-Aided Design
The engineering design process utilizing the microcomputer as a tool in vector graphics, descriptive geometry, three-dimensional rotation for area and volume calculations, and statistical graphs. A creative design project incorporating the microcomputer to produce a set of working drawings is required. Prerequisite: GEE 101. Lec 1, Lab 4. **Cr 3.**

Courses in Geography (GEO)

GEO 201 Introduction to Human Geography
A survey of human geography, paying particular attention to the five themes of Geography: location, cultural and economic aspects of place, human-environment interaction, movement and migration and regional geography. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives and the Population and the Environment Requirements.) **Cr 3.**

GEO 215 Cultural Geography
A survey of the impact of culture on the land. Focus on the distribution of people on the land, their movement, and the worlds they have passed through, from hunting and gathering environments to the agricultural landscape and the urban mosaic. **Cr 3.**

GEO 401 Historical Geography of the United States
A survey of the exploration, settlement, economic development and cultural landscape of the United States from 1500 to the present. Particular attention paid to the New England region. Prerequisite: junior standing. **Cr 3.**

GEO 450 Historical Geography of Canada
A survey of the exploration, settlement, economic development and cultural landscape of Canada from 1500 to present. Particular attention paid to Atlantic Canada. Prerequisite: junior standing. **Cr 3.**

Courses in German (GER)

GER 101 Elementary German I
The basics of the German language. Emphasis on developing reading, comprehension, speaking and writing skills. For students with no previous study of German or fewer than two years in high school. **Cr 3-4.**

GER 102 Elementary German II
Continued study of the basics of the German Language. Emphasis on developing reading, comprehension, speaking and writing skills. For students with no previous study of German of fewer than two years in high school. Prerequisite: GER 101 or equivalent. **Cr 3-4.**

GER 121 Elementary German (Schnelldeutsch)
A beginning course in the German language for students with no previous study of German or fewer than two years in high school. A full year's work covered in one semester. **Cr 6.**

GER 199 Review German
For students who have taken 2 or more years of high school German, but do not feel ready to complete the GER 203-204 sequence. Fast-paced review of basic grammar, pronunciation and vocabulary, with strong emphasis on oral communication. This is not the equivalent of GER 203/204 level language courses. 2 class meetings per week, with substantial listening and writing assignments. Prerequisite: 2 years of high school German or permission. Lec 2. **Cr 2.**

GER 203 Intermediate German I
An integrated approach. Reading texts as well as various audiovisual materials will be employed to strengthen reading, writing and especially speaking and comprehension skills. Includes a systematic but gradual review of the essentials of German grammar. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 102 or equivalent. **Cr 3-4.**

GER 204 Intermediate German II
A continuation of GER 203. Designed to strengthen reading, writing, speaking and comprehension skills. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 203 or equivalent. **Cr 3-4.**

GER 205 Practical German I
Conversational and composition language course designed to further develop students' comprehension, speaking and writing skills for everyday use. All classes are conducted in German. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 204 or equivalent. **Cr 3.**

GER 206 Practical German II
Continued conversation and composition. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 204, GER 205 or equivalent. **Cr 3.**

GER 223 Intermediate German (Schnelldeutsch)
An integrated approach employing various materials to strengthen reading, writing, speaking and comprehension skills. Includes a systematic but gradual review of the essentials of German grammar. A full year's work covered in one semester. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisites: GER 102 or GER 121 or equivalent. **Cr 6.**

GER 250 Multidisciplinary Readings in German
Intended to be taken in conjunction with course from another department, this course supplements the content areas of the course to which it is attached and promotes increased proficiency in German through reading and discussion in German. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 204 or equivalent or permission. May be repeated for credit. **Cr 1.**

GER 297 German (May Term)
A fifteen-day, off-campus, total immersion program on Lake Megunticook near Camden, Maine. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: Permission of instructor. **Cr 3.**

GER 311 Readings in German Literature I
An introduction to German literature and culture. Reading selections from contemporary literary texts and current events. Prepares students for literature and civilization courses at the 400 level. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 204 or equivalent. **Cr 3.**

GER 312 Introduction to German Literature II
Introduces students to German literature and culture. Reading selections are based on contemporary literary texts. Prepare students for literature and civilization courses at the 400 level. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 204 or equivalent. **Cr 3.**

GER 401 German Civilization
Readings, discussions, lectures, oral and written reports on Germany, its people, institutions, and culture provide background essential to an understanding of German literature, thought, and artistic expression. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 204 or the equivalent. **Cr 3.**

GER 402 Contemporary Germany
A study of modern German civilization and Landeskunde; the political, social and intellectual development of Germany from 1945 to present. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 204 or the equivalent. **Cr 3.**

GER 403 History of the German Language
Studies the development of the German language from Indoeuropean times to the present. Places present day German in its linguistic perspective, and examines the reasons and origins of specific forms, patterns and usages. Provides the prospective teacher with a linguistic background in German. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 204 or the equivalent. **Cr 3.**

GER 404 Translation: Theory and Practice
Thought and theory behind the process of translation with ample opportunity for analysis and practice. (German-English, English-German). Prerequisite: GER 204 or equivalent. **Cr 3.**

GER 406 Goethe
Readings from selected works of prose, poetry and drama from Goethe's classical period, with lectures on historical background and influence on later German literature. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 3.**

GER 407 Schiller
Selected works of poetry, drama, and critical writings from Schiller's classical period, including historical background and influence on later German literature. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 204. **Cr 3.**

GER 408 The Romantic School
Readings from works of major authors of the Romantic School, including Novalis, Schlegel, Tieck, Wackenroder, Brentano, E.T.A. Hoffmann, and Eichendorff. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 204. **Cr 3.**

GER 410 German Literature from 1832 to the Turn of the Century
Readings from representative works of the 19th century realists, with special emphasis on the Novelle. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 204. **Cr 3.**

GER 411 German Literature of the 20th Century I
Readings and discussions of representative authors of the 20th century. Emphasis on literature before 1945. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: GER 204. **Cr 3.**

GER 412 German Literature of the 20th Century II
Readings and dicussions of representative authors of the 20th century. Focus on the development of new techniques in the novel, Novelle, and drama in the Germanys, Austria, and Switzerland of the post-war era. (Satisfies the General Education Human Values and Social Context Cultural Diversity and

International Perspectives Requirement.) Prerequisite equivalent.

GER 490 Topics in German Cr 3.
Specific topics vary from semester to semester. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 1-3.**

GER 497 Projects in German I
(Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 1-3.**

GER 498 Projects in German II
(Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 1-3.**

GER 597 Projects in German I
Specific projects vary from semester to semester depending on the needs of the graduate student and the skills of the faculty member. May be repeated for credit. **Cr 1-3.**

GER 598 Projects in German II
Specific projects vary from semester to semester depending on the needs of the graduate student and the skills of the faculty member. May be repeated for credit. **Cr 1-3.**

Courses in Geological Sciences (GES)

GES 100 An Introductory Survey of Geology
An introduction for non-science majors to the main features and processes included in the science of geology. This course has two main goals: (1) To develop an appreciation by the students of the scientific method as applied by geologists, and (2) To develop in the students an appreciation of the aesthetic, social, political, environmental and economic aspects of the topics included in the study of geology. (Satisfies the General Education Applications of Scientific Knowledge Requirement.) Lec 3. One field trip. **Cr 3.**

GES 101 Introduction to Geology
A study of earth materials and processes, including their impact on humans. Topics include mineralogy, formation of igneous, metamorphic and sedimentary rocks, geologic time, weathering and soil formation, glaciation, deserts and desertification, coastlines, earthquakes and seismology, and evolution of mountain belts and plate tectonics. Laboratory work includes the study of rocks, minerals, topographic maps and aerial photographs in preparation for a one-day field trip to Acadia National Park. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Lec 3, Rec, Lab and field trip. **Cr 4.**

GES 102 Environmental Geology of Maine
After developing an understanding of rocks, minerals and geologic time, the course explores the modern distribution of natural geologic resources that limit human activity and influence political and economic decision-making. Examines the impact of humans on the physical and chemical environment and subsequent impact on the biosphere, and geologic hazards. Ends with a detailed look at the terrestrial and marine geologic records related to climate change and explores hypotheses related to the mechanisms and rates of climate change. The emphasis in the course is on the Maine geologic environment. (Satisfies the General Education Science Basic or Applied Sciences and Population and the Environment Requirements.) Lec 3, Rec, Lab and one-day field trip. **Cr 4.**

GES 103 Plate Tectonics and Mountain Building Processes
Introduces the concepts and components of the plate tectonic theory, including the history of its development, proposed driving forces of plate motion, oceanic spreading ridges, oceanic trenches and continental deformation leading to the development of mountain belts. (Satisfies the General Education Science Applications of Scientific Knowledge Requirement.) Prerequisite: GES 101 or GES 102 or GES 106 or permission. Lec 3. **Cr 3.**

A study of this fossil group emphasizing the paleontological methods scientists use to learn about the environments in which Dinosaurs evolved, lived, and their habits and behavior. Topics include: Origin, evolution, and characteristics of the principal groups of Dinosaurs, Dinosaur trace fossils, Behavior and biology, and controversial topics including "Warm-Blooded Dinosaurs", the Origin of Birds, and Dinosaur Extinction. Two lectures plus one 2-hour laboratory each week, and a required field trip to the Triassic of the Connecticut River Valley and Dinosaur State Park. (Satisfies the General Education Science Applications of Scientific Knowledge Requirement.) Prerequisite: GES 101 recommended but not required. Lec 2, Laboratory and Field Trip. **Cr 3.**

GES 105 The Earth Through Time
The Earth's history is traced from the oldest known rocks to the modern world in which we live. Forces that moved whole continents and built/destroyed mountains are followed from the earliest land masses to the present arrangement. Concurrently, Earth's ever changing life is traced from the first single-celled organisms that appeared 3 billion years ago to the origins of the human race. (Satisfies the General Education Lab Courses in the Basic or Applied Sciences Requirement.) Prerequisites: GES 101 or GES 102 or GES 106. Lec 3, Lab 3. **Cr 4.**

GES 106 Geology for Engineers
Provides a physical geology basis for civil engineering applications. Emphasis is topics related to physical properties and behavior of surficial and crustal materials. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Lec 3, Lab 2. **Cr 4.**

GES 109 Geology of Maine
An introduction to the minerals, rocks, groundwater, coastline, geomorphology, geological history, and geoenvironmental problems of Maine. Three weekend field trips. Prerequisite: GES 101 or GES 102 or GES 106 or permission of instructor. **Cr 3.**

GES 110 Coastal Geology of New England and the Canadian Maritimes
Reviews the bedrock, glacial and coastal processes that formed the shoreline of New England and adjacent Canadian Provinces. The distinction between this region and the rest of the east coast of North America is developed. Stress is placed on understanding the integrated influence of bedrock, glacial and modern processes on the geomorphology of coastal regions. **Cr 3.**

GES 121 Humans and Global Change
Explores how Earth's climate system works and how past environmental changes affected humans on time scales ranging from interannual to hundreds of thousands of years. Topics will range from the development of agriculture at the beginning of the current interglaciation to how humans are now changing global climate through the addition of greenhouses gases to the atmosphere. (Satisfies the General Education Population and the Environment Requirement.) **Cr 3.**

GES 140 The Atmosphere
The nature of planetary atmospheres, physical processes in the atmosphere, clouds and precipitation, global climate, seasons, natural and anthropogenic climate change, forecasting of storms. (Satisfies the General Education Basic or Applied Sciences Requirement.) Lec 3, Lab 2. **Cr 4.**

GES 221 Geologic Problems I
Students conduct an original investigation and report findings. May not normally be used as a required geology elective. May be repeated for credit. Prerequisite: permission of instructor. **Cr 1-3.**

GES 222 Geologic Problems II
Students conduct an original investigation and report findings. May not normally be used as a required geology elective. May be repeated for credit. Prerequisite: permission. **Cr 1 or 2.**

GES 255 Non-Honors Senior Thesis Cr 3.

GES 314 Invertebrate Paleontology
Description and classification of the important phyla of fossil invertebrates

and a survey of their use in biostratigraphic, evolutionary, paleoecologic, and other studies. One or more day or weekend field trips. Prerequisite: GES 101 or GES 102 or GES 106. Lec 2, Lab 4. **Cr 3.**

GES 315 Principles of Sedimentology and Stratigraphy
Basic concepts and techniques of stratigraphy and sedimentation. Field trips to local environments and outcrops. Laboratories emphasize practical analytical techniques of sedimentology, petrography of seimentary rocks in hand specimens and thin section, and modern stratigraphic approaches. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: GES 101 or GES 102 or GES 106, MAT 232 or permission. Lec 3, Lab 3. **Cr 4.**

GES 324 Geology of North America
Covers the geologic development of selected regions of North America which illustrate the theories and principles of continental evolution. Prerequisite: GES 101 or GES 102 or GES 106. Lec 3. **Cr 3.**

GES 325 Ore Deposits-Origin and Exploration
The chemical and physical factors controlling the formation of metallic mineral deposits. Information derived from experimental work is considered and related to field observations. Techniques employed in ore deposit exploration are explained as they apply to specific geologic situations. Prerequisites: GES 330, GES 416 or permission. Lec 4. **Cr 4.**

GES 330 Mineralogy
Introduction to crystallography and the crystal chemistry of minerals. Identification of the common minerals by their physical properties. Prerequisite: CHY 121. Lec 3, Lab 4. **Cr 4.**

GES 331 Optical Mineralogy-Petrography
A laboratory course emphasizing use of the polarizing microscope to determine the optical properties and identification of non-opaque minerals in crushed-grain mounts and in thin sections. Prerequisites: GES 330, PHY 111 or PHY 121. Lab 6. **Cr 3.**

GES 332 Modern Analyt ical Methods
Introduction of mineralogical and chemical determinative methods used in modern geological research and practice. Methods include x-ray diffraction, electron microprobe, mass spectrometry and wet-chemical techniques. Prerequisite: GES 330. **Cr 1.**

GES 333 Igneous and Metamorphic Petrology
Introduction to the formation, textures and classification of igneous and metamorphic rocks. Chemical systems of these rocks are investigated. Three weekend field trips, related to field projects, are required. Petrographic microscopes are used extensively in the laboratory. Prerequisite: GES 101 or GES 102 or GES 106 and GES 331. Lec 3, Lab 3. **Cr 4.**

GES 416 Introduction to Structural Geology
Principles of structural geology, with emphasis on the integration of field observations and theory. Includes field trips. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: GES 333, PHY 112 or PHY 122, MAT 126. Lec 2, Lab 3. **Cr 4.**

GES 417 Introduction to Geophysics
Introduction to geophysical studies of the Earth. Seismological, gravity, magnetic, electrical and geothermal studies of the Earth's lithosphere are emphasized. Field exercises on one afternoon of selected weeks; course problem solving requires spread sheeting/ graphical applications using available personal computers. Prerequisites: GES 101 or GES 102 or GES 106, MAT 127, PHY 111 and permission. Lec 3. **Cr 3.**

GES 499 Gological Sciences Summer Field Camp
Covers techniques of field geology, including pace and compass, plane table, total survey station, GPS, topographic and air-photo base mapping. Introduces the interpretation of sedimentary, metamorphic and igneous rock field relationships. Structural geology and plate tectonics, geologic history of the northern Appalachians, geomorphology, modern sediments, and coastal stratigraphy are emphasized. Conducted at a base camp at Chesuncook Dam, with field trips to other areas in Maine, Quebec and Nova Scotia. Prerequisites: GES 101, GES 102 and two intermediate geology courses. **Cr 6.**

GES 510 Special Topics
One to two week intensive treatment of specialized geologic topics by scientists from government and other institutions. Specific topics vary. May be repeated for credit. Prerequisite: permission. **Cr 1 or 2.**

GES 521 Low Temperature-Pressure Geochemistry
Algebraic and graphical analysis of water-mineral interactions at earth surface conditions. Topics include congruent and incongruent solubility, complexing, redox reactions, ion exchange, coprecipitation, chemical precipitation, evaporation, and diffusion. Prerequisites: CHY 121, MAT 126. **Cr 3.**

GES 523 Physical Geochemistry
Introduction to thermodynamics and its application to petrology. Emphasis on geologically relevant heterogeneous equilibria at elevated pressure and temperature. Mathematical methods beyond MAT 127 are introduced. Prerequisites: CHY 121, GES 331, MAT 127 or permission. **Cr 3.**

GES 524 Aqueous Terrestrial Geochemistry
A survey of earth surface or near surface processes involving chemical reactions between rocks, organic matter and water. Topics include soil genesis, supergene enrichment, nutrient cycling, ground water evolution, and river and lake chemistry and cycles. Prerequisite: GES 521 or OCE 520. **Cr 2.**

GES 527 Isotope Geology
Theory of variations in the relative abundances of naturally occuring radioactive and stable isotopes. Applications will emphasize the use of isotopic tracers in studies of petrogenesis, geochronology, paleoceanography and paleoecology. Prerequisite: GES 333 or permission. **Cr 3.**

GES 528 Geochronology
Studies emphasizing theory, interpretation and techniques of dating rocks and minerals using naturally occurring radionuclides. Prerequisite: GES 527 or permission. **Cr 3.**

GES 532 Advanced Sedimentology
Advanced concepts of sedimentology: hydrodynamics of sediment transport and deposition, origin and characteristics of the major sedimentary rock types, facies analysis and modern stratigraphic approaches. Laboratories emphasize textural analysis, numerical and computer applications, and sequence stratigraphy. Research paper and verbal presentation required. Prerequisites: GES 315, SMS 270 or permission. Lec 3, Lab 3. **Cr 4.**

GES 534 Coastal Sedimentology
Covers principles of sedimentary processes in the coastal zone and the resultant coastal geomorphology, three-dimensional sedimentary bodies, stratigraphic sequences and evolution of coastal systems through geologic history. Emphasis on modern coastal systems such as estuaries, beaches, barrier-lagoon complexes, and rocky coasts. Prerequisite: GES 315 or permission. Lec 3, Lab 2. **Cr 4.**

GES 538 Geology of Continental Margins
A study of the structural framework, stratigraphy, and sedimentation. An integrated analysis based on modern marine geological discoveries of structural controls and sedimentation along continental margins, with emphasis on the U.S. east coast. Prerequisite: GES 315 or OCE 560 or permission. Lec 3, Lab 2. **Cr 4**

GES 541 Glacial Geology
Topics include glaciers and their deposits, flow dynamics of glaciers, mechanics of erosion, transportation and deposition, development of soils, isotopic and sedimentologic techniques in stratigraphy, chronology, and reconstruction of paleoglacial events from glacial deposits. Required field trips. Prerequisites: GES 101 or GES 106, MAT 126. Lec 2, Lab 2. **Cr 3**

GES 542 Quaternary Environments and Climatic Change
Study of the physical environments of the Quaternary Period with special emphasis on ice-age theories, world-wide terrestrial and marine glacial stratigraphy, paleoclimatology, and effects of environment on society. One weekend field trip. Prerequisite: GES 541 or permission. Lec 2, Lab 2. **Cr 3**

GES 543 Quaternary History of Northeastern North America
An interdisciplinary approach with emphasis on glacial and nonglacial

episodes and discussion of associated climatic and biologic changes. One week-end field trip. Prerequisite: GES 541 or permission. Rec 2. **Cr 3.**

GES 544 Glaciology
A study of the dynamics of ice sheets including creep deformation of ice and the interaction between a glacier and its bed, numerical methods for modeling advance and retreat of ice sheets during times of climatic change, glacial erosion and deposition. Prerequisites: MAT 127, COS 210 or COS 220 or permission. Lec 3. **Cr 3.**

GES 545 Glaciology Laboratory
Experiments in creep deformation. **Cr 1.**

GES 546 Marine Paleoclimatology
Paleoclimatic and paleooceanographic interpretations of marine sediment sequences. Emphasis on Late Quaternary stratigraphy, regional and global paleoclimates, correlation of the marine and terrestrial records and the recent advances of the CLIMAP program. Prerequisites: GES 314, GES 315 and OCE 568. Lec 2, Rec 1. **Cr 3.**

GES 553 Coastal Geomorphology
Covers classification methods, mapping procedures and techniques for the study of coastal landforms and interpretation of their origin and development. Dynamic processes that affect coastal environments including regional geology, climate, weather, tides, sea level, waves, storms, coastal currents, ice and crustal movements. Emphasis on field studies of beach forms and processes on Maine beaches. Several field trips. Prerequisites: SMS 270, GES 101 or GES 106 and permission. **Cr 3.**

GES 559 Seminar in Mountain Building Processes
Covers various topics in orogenesis. Specific topics vary. May be repeated for credit. Prerequisites: GES 416, GES 578 or permission. **Cr 2.**

GES 578 Metamorphic Petrology
A study of the genesis of metamorphic rocks with emphasis on the regional petrologic and geologic history of a metamorphic terrain, the procedures for ascertaining the pressure and temperature prevailing during metamorphism, and a detailed consideration of the composition of fluid and volatile phases participating in the metamorphic mineral reactions. Prerequisite: GES 331. Lec 3, Lab 4. **Cr 4.**

GES 580 Introduction to Hydrogeology
The role of groundwater in geologic processes: the hydrologic cycle, groundwater transport equations, chemical evolution of groundwater, and groundwater as a geologic agent. Prerequisites: GES 101 or GES 102 or GES 106, MAT 127. **Cr 3.**

GES 582 Advanced Topics in Geophysics
Advanced treatments of geothermal, gravity, or seismological studies of the earth. Specific topics vary. May be repeated for credit. Prerequisites: GES 417, MAT 452, MAT 454, PHY 238 or PHY 462 or permission. **Cr 3.**

GES 588 Hydrogeochemical Modeling
Emphasizes the use of a numerical program to evaluate environmental groundwater problems. Kinetic and equilibrium approaches used in modeling chemical reactions and mass transport processes are reviewed. Mass transport processes are linked to chemical reactions in the computer simulations used in class. Prerequisites: GES 521, GES 580, MAT 228 or consent of instructor. **Cr 3.**

GES 591 Introduction to Meteorology and Climatology
The climatic system, survey of atmospheric behavior and climatic change; meteorological measurements and analysis; formulation of physical principles governing weather and climate with selected applications to small and large scale phenomena. Prerequisites: PHY 112 or PHY 122, MAT 126 or permission. **Cr 3.**

GES 592 Paleoclimate Modeling
Evolution of the earth's climate on time scales ranging from decades to millions of years. Time series analysis of historical and paleoclimate records. The development of time-dependent theoretical models to account for marine and terrestrial evidence for global climate change. Prerequisites: PHY 112 or PHY 122, MAT 126 or permission. **Cr 3.**

GES 593 Large Scale Atmospheric Motions
Dynamics of the major weather-producing waves and vortices, scale analysis of the fundamental equations, barotropic and baroclinic instability, nongeostrophic effects, numerical weather prediction. Prerequisites: PHY 112 or PHY 122, MAT 126, GES 591 or permission. **Cr 3.**

Courses in Greek (GRE)

GRE 101 Elementary Greek I
Fundamentals of the Greek language for students who have had little or no preparation in ancient Greek. Prerequisite: intermediate language skill in another language or permission of the instructor. **Cr 4.**

GRE 102 Elementary Greek II
Fundamentals of the Greek language for students who have had little or no preparation in ancient Greek. Prerequisite: intermediate language skill in another language or permission of instructor and GRE 101 or equivalent. **Cr 4.**

GRE 203 Readings in Greek Literature I
Selections from the work of one prose author and one playwright, including Xenophon, Plato, and the Tragedians. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 3.**

GRE 204 Readings in Greek Literature II
Selected readings from the works of Homer and Hesiod. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 3.**

Courses in Education: Higher Education (HED)

HED 561 Developmental Theory in Higher Education
Developmental theory as a foundation for student affairs emphasizing the interdependence of theory and practice. Prerequisite: Permission. **Cr 3.**

HED 562 Impact of College on Students
Integrating empirical knowledge and theoretical propositions in the context of the impact of higher education on students. Prerequisite: HED 561 or equivalent. **Cr 3.**

HED 580 History of Higher Education in the United States
History of American higher education, colonial period to the present. Prerequisite: permission. **Cr 3.**

Courses in Honors (HON)

HON 101 The Development of Western Thought I
Reading and discussion of basic texts in Western civilization, from early creation myths through the Renaissance. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Cultural Diversity, International Perspectives and the Demonstrated Writing Competency Requirements.) **Cr 4.**

HON 102 The Development of Western Thought II
Reading and discussion of basic texts in Western civilization, from the Enlightenment to the present. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Social Contexts and Institutions and the Demonstrated Writing Competency Requirements.) **Cr 4.**

HON 190 Honors Summer Readings: Basic
An individually arranged program of readings for independent study during the summer. Course credit is given the following fall semester. For students wanting to supplement their work in HON 101 and HON 102. Prerequisite: permission. **Cr 1.**

HON 201 The Sciences and Western Culture I
HON 201 and HON 202 constitute a two-semester chronological sequence exploring the origins and development of science and social science in Western culture. Beginning with Babylonian, Egyptian and early Greek science and technology, and concluding with the effects of Quantum

Mechanics and genetic manipulation, the two courses examine selected texts and ideas in science as they grew out of and in turn influenced the cultures of their time. The development of the study of social organisms as a set of sciences parallels the investigation of science and mathematics. Readings include primary texts whenever possible, along with a critical approach which contextualizes the development of Western thought. (Satisfies the General Education Demonstrated Writing Competency and Human Values and Social Contexts Western Cultural Tradition Requirements.) Prerequisites: HON 101 or HON 102 or permission of the Honors director. **Cr 4.**

HON 202 The Sciences and Western Culture II
A continuation of HON 201. (Satisfies the General Education Demonstrated Writing Competency and Human Values and Social Contexts Western Cultural Tradition Requirements.) Prerequisites: HON 101 o HON 102 or permission of the Honors director. **Cr 4.**

HON 290 Honors Summer Readings: Intermediate
Guided summer readings and reports, individually adapted to the student's program of study. Credit is given the following fall semester. For students wanting to supplement their readings in HON 201 and HON 202. Permission: permission. **Cr 1.**

HON 297 Honors Independent Study
A tutorially conducted study of a topic outside the student's major field. Prerequisite: permission. **Cr 1-3.**

HON 298 Honors Independent Research
A research project done under the supervision of a faculty member. May not be substituted for the senior research project or thesis. Prerequisite: permission. **Cr 1-3.**

HON 299 Honors Project
A directed independent project, required of students taking two-year degrees with Honors. **Cr 3.**

HON 301 Honors Tutorial Arts and Humanities
Small group discussion, under tutorial direction, of important readings in a specific topic or theme. May be repeated for credit with permission of the director of the Honors Program. Prerequisite: permission. **Cr 3.**

HON 302 Honors Tutorial Social and Behavioral Sciences
Small group discussions, under tutorial direction, of important readings in a specific topic or theme. May be repeated for credit with the permission of the director of the Honors Program. (Satisfies the General Education Social Context and Institutions, Cultural Diversity and International Perspectives and Population and the Environment Requirements.) Prerequisite: permission. **Cr 3.**

HON 303 Honors Tutorial Sciences
Small group discussions, under tutorial direction, of important readings in a specific topic or theme. May be repeated for credit with the permission of the director of the Honors Program. Prerequisite: permission. **Cr 3.**

HON 304 Honors Tutorial Interdisciplinary
Small group discussions, under tutorial direction, of important readings in a specific topic or theme. May be repeated for credit with the permission of the director of the Honors Program. (Satisfies the General Education Demonstrated Writing Competency and Population and the Environment Requirements.) Prerequisite: permission. **Cr 3.**

HON 350 Honors Seminar
Topics in such subject areas as the arts, philosophy, history of science, the study of society, etc. Specific topics vary. **Cr 3.**

HON 397 Honors Specialized Study
A tutorially conducted study in the student's major field, usually resulting in the choice of a thesis topic. May be repeated once for credit, with permission. **Cr 3.**

HON 450 Honors Distinguished Lecture Series
A series of lectures by a distinguished lecturer or lecturers, involving collateral reading and group discussions. **Cr 1-3.**

HON 498 Honors Directed Study
Tutorially directed research for the senior thesis or project. Graded "T" (meaning acceptable, but deferred.) Required of all four-year students graduating with a degree with Honors. **Cr 3.**

HON 499 Honors Thesis
The completion of the senior project begun in HON 498. Required of all four-year students graduating with a degree with Honors. The grade for this course is retroactive to HON 498 and counts for the combined six hours of HON 498 and HON 499. **Cr 3.**

Courses in History (HTY)

HTY 103 United States History I
Examines the historical experience of the American people through the major ideas and forces that have shaped the Republic. Focus on the exploration of America through post-Civil War Reconstruction. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Social Contexts and Institutions Requirements.) **Cr 3.**

HTY 104 United States History II
Examines the historical experience of the American people through the major ideas and forces that have shaped the Republic. Focus on the urban-industrial age, liberal political reform, and American world leadership. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Social Contexts and Institutions Requirements.) **Cr 3.**

HTY 105 History of European Civilization I
Political, economic, social, and intellectual developments in Europe from antiquity to 1715, emphasizing those features which help to explain our present-day civilization. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Social Contexts and Institutions Requirements.) **Cr 3.**

HTY 106 History of European Civilization II
Political, economic, social, and intellectual developments in Europe from 1715 to the present, emphasizing those features which help to explain our present-day civilization. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Social Contexts and Institutions Requirements.) **Cr 3.**

HTY 107 East Asian Civilization I
A survey of China's and Japan's social, economic, cultural and political life from prehistoric times to the present. Whenever applicable, Korea and Vietnam will be discussed. Emphasis on key periods in each country, especially changes in the 19th and 20th centuries. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) **Cr 3.**

HTY 108 South and Southeast Asia Civilization
A survey of the social, economic, cultural and political life of India and some Southeast Asian countries from prehistoric times to the present. Emphasis on key periods, especially the 19th and 20th centuries. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) **Cr 3.**

HTY 109 Introduction to Latin America
The historical experience of the people of Latin America from prior to contact through conquest and colonization, cultural exchange, the social, economic, and political developments following independence in the nineteenth century, and the evolving crises of the twentieth century. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) **Cr 3.**

HTY 111 Canada: From Cartier to Trudeau
An overview of Canadian history from the age of the 16th century explorers to the contemporary political scene. Emphasis on the emergence of various regional identities and the evolution of the social formation from colonial times to the modern urban era. (Satisfies the General Education Human

Values and Social Context Western Cultural Tradition, Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.)
Cr 3.

HTY 197 Technology and Society I
A survey of the development of modern technology. The interaction of engineering with other facets of modern society examined in relation to issues of current or recent interest. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions and Western Cultural Tradition Requirements.) (This course is identical with TSO 198.)
Cr 3.

HTY 198 Technology and Society II
A survey of the interaction of modern technology and contemporary societies with emphasis on particular cases and technologies of current interest. Concludes with discussion of possible scenarios for future technological and societal developments based on present trends. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions, Western Cultural Tradition and Population and the Environment Requirements.) (This course is identical with TSO 199.) Cr 3.

HTY 199 Problems in History
An analysis of a selected controversial or contemporary historical problem. In some cases the specific topic and methodology may be chosen jointly by interested students and an instructor.
Cr 3.

HTY 210 History of Maine
A survey of Maine's social, economic, and political life, from primitive times to the present. After a brief study of Native American life preceding white settlement, the periods of colonial, provincial, and state history are covered. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Social Contexts and Institutions and the Cultural Diversity and International Pespectives Requirements.) No first-year students. Cr 3.

HTY 250 History as People: The American Experience as Biography
Major facets of American life from the colonial period to the present explored through lectures on the lives and important actions of representative Americans. The premise of this course is that the past is sometimes best understood through its individual people.
Cr 3.

HTY 276 Sports in the Western World
A survey of the origins and evolution of competitive sport from the ancient world to the present with emphasis on the relation of sport to changes in technology, political systems, and social values. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.)
Cr 3.

HTY 278 American Military History
America's experience with warfare, from the colonial period through the Vietnam era. How American wars have been fought, and the complex interrelationship between American society and the military, including economic, political and social factors.
Cr 3.

HTY 280 Naval History
The history of navies in the modern period (c. 1500 to the present) including use of naval forces in the achievement of national goals, development of naval technology and tactics, effects of naval construction and manning upon society, sociology of navies, comparison of naval policies in various states, the current balance sheet of navies.
Cr 3.

HTY 332 Womanhood in America
Examines the changing experiences of American women from colonial times to the present. Emphasis on what women did and what they were told to do, the experiences of different groups of women, and the ways in which women worked to change their situation. First-year students require permission. (Satisfies the General Education Human Values and Social Contexts Western Cultural Tradition and the Cultural Diversity and International Perspectives Requirements.)
Cr 3.

HTY 401 History of Greece
Ancient Greece from the "Heroic Age" to the "Classical and Hellenistic" including discovery of rational thought, the development, crisis, and failure of democracy in classical Athens; unification of city-states and creation of a world empire that launched a new era in world history. Prerequisite: HTY 105 or permission.
Cr 3.

HTY 402 Roman History
The rise of ancient Rome from a small Italian town to mistress of the Mediterranean. Problems of excessive greatness including failure of a city-state republic to rule a vast empire and triumph of Caesarism. Covers the establishment of the "Roman Peace" under the emperors. "Christianization" and problem of the "Decline of Rome." Prerequisite: HTY 105 or permission.
Cr 3.

HTY 403 Early Middle Ages
Europe from late antiquity to about 950, considering the social, economic, political, and intellectual developments during Merovingian and Carolingian times, emphasizing the early medieval agricultural revolution and reconstructing the factors affecting the lives of ordinary people. Prerequisite: HTY 105 or permission.
Cr 3.

HTY 404 Late Middle Ages
Social, economic, political, and intellectual history of Europe from 950 to the Renaissance, focusing on the medieval frontier period and the late medieval era of environmental crisis and economic contraction. Prerequisite: HTY 105 or permission.
Cr 3.

HTY 405 The Renaissance and Reformation
The social, intellectual, cultural and economic achievements of the period 1300-1600. The Protestant and Catholic reforms and their effects will be evaluated. (This Fall, the course will focus on the prelude to, and immediate aftermath of, the Columbus voyages, as well.) Prerequisite: HTY 105 or HTY 106 or permission.
Cr 3.

HTY 406 The Age of Monarchs, 1600-1789
The socio-economic, political and cultural developments of Europe in the Early Modern period, emphasizing the history of several major countries including France, Prussia, the Austrian Empire and Russia. Prerequisite: HTY 105 or HTY 106 or permission.
Cr 3.

HTY 407 The Age of Revolution, 1789-1860
Emphasis on the effects of the Industrial and French Revolutions on European politics, society, and thought, the transformation of a peasant, agrarian world to a middle-class, urban society. Considers the movement from oligarchial to liberal politics, from aristocratic to middle-class tastes, from enlightened thought and the romantic reaction to Marxist and Darwinian intellectual bombshells. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: HTY 105 or HTY 106 or permission.
Cr 3.

HTY 408 19th Century Europe, 1815-1914
Europe from the Congress of Vienna to World War I: industrialization, the emergence of modern ideologies, German and Italian unification, the rise of democracy, imperialism and the road to World War I. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: HTY 106 or permission
Cr 3.

HTY 409 Twentieth Century Europe I (1914-1945)
Europe in the age of the two world wars, focusing on the causes and consequences of the wars themselves, concurrent political and economic problems, the challenge of totalitarianism, and the intellectual and cultural contexts. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: HTY 105 or HTY 106 or permission.
Cr 3.

HTY 410 20th Century Europe II (Since 1945)
Europe in the age of Cold War division, focusing on the contrasting development of prosperous democracies in western Europe and the Soviet imperium in eastern Europe, culminating in the overcoming of this division and this imperium in the revolutions of 1989/1991. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Cultural Diversity and International Perspectives Requirements.) Prerequisite: HTY 106 or permission.
Cr 3.

HTY 411 The Holocaust
The Nazi persecution and extermination of European Jews (1933-1945) including the exploration of modern anti-Semitism, Nazi ideology, the persecution of German Jews after 1933 and the extermination of six million European Jews in Nazi occupied Europe during the Second World War. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Cultural Diversity and International Perspectives Requirements.) Prerequisites: HTY 105 or HTY 106 or permission. **Cr 3.**

HTY 413 The Evolution of the American Corporation
Intensive reading acquaints the student with the major themes in the historical development of corporate America and "big business" in general, specifically manufacturing. Prerequisite: 6 hours of history or permission. **Cr 3.**

HTY 414 Law and American Society
Examines our national tendency to attempt to settle our biggest problems—sex discrimination, the death penalty, desegregation—through law. Explains how laws were (and are) made, from federal and state constitutions and legislature to small-town zoning, and how law was (and is) administered by courts and agencies of every sort. Prerequisite: 6 hours of history or permission. **Cr 3.**

HTY 415 African-American History
Examines the Arican-American experience both thematically and chronologically, from slavery to emancipation, and the lives of African-Americans in the twentieth century. Includes African survivals and slave culture, the impact of racism, religion, and family on African-American lives, efforts by blacks to improve their lives, and the meaning of their history for contemporary African-Americans. Prerequisites: HTY 103 or HTY 104 or permission. **Cr 3.**

HTY 416 The American South
The American South is part of the United States, yet its history and traditions are very different from those of the rest of the country. Considers the separate history of the American South, addressing such issues as slavery, the South's failed war for independence, race relations, the New South, and the civil rights movement. Examines images and stereotypes of the South in popular culture and the question of southern distinctiveness, in order to assess the place of the South in the nation. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Cultural Diversity and International Perspectives Requirements.) Prerequisites: HTY 103 or HTY 104 or permission. **Cr 3.**

HTY 417 The American West From Lewis and Clark to World War Two
Examines the social and political history of America West of the Mississippi River. It is organized around three main themes: land use; lives of inhabitants including Native Americans and Americans of European, African, or Asian origin; the West as an American myth. Covers topics ranging from the fur trade in Native American societies to industrialization during World War Two. Prerequisites: HTY 103 or HTY 104 or permission. **Cr 3.**

HTY 420 Science and Society Since 1800
Examines the development of science, with emphasis on America, since the Scientific Revolution both 'internally'—as ideas and experiments—and 'externally'—as related to American and other societies which have produced them and upon which they in turn have had impact. (Satisfies the General Education Human Values and Social Contexts Western Cultural Tradition Requirement.) Not open to first-year students. **Cr 3.**

HTY 423 History of Russia I
Russian history from the earliest times to the 1870s, including political, economic, cultural and social developments during the Kievan, Tartar, Muscovite, and Imperial periods. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Cultural Diversity and International Perspectives Requirements.) Prerequisite: HTY 105 or HTY 106 or permission. **Cr 3.**

HTY 424 History of Russia II
The history of the Russian Empire and the Soviet Union during the last 125 years, including the problems and achievements of Imperial Russia, World War I and the Bolshevik seizure of power, the development of Communist totalitarianism, Russia as a world power and contemporary dilemmas. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Cultural Diversity and International Perspectives Requirements.) Prerequisite: HTY 106 or permission. **Cr 3.**

HTY 425 History of Germany I
A survey of German history from the earliest times to the mid-19th Century, treating selected political, cultural, economic and social themes which help illuminate modern Germany. Prerequisite: HTY 105 or HTY 106 or permission. **Cr 3.**

HTY 426 History of Modern Germany
Includes major political, economic, cultural and social developments during the Imperial, Weimar, National Socialist and Federal Republic eras. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Cultural Diversity and International Perspectives Requirements.) Prerequisite: HTY 106 or permission. **Cr 3.**

HTY 429 History of Modern Italy
Covers the economic, social, political and cultural developments of the Italian people from 1796 to the present. Explores Italian unification, Fascism and the Italian migration to the U.S. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: Six hours of history or permission. **Cr 3.**

HTY 433 Greek and Roman Mythology
The study of classical myths as the poetic expression of the Greek and Roman spirit, as the depiction of everything considered sacred, and as the embodiment of the basic patterns of the human psyche. Discusses the major theories of myth. Uses modern psychology and anthropology to show how the myths reveal secrets of our emotional and intellectual and spiritual lives. Prerequisite: GRE 101 or LAT 101 or PHI 101 or permission. **Cr 3.**

HTY 436 History of China
History and culture of the Chinese people, emphasizing the Western penetration of China, coming of the missionaries and the gunboats, impact of Western ideas, and the resulting nationalist and revolutionary movements. Prerequisite: HTY 107 or HTY 108 or six hours of history, or permission. **Cr 3.**

HTY 437 History of Modern Japan
The history of Japan during the past century including western penetration, the influence of Western ideas on traditional Japanese culture, the emergence of the modern Japanese industrial state, and the rise and defeat of the Japanese empire. Prerequisite: HTY 107 or HTY 108 or six hours of history or permission. **Cr 3.**

HTY 441 History of Modern China
An examination of social structure, foreign contact, value change and popular movements from the late Qing (19th century) until present. Emphasis on the relationship between popular uprisings (White Lotus, Muslim Nian, Taiping, Boxers, Red Spears, etc.) and the Communist Revolution. The Chinese revolution will be compared to those of other East Asian countries, and to general theorieds of peasant revolt. Prerequisite: HTY 107 or HTY 436. **Cr 3.**

HTY 442 The United States and Vietnam: A History
Traces the history of relations between the United States and Vietnam since the beginning of World War II. The economic, social, political, ideological and cultural origins of the Vietnam conflict, the conduct of the war and the aftermath in Vietnam, East Asia and the United States will be examined. Prerequisite: HTY 103 or HTY 104 or permission. **Cr 3.**

HTY 446 History of Modern Middle East (1800-Present)
The economic, social and political transformations experienced by the Middle East in the nineteenth and twentieth centuries. Focus on the rise of Arab nationalism and the Israeli Arab conflict. (Satisfies the General Education Human Values and Social Contexts Cultural Diversity and International Perspectives Requirement.) Prerequisite: One survey course in history. **Cr 3.**

HTY 447 Latin America: Under the Conquerors
Changes brought by Iberian conquest and colonization in the lives of the

native peoples of Latin America. Individual and group resistance and accommodation, contributing to cultural change and continuity. Considerable attention to agrarian and labor themes in the central areas. Prerequisite: HTY 109 or permission. Cr 3.

HTY 448 Latin America: Reform and Revolution
Nineteenth and twentieth-century reform movements and revolutionary struggles in Latin America, their local historical roots and their international ramifications. Mexico, Cuba, Central America, and other case studies. Prerequisite: HTY 109 or permission. Cr 3.

HTY 452 Topics in Latin American History
Analysis of varying political, economic, social, and/or cultural topics highlighted in the recent scholarship on Latin American history. Prerequisite: HTY 109 or permission. Cr 1-3.

HTY 454 History of Ireland II
The history of Ireland from the late seventeenth through twentieth centuries, examines nationalist movements, the land question and the development and issues of Northern Ireland. Prerequisite: HTY 105 or HTY 106 or six hours of history. Cr 3.

HTY 455 History of England I
The political, socio-economic and constitutional aspects of British history from Roman Britain to 1700, emphasizing economic growth and the development of political institutions. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: HTY 105 or HTY 106 or six hours of history Cr 3.

HTY 456 History of England II
The political, socio-economic and constitutional aspects of British history from 1700 to the present, emphasizing economic growth and the development of democracy. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: HTY 105 or HTY 106 or six hours of history. Cr 3.

HTY 457 France in America to 1763
French empire in St. Lawrence Valley, Acadia, Louisiana, and sugar islands from exploration to loss of her main American holdings. Emphasis on political and social institutions; French colonial life compared to France and to the English colonies. Prerequisite: HTY 103, 104 or HTY 105, 106 or permission. Cr 3.

HTY 458 History of French Canada and Franco-Americans
The common historical heritage of French Canadians and Franco-Americans from the establishment of New France and Acadia to the great migrations to the United States in the 19th century. The separate development of French Canadians and Franco-Americans from this point to the present. Prerequisite: 6 hours of History. Cr 3.

HTY 459 Colonial Canada
Canada's history from New France to 1850, emphasizing political, social and economic developments and relations with the American people. Prerequisite: HTY 103 or HTY 111 or permission. Cr 3.

HTY 460 Modern Canada
Canada's history from Confederation to the present, emphasizin political, social, and economic developments and Canada's relaons with the United States. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives and Ethics Requirements.) Prerequisites: HTY 104 or HTY 111 or permission. Cr 3.

HTY 461 America Takes Shape: The Colonies to 1740
The founding and development of the American colonies. Emphasis on the expropriation of Native American lands, enslavement of blacks, the role of women, the American family, and internal conflicts. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: HTY 103 or permission. Cr 3.

HTY 462 Rebellion and Revolution in America, 1740-1789
The social tensions of a maturing society: rebellions, religious revivals, violence. The origins and consequences of the American Revolution, Founding Fathers and the new Constitution. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: HTY 103 or permission. Cr 3.

HTY 464 America at the Crossroads: The Era of Civil War Reconstruction, 1840-1876
Problems and processes involved in territorial expansion, economic growth, the slavery issue, civil war, and the reconstruction of American society. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: HTY 103 or permission. Cr 3.

HTY 467 Early 20th Century America, 1914-1945
Changes in American politics, economics, society and culture including the Wilson era of reform and intervention in World War I, the age of business, depression and the New Deal of FDR, World War II and American global power. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: HTY 104 or permission. Cr 3.

HTY 468 America Since 1945
Changes in American politics, economics, society and culture including the Cold War and McCarthyism, protest movements of the 1960s, Watergate, the energy crisis and economic recession, affluence and poverty in the 1980s. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: HTY 104 or permission. Cr 3.

HTY 473 American Diplomatic History I
American diplomatic history from the revolution to World War I, emphasizing the formation and application of America's major foreign policies. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: HTY 103 or HTY 104 or permission. Cr 3.

HTY 474 American Diplomatic History II
American diplomatic history from World War I to the present, emphasizing the formation and application of America's major foreign policies. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: HTY 103 or HTY 104 or permission. Cr 3.

HTY 477 The American Worker
Examines changes in the world of work during successive phases of capitalist development since the Revolutionary War. Focus on skilled and unskilled labor, the evolving factory system, public policies and effects of technological change, ethnicity, race and gender on worker responses. Assesses contemporary workplace issues from an historical perspective. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives Requirements.) Prerequisites: HTY 103, HTY 104 or permission. Cr 3.

HTY 479 U.S. Environmental History
The attitude, policies, and behavior of Americans and their government toward the environment. Current issues evolving out of past attitudes and policies. (Satisfies the General Education Ethics and Human Values and Socil Contexts Population and the Environment Requirements.) Prerequisite: 6 hours of history or permission. Cr 3.

HTY 481 Amerindians of the Northeast: A History
Considers Amerindian history from a regional perspective, with emphasis on intersocietal and interethnic relations between the 16th and 19th centuries. It encompasses the Algonquian and Iroquoian speaking peoples from the Atlantic seaborard to the upper Great Lakes and from the Ohio Valley to the Hudson Bay. Cr 3.

HTY 482 Canada and the American Economy
Examines the role and impact of American investment and technology on Canada, relations between American businessmen and Canadian elites, respective industrial relations systems, U.S. trade unions in Canada, trade legislation and other government policies affecting the North American economy. Prerequisite: HTY 459 or HTY 460 or ECO 338 or BUA 345 or permission. Cr 3.

HTY 484 History of Jazz
Origin and development of the American form of improvised music popularly known as "Jazz." Study and analysis of the styles of Jazz as forms of musical art through exposure to the music, especially as played by major innovators. Prerequisite: HTY 103, HTY 104 or permission. **Cr 3.**

HTY 485 The Sea and Civilization: An Introduction to Maritime Studies I
A study of humankind in relation to the sea from prehistory to 1800 including demographic and social effects of the seas on human populations, marine technology, economics of the seas, national and international ramifications. Not open to first-year students. **Cr 3.**

HTY 486 The Sea and Civilization: An Introduction to Maritime Studies II
A study of humankind in relation to the sea from 1800 to the present including demographic and social effects of the seas on human populations, marine technology, economics of the seas, national and international ramifications, contemporary problems. Not open to first-year students. **Cr 3.**

HTY 491 Technology and Society Until 1800
Examines the development of technology from earliest times through the English Industrial Revolution both 'internally'—as tools and machines—and 'externally'—as related to the societies which have produced them and upon which they in turn have had impact. (Satisfies the General Education Human Values and Social Contexts Western Cultural Tradition Requirement.) Not open to first-year students. **Cr 3.**

HTY 492 Technology and Society Since 1800
Examines the development of technology, with emphasis on America, since the English Industrial Revolution both 'internally'—as tools and machines—and 'externally'—as related to American and other societies which have produced them and upon which they in turn have had impact. (Satisfies the General Education Human Values and Social Contexts Western Cultural Tradition Requirement.) Not open to first-year students. **Cr 3.**

HTY 494 Women, History and American Society: Selected Topics
Examines the changing experiences of American women via several intensive, topical interdisciplinary explorations. Emphasis on women's historical relationship with different institutions or bodies of knowledge. Possible topics include: history of women, family, and the law, women and technology, women and work, or women and racism. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives and Demonstrated Writing Competency Requirements.) May be repeated once for credit. Prerequisite: 6 hours of history or permission. **Cr 3.**

HTY 495 Cities in Nineteenth-Century America
Considers the challenge of creating viable American cities, 1790-1917; changing urban forms; impact of urban life on culture, politics, and society; problems associated with rapid industrial and demographic growth, ethnic and class cleavage, and new urban technologies. Prerequisites: HTY 103 or HTY 104 or permission. **Cr 3.**

HTY 496 Protest and Reform in Nineteenth-Century America
Considers America's nineteenth-century political crusades: Jacksonian democracy, the anti-slavery movement, populism, progressivism, and working-class radicalism. Covers the social tensions that gave rise to these reform movements, the leadership and organizational developments, the issues, the goals, and accomplishments. Prerequisites: HTY 103 or HTY 104 or permission. **Cr 3.**

HTY 497 The Rise of Industrial America, 1790-1929
Traces the transformation of America into a predominantly industrial society including foundations for the rise of industry; impact on cities and farms, trade and commerce, money and banking; changing forms of business organization; national and international politics. Prerequisites: HTY 103 or HTY 104 or permission. **Cr 3.**

HTY 498 Senior Seminar in History
Intensive reading, research, and writing under the close supervision of an instructor on a selected problem in American or European history. Required of History majors; offered each semester. **Cr 3.**

HTY 499 Contemporary Problems in History
In depth analysis of a selected controversial contemporary historical problem. The specific topic and methodology will be chosen jointly by interested students and an instructor. Prerequisite: permission. **Cr 1-3.**

HTY 501 American Diplomatic History
Advanced reading seminar. Deals with problems, interpretations, and issues in American diplomacy such as maritime neutral rights, expansion, role of military and naval powers. Content varies. Prerequisites: graduate students, senior history majors and others by permission. **Cr 3.**

HTY 502 American Intellectual History
Advanced reading seminar. Major intellectual currents in American history, e.g. Transcendentalism, Pragmatism, progress, mission. Interrelationship between ideas and their social environment. Content varies. Prerequisites: graduate students, senior history majors and others by permission. **Cr 3.**

HTY 503 American Regional History
Advanced reading seminar. Emphasis on various historically discrete areas, such as the South, West, New England; their distinctive development and interrelationship to broader American history. Content varies. Prerequisites: graduate students, senior history majors and others by permission. **Cr 3.**

HTY 505 American Political History
Advanced reading seminar. Covers major political ideas, constitutional and legal development, political issues and their impact on American society, political party evolution. Content varies. Prerequisite: graduate students, senior history majors and others by permission. **Cr 3.**

HTY 507 American History to the Civil War
Exposes graduate students to the basic themes of American history and a wide range of readings. Key topics to be addressed include colonial, urban, diplomatic, labor, political, legal, business, western, New England, cultural, women's, southern and African-American history and the history of technology. **Cr 3.**

HTY 508 American History from the Civil War to the Present
Exposes graduate students to the basic themes of American history and a wide range of readings. Key topics to be addressed include colonial, urban, diplomatic, labor, political, legal, business, western, New England, cultural, women's, southern and African-American history and the history of technology. **Cr 3.**

HTY 517 Seminar in Premodern European History
Current research on premodern European history, especially as applied to graduate research and problems of teaching European or World Civilization at secondary school or college level. **Cr 3.**

HTY 518 Readings Seminar in Modern European History
Reading and discussion of important recent books and articles in modern European history. Emphasis on publications and historical problems which apply to teaching European and world history on the secondary school and college levels, and on preparation for graduate study in European history. Prerequisite: seniors and graduate students. **Cr 3.**

HTY 519 Modern England
Evaluation of selected problems in English history since 1815 including the gradual democratization of British government, continuing industrial revolution, and impact of two world wars on English social, cultural and political life. Prerequisites: graduate students, senior history majors, and others by permission. **Cr 3.**

HTY 520 Canadian Historiography
Critical analysis of works by selected historians of Canada from F.X. Garneau to the present. **Cr 3.**

HTY 521 Canada and the United States, 1783 to the Present
Wars, migration, boundaries, resources, and trade, emphasizing the historical background to contemporary political, strategic, economic, and cultural issues in Canadian-American relations. Prerequisite: HTY 459, HTY 460, or HTY 473, HTY 474 or POS 374 or permission. **Cr 3.**

HTY 550 Readings in Bibliography and Criticism in:
1. American History
2. European History
3. British and Commonwealth History
4. Canadian History
5. Latin American History
6. Asian History
7. Maine History
8. Maritime History

Cr Ar.

HTY 597 Field Work in Historical Institutions
Field work in local museums, state agencies, and other historic laboratories. Involves preparation and repair of exhibits, research and preparation of historic preservation documents, and beginning archival and artifact handling. Prerequisite: graduate students, senior history majors and others by permission. Cr 3-12.

HTY 598 Editing and Producing a History Journal
Introduction to the various stages and procedures involved in editing and producing a scholarly journal in history, including editorial revisions, layout, graphics, proofreading, and printing. Practicum format in association with the Maine Historical Society Quarterly (MHSQ.) Prerequisite: graduate standing. Cr 1-3.

HTY 599 Special Topics in History
Exploration and analysis of new trends in research and interpretation in history. Prerequisite: graduate students, senior history majors and others by permission. Cr 3.

Courses in Human Development (HUD)

HUD 511 Seminar in Family Relationships
Reports and discussions of current literature in family relationships and related social sciences with special attention to critical analysis. Cr 3.

HUD 525 Theories of Child Development
Theoretical conceptualizations influencing the study of child development. Prerequisite: permission of instructor. Cr 3.

HUD 535 Recent Research in Child Development
Advanced study of topics of current interest in the field of child development. Reports and evaluation of current research. Prerequisite: Permission of the instructor. (May be taken more than once for credit.) Cr 3.

HUD 540 Theories and Concepts of Family Development
An interdisciplinary and developmental approach to the evaluation of theories used in the study of family functioning. Prerequisite: Permission of the instructor. Cr 3.

HUD 560 Seminar in Human Development
Reports and discussions of research findings in human development. Topics may vary by semester. (May be repeated for credit.) Prerequisite: permission. Cr 3.

Courses in English as a Second Language (IEI)

IEI 010 Developing Accurate Listening
Students learn to improve their understanding of oral, idiomatic speech of native speakers through close and systematic examination of the rhythm and stress, intonation and phonemes of American English. Students improve their own production of American English through individual and group work on troublesome areas.

IEI 012 Oral Communication Skills for Non-Native Speakers
Practice in various modes of speaking, listening and interacting in conversational and academic English in increasingly more challenging situations. The focus is on developing strategies for effective communication.

IEI 013 Writing and Grammar for Non-Native Speakers
The structures of English are examined in a sequence of levels increasing in complexity and subtlety. Writing tasks appropriate to each level, ranging from basic descriptions to formal essays, consolidate and improve writing skills from both a grammatical and organizational perspective. Writing assignments help students to develop fluency, clarity, organization, expression, grammatical accuracy and editing skills.

IEI 014 Vocabulary and Reading for Non-Native Speakers
Students develop their receptive and productive vocabulary as well as their reading ability. Activities will focus on strategies for effective reading and the acquisition of new vocabulary, including the recognition of rhetorical structures, English lexical forms and word formation rules. Students work with level-appropriate texts to develop reading comprehension and speed.

IEI 015 Directed Study Skills
Assists the transition of students entering the University of Maine through the Intensive English Institute. An individualized program of study for intermediate level students and higher; required of conditionally admitted students. Topics include the cultural and academic skills necessary for successful study in American universities including analysis of course expectations through syllabi and textbooks, course selection and registration, writing papers for university courses, test taking, library research methods, lecture notetaking, speaking in class and with professors, introduction to E-mail, word processing and URSUS. Prerequisite: permission of instructor. (Pass/Fail Grade Only.)

IEI 016 English Through U.S. History and Culture
Students will examine U.S. history and culture in terms of significant events, values, behaviors and beliefs and develop their skills in classifying, analyzing, evaluating and reacting by working with adapted authentic texts and other media. Students improve their English language proficiency as they learn about some of the many cultural and historical references made in social and academic contexts and bridge from language learning to acquiring academic knowledge.

IEI 017 English Through Film
Through the medium of film, students work with authentic language and contexts to develop their ability to understand and communicate in English. The development of vocabulary, aural comprehension and speaking skills are major components of the course. Critical thinking skills are developed through discussion and written analysis of films.

IEI 018 TOEFL Preparation
Focuses on all the skills (grammar, listening, reading and vocabulary) necessary for the TOEFL. Test taking tips and strategies will also form a part of the course, along with the opportunity to take a practice TOEFL. Students receive regular feedback on their performance and individual guidance in terms of how to best prepare for the TOEFL.

IEI 019 Special Topics in ESL
Readings, discussions, lectures, oral and written reports on issues and themes in U.S. History and contemporary society with a cross-cultural perspective. Topics vary. For intermediate and advanced level students. Cr 3.

IEI 024 Academic Composition and Critical Reading
Prepares non-native speakers of English to meet both undergraduate and graduate level standards of presenting their own research in written reports or formal papers. Students will work on critical analysis of research material and writing skills that include analysis, evaluation, response and documentation. Also emphasizes development of the students' skills of critical assessment of their own research and writing. Prerequisite: Permission of the IEI director required. (Pass/Fail Grade Only.)

IEI 025 Advanced ESL Speech Communication
Prepares students for both public communication and sophisticated interpersonal situations. Emphasis will be placed on presenting information through detailed explanation, persuasive speaking utilizing researched support materials and strategies of group discussion, debate and argumentation. Discussion will include sociolinguistic conventions of communication in Western cultures. Formal presentation of some aspect of each student's special field of interest is required. Prerequisite: permission of the IEI director required. (Pass/Fail Grade Only.)

IEI 026 Business English Studies
Students focus on developing communication skills in a number of business contexts including business case analysis and simulations, public speaking, problem-solving discussions, presentations, reports and negotiations. Selected topics in management, marketing and strategic planning are introduced and discussed. Values, customs and practices that influence business and international relations, such as concepts of time, trust, quality, success, commitment, attitudes to work and leisure, cultural diversity, etc. are discussed from a cross-cultural perspective to help students understand the U.S. approaches to business.

IEI 034 TOEFL Preparation Program - Core Classes (Listening, Structure, Reading and Vocabulary)
Students develop the listening and reading skills required for success on the TOEFL and in university classes. They also develop their knowledge of English structures and learn how to apply that knowledge to the TOEFL and to their own work. Vocabulary acquisition is a third component of the class. For intermediate level students of English and above. 4 weeks, 15 hours per week. (Pass/Fail Grade Only.)

IEI 034L TOEFL Preparation Program - Labs (Study Skills, Writing and Listening)
In the Study Skills lab, the academic skills required of U.S. university students are presented and students develop them using authentic materials and facilities of the university. In the Writing lab, students prepare for the Test of Written English (TWE.) In the Listening lab, students practice and further develop the listening skills introduced in the core class for listening comprehension. For intermediate level students of English and above who are enrolled in IEI 034. 4 weeks, 8 hours per week.

IEI 036 TOEFL Preparation Program - Core Classes (Listening, Strucuture, Reading and Vocabulary)
Students develop the listening and reading skills required for success on the TOEFL and in university classes. They also develop their knowledge of English structures and learn how to apply that knowledge to the TOEFL and to their own work. Vocabulary acquisition is a third component of the class. For intermediate level students of English and above. 6 weeks, 15 hours per week. (Pass/Fail Grade Only.)

IEI 036L TOEFL Preparation Program - Labs (Study Skills, Writing and Listening)
In the Study Skills lab, the academic skills required of U.S. university students are presented, and students develop them using authentic materials and facilities of the university. In the Writing lab, students prepare for the test of written english (TWE.) In the Listening lab, student practice and further develop the listening skills introduced in the core class for listening comprehension. For intermediate level students of English and above who are enrolled in IEI 036. 6 weeks, 8 hours per week.

IEI 040 Writing for International Graduate Students
Success in graduate school largely depends on clear, concise and correct written expression. Recognizing that students may have experience as writers in academic settings, this course aims to introduce, develop and maintain the skills particular to writing at the graduate level in the U.S. Research materials from individual students' fields will serve as a point of departure for the creation of a portfolio of writing projects, covering topics from documentation techniques to the preparation of articles of publishable quality.

Interdisciplinary Courses (INT)

INT 105 (ECO, REP) Environmental Policy
Examines the relation between the natural environment and the economy, the economic sources of environmental degradation and economic analysis of alternative approaches to environmental regulation and management. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) **Cr 3.**

INT 110 (ECO, REP) Modern Economic Problems
An introduction to the operation of modern economic systems. Topics include: the price system, resource allocation, the organization of markets, the economics of government policy, and international aspects of the economy. This course does not substitute for either ECO 120 or ECO 121. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) **Cr 3.**

INT 190 (BSC, REP) World Food Supply, Population and the Environment
Reviews past and current trends in population, population distribution, and food production. Examines the physical and biological limits to food production, sustainability, distribution issues and relevant government policies. (Satisfies the General Education Human Values and Social Contexts Population and the Environment Requirement.) **Cr 3.**

INT 211 (BSE, MET) Introduction to CAM and Welding
Introduction to computer aided design and computer aided manufacturing software. Covers programming and operation of computer numerical control machine tools. Welding principles and practice including AC and DC stick welding, Oxy-fuel cutting and welding, GTA/GMA with iron, steel and aluminum. Prerequisite: MET 107, MET 121 or permission of instructor. Lab 3. **Cr 2.**

INT 219 (BSC) Introduction to Ecology
Emphasis on ecological principles and their relationships to the natural environment and human beings. Not open to majors in biological sciences or resource management. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) Prerequisite: BIO 100. Rec 3. **Cr 3.**

INT 256 (BSC, FES) Tree Pests and Disease
Principles of studying tree pests and disease with emphasis on understanding their identification, ecology, and control. Prerequisites: FES 100 or equivalent, BIO 233 or BIO 464. Lec 3, Lab 1. **Cr 4.**

INT 305 (SOC) Women of Maine: An Autobiographical Approach
An ongoing study of the language and communication patterns of women and men. Students learn oral history techniques and tape interviews with persons born in Maine. Interview transcripts are prepared and analyzed based on the historical period under examination and on relevant language and communication theories. Taught by cooperating faculty in Communication and Journalism, Anthropology, and History. Prerequisite: No first-year students. **Cr 3.**

INT 323 (AES, BSC, NRC, WLE) Introduction to Conservation Biology
Maintaining the diversity of life forms in the face of environmental degradation involves the study of population ecology, population genetics, and ecosystem ecology plus the socioeconomic and political matrix in which conservation problems must be solved. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) Prerequisite: BIO 100. **Cr 3.**

INT 329 (REP, SOC) The Individual and the Community
Analysis of the structure and functioning of the community. Emphasis on ways in which individuals and groups are affected by community dynamics. Students participate in a community project. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Prerequisite: permission. Rec 3. **Cr 3.**

INT 330 (CIE, REP) Waste Management
The study of the history and current problems of society's municipal solid waste. Waste generation, recycling and disposal are covered for both Maine and the nation. Social, economic and engineering aspects are examined. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) **Cr 3.**

INT 398 (CHE, CHY, ECE) Undergraduate Research Participation
Research topics chosen by students in consultation with faculty members. Students submit a final report describing their research and present an oral seminar. **Cr 1-3.**

INT 410 (ANT, ENG, MLC) Introduction to the Study of Linguistics
A survey of language structure and its socio-cultural, psychological and

historical aspects. Provides conceptual and technical tools for understanding the phenomenon of language. No previous training in languages or linguistics is required. Cr 3.

INT 440 (ANT, HTY) Shipwreck Sites: Archaeological and Historical Investigations
The process of a complete shipwreck site investigation, from initial research through publication. Prerequisite: ANT 317 or permission. Cr 3.

INT 441 (ANT, HTY) Maritime History and Archaeology of New England
An overview of maritime aspects of New England history, from aboriginal uses through the current state of maritime New England. Emphasis will be given not only to history, but also pertinent archaeological research. Prerequisite: HTY 103 or HTY 104 or permission. Cr 3

INT 450 (AES, REP) Design and Management of Agroecosystems
Students utilize concepts in crop/pest ecology and economic analysis to evaluate farming system of selected operating farm and recommend appropriate changes. Students work as teams making oral and written presentations of findings. (Satisfies the General Education Demonstrated Writing Competency and the Capstone Experience Requirements.) Prerequisites: Must have completed in introductory courses in two of the three pest sciences or permission. BIO 326, BIO 327, AES 403 and INT 256. Cr 3.

INT 460 (BSC, BSE, CIE) Environmental Aspects of Aquaculture
Impact of the environment, including currents, waves, tides, temperature, bottom type, nutrients, food availability, and pollution on aquaculture, using algae and shellfish as demonstration species. Projects involving site evaluation for aquacultural activities will utilize GPS, GIS and numerical flow models. Prerequisites: BIO 100, BIO 210, MAT 126, MAT 434. Cr 3.

INT 475 (BSC, FTY, SMS, WLE) Field Studies in Ecology
An intensive ecology field trip of one to several weeks to an area of ecologic interest scheduled during Christmas, midyear, spring recess or summer. Field and living conditions may be rigorous and/or primitive. Prerequisite: a course in ecology. Other preparation and/or recommended prerequisites announced for each trip. Credit depends upon specific trip. Cr Ar.

INT 476 (HDF) School and Society Study Tour
A field based, interdisciplinary study tour of educational facilities such as schools, hospitals, food services and selected agencies in foreign countries. Lectures, seminars, tours and and presentations by teachers and officials will supplement guided visits to classrooms, hospitals, food services and agencies. Cr 3.

INT 482 (AES, BSC) Pesticides and the Environment
Study of the properties of pesticides and their fate in the environment. Includes application technology, governmental regulations, and environmental concerns. Prerequisites: One semester of biology and one semester of chemistry; juniors and above. Lec 3. Cr 3.

INT 494 (PAA, POS) Field Experience
Students participate in a political or governmental organization. Readings and reports required in addition to meetings with faculty sponsor and/or other field experience participants. Six credit hours maximum for any single field experience registration. Majors within the department may not receive more than a total of 12 credit hours toward graduation for any combination of internships and field experience, and not more than 6 credit hours may be used toward the department major. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: junior or senior standing. Cr Ar.

INT 500 (AES, ANT, BSC, GES) Seminar in Quaternary Studies
Selected areas of study - physical, biological and anthropological - related to the Quaternary Period. One weekend field trip may be required. May be repeated for credit. Prerequisite: permission. Cr Ar.

INT 510 (BSC, SMS) Marine Invertebrate Zoology
Covers systematics, adaptive-functional anatomy, and life histories of free-living marine invertebrates, excluding protozoans. Laboratory emphasis on studies of living material from the local fauna. Numerous field trips required. Prerequisite: BIO 353 or equivalent. Rec 2, Lab 6. Cr 5.

INT 514 (ECO, REP) Microeconomic Theory
An examination of modern economic analysis with regard to the consumer, the firm and market structures. Prerequisite: permission. Cr 3.

INT 521 (BUA, COJ, NUR, PAA, SWK) International and Intercultural Relationships
Exploration and integration of theoretical, experiential and practical considerations of international and intercultural relationships and communication, both professional and personal. Open to graduate students in all disciplines. Cr 3.

INT 525 (BSC, BSE, FTY) Tropical Deforestation Seminar
Local, regional and global issues associated with tropical deforestation are addressed. Discussions focus on ecological, social, political, economic and cultural aspects of tropical forests and human interactions for understanding the causes and consequences of deforestation. Prerequisites: Senior or graduate status or permission. Lec 1. Cr 1 or 2.

INT 528 (CDS, NUR, PSY, SWK) Interdisciplinary Rural Health Care Delivery I
A study of health professions, health care delivery models, and interdisciplinary team health care delivery in rural settings. Group process and conflict management strategies are incorporated. Prerequisite: permission. Cr 3.

INT 529 (CDS, NUR, PSY, SWK) Interdisciplinary Rural Health Care Delivery II
Through use of case studies illustrative of prevalent health problems, students will learn to function as interdisciplinary health delivery team members. Focus is on needs associated with cultural minorities, rurality and poverty. Prerequisite: INT 528 or permission. Cr 3.

INT 530 (ECO, REP) Econometrics
An introduction to economic concepts and relationships expressed in quantitative terms. Covers problems of ordinary least squares, generalized least squares, estimation and use of multiequation models and forecasting. Prerequisite: ECO 485 or permission. Cr 3.

INT 551 (BUA, CHE, FTY, WSC) Structure of the Pulp and Paper Industry
Includes an historical overview of the industry, products and product classifications, profiles of industry leaders, management styles, trends in strategic planning, financial aspects, capital investment and budgeting and an analysis of issues related to raw material availability and the environment pressures facing the industry. Prerequisites: senior or graduate level standing in Business, Chemical Engineering, Forest Management or Wood Science and permission. Cr 3.

INT 553 (BUA, CHE, FTY, WSC) Markets and Marketing in the Pulp and Paper Industry
A detailed look at the markets and marketing of pulp and paper both domestically and internationally. Buyer/seller relationships, distribution, promotion, strategic planning, competitive/competitor analysis and pricing for commodity and specialty producers. Prerequisite: INT 551. Cr 3.

INT 555 (AES, BSC) Pest-Plant Interactions
Physiological and genetic systems involved in pathogenesis, insect feeding, and host plant resistance, including plant breeding practices and strategies for disease and insect control. Prerequisite: genetics and biochemistry or permission. Cr 3.

INT 563 (BSC, SMS) Marine Benthic Ecology
Advanced ecological studies of benthic intertidal and subtidal marine organisms. Includes discussion of distributions, zonation, biotic interactions, food webs, succession, hypothesis testing, problems of scale, recruitment community structure and organization. Prerequisite: a course in ecology. Lec 2, Rec 1. Cr 3.

Courses in Integrating Students into Interdisciplinary Studies (ISI)

ISI 192 Ages of Discovery
Art exploration of a range of topics for first-year students. Designed as an introduction to the various academic disciplines, the course will explore several different topics from an interdisciplinary perspective. Will concentrate on the ideas of geographical exploration and intellectual invention. Emphasis on developing critical thinking and writing skills. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition/Social Contexts and Institutions and the Demonstrated Writing Competency Requirements.) **Cr 3.**

ISI 193 World in the Balance: Population and the Environment
An exploration of society's use of finite resources on earth. Among others, the course will address the concepts of carrying capacity, population growth, and human consumption and the environment, including ideas regarding finite resources, such as deforestation, the consequences of the loss of species and the disposition of waste. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) **Cr 3.**

ISI 194 Bodies of Power: Legitimacy and the State
An examination of the connections - sometimes explicit, sometimes implicit - between forms of political power and their means of retaining legitimacy. Questions to be addressed include: What is power? Why is power important? How is power manifested? Who acquires power? How do the powerful act to retain power? (Satisfies the General Education Human Values and Social Contexts/ Social Contexts and Institutions and Demonstrated Writing Competency Requirement.) **Cr 3.**

ISI 195 The Mind's Eye: The Brain, Consciousness and Understanding
An exploration of the physiological nature of the mind as entity and as concept. Of particular significance in this course will be a consideration of the diverse effects and affects of the mind on human ways of seeking understanding and determining meaning. The course as a whole was organized in relation to three general themes: communication systems and language; consciousness; and bicamerality. **Cr 3.**

Courses in Journalism and Mass Communication (JMC)

JMC 100 Introduction to Mass Communication
Introduces the structure and operation of mass media and the social, political and economic implications of their activities. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) **Cr 3.**

JMC 211 History of Mass Communication
Social history of mass communication roles, technologies and processes with emphasis on interactions with political, economic and cultural institutions. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Social Contexts and Institutions Requirements.) **Cr 3.**

JMC 212 Survey of Telecommunication
Survey of broadcast and non-broadcast communications services as they function in the United States including history, industrial structure, systems of content and dissemination, and social, political and technological influences. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) **Cr 3.**

JMC 236 Writing for the Mass Media
Practical introduction to non-fiction writing styles in journalism, broadcasting, advertising and public relations. Intensive stress on grammar, spelling, punctuation. Work is typed in desktop publishing lab. Prerequisite: ENG 101 with 'C' or better. **Cr 3.**

JMC 237 Newswriting and Reporting
Provides intensive practice in newswriting with emphasis on accuracy, style, judgment and responsibility. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: JMC 236 with a 'C-' or better. **Cr 3.**

JMC 250 Introduction to Advertising
Examines social and economic roles of advertising including rate structure, agency practices, effective use of media. Advertising principles analyzed and discussed from the media point of view. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) **Cr 3.**

JMC 251 Media Operation and Management
Basic principles and methods of operation and management applied to the mass media with emphasis on circulation, advertising, business, and editorial operations. Prerequisite: JMC 100 or JMC 250. **Cr 3.**

JMC 314 International Mass Communication
Survey of media systems around the world and the role of mass media in political, social, economic and cultural development. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) **Cr 3.**

JMC 330 Copy Editing
A lab course in electronic copy editing designed to develop editorial judgment and skills for preparing news for publication. Covers headline writing, photoediting and basic page make up. Prerequisite: JMC 237 with 'C-' or better and declared JMC majors or permission. **Cr 3.**

JMC 332 Public Affairs Reporting
Students cover public issues and institutions in surrounding communities and write for publication. Emphasis on local and state government. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: JMC 237 with 'C-' or better and declared JMC majors or permission. **Cr 3.**

JMC 341 Electronic Journalism
Develops news reporting and writing skills for radio, television and on-line computer journalism. Prerequisite: JMC 237 with 'C-' or better and declared JMC majors or permission. **Cr 3.**

JMC 355 Advertising Copy and Graphics I
Provides theory and practice in creating advertising for print, direct mail and electronic media, with emphasis on the limitations of each and the responsibilities of the advertising practitioner. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: JMC 236 and JMC 250 with 'C-' or better; declared JMC majors or permission. **Cr 3.**

JMC 356 Advertising Media
Covers problems and procedures of the advertising industry as they pertain to media selection, support, promotion, research, organization, and consumer understanding. Prerequisite: JMC 250 or BUA 370 with 'C-' or better; declared JMC majors. **Cr 3.**

JMC 358 Advertising Copy and Graphics II
Continuation of topics covered in JMC 355. Theory and practice of perception and persuasion. Students undertake realistic projects and build portfolios. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression and Demonstrated Writing Competency Requirements.) Prerequisite: JMC 355 with grade of 'B' or better; declared JMC majors or permission. **Cr 3.**

JMC 375 Mass Media Law and Regulation
Topics include libel, privacy, contempt, copyright, obscenity, censorship, prejudicial pre-trial publicity. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Social Contexts and Institutions Requirements.) Prerequisite: JMC 100 with 'C-' or better; declared JMC majors or permission. **Cr 3.**

JMC 376 Programming and Criticism of Electronic Media
Programming practices, strategies and conventions considered in relation to broadcast history, economics and socio-cultural factors. Critical analysis of contemporary program trends in television and radio. Prerequisite: JMC 212 with 'C-" or better; declared JMC majors or permission. **Cr 3.**

JMC 398 Topics in Mass Communication
Topics not regularly covered in other courses. Content varies to suit current needs. May be repeated for credit. Prerequisite: Permission. **Cr 1-3.**

JMC 434 Editorial and Opinion Writing
Develops skills of persuasive and argumentative writing, with emphasis on disciplined logic, knowledge of subject and alternate points of view. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Prerequisite: At least 12 hours of journalism, including JMC 237 with a 'C-' or better and declared JMC majors or permission. Cr 3.

JMC 435 Feature Writing
Develops style and proficiency in writing non-fiction newspaper and magazine articles. Prerequisite: At least 12 hours of journalism, including JMC 237 with a 'C-' or better and declared JMC majors or permission. Cr 3.

JMC 459 Advertising Campaigns
Emphasis on practical and theoretical aspects of marketing and promotional strategy, creative effort, media selection, and advertising research. Prerequisite: JMC 355 and JMC 356 with 'C-' or better; declared JMC majors. Cr 3.

JMC 489 Seminar-Media Ethics and Issues
An advanced level course requiring extensive reading, discussion and research on the mass media and ethics, politics, economics and society. Prerequisite: Senior JMC majors or permission. Cr 3.

JMC 492 Directed Independent Study
Individualized study of a mass communication topic. Prerequisite: permission. Cr 1-3.

JMC 495 Internship
Internships must receive prior departmental approval. Interns may earn from 1 to 3 credit hours per internship with 1 credit hour awarded for each 50 hours of work. Prerequisite: Declared majors only with permission. (Pass/Fail Grade Only.) Cr 1-3.

JMC 497 Problems in Telecommunication
Special topics and problems in Broadcasting and Cable, including criticism and analysis. Prerequisite: permission. Cr 3.

JMC 498 Advanced Topics in Mass Communication
Topics not regularly covered in other courses, content varies to suit current needs. Prerequisite: permission. Cr 1-3.

Courses in Education: Kinesiology and Physical Education (KPE)

KPE 222 Personalized Health Fitness
To develop an understanding of basic principles of health fitness and to develop a personal fitness program. Modern strength training techniques including free weights, plyometrics, and resistance machines. Prerequisite: KPE major or permission. Cr 2.

KPE 223 Lifeguard Training
Develops the necessary skills and comptencies to qualify as a certified American Red Cross nonsurf lifeguard. Prerequisite: permission. Cr 1.

KPE 227 Introduction to White Water Kayaking
Covers the fundamentals of white water paddling, the basic strokes, maneuvers, rolling, and river reading and strategy. Discussion and projects will focus upon, current issues in paddling, equipment development and sport specific training. Cr 2.

KPE 228 Introduction to Rock Climbing
Covers the fundamentals of climbing movement, the basics of belaying and rappelling, anchor establishment and self-rescue. Discussion and projects will focus upon climbing history, current issues in climbing, equipment development and sport specific training. Cr 2.

KPE 229 Ropes Course Management
Familiarizes you with the concepts of adventure based programming which relies on activities such as cooperative games, group initiative and problem solving elements, trust activities, and low and high ropes course elements to help individuals and groups learn about concepts such as decision making and problem solving, leadership and how to be a team player. Introduces the technical methods and skills required to conduct ropes course activities, as well as the associated management issues of the safety, liability and staffing training. Cr 2.

KPE 230 Archery
Instruction to develop skills and teaching techniques in this leisure activity. Prerequisite: KPE major or permission. Cr 1.

KPE 231 Badminton
Instruction to develop skills and teaching techniques in this leisure net sport. Prerequisite: KPE major or permission. Cr 1.

KPE 232 Golf
Instruction to develop skills and teaching techniques in this leisure activity. Prerequisite: KPE major or permission. Cr 1.

KPE 233 Volleyball
Instruction to develop skills and teaching techniques in this leisure net sport. Prerequisite: KPE major or permission. Cr 1.

KPE 234 Racquetball
Racquetball skills and teaching techniques along with instructions and rules will be presented. Prerequisite: KPE major or permission. Cr 1.

KPE 235 Rhythmic Activities
Develops skills, teaching techniques and an understanding of basic rhythms, particularly as they relate to folk, social, and square dance patterns. Prerequisite: KPE major or permission. Cr 1.

KPE 236 Dance Fitness
To develop skills and teaching techniques in performing and teaching aerobic dance. Prerequisite: KPE major or permission. Cr 1.

KPE 237 Swimming Skills
Teaching and improving the skills in swimming, springboard diving, water polo, and related aquatic skills. Each phase developed carefully and fully, enabling the more capable to learn how to teach these basic skills at each level, including the beginning level. Prerequisite: KPE major or permission. Cr 1.

KPE 238 Tennis
Instruction to develop skills and teaching techniques in this leisure net sport. Prerequisite: KPE major or permission. Cr 1.

KPE 240 Methods of Teaching and Coaching Track and Field
Designed to develop proficiency in basic track and field skills and knowledge of methods of teaching and/or coaching track and field. Cr 1.

KPE 241 Methods of Teaching and Coaching Basketball
Practical instruction in basketball to develop skills, techniques and understandings for people preparing to enter the teaching and coaching professions. Cr 1.

KPE 242 Methods of Teaching and Coaching Baseball
Provides the student with the skills, techniques and understandings necessary to teach and/or coach baseball to youngsters representing all ability levels. Cr 2.

KPE 243 Methods of Teaching and Coaching Football
Develops proficiency in basic football skills and knowledge of methods of teaching and/or coaching football. Prerequisite: sophomore standing. Cr 1.

KPE 244 Methods of Teaching and Coaching Soccer
Practical instruction in soccer to develop skills, techniques, and understandings for those preparing to enter the teaching and/or coaching professions. Prerequisite: sophomore standing. Cr 1.

KPE 247 Methods of Teaching and Coaching Softball
Provides the student with comprehensive instructional materials, including the guiding principles for all aspects of the game. Content includes the skills of softball and methods of coaching and teaching. Prerequisite: sophomore standing. Cr 1.

KPE 248 Methods of Teaching and Coaching Field Hockey
Identifies for the prospective teacher/coach the basic skills and techniques used in field hockey. Emphasis on teaching and coaching methods. Prerequisite: sophomore standing. Cr 1.

KPE 249 Methods of Teaching and Coaching Swimming and Diving
Stroke analysis, training and conditioning for competitive swimming, springboard diving, basic synchronized swimming and pool management. **Cr 1.**

KPE 250 First Aid and Emergency Care
Involves instruction in, and practice of, first aid and emergency medical care procedures. Students will be required to pass written examinations and practical tests to demonstrate competency in cardio-pulmonary resuscitation and how to correctly handle bleeding, wounds, shock, musculo-skeletal injuries, and various medical emergencies. Prerequisite: KPE major or permission. **Cr 2.**

KPE 253 Theories of Conditioning
Familiarizes the student with different physical conditioning regimens and what these programs can and cannot accomplish. Investigates specific traits and components of physical fitness and develops competencies to prescribe conditioning programs to meet specific needs. Prerequisite: KPE major or permission. **Cr 3.**

KPE 262 Methods-Teaching Physical Education
Methods of teaching physical education to all grade levels and abilities. Teaching models and practical application of models by students will be stressed. Teaching effectiveness techniques, theories, principles, instructional design and methods of evaluation will be examined. **Cr 3.**

KPE 270 Motor Development and Learning
The understanding and application of major principles in the development and learning of motor behavior from conception through adolescence. The effects of development in the cognitive and affective domains upon the motor domain. Prerequisite: KPE major or permission. **Cr 3.**

KPE 271 History and Philosophy of Kinesiology and Physical Education
Provides historical and philosophical knowledge in relation to physical education and sport. Current sociological issues will be discussed. Oral and written presentations will be required covering historical, philosophical and social issues relating to sport and physic physical education. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: ENG 101. **Cr 3.**

KPE 273 Prevention and Care of Athletic Injuries
Prevention and care of common injuries associated with the athletic, school or recreational setting. Use of proper personal and field equipment support methods, medical examinations and therapeutic aids. Prerequisite: BIO 208. **Cr 3.**

KPE 278 Health Education
Examines all the factors that influence health. Serves as a channel for education students in all the choices they have for creating positive, healthy lifestyles. Current health issues and information will be presented and discussed. **Cr 2.**

KPE 309 Wilderness First Responder
Covers a wide spectrum of emergency care topics relative to wilderness medicine and caring for injuries and illnesses over prolonged periods of time. A combination of discussions, practical stations and real-life simulations. Topics include assessment and management of traumatic injuries such as fractures, burns and wounds; circulatory, nervous and respiratory system problems; common injuries such as blisters, sprains and strains; medical problems such as anaphylaxis, toxins, altitude, hypothermia, hyperthermia, and infections; and use of improvised materials in remote situations. Includes information on personal outdoor preparedness, accident management and prevention and introduces simple evacuation techniques and ropework. Upon completion students receive nationally recognized Wilderness First Responder certification and CPR certification. **Cr 3.**

KPE 310 Outdoor Leadership
Develops and evaluates educational experience which can be pursued beyond the classroom setting. Emphasis will be on leadership, safety and liability in the field of outdoor education. Prepares student to meet the challenges of leading wilderness trips and conducting outdoor education classes. Lab fee will be charged. **Cr 3.**

KPE 344 Principles of Coaching
Supplies an appreciation and background in the art of coaching. Deals with the complex problems facing those that accept the challenge of handling our youth of today in a sport setting. The complete role of the effectiveness of the coach will be surveyed. Field trips to study experienced coaches will be required. Prerequisites: sophomore standing. **Cr 3.**

KPE 350 Educational Gymnastics, Games and Dance
Development of basic games analysis technique, gymnastic progressions and spotting techniques and group dance development and organization for the elementary and secondary schools. To develop skills in teaching games, dance and gymnastics, utilizing movement themes and activity. Prerequisite: KPE 262; KPE major or permission. **Cr 3.**

KPE 361 Organization and Administration of Physical Education and Recreation
Provides the student with an opportunity to organize and administer a physical education or recreation program. The student will develop skills in curriculum development, budgeting, bidding and purchasing, scheduling, hiring, evaluating, and insuring as they organize and administrate their program. **Cr 3.**

KPE 364 Elementary School Physical Education
Specifically designed for the elementary physical educator for the purpose of studying the movement education curriculum used in elementary schools. Emphasis will focus on effective teaching techniques, instructional planning and on the progression of skills used in games, dance and gymnastics. A laboratory teaching experience will be implemented at a local elementary school. Prerequisite: KPE 262. **Cr 3.**

KPE 365 Curriculum and Instruction in Secondary Physical Education
Provides the preservice teacher with an opportunity to practice learned effective teaching behavior in various teaching settings. Also provides the preservice teacher with an overview of secondary schools. Prerequisite: KPE 262. **Cr 3.**

KPE 367 Mainstreaming in Physical Education-Recreation
Helps teachers, coaches, and recreation personnel meet state and federal requirements for equal opportunities for handicapped persons. Content includes etiology and characteristics for handicapping conditions; implications for teaching; direct experience with handicapped persons. **Cr 3.**

KPE 372 Tests and Measurements in Physical Education-Recreation
Discussion and use of procedures and instruments for evaluation of persons in physical education, recreation and athletic programs. How to select, construct, administer, score, and interpret tests for psychomotor, affective and cognitive abilities will be emphasized. (Satisfies the General Education Mathematics Requirement.) **Cr 3.**

KPE 376 Kinesiology
An introduction to the analysis of human motion based on anatomic knowledge, basic biomechanics and kinesiological principles as they apply to teaching and coaching sport skills. Prerequisites: BIO 208, KPE 253. **Cr 3.**

KPE 378 Physiology of Exercise
Develops an understanding of the integration and regulation of physiological functions during physical activity. Through investigation of factors affecting human performance, and the coordinated adjustment of body functions to the stress of exercise, students will become more aware of the theoretical and practical applications of exercise science. Prerequisites: BIO 208, KPE 253. **Cr 3.**

KPE 380 Kinesiology and Physical Education Programs in the Elementary School
Integrates the goals, objectives and concepts of physical education with the curriculum of the elementary school. Emphasis on purposeful, idea-directed movement and the important contributions physical education makes to the health, fitness and development of the elementary school child. **Cr 3.**

KPE 384 Practicum in Kinesiology and Physical Education
Leadership experiences under staff supervision in the service program. Limited opportunities also exist in local public schools. Consult with Dr. Cobb before registering. **Cr 1-3.**

KPE 386 Assessment and Evaluation of Athletic Injuries
Provides theories and techniques for the assessment and evaluation of athletic related injuries. Determination of severity and referral protocols will be presented in reference to management and treatment. Prerequisite: KPE 273, KPE 376. Cr 3.

KPE 387 Rehabilitation of Athletic Injuries
Addresses flexibility, cardiovascular and strength needs as they relate to the rehabilitation of injured athletes. Proper progression of exercises, use of equipment and criteria to return athletes to activity will be discussed. Prerequisites: KPE 273, KPE 376, KPE 386 or permission. Cr 3.

KPE 388 Therapeutic Modalities
Provides specific content in the application and analysis of physical agents utilized in the treatment of athletes, including heat, cold, electricity, light, sound, water, traction and massage. Prerequisites: KPE 273; PHY 103 or equivalent. Cr 3.

KPE 398 Problems in Kinesiology and Physical Education
Individual work on a problem in the area of health, physical education or recreation. Cr 1-3.

KPE 409 Wilderness Education Skills and Leadership
Establishes a professional foundation for students pursuing careers in wilderness education and outdoor program management. Participation in the course requires a significant commitment from the student. In exchange, students will gain leadership experience and improve their knowledge and skills in a variety of areas including: philosophy and educational models of adventure education; expedition behavior; leading group and personal growth discussions; use of new games and initiatives; environmental awareness and minimum impact techniques; judgement and decision-making; emergency procedures/evacuation; expedition planning and organization; and basic wilderness skills such as cooking and nutrition, equipment maintenance and navigation. Prerequisite: KPE 310 or equivalent and instructor permission. Cr 4.

KPE 410 Practicum in Wilderness Education Skills and Leadership
Provides the opportunity for the student to implement the skills learned in KPE 409 in a professional setting. Students taking this practicum will be actively involved in the management and delivery of programs to the public. Student may also have the option of proposing their own self-directed study program. Prerequisite: KPE 409 or equivalent and instructor permission. Cr 3.

KPE 424 Adult Fitness
Adult fitness is designed as an introductory class which provides the student with a broad theoretical background in the area of adult exercise and physical training. The role chronic exercise has in the possible prevention and retardation of coronary heart disease serves as the basic premise of the course. Prerequisite: KPE 378. Cr 3.

KPE 425 Wellness Programming
Provides specific content in worksite health promotion. Current health issues implications will be explored. Initial planning, needs analysis, program design, implementation and evaluation will be presented in the context of health promotion in business, education and industry. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: KPE 378; junior standing and permission. Cr 3.

KPE 426 Exercise Leadership and Class Management
Provides specific knowledges, skills and competencies needed to appropriately develop, prescribe, instruct and manage various kinds of exercise programs for diverse populations. Prerequisite: KPE 424. Cr 3.

KPE 427 Field Experience
Supervised experience in conducting recreation programs in camp, community, social agency or institution situations. Prerequisite: permission. Cr 3-6.

KPE 468 Advanced Prevention and Care of Athletic Injuries
Acquaints teachers and athletic coaches with modern principles and practices in prevention, treatment, rehabilitation, and safety in physical education and athletics. Cr 3.

KPE 483 Planning the Health Education Curriculum
Assists students in more thoroughly understanding health education in relation to the total school curriculum. Concepts of curriculum development, national considerations and current research related to health curriculum construction. Cr 3.

KPE 485 Psycho-Social Aspects of Sport
An analysis of sociological and psychological dynamics and processes of sport. Topics will include: performance enhancement, gender and racial issues in sport, youth sport, and violence/aggression in sport. Prerequisite: Junior or Senior standing and PSY 100 or SOC 101. Cr 3.

KPE 560 Assessment and Evaluation of Human Performance
The assessment and evaluation of selected anatomical, physiological and psychological aspects of human performance for the purpose of developing prescriptive exercise programs based upon individual needs, goals and interests. Prerequisites: KPE 378 and permission. Cr 3.

KPE 572 Planning the Physical Education Curriculum
Selection of activities, sequentially arranged and organized to produce a curriculum for physical education for the modern school including time allotments, facilities, individual characteristics, problems of appraisal. Cr 3.

KPE 573 Motor Performance and Learning
Study of motor performance to aid the instructor to provide better theoretical framework to structure learning experiences for skillful individual performance. Prerequisite: permission. Cr 3.

KPE 575 Current Studies in Kinesiology and Physical Education
Analysis of current and emerging trends in kinesiology and physical education based on experiments, research, literature and empirical observations. Cr 3.

KPE 577 Organization and Administration of Kinesiology and Physical Education
Provides the student with an overview of the organization and administration of physical education and recreation programs. Develops an understanding of the essential components (interpersonal interaction, budgeting, scheduling, evaluating, etc.) of an effective program. Cr 3.

KPE 579 Current Studies in the Administration of Athletics Cr 3.

KPE 580 Mechanical Analysis of Human Movement
Analysis of activities provide the student with scientific basis for teaching and evaluating correct form for execution of the fundamental movements. Prerequisite: KPE 376. Cr 3.

KPE 582 Physical Education for the Exceptional
Modifications of instructional programs for atypical individuals in the regular school curriculum. Evaluation of body mechanics, programs of correction, recognition of behavior patterns. Cr 3.

KPE 583 Admininistration of Elementary & Secondary School Health Programs Cr 3.

KPE 584 Evaluative Procedures in Kinesiology and Physical Education
Introduces the student to various evaluative techniques which are designed to improve teaching effectiveness and student learning. Emphasis will be placed on utilizing various strategies of evaluation in the instructional setting. Prerequisite: KPE 372. Cr 3.

KPE 585 Development of an Adapted Physical Education and Recreation Program
Designed to assist professionals in developing and implementing a full range adapted physical education or recreation program. Addresses the program needs for children and adults of various types and levels of severity of handicapping conditions. Prerequisite: KPE 367 and KPE 372 or their equivalent. Cr 3.

KPE 588 Advanced Exercise Physiology
Broadens the knowledge base of graduate students and to identify potential research areas. Involves in depth study of selected topics in exercise

physiology and requires students to extensively utilize the current research literature. Prerequisite: KPE 378 and permission. **Cr 3.**

Course in Liberal Arts and Sciences (LAS)

LAS 100 Majoring in the Liberal Arts and Sciences
Introduces students to the faculty, students, facilities and resources central to their intended academic major. Topics covered include the specific program requirements of the intended major, the requirements of the B.A. and B.S. degrees, library resources and organization, special laboratory facilities, and the special expertise of faculty. First-year students only. Prerequisite: permission of Dean's Office. (Pass/Fail Grade Only). **Cr 1.**

Courses in Latin (LAT)

LAT 101 Elementary Latin I
Fundamentals of the Latin language. **Cr 4.**

LAT 102 Elementary Latin II
Fundamentals of the Latin language. Prerequisite: LAT 101 or equivalent **Cr 4.**

LAT 199 Review Latin
Fast-paced review of elementary Latin grammar for those who have taken two or more years of high school Latin but do not feel qualified to go on to LAT 203/204; substantial written assignments. The course is also appropriate for students at all levels who have been away from Latin for sometime and wish to review their Latin skills. This class is not the equivalent of LAT 203/204 level language courses. Prerequisite: 2 years of high school Latin or permission of instructor. Lec 2. **Cr 3.**

LAT 203 Readings in Latin Literature I
Selections from Latin prose authors: Cicero, Caesar, the letters of Pliny. Facility in reading through grammatical analysis will be emphasized. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) **Cr 3.**

LAT 204 Readings in Latin Literature II
Selections from Latin poetry. Meter, scansion and the interpretation of poetry will be emphasized. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: LAT 203 or the eqivalent or permission of instructor. **Cr 3.**

LAT 247 Latin Prose Composition and Stylistics I
Review of grammar and syntax, with particular attention to Cicero and Tacitus. The writing of prose, especially in the style of Cicero. Required for majors; should be taken in the junior year or earlier, if possible. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives and Demonstrated Writing Competency Requirements.) Prerequisite: LAT 204 or the equivalent or permission of instructor. **Cr 3.**

LAT 248 Latin Prose Composition and Stylistic II
Continued study of grammar and syntax. Required for majors; should be taken in the junior year or earlier, if possible. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives and Demonstrated Writing Competency Requirements.) Prerequisite: LAT 247 or permission of instructor. **Cr 3.**

LAT 451 Roman Comedy: Plautus and Terence
A study of the source of Roman comedy, its literary features, and influence upon later literature. One play by each dramatist will be read. Given every three years. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: LAT 204 or permission. **Cr 3.**

LAT 452 Roman Philosophical Thought
Examines the three major philosophical schools: Academic, Stoic, Epicurean, and their influence on Roman thought with selection from: Lucretius, .us De Rerum Natura, and Cicero's philosophical essays. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Offered every three years. **Cr 3.**

LAT 453 Poetry of the Republic and Early Empire
Considers the lyric poetry of Catullus, the Odes of Horace and the origin and development of satire, with selections from the satires of Horace and Juvenal. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Offered every three years. **Cr 3.**

LAT 454 Prose of the Republic and of Early Empire
Includes selections from Cicero's letters, Pliny's letters, and Tacitus' Annals. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Offered every three years. **Cr 3.**

LAT 481 Virgil: The Ecologues, Georgics, Aeneid
The poet's background achievements and influence upon later literature. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Offered every three years. **Cr 3.**

LAT 482 Medieval Latin
Introduction to a variety of Latin prose and texts from the Middle Ages. Emphasis on stylistic and thematic continuities with and differences from classical Latin prose and poetry. Offered upon sufficient demand. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 3.**

LAT 497 Projects in Latin I
Individual work on a project selected by the student. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: LAT 204 or equivalent or permission of instructor. (maximum: 3 hrs.) **Cr Ar.**

LAT 498 Projects in Latin II
Individual work on a project selected by the student. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: LAT 204 or equivalent or permission of instructor. (maximum: 3 hrs.) **Cr Ar.**

Courses in Landscape Horticulture (LHC)

LHC 111 Applications in Horticulture
Designed to permit students the opportunity to gain an overview of the discipline by participating in a series of hands-on exercises relating to important aspects of the science of landscape horticulture. Prerequisite: LHC major or permission. Lec 1, Rec 1. **Cr 2.**

LHC 119 Herbaceous Landscape Plants I
The study of foundational principles and practices of growing and using perennial herbaceous ornamental plants in the landscape. Emphasis of identification, selection, landscape use and plant culture. Prerequisites: AES 100 and LHC 111. Rec 2, Lab 2. **Cr 3.**

LHC 120 Herbaceous Landscape Plants II
The principles and practices of growing and using annual and indoor herbaceous ornamental plants in the landscape. Emphasis on identification, selection, landscape use and plant culture. Prerequisite: AES 100, LHC 111 and LHC 119. Rec 2, Lab 2. **Cr 3.**

LHC 130 Floral Design: Retail Shop
Demonstration and practice of the basic skills required in a flower shop: taping, wiring, vase arrangements, corsage, wedding and funeral designs. Fresh and dried flowers will be used. Prerequisite: Permission. (Pass/Fail Grade Only.) Lab 2. **Cr 1.**

LHC 131 Floral Design: Home
Design labs will emphasize the use of flowers in the home. Introduces the basic elements and principles in flower design, the care and storage of cut

flowers. Fresh, silk, and dried materials will be used. Prerequisite: Permission. (Pass/Fail Grade Only.) Lab 2. **Cr 1.**

LHC 143 Tropical Agriculture
Considers the characteristics and problems of the soils, plants, and animals of the tropics. Explores programs and methods for stimulating their potential productivity. (Spring - even.) Rec 3. **Cr 3.**

LHC 221 Woody Landscape Plants I
The study of conifers, small flowering trees and evergreen shrubs suitable for landscape use in New England. Emphasis on plant identification, cultural characteristics and use in the landscape. Extensive outdoor labs. Prerequisite: AES 100 or permission. Lec 2, Lab 2. **Cr 3.**

LHC 222 Woody Landscape Plants II
The study of deciduous trees and shrubs suitable for landscape use in New England. Emphasis on plant identification, cultural characteristics and use in the landscape. Extensive outdoor labs. Prerequisite: AES 100 or permission. Lec 2, Lab 2. **Cr 3.**

LHC 223 Plant Production
Covers the basic techniques for production of woody and herbaceous ornamental plants in the greenhouse and outdoor nursery settings. Specific areas of study will include greenhouse structure design and operation, plant propagation, irrigation, fertilization, lighting, pruning, harvest, etc. Extensive greenhouse and field lab work. Prerequisites: AES 100, AES 140, LHC 119, LHC 120, LHC 221, LHC 222 or permission. Lec 3, Lab 1. **Cr 4.**

LHC 225 Landscape Graphic Communication
A study of landscape graphics as communication. Two 3 hour studios with up to one hour of studio work devoted to group presentation meetings, instructions and review of new techniques such as drafting, lettering, free hand drawing, section and elevations, concept diagraming, plan graphics and three-dimentional drawing techniques. (Satisfies the General Education Human Values and Social Contexts Artistic and Creative Expression Requirement.) Prerequisite: AES 100 or permission. Studio 6. **Cr 3.**

LHC 227 Landscape Construction
An introduction to the physical properties, functional uses and aesthetic values of landscape construction materials, as independent items and as designed elements withing the landscape. Prerequisite: LHC 225. Lec 2, Studio 4. **Cr 4.**

LHC 305 Problems in Horticulture
Opportunity is provided for specialization in specific areas of horticulture. Prerequisite: permission. **Cr Ar.**

LHC 325 Turfgrass Management
Study of the scientific principles of turfgrass culture. Includes identification, soil requirements, establishment, fertilization, mowing and pest control of grass species used on home lawns, golf courses, athletic fields, parks and low maintenance areas. Prerequisites: AES 100 and AES 140. Rec 2, Lab 2. **Cr 3.**

LHC 328 Landscape Design
The planning and design of residential sites. Based on balancing the "hands-on" experience with formal design education, by furnishing an overview of the fundamentals of the residential site design process. The students will integrate previous experience and course work in plant material, landscape construction, graphic communication, and general horticultural experiences. Prerequisites: AES 100, LHC 119, LHC 120, LHC 221, LHC 222, LHC 225 and LHC 227. Lec 2, Studio 4. **Cr 4.**

LHC 370 Seminar in Landscape Horticulture
Review of literature, problems, and research as related to plants, soils and the environment. Prerequisite: Senior standing in Landscape Horticulture or permission. Rec 1. **Cr 1.**

LHC 396 Field Experience in Horticulture
An approved program of work experience which contributes to the academic major and for which academic credit is given. Students may work part time or full time for a semester in a job related to their professional career goals. Prerequisite: sophomore standing and permission. (Pass/Fail Grade Only.) **Cr 1-16.**

LHC 410 Plant Propagation
Principles and methods involved in the propagation of herbaceous and woody plants by seeds, division, layering, cutting, budding, grafting, and tissue culture. Prerequisites: BIO 452 and BIO 453 or permission. Rec 2, Lab 2. **Cr 3.**

LHC 425 Landscape Management
The principles and practices of operating a landscape maintenance and landscape contractor business. Includes setting up a new business, site analysis, labor analyses, bidding and estimating, development of maintenance plans and contracts and customer/employee relations. The student will integrate previous experience and instruction in plant materials, landscape design, soil management and general horticultural principles. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisites: LHC 325, LHC 328, AES 457 and senior standing in LHC. Lec 2, Lab 2. **Cr 3.**

LHC 428 Professional Practices in Landscape Horticulture
A senior level capstone course integrating three years of landscape horticultural coursework, expanding the theoretical base and practical applications of Landscape Horticulture. Prerequisites: LHC 425 and senior standing in LHC. Lec 2, Rec 1, Studio 2. **Cr 4.**

LHC 429 Park Planning and Design
Basic planning and design principles of space, scale and circulation applied to recreation areas and park facilities with special emphasis on visitor use. Prerequisite: LHC 221, LHC 222 or BIO 233. Lec 2, Studio 2. **Cr 3.**

LHC 503 Post-Harvest Physiology
Biochemical and physiological processes associated with ripening and retaining quality of harvested plant products. Includes temperature, humidity, growth regulators, types of storage, handling and physiological disorders. (Spring - odd.) Prerequisites: BIO 452 and BIO 453 or permission. Lec 3. **Cr 3.**

LHC 580 Graduate Seminar in Horticulture
Student presentations of their research proposal before a critical audience of peers and faculty. **Cr 1.**

LHC 597 Special Topics in Horticulture
Advanced study of topics in horticulture. Prerequisite: permission. **Cr Ar.**

Course in Liberal Studies (LIB)

LIB 500 Graduate Seminar in Liberal Studies
Interdisciplinary exploration of selected topics both within and across the areas of humanities, social sciences and the nature sciences. Topic varies from semester to semester. May be taken more than once. Prerequisite: Permission of instructor. **Cr 3.**

Courses in Mathematics and Statistics (MAT)

MAT 101 The Nature and Language of Mathematics
An opportunity for non-science majors to experience in the nature of mathematics and to explore the connections between mathematics and other areas of human understanding. (Satisfies the General Education Mathematics Requirement.) **Cr 3.**

MAT 105 Topics in Mathematics for Non-Science Majors I
A survey course in mathematical ideas. Content varies with the instructor. Prerequisite: Two years of high school algebra and one year of geometry. (Satisfies the General Education Mathematics Requirement.) **Cr 3.**

MAT 106 Topics in Mathematics for Non-Science Majors II
A continuation of MAT 105. (Satisfies the General Education Mathematics Requirement.) Prerequisite: MAT 105 or permission. **Cr 3.**

MAT 107 Structure of Elementary and Middle School Mathematics I
Emphasizes the deductive and creative aspects of mathematics. Students are led to investigate and discover mathematical relationships and demonstrate the logical validity of conclusions. Students learn methods of mathematical argument and how to communicate mathematical ideas using both everyday

and precise mathematical language. Practical applications of mathematics, especially geometry and arithmetic, together with historical and cultural perspectives, are used to place major ideas in context. (Satisfies the General Education Mathematics Requirement.) **Cr 3.**

MAT 108 Structure of Elementary and Middle School Mathematics II
A "professional" course open only to those students who are pursuing programs leading to teaching certification. Begins with a study of the integers and rational numbers from a mature view-point based on the foundational ideas developed in MAT 107. Operations, computational algorithms, basic ideas in probability, estimation, measurement, and the collection and interpretation of data are also treated. Problem-solving is a primary focus, and students are expected to use calculators and other technology to explore conjectures and solve problems. (Satisfies the General Education Mathematics Requirement.) Prerequisite: Successful completion of MAT 107. **Cr 3.**

MAT 111 College Algebra
A basic course in college algebra emphasizing linear, polynomial, rational, exponential and logarithmic equations, functions and graphs, including applications to problems from other disciplines. (Satisfies the General Education Mathematics Requirement.) Prerequisites: adequate performance on a departmental qualifying examination given during summer orientation and the first week of classes. **Cr 3.**

MAT 114 Calculus for Business and Economics
Introduction to differential and integral calculus with applications to business and economics. (Satisfies the General Education Mathematics Requirement.) Prerequisite: A recent grade of C or better in MAT 111 or MAT 122 or a passing grade on a departmental qualifying examination given during summer orientation and the first week of classes. Note: Because of overlapping subject matter, no more than four (4) degree credits will be allowed for successful completion of more than one of MAT 114, MAT 126 and MAT 151. **Cr 3.**

MAT 115 Applied Mathematics for Business and Economics
Topics in discrete mathematics and finite mathematics with applications to business and economics. Topics include matrices, linear programming, probability, the mathematics of finance, and graph theory. (Satisfies the General Education Mathematics Requirement.) Prerequisite: A grade of C or better in MAT 111 or MAT 122 or adequate performance on a qualifying examination. **Cr 3.**

MAT 122 Pre-Calculus
Designed as a transitional course between high school algebra and college mathematics, particularly MAT 126. A quick review of high school algebra is followed by a detailed study of exponential, logarithmic and trigonometric functions, bearing in mind the needs of those who subsequently take calculus. Note: Students in some sections of MAT 122 may be required to purchase a graphing calculator for use in the course. (Satisfies the General Education Mathematics Requirement.) Prerequisite: Adequate performance on a departmental qualifying examination given during summer orientation and the first week of classes. **Cr 4.**

MAT 126 Calculus I
An introduction to calculus for students in mathematics, engineering, and the sciences. Covers the differential calculus of the algebraic, trigonometric, exponential and logarithmic functions, concluding with the definite integral and the fundamental theorem of calculus. The approach is intuitive and geometric, with emphasis on understanding the basic concepts of function, limit, derivative and integral. (Satisfies the General Education Mathematics Requirement.) Prerequisite: a grade of C or better in MAT 122, or adequate performance on a departmental qualifying examination given during summer orientation and the first week of classes. Note: Because of overlapping subject matter, no more than four (4) degree credits will be allowed for successful completion of more than one of MAT 114, MAT 126 and MAT 151. **Cr 4.**

MAT 127 Calculus II
Completes the study of single-variable calculus. Topics covered include inverse trigonometric functions, hyperbolic functions, methods of integration, improper integrals, indeterminate forms, parametric equations, polar coordinates and infinite series. (Satisfies the General Education Mathematics Requirement.) Prerequisite: A grade of C or better in MAT 126. **Cr 4.**

MAT 151 Calculus for the Life Sciences
An introduction to differential and integral calculus and its applications to the life sciences. (Satisfies the General Education Mathematics Requirement.) Prerequisite: A grade of C or better in MAT 122 or successful performance on qualifying examination given during summer orientation and the first week of classes. Note: Because of overlapping subject matter, no more than four (4) degree credits will be allowed for successful completion of more than one of MAT 114, MAT 126 and MAT 151. **Cr 4.**

MAT 200 Topics in Elementary Mathematics
Topics in mathematics not regularly covered in other courses. Content varies to suit current needs. May be repeated for credit. Prerequisite: departmental permission. **Cr 1-3.**

MAT 215 Introduction to Statistics for Business and Economics
For students in the College of Business, Public Policy and Health and for others concentrating in business or economics. A limited introduction to probability theory leading to discussion of distributions of random variables, in particular the normal and binomial families; a brief treatment of descriptive methods; an introduction to inferential statistics, including one- and two-sample procedures for estimation of parameters and for hypothesis testing; fundamentals of regression analysis or contingency table analysis or contingency table analysis as time permits. (Satisfies the General Education Mathematics Requirement.) Prerequisite: A grade of C or better in MAT 115. (Note: because of overlap, MAT 232 and MAT 215 cannot both be taken for degree credit.) **Cr 3.**

MAT 228 Calculus III
For students of mathematics, engineering and the sciences. Vector algebra, geometry and calculus; multivariable differential and integral calculus, including the theorems of Gauss, Green and Stokes. Prerequisite: A grade of C or better in MAT 127. **Cr 4.**

MAT 232 Principles of Statistical Inference
Intended for students who will use statistics as an aid to the comprehension of quantitative work done by others and for students who will follow this course by an intermediate level applied statistics course. An introduction to the language and methods of statistical analysis, probability, graphic and numeric descriptive methods and inference from sample data. (Satisfies the General Education Mathematics Requirement.) Prerequisite: Two years of high school math or MAT 111. (Note: because of overlap, MAT 232 and MAT 215 cannot both be taken for degree credit.) **Cr 3.**

MAT 241 Logic
Primarily intended for liberal arts majors. The semantic tableaux of Beth and Smullyan and the context-free grammars of Chomsky are use to motivate logic. Provability and argumentation are investigated. Sentence logic and predicate logic are studied. **Cr 3.**

MAT 258 Introduction to Differential Equations with Linear Algebra
An introduction to elementary linear algebra and ordinary differential equations including applications. Prerequisite: A grade of C or better in MAT 228. (Not open to students who have already taken MAT 262 or MAT 259.) **Cr 4.**

MAT 259 Differential Equations
The theory and applications of ordinary differential equations for science and mathematics students intending to take further courses in applied mathematics. (Note: Students planning to take MAT 262 or MAT 451 or MAT 453 should choose MAT 259 instead of MAT 258. A student may not take either MAT 259 or MAT 262 for credit in addition to MAT 258. Prerequisite: A grade of C or better in MAT 228. **Cr 3.**

MAT 261 Introduction to Abstract Mathematics
Topics covered typically include logic, basic set theory, relations and functions, sequences, limits, cardinality, and algebraic and geometric structures, but may vary somewhat with the instructor. Class size will remain small, not to exceed 20 students. The goal is to enable students to read,

critique, construct, and write mathematical proofs. At least 40% of the student's grade will be based on the quality of written work. Written assignments must present mathematical arguments in a clear, logical manner, using standard mathematical notation as well as correct English grammer, spelling, and punctuation. Students will be given considerable coaching and feedback with preliminary drafts so that submitted final versions of their work will be of acceptable quality. In addition to studying methods of proof and writing proofs of individual theorems, students will be required to write at least one short paper in which they begin with axioms or definitions and present the proofs of several theorems which taken together form a coherent mathematical pattern. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: A grade of C or better in MAT 127 or permission. Cr 3.

MAT 262 Linear Algebra
An introduction to matrices, systems of linear equations, linear transformations, determinants, vector spaces, orthogonality, eigenvalues and eigenvectors, with applications. Some use will be made of computer software. Cr 3.

MAT 305 Mathematics for Secondary School Teachers
Intended for prospective teachers of secondary school mathematics. MAT 305 satisfies the state certification requirements for a methods course. Topics covered include issues and problems in mathematics education, classroom management and selected topics in mathematics pertinent to the secondary curriculum. Open to prospective secondary teachers only. Prerequisite: Permission of the instructor. Cr 3.

MAT 329 Problems Seminar II
Problem-solving in selected areas of mathematics. Material will be taken from various problem books, competitions and mathematical periodicals. Recommended for third and fourth year students who wish to participate in the annual Putnam competition. May be repeated for credit. Prerequisite: Successful completion of MAT 261 or permission. Cr 1.

MAT 332 Statistics for Engineers
Statistical methods applicable to engineering including theory and application of classical and nonparametric methods. Prerequisite: MAT 228. Cr 3.

MAT 351 Introduction to Vector and Tensor Analysis
Scalar and vector fields; Newtonian kinematics and Kepler's laws of planetary motion. Gradient, divergence, and curl; the theorems of Green, Stokes, and Gauss; curvilinear coordinates; contravariant and covariant tensors; absolute derivative of a tensor field; geodesics; Riemannian curvature. Prerequisite: MAT 228. Cr 3.

MAT 372 Complex Numbers
The basic properties of the complex numbers and their applications to algebra, geometry, trigonometry, and vector forces. Especially appropriate for mathematics and science teachers. Prerequisite: MAT 127 or one year of college mathematics or permission. Cr 3.

MAT 400 Topics in Mathematics
Topics in mathematics not regularly covered in other courses. Content varies to suit current needs. May be repeated for credit. Prerequisite: departmental permission. Cr 1-3.

MAT 425 Introduction to Real Analysis I
A study of functions of a real variable and the related topology of the real line. Concepts of limit, convergence, continuity and differentiability are studied. Prerequisite: MAT 228, MAT 261 and preferably MAT 262. Cr 3.

MAT 426 Introduction to Real Analysis II
A continuation of MAT 425 emphasizing integration and sequences and series of functions. Contents may vary from year to year. Prerequisite: MAT 425. Cr 3.

MAT 434 Introduction to Statistics
Topics include probability, random variables, continuous and discrete distributions, point and interval estimation, tests of hypotheses, linear regression and correlation, analysis of variance. Prerequisite: MAT 228. Cr 4.

MAT 435 Introduction to Mathematical Statistics
Topics include moment generating functions, distributions of functions of random variables, sampling distributions, principles of estimation and hypothesis testing, limit theorems, and order statistics. Prerequisite: MAT 434. Cr 3.

MAT 436 Nonparametric Statistics
Surveys nonparametric alternatives to standard parametric techniques. Emphasis on situations in which the use of a parametric technique is incorrect or, at best, marginal. Prerequisite: MAT 434 or MAT 437. Cr 3.

MAT 437 Statistical Methods in Research
An introduction to analysis of variance and regression analysis using a unifying approach to theory; application and illustrations from many fields. Prerequisite: MAT 232 or MAT 434 or permission. Cr 3.

MAT 445 History of Mathematics
Deals with the lives and times of mathematicians, while focusing on mathematical ideas. Designed to acquaint the student with the evolution of various mathematical disciplines and to develop an appreciation of the problems faced by and often solved by mathematicians. Prerequisite: MAT 127 or permission. Cr 3.

MAT 451 Differential Equations and Dynamical Systems
A study of the nature and behavior of solutions of linear and nonlinear systems of differential and difference equations through mathematical analysis and the use of available menu-driven PC software. For students in mathematics and the sciences. Prerequisite: A grade of C or better in MAT 259 or MAT 453 or permission. Some knowledge of vectors and matrices and some familiarity with personal computers is recommended. Cr 3.

MAT 452 Complex Analysis
An introduction to functions of complex variables including differentiation, integration, series, mappings and applications. Prerequisite: MAT 228. Note: Prospective teachers should opt for MAT 372. Cr 3.

MAT 453 Partial Differential Equations I
Introduction to general properties of partial differential equations followed by solutions of specific equations. Techniques include eigen function expansions, operational methods, and Green's functions. Prerequisite: MAT 259 or permission. Cr 3.

MAT 454 Partial Differential Equations II
A continuation of MAT 453. Prerequisite: MAT 453. Cr 3.

MAT 455 Linear Programming
Linear programming, convex sets and polytypes, the simplex algorithm, principle of duality, the dual simplex algorithm, revised simplex algorithms, decomposition theorems, two-person zero-sum game theory, survey of recent developments in linear programming introduction to non-linear programming. Prerequisite: MAT 262 or permission. (Note: offered only in fall semesters. No familiarity with calculus is assumed.) Cr 3.

MAT 456 Network Optimization
Graphs and networks, minimal spanning trees, shortest path problems, transshipment problems, matching and covering problems, the traveling salesperson problem, maximum flow problems, branch and bound methods, introduction to integer programming. Prerequisite: MAT 262 or MAT 455. (Note: Offered only in spring semesters. MAT 455 is not an essential prerequisite. Cr 3.

MAT 457 Introduction to Mathematical Modeling
A hands-on approach. Students formulate, analyze and criticize mathematical models chosen from biological and managerial sciences and the physical sciences. Students report on particular models of their choosing. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: MAT 215 or MAT 127. Cr 3.

MAT 459 Methods of Applied Mathematics I
Intensive study of methods for solving problems in the physical sciences including vector and tensor analysis, series solution of differential equations near singular points, linear algebra and determinants. Prerequisite: MAT 259 or permission. Cr 3.

MAT 463 Introduction to Abstract Algebra I
A study of algebraic systems composed of non-empty sets with binary

operations defined on them, and characterized by specific axiom systems. Begins with a study of set theory, functions, and operations, and continues with topics selected from group theory and abstract linear algebra. Prerequisite: MAT 261 and MAT 262. **Cr 3.**

MAT 464 Introduction to Abstract Algebra II
A continuation of MAT 463, with emphasis on properties of rings and fields. Prerequisite: MAT 463. **Cr 3.**

MAT 465 Theory of Numbers
Elementary properties of integers including divisibility, prime and composite numbers, uniqueness of prime factorization, Diophantine equations, congruences and continued fractions. Prerequisite: One year of college mathematics or permission. **Cr 3.**

MAT 471 Differential Geometry
The application of multivariable calculus to the study of curves, surfaces and their higher-dimensional analogues. Prerequisite: MAT 228. Some knowledge of linear algebra is helpful. **Cr 3.**

MAT 475 Higher Geometry
Topics include: constructions, Euclidean properties, Ceva's and Menelaus' theorems with applications—Desargues', Pappus' and Pascal's theorems, isometries, axiomatic approach to one of the geometries, algebraic models for geometry, Klein's Erlanger program, classical construction problems. Prerequisite: MAT 228 or permission. **Cr 3.**

MAT 481 Discrete Mathematics
Primarily designed for both mathematics and computer science majors. While the calculus-based mathematics of classical engineering and physical science is essentially "continuous," the finite mathematics of computer science and some social sciences is essentially "discrete" or "combinatorial." MAT 481 is an introductory course offered in this spirit. Topics covered typically include graphs and networks, analysis of algorithms, generating functions and recurrence relations, graph coloring, satisfiability, computational complexity, automata and languages, Turing machines and computability, and a brief introduction to the theory of NP-completeness. Prerequisite: MAT 261 or MAT 262 or permission. **Cr 3.**

MAT 487 Numerical Analysis
Covers computational methods for electronic computers. Includes exercises on the IBM 370 for interpolation, simultaneous linear algebraic equations, non-linear and polynomial equations, numerical integration, ordinary and partial differential equations. Prerequisite: MAT 228 and COS 220. **Cr 3.**

MAT 500 Topics in Graduate Mathematics
Topics in mathematics not regularly covered in other courses. Content varies to suit current needs. May be repeated for credit. Prerequisite: departmental permission. **Cr 1-3.**

MAT 505 Seminar in Mathematics Education
Topics in mathematics with relevance to programs in the secondary schools. Restricted to secondary school teachers or supervisors. **Cr 3.**

MAT 523 Functions of a Real Variable I
Topics include construction of Lebesgue measure and Lebesgue integral on the Euclidean Space, convergence, differentiation, general measure and integration, the Radon-Nikodym Theorem, the Daniell integral, topics in functional analysis. Prerequisite: MAT 426 or permission. **Cr 3.**

MAT 524 Functions of a Real Variable II
A continuation of MAT 523. Prerequisite: MAT 523. **Cr 3.**

MAT 527 Functions of a Complex Variable I
Elementary properties of holomorphic functions including the classification of isolated singularities, Laurent expansion and infinite product representations. Introduction to conformal mapping and the Riemann Mapping Theorem. Prerequisite: MAT 426 or permission. **Cr 3.**

MAT 528 Functions of a Complex Variable II
Continuation of MAT 527. Prerequisite: MAT 527. **Cr 3.**

MAT 531 Mathematical Statistics I
Covers axioms of probability, random variables, continuous and discrete distributions, moment generating functions, distributions of functions of random variables, sampling distributions. Prerequisites: MAT 425, MAT 434 or permission. **Cr 3.**

MAT 532 Mathematical Statistics II
Toics include principles and methods of parametric point estimation, interval estimation and hypothesis testing, non-parametric inference. Prerequisite: MAT 531. **Cr 3.**

MAT 533 Stochastic Systems
The study of mathematical models which involve random processes. Topics include Poisson process, waiting-line models, Markov chains, decision analysis and reliability theory. Some emphasis on modelling problems encountered in business and industry. Prerequisite: MAT 434. **Cr 3.**

MAT 558 Mathematical Programming II
A continuation of MAT 557 with emphasis on linear and dynamic programming. Prerequisite: .MAT 557. **Cr 3.**

MAT 559 Methods of Applied Mathematics II
Continuation of MAT 459. Emphasis on complex variables, including conformal mapping and transform analysis, Sturm-Liouville theory, variational calculus, stability, theory and asymptotics. Prerequisite: MAT 459 or permission. **Cr 3.**

MAT 562 Advanced Linear Algebra
Topics covered include vector spaces, homomorphisms, bilinear forms, multilinear maps and tensor products, Jordan canonical forms of matrices, normed linear spaces, real and comples inner product spaces, basic ideas of functional analysis, applications. Prerequisites: MAT 262 and MAT 425 and MAT 463 or their equivalent. Offered alternate fall semesters. **Cr 3.**

MAT 563 Abstract Algebra
A study of basic structure theorems for groups, rings, fields and modules. Prerequisites: Two courses from among MAT 262, MAT 463 and MAT 464. **Cr 3.**

MAT 577 Topology I
Fundamental concepts of topology, including cardinal and ordinal numbers, topological spaces, cartesian products, connectedness, compactness, continuity, separation axioms and metric spaces. Prerequisite: MAT 426 or permission. **Cr 3.**

MAT 578 Topology II
A continuation of MAT 577. Prerequisite: MAT 577. **Cr 3.**

MAT 587 Methods of Numerical Analysis
Solution of non-linear algebraic systems, ordinary and partial differential equations, stability, convergence and consistency analysis. Prerequisite: MAT 487 or equivalent. **Cr 3.**

MAT 590 Graduate Research Seminar
Current topics of mathematical interest are studied under faculty supervision. May be repeated for credit to a maximum of four times. **Cr 1.**

Courses in Multimedia (MDM)

MDM 206 Multimedia in the Electronic Age
An overview of the history, theory and technologies of electronic-based multimedia. Designed as an introduction to the scope and emphases of the multimedia minor track, students will explore the creative history and future possibilities of work in electronic forms, such as digital imaging, multimedia systems, electronic publishing, digital music, hardware and software design and digital design. Prerequisites: COS 100, COS 110 or permission. **Cr 3.**

MDM 295 Topics in Multimedia
An exploration of a range of topics in multimedia. Designed as introductions to the various emphases of the multimedia minor track, the course will explore work in a number of electronic forms: digital imaging, multimedia systems, electronic publishing, electronic imaging, digital music, hardware and software design and digital design. Prerequisite: MDM 206 or permission. **Cr 3.**

MDM 430 Topics in Multimedia
An exploration of intermediate and advanced topics in multimedia production and design, including, among others, digital video production, software and hardware design or, electronic publishing. Designed to provide students with a deeper and more sophisticated experience with a multimedia issue, tool, or skill—or combination of all three. Prerequisites: MDM 206, MDM 295; permission of instructor. **Cr 1-3.**

Courses in Mechanical Engineering (MEE)

MEE 150 Applied Mechanics: Statics
A study of force systems and equilibrium, structural models, friction, distributed forces. Designed to develop the ability to analyze and solve engineering problems. Rec 3. **Cr 3.**

MEE 230 Thermodynamics I
Covers energy and energy transformations, the First and Second Laws applied to systems and to control volumes, thermodynamic properties of systems, availability of energy. Prerequisite: MAT 127. Rec 3. **Cr 3.**

MEE 231 Thermodynamics II
A continuation of MEE 230 and includes thermodynamics of mixtures, chemical thermodynamics, thermodynamics of fluid flow, vapor and gas cycles, applicable to compressors, internal combustion engines and turbines. Computers used. Prerequisite: MEE 230, COS 215 or equivalent. Rec 3. **Cr 3.**

MEE 251 Strength of Materials
The principles of solid mechanics and their applications to practical problems, stresses and deflections in axial loading, torsion, beams, columns, combined stresses. Prerequisite: MEE 150, MAT 127. Rec 3. **Cr 3.**

MEE 252 Statics and Strength of Materials
The basic principles of statics and their applications in strength of materials. Emphasis on equilibrium of various systems, stresses and deformations of axially loaded members, connections, circular shafts, beams and columns. Prerequisite: MAT 127. Rec 3. **Cr 3.**

MEE 270 Applied Mechanics: Dynamics
Motion of particles and rigid bodies, impulse and momentum, work and energy and simple harmonic motion, force, mass and acceleration. Prerequisite: MEE 150 or MEE 252, and MAT 228. Rec 3. **Cr 3.**

MEE 320 Materials Engineering and Science
The principles of material science with emphasis on the relationship between structure and properties and their control through composition, mechanical working and thermal treatment. Prerequisite: MEE 230 and MEE 251. Rec 3. **Cr 3.**

MEE 340 Machine Tool Processing
Topics include the theory and application of fundamental metal removing processes, basic metrology, the characteristics and operation of machine tools and numerically controlled machining. Mechanical Engineering majors only. Lab 4. **Cr 2.**

MEE 341 Mechanical Laboratory I
An introduction to experiment design, data analysis, laboratory techniques, instrumentation, and calibration of equipment. Application to thermodynamics, mechanics of materials, fluid mechanics and metallurgy. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: MAT 258, MEE 251 and MEE 360. Rec 1, Lab 3. **Cr 3.**

MEE 342 Mechanical Laboratory II
A continuation of MEE 341. Mechanical engineering problems in a laboratory setting. Prerequisite: MEE 231, MEE 341 or permission. Lab 3. **Cr 2.**

MEE 343 Mechanical Laboratory III
A continuation of MEE 342. Mechanical Engineering problems in a laboratory setting. Prerequisites: MEE 231, MEE 341, MEE 342 or permission. **Cr 2.**

MEE 360 Fluid Mechanics
Includes fluid statics, kinematics, Bernoulli equation, free-surface flow, viscosity, friction, dimensional analysis and similitude, and an introduction to compressible flow. Prerequisite: MEE 230, MEE 270 and MAT 258. Rec 3. **Cr 3.**

MEE 380 Design I
Kinematical design of machines. Prerequisite: MEE 270. Rec 3. **Cr 3.**

MEE 381 Design II
Includes analysis of mechanical elements. Advanced concepts in mechanics of materials, stress concentration, fatigue, factor of safety. Introduction to creative synthesis and economic design. Prerequisite: MEE 251 or MEE 252, MAT 258. Rec 3. **Cr 3.**

MEE 383 Turbomachine Design
Topics include: the theory and design of turbomachinery flow passages, control and performance of turbomachinery, gas-turbine engine processes. Prerequisite: MEE 230, MEE 360. Rec 3. **Cr 3.**

MEE 384 Power Plant Design and Engineering
A study of power station engineering and economy, including design, construction and operating theory of steam, internal-combustion, and hydroelectric power plants. Introduction to nuclear power plants, solar energy, fuel cells, and associated problems. Prerequisite: MEE 230, MEE 231. Rec 3. **Cr 3.**

MEE 386 Refrigeration and Air Conditioning System Design
Examines methods of producing artificial low temperatures including refrigeration for controlled-temperature applications in comfort air conditioning and for industrial manufacturing processes. Prerequisite: MEE 230. Rec 3. **Cr 3.**

MEE 387 Design III
Design of mechanical engineering systems components, including problem definition, analysis, synthesis and optimization. (Satisfies the General Education Capstone Experience Requirement.) Must be taken in series with MEE 388 to meet the Capstone Experience requirement. Neither course alone fulfills the requirement. Prerequisite: MEE 231, MEE 381; MEE 432 concurrently or permission. Rec 4. **Cr 4.**

MEE 388 Design IV
Design of mechanical engineering systems, including problem definition, analysis, synthesis and optimization. (Satisfies the General Education Capstone Experience Requirement.) Must be taken in series with MEE 387 to meet Capstone Experience requirement. Neither course alone fulfills the requirement. Prerequisite: MEE 231, MEE 381, MEE 432. Rec 4. **Cr 4.**

MEE 394 Mechanical Engineering Practice
Full-time engineering work with companies participating in the Mechanical Engineering Department Cooperative Education Program. (Pass/Fail Grade Only.) **Cr 3.**

MEE 432 Heat Transfer
The fundamental laws of heat transfer by conduction, convection and radiation. applied to the study of engineering problems via analytical, numerical, and graphical techniques. Prerequisite: MAT 258 and MEE 360. Rec 3. **Cr 3.**

MEE 433 Solar-Thermal Engineering
Introduces solar energy collection and use as process thermal energy. Includes performance analysis of solar collectors and thermal energy storage devices both separately and as a combined system. Prerequisite: MEE 230. Rec 3. **Cr 3.**

MEE 434 Thermodynamic Design of Engines
An introduction to combustion, with applications to the design of propulsion systems, such as gas turbines, I-C engines, rocket engines. Prerequisite: MEE 231. Rec 3. **Cr 3.**

MEE 450 Introduction to the Mechanics of Composite Materials
Covers polymer matrix composites from the applied mechanics, design and manufacturing aspects. Includes recent developments in modeling and analysis techniques and fabrication methods. Prerequisites: MAT 228 and MEE 251. Rec 3. **Cr 3.**

MEE 453 Experimental Mechanics
Experimental methods and techniques for analysis of stress and displacement. Also covers electric strain gages, brittle lacquers, mechanical and optical strain gages, and introduction to photoelasticity. Prerequisite: MEE 251. Rec 2, Lab 2. **Cr 3.**

MEE 455 Advanced Strength of Materials
Considers limitations of elementary stress formulas, theories of failure, unsymmetrical bending, beams, plates, torsion of non-circular bars, thick-walled cylinders, stress concentrations, energy methods. Introduces theory of elasticity. Prerequisite: MEE 251. Rec 3. **Cr 3.**

MEE 456 Introduction to Computational Methods
Introduces numerical methods for solution of partial differential equations. Existing and prepared programs are applied to engineering problems in heat transfer, solid mechanics, and fluid dynamics. Prerequisite: MAT 258. Rec 3 **Cr 3.**

MEE 461 Compressible Fluid Flow I.
Fundamental equations and concepts considered in isentropic flow, normal shock waves, flows in constant area ducts, and generalized one-dimensional continuous flow. Prerequisite: MEE 230 and MEE 360. Rec 3. **Cr 3.**

MEE 462 Fluid Mechanics II
Considers flow in multiple-pipe systems, boundary-layer flows, inviscid incompressible flow, compressible flow, open-channel flow. Prerequisite: MEE 360. Rec 3. **Cr 3.**

MEE 471 Mechanical Vibrations
Examines free and forced vibrations with viscous damping for discrete and continuous mass systems as well as derivation and application of energy methods. Prerequisite: MEE 270 and MAT 258. Rec 3. **Cr 3.**

MEE 498 Selected Topics in Mechanical Engineering
Topics in mechanical engineering not regularly covered in other courses. Content varies to suit needs. May be repeated for credit, with departmental permission. Prerequisite: permission. **Cr 1-3.**

MEE 501 Macroscopic Thermodynamics
Concepts of energy transfer, internal energy and entropy are used to formulate the first and second laws of thermodynamics for a system. The equivalent entropy maximum and energy minimum principles are introduced. Emphasis on mechanical engineering problems including air conditioning applications, steam and gas turbine power plants, solar power, and thermoelectric phenomena. Prerequisites: MEE 231, MAT 258 or permission. **Cr 3.**

MEE 536 Advanced Heat Transfer I
A study of transfer of heat by conduction including use of approximate, exact analytical, and numerical techniques for the prediction of temperature distributions in both the steady and unsteady state. Prerequisite: MEE 432. **Cr 3.**

MEE 546 Finite Elements in Solid Mechanics
Basics of the finite element method with emphasis placed on applications. Fundamentals of matrix algebra and computer solution techniques. Derivation of relatively simple spring and beam elements which uses the direct approach and truss, frame, plane strain, plate bending, and axisymmetric elements which uses the variational approach. Isoparametric formulation introduced. Prerequisite: MEE 456. **Cr 3.**

MEE 554 Theory of Elasticity
Includes plane stress and plane strain, stress function; problems in Cartesian and polar coordinates; photo-elasticity, strain energy; three-dimensional problems. Prerequisite: MAT 258 and MEE 251. Rec 3. **Cr 3.**

MEE 562 Advanced Fluid Mechanics
Development of the differential and integral equations of mass, momentum, and energy conservation for viscous fluids and application of these to internal, external, and boundary layer flows of incompressible, viscous fluids. Prerequisite: MEE 360. **Cr 3.**

MEE 573 Advanced Vibrations I
Advanced vibration theory and applications including multi-degree of freedom systems, transient and random vibrations, Lagrange's equation, Laplace transformation and matrix iteration, computer techniques. Prerequisite: MEE 471. **Cr 3**

MEE 574 Advanced Vibrations II
Covers theory of vibrations with continuously varying mass and stiffness; solutions of wave equations for strings, longitudinal and torsional systems, vibration of beams, methods of Rayleigh, Ritz and Stodola. Introduction to nonlinear vibrations. Prerequisite: MEE 573 or permission. **Cr 3**

MEE 588 Advanced Thermodynamics II
A continuation of MEE 434, including the study of chemical equilibrium in systems of reacting gases, with applications to the design of propulsion systems, particularly rockets. Prerequisite: MEE 434. **Cr 3**

Courses in Mechanical Engineering Technology (MET)

MET 107 Machine Tool Laboratory I
Theory and application of fundamental metal removing processes and basic metrology and tool nomenclature. Light machine work using drill presses, lathes, milling machines and surface grinders. (MET and EPS majors or permission). Lab 4. **Cr 2**

MET 121 Technical Drawing
An introduction to graphic symbols utilizing both manual and CADD skills applied to engineering drawings. Topics include: lettering, geometric construction, multiview drawing, sections, graphs, dimensioning, and pictorial drawing. Lec 2, Lab 2. **Cr 3**

MET 126 Machine Drawing
Preparation of complete working drawings of a project for INT 211. Topics include: pictorial drawings, descriptive geometry, CADD, design process, dimensioning, tolerancing, fasteners, details, and assembly drawings. Prerequisite: MET 121. Lec and Lab 4. **Cr 3**

MET 150 Statics
The study of forces acting on particles and rigid bodies in equilibrium, trusses, centroids and centers of gravity, properties of area, friction. Prerequisites: MET 121, PHY 107, TME 151. Lec 2, Rec 2. **Cr 3**

MET 212 Machine Tool Laboratory II
Design, manufacture and evaluation of prototype assembly. Prerequisites: MET 107, MET 126. Lab 4. **Cr 2**

MET 219 Strength of Materials
An introduction to machine design. A study of stress and strain in materials and bodies subjected to tension, compression, torsion and flexure as well as deflection of prismatic members, columns, combined stresses. Prerequisite: MET 150. Corequisite: TME 253. Lec 4. **Cr 4**

MET 220 Selected Topics in Mechanical Engineering Technology I
Topics in engineering technology not regularly covered in other courses. Content varies to suit the needs of individuals. May be repeated for credit. Prerequisite: permission. **Cr 1-3**

MET 233 Thermal Science
A study of elementary thermodynamics including engineering calculations relative to heat, power, work and mechanical and electrical energy. Prerequisite: PHY 108 or PHY 112. Rec 3. **Cr 3**

MET 234 Mechanical Technology Laboratory I
Experimental application of solid and fluid mechanics, and thermodynamics. Covers calibration of laboratory instruments. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: MET 233 and MET 219. Rec 1, Lab 2. **Cr 2**

MET 236 Thermal Applications
Applications of fundamentals studied in MET 233 including steam and gas cycles, analysis of cycle components, steam generators, pumps, turbines, compressors, heat transfer and refrigeration systems. Prerequisite: MET 233. Rec 3. **Cr 3**

MET 270 Manufacturing Technology
Examines production processes and problems including process planning, automation, numerical control, quality control, specialized machine tools and current advances in the field of metal working. Prerequisites: MET 107, MET 150 and sophomore standing. Rec 3. **Cr 3.**

MET 317 Dynamics
A study of kinematics and kinetics of particles, including conservation of energy, conservation of momentum and impulse. Also kinematics of rigid bodies including linkages, gears and gear trains. Prerequisite: MET 150 or CET 211 and TME 152. Lec 4. **Cr 4.**

MET 320 Selected Topics in Mechanical Engineering Technology II
Topics in engineering technology not regularly covered in other courses. Content varies to suit the needs of individuals. May be repeated for credit. Prerequisite: permission. **Cr 1-3.**

MET 325 Fluid Flow Technology
Examines fluid statics, dynamics and energy as well as flow measuring devices, fluid components and systems. Prerequisite: TME 253, MET 317, MET 236. Rec 3. **Cr 3.**

MET 351 Computer Aided Design and Drafting I
Introduction to commercial CADD systems, especially microcomputer graphics hardware and software. Application of CADD software to create graphic designs and solve graphic problems. Use of a turnkey CADD system. Prerequisite: MET 121. Lec 2, Lab 2. **Cr 3.**

MET 355 Engineering Materials
The study of the composition and behavior of materials used in engineering. Materials covered include metals, plastics, wood, ceramics, and concrete. The laboratory demonstrates the effect of heat treatment on the mechanical properties of steels. Corerequisite: CHY 121. Prerequisites: MET 219, MET 234, MET major and junior standing. Rec 2, Lab 2. **Cr 3.**

MET 360 Statistical Quality Control
The basics of statistical quality control for variables and attributes. Includes process capability, control charts, sampling plans, reliability and quality costs. In the laboratory actual parts are measured and the appropriate statistical studies and charts are made. Visits to local plants are made to witness actual production results. Prerequisites: MET 212, MET 270 or permission. Rec 2, Lab 2. **Cr 3.**

MET 391 Heating, Ventilating and Air Conditioning
Determination of heating, ventilating and air conditioning loads for buildings and industrial processes. Heat transfer devices and applications to systems. Refrigeration for controlled-temperature applications. Heating, ventilating and air conditioning system layout and control systems. Prerequisite: MET 236. Rec 3. **Cr 3.**

MET 394 Mechanical Engineering Technology Practice
Cooperative work experience in mechanical engineering technology at full-time employment for at least a ten-week period. Prerequisite: MET 234, MET 236; junior standing or permission. (Pass/Fail Grade Only.) **Cr 3.**

MET 462 Design I
Analysis of mechanical elements as well as applications of mechanics of materials, stress concentration, combined stresses, fatigue, and factor of safety to the design of machine components. Design of capstone design project. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: MET 219, MET senior standing or permission. Lec 4. **Cr 4.**

MET 463 Design II
Continuation of MET 462 including drive components, welded connections, lubrication, bearings, gearing, miscellaneous machine elements and engineering materials. Completion of capstone design project. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: MET 462. Lec 4. **Cr 4.**

MET 471 Mechanical Technology Laboratory II
A project-oriented laboratory course in which the students solve technical problems similar to those encountered by technologists in industry. Prerequisite: MET 234, EET 330 and senior standing. Corequisite: MET 325 and MET 462. Rec 1, Lab 3. **Cr 3.**

MET 484 Engineering Economics
A study of economic theory and applications in engineering and industrial organizations including capitalization, amortization, time value of money, cost comparasion analysis and breakeven value. Also included are personal finance topics as applied to engineering situations and case study. (This course is identical to GEE 284.) Prerequisite: senior standing in SET or permission. Lec 3. **Cr 3.**

Courses in Military Science (MIS)

MIS 040 Mountain School
A 22 day school conducted in Vermont stressing basic mountaineering training, ropes, knots and rappelling as appropriate to the training conditions. Available only to students in the ROTC Program. (Pass/Fail Grade Only.) **Cr 0.**

MIS 050 Northern Warfare School
A 30 day school conducted at the Northern Warfare school in Alaska. Available only to students in the ROTC Program. (Pass/Fail Grade Only.) **Cr 0.**

MIS 060 Air Assault School
A 10 day school conducted at Ft. Campbell, Kentucky, on the tactical utilization of Army Helicopters. Available only to students in the ROTC Program. Students who graduate are awarded the Army Air Assault Badge. (Pass/Fail Grade Only.) **Cr 0.**

MIS 070 Airborne School
A 3 week school conducted at Fort Benning, Georgia. Available only to students in the ROTC Program. Students who graduate are awarded the Army Parachutist Badge. (Pass/Fail Grade Only.) **Cr 0.**

MIS 100 Leadership Laboratory
Leadership laboratory is available only to students enrolled/contracted in the ROTC program. Cadets develop and improve military leadership skills. Includes continuous counselling and periodic evaluations of cadet performance. In case of class conflicts an alternate Leadership Lab will be arranged. (Pass/Fail Grade Only.) **Cr 0.**

MIS 101 Introduction to Leadership: Theory and Application
Includes study and discussions of leadership concepts, traits, beliefs, values, and ethics. Provides increased self-confidence through physical training in rapelling, mountaineering skills, leadership reaction course, and first aid. Practical application of leadership skills in classroom and outdoor laboratory environments. Leadership self assessment paper required. Participation in Leadership Laboratory (MIS 100) is suggested but optional. **Cr 1.**

MIS 102 Introduction to the United States Army
Considers past and current Army leaders and contrasting styles of leadership, the politics of leadership at increasing levels of responsibility and introduces the organizational structure role of the Army. Provides awareness and study of physical fitness and mental health interrelation. Develops communication skills to improve individual performance and group interaction. Participation in Leadership Lab (MIS 100) required. **Cr 1.**

MIS 105 Military Physical Fitness
A study of the United States Army physical fitness program, including aerobic exercises and strength-building programs which provide actual leadership and fitness opportunities. Emphasis on the importance of exercise and fitness to the individual and development of a personalized training program. **Cr 1.**

MIS 201 Basic Military Skills
Study and practice in military skills required during completion of the Army ROTC Basic Course: Physical Fitness Program Planning, Military Correspondence, Oral Briefings and Communications, Command and Staff Functions, Basic Military First Aid and the Leadership Assessment Program. Subjects promote understanding of the Roles and Organization of the Army.

World Military Powers, and the Principles of War. The Leadership Assessment Program investigates leadership techniques and the processes used in leadership situations. Participation in Leadership Lab (MIS 100) is required. **Cr 1.**

MIS 202 Orienteering
A study of map reading and land navigation based on the sport of Orienteering and using topographic maps and compasses to study and practice navigation skills. Participants will need appropriate outdoor clothing and may experience rigorous physical activity. Participation in Leadership Lab (MIS 100) is suggested but optional. **Cr 1.**

MIS 290 ROTC Basic Camp
A 6 week summer camp conducted at Fort Knox, Kentucky. The student receives pay, and travel costs are defrayed by the Army. No military obligation incurred. Includes the role and mission of the U.S. Army, map reading and land navigation, first aid, marksmanship, leadership, physical training, parades, and tactics. Satisfies all Basic Course requirements. Four different cycles offered during the summer, but candidates are accepted during the entire spring semester. Participation in a physical fitness program during the spring semester is required. Students apply for enrollment to the Professor of Military Science. Selection is based on qualifications and merit. **Cr 6.**

MIS 310 Advanced Leadership and Army History (1770 to 1898)
Examines advanced principles of leadership applicable to both civilian and military careers. Includes fundamentals of leadership theory, psychology of leadership, leadership environment, interpersonal communication and contemporary human problems. Historical survey of U.S. Army, its leadership and contributions into the formative period of America history, 1770-1898. Participation in Leadership Laboratory (MIS 100) and FTX's is required. **Cr 3.**

MIS 320 Advanced Tactics
Covers rifle squad, platoon level tactics including offensive and defensive tactics, squad and platoon level patrolling skills, operation orders, combined arms tactics, field fortifications, camouflage and concealment at squad and platoon level. Students participate in intensive physical training, primary marksmanship instruction, land navigation skills and other basic soldier level training in preparation for attending Advanced Camp the summer between their junior and senior year. Participation in Leadership Laboratory (MIS 100) and FTX's is required. **Cr 3.**

MIS 390 ROTC Advanced Camp
A 5 week camp conducted at Fort Lewis, WA. The student receives pay. Travel costs are defrayed by the U.S. Army. Environment is highly structured, stressing physical training and basic tactical training at squad and platoon leadership levels. Individual leadership training is evaluated throughout the full training period. Training includes: advanced land navigation skills, marksmanship training, tactical training, combined arms demonstrations, Army branch orientation and air mobile operations. Eight different cycles are offered during the summer. Participation in a structured physical fitness program during the spring semester prior to attending advanced camp is required. (Pass/Fail Grade Only.) **Cr 0-6.**

MIS 410 Military Management, Justice and Leadership Assessment
Training management including preparation of training schedules and Battalion Training Management System. Military Law at the unit level and higher, non-judicial punishment and the Uniform Code of Military Justice, the uses and requirements of the Army installation and post support system, and the function and manipulation of the Army logistics system. Utilization of simulations to assess leadership potential through recognition, classification, and evaluation of behavior; feedback to provide basis for behavioral modification. Participation in Leadership Laboratory (MIS 100) and FTX's is required. **Cr 3.**

MIS 420 History (WWI to present), Leadership and Ethics Seminar
A consideration of military ethics including situations ranging from peacetime conduct to wartime activities through training and writing projects as well as case studies. Includes intensive investigation of the rules and regulations governing conduct during war, the staffing and operations of larger units, U.S. Army history from WWI to the present. Participation in Leadership Laboratory (MIS 100) and FTX's is required. **Cr 3.**

Courses in Modern Languages and Classics (MLC)

MLC 175 Multiculturalism in America
A multidisciplinary course that investigates the nature of "American" identity through readings and essay writing, video and debate. **Cr 3.**

MLC 190 Topics in Modern Languages
Prerequisite: permission. **Cr Ar.**

MLC 231 Western Tradition in Literature: Homer Through the Renaissance
Survey of the major writers in the Western literary tradition. The development of our cultural heritage and the evolution of major literary forms. Recommended for English majors. (This course is identical with ENG 231) **Cr 3.**

MLC 232 Western Tradition in Literature: Enlightenment to 20th Century
Survey of the major writers in the Western literary tradition. The development of our cultural heritage and the evolution of major literary forms. Recommended for English majors. (This course is identical with ENG 232.) **Cr 3.**

MLC 293 Study Abroad
Permits the granting of foreign language credit for courses taken abroad with no exact University of Maine catalog equivalent. May be repeated for credit. **Cr 1-6.**

MLC 430 Topics in European Literature
Varies in content from generic studies (the novel, the drama) to period studies (the Renaissance, Neo-Classicism.) Prerequisite: 6 hours of literature or permission. (This course is identical with ENG 430.) **Cr 3.**

MLC 445 Cervantes in English
Don Quixote and other major works of Cervantes in English. **Cr 3.**

MLC 466 The Teaching of Modern Languages
Includes analysis of current trends and methods, application of language learning principles to classroom procedures, theory and practice of language methodologies at different learning levels, use of technologies such as video and computers in the instructional process. For students seeking certification in foreign language teaching. **Cr 3.**

MLC 475 Contributions of European Linguistic Groups to the American Cultural Heritage
A study of the cultural contributions of European language groups to the development of America. Examines the roots of many American traditions, traces origins of characteristic (place) names and words to early immigrants and investigating ways in which groups or individuals dealt with the new environment in accordance with their own heritage. A reading knowledge of a foreign language is recommended. **Cr 3.**

MLC 493 Study Abroad
Permits the granting of foreign language credit for courses taken abroad with no exact University of Maine catalog equivalent. May be repeated for credit. **Cr 1-6.**

MLC 496 Field Work in Modern Languages
Supervised work in either the public or the private sector which is relevant to the study and use of a modern language. Requirements include an initial proposal which shows the relevance of the work experience to the student's program in modern languages and a final report or paper. Prerequisite: an appropriate level of fluency as determined by the department. **Cr 1-12.**

MLC 499 Senior Project in Modern Languages and Classics
Capstone Experience in which majors in French, German, Latin, Spanish, Modern Languages and Romance Languages and majors in International Affairs in Foreign Languages (French, German, Russian, Spanish) apply language skills and knowledge gained from all prior language study.

Students work closely with faculty advisor on approved project, practicum, research, study abroad. Students present project in major language at student colloquium. (Satisfies the General Education Human Values and Social Contexts Western Cultural Tradition, Cultural Diversity and International Perspectives and Capstone Experience Requirements.) Prerequisite: senior standing and permission. Cr 1-6.

MLC 598 Topics in Modern Languages Cr 3.

Courses in Music: Education (MUE)

MUE 207 Voice Class
The systematic development of the principles of good singing through class method approach. Prerequisite: MUY 101 or permission. Lab 2. Cr 1.

MUE 209 String Class
Basic performance and pedagogical skills pertaining to each of the four string instruments. Prerequisite: MUY 101 or permission. Lab 4. Cr 2.

MUE 210 Introduction to Music Education
Provides exposure to music classrooms, primary and secondary. Covers philosophies of music education, programming and evaluation. Open to all music majors. Cr 2.

MUE 213 Woodwinds I
First semester of a required two-semester course dealing with woodwind pedagogy. Covers oboe, bassoon and saxophone. Lab 2. Cr 1.

MUE 214 Woodwinds II
Second semester of a required two-semester course dealing with woodwind instrument pedagogy. Covers flute and clarinet. Prerequisite: MUE 213. Lab 2. Cr 1.

MUE 215 Early Music Teaching Field Experience
Provides observation and teaching experience through field work in public school classrooms. Observation time will be spent in each of three areas: elementary, junior high and high school. Open to first-year or sophomore music education majors. Cr 2.

MUE 217 Brass Class
Basic performance and pedagogical skills pertaining to the brass instruments. Prerequisites: MUY 101 or permission. Lab 4. Cr 2.

MUE 222 Percussion Class
Basic performance and pedagogical skills pertaining to the percussion instruments. Prerequisite: MUY 101 or permission. Lab 4. Cr 2.

MUE 320 Teaching of General Music: Elementary
Methods, materials, organization and administration of the K-6 classroom music curriculum. Includes classroom instruments, field experiences, materials and methods for gifted and talented and the special learner. Prerequisite: MUY 212 and MUL 202. Cr 3.

MUE 321 Teaching of General Music: Secondary
Methods, materials, organization and administration of the 6-12 classroom music curriculum. Includes classroom instruments, field experiences, materials and methods for gifted and talented and the special learner. Prerequisites: MUY 212, MUL 202. Cr 3.

MUE 400 Choral Music Education
The organization and development of techniques requisite to a successful choral program. Open to all music majors. Cr 3.

MUE 401 Organization and Development of the Instrumental Music Program
Covers instrumental organizations, review and application of instrumental pedagogy skills in laboratory settings. Prerequisites: MUP 345, MUE 209, MUE 213, MUE 217, MUE 222. Cr 3.

MUE 403 Instrumental Laboratory
Performance on secondary instruments in a heterogeneous setting. Required for those enrolled in MUE 401 but may be taken separately. Instrumental majors must attend Instrumental Laboratory for two of the three fall semesters following their first-year student year. Open to sophomore, junior and senior music education majors. Offered every fall. Lab 1. Cr 1.

Courses in Music: History (MUH)

MUH 201 History of Western Music I
The history of music from antiquity to approximately 1750 with a technical study of the significant musical trends. Prerequisite: MUL 200 and MUL 202 or permission. Cr 3.

MUH 202 History of Western Music II
The history of music from 1750 to the present day with a technical study of the significant musical trends. Prerequisite: MUL 200 and MUL 202 or permission. Cr 3.

MUH 517 Music of the Baroque Period
A study of music in the 17th and first half of the 18th centuries from Monteverdi and Schutz to Bach and Handel. Prerequisite: MUH 202 or permission. Cr 3.

MUH 519 Music of the Classical Period
The changing style in form and content as evolved by Haydn, Mozart and Beethoven viewed in historical content. Prerequisite: MUH 202, or permission of the instructor. Cr 3.

MUH 521 Music of the Romantic Period
Study of musical expression during the 19th century with emphasis on the intellectual foundations of the romantic movement. Detailed analysis of representative works from Beethoven through Debussy. Prerequisite: MUH 202 or permission. Cr 3.

MUH 523 Music of the Twentieth Century
Trends in contemporary music and their relationship to the cultural and political life of our time. Prerequisite: MUH 202 or permission. Cr 3.

Courses in Music: Literature (MUL)

MUL 101 The Art of Listening to Music: Elements
Designed for the student with no previous experience in music. Provides a working vocabulary of terms and listening experiences intended to expand the basic understanding of the art form. Music listening assignments to be completed in Fogler Library. Open to all university students. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Cr 3.

MUL 120 World Music
Survey of the music cultures of the non-Western world considered as an integral part of their respective cultures, as reflected in history, religion, philosophy, theater and dance. No previous training in music is required. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Cr 3.

MUL 200 The Art of Listening to Music: Historical Survey-Laboratory
Introduction to musicology, music, research, academic writing in music and world music. Extensive use of electronic information retrieval systems. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Music majors. Corequisite: MUL 202. Cr 1.

MUL 202 The Art of Listening to Music: Historical Survey
Designed for the student with some previous experience in music. Primarily an historical survey of music from 1600 to the present, with some attention to musical terms and listening experiences. Music listening assignments to be completed in Fogler Library. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisites: MUL 101 or permission. Cr 3.

MUL 531 Choral Literature and Performance Practice
Survey of choral literature from the Renaissance to the present. Cr 3.

MUL 541 Instrumental Ensemble Literature and Performance Practice
Survey of selected instrumental ensemble literature from the standard repertory. Prerequisite: Permission. Cr 3.

Courses in Music: Organizations and Ensembles (MUO)

MUO 101 University Singers
Rehearsal and performance of choral concert repertoire. Extended concert tours. Five hours of rehearsal a week. Attendance at all rehearsals and public performances required. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Prerequisite: audition (requires sight reading ability.) Lab 5. **Cr 1.**

MUO 103 Oratorio Society
Rehearsal and performance of major choral works. Attendance at all rehearsals and public performances required. May be repeated for credit. Prerequisite: audition. Lab 2. **Cr 1.**

MUO 109 Collegiate Chorale
Rehearsal and performance of choral music appropriate for choral singers with limited background and training. No audition required; open to all students. Attendance at all rehearsals and public performances required. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Lab 2. **Cr 1.**

MUO 111 Marching Band
Performs at home and occasional off-campus football games. Course begins four days prior to opening of classes. Rehearsal of concert music on limited schedule during final weeks of semester. Attendance required at rehearsals and performances. May be repeated for credit. (Fall semester only.) (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Prerequisite: permission. Lab 4. **Cr 1.**

MUO 112 Concert Band
Rehearsal and performance (on and off campus) of a variety of concert band literature appropriate for the general University instrumentalist. Attendance required at rehearsals and performances. May be repeated for credit. (Spring semester only.) (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Prerequisite: permission. Lab 3. **Cr 1.**

MUO 113 Pep Band
Rehearsal and performance of band music appropriate for athletic events including current marching band selections. Attendance required at rehearsals and performances. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Prerequisite: permission. Lab 2. **Cr 1.**

MUO 114 Symphonic Band
Rehearsal and performance of the most challenging and significant band literature. Attendance required at rehearsals and performances. Occasional touring on class days. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Prerequisite: audition. Lab 3. **Cr 1.**

MUO 121 University Orchestra
Rehearsal and performance of standard orchestral repertoire. Attendance at all rehearsals and public performances required. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Prerequisite: audition. Lab 4. **Cr 1.**

MUO 132 Opera Workshop
Rehearsal and performance of standard opera repertory. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Prerequisite: audition. Lab 3. **Cr 1.**

MUO 141 Brass Ensemble
The study and performance of chamber music for brass instruments. May be repeated for credit. Lab 2. **Cr 1.**

MUO 143 UMAINE Jazz Ensemble
Rehearsal and performance of music for the large (16-24) jazz ensemble. Membership through audition. Attendance at all rehearsals and performances required. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Lab 3. **Cr 1.**

MUO 145 Woodwind Ensemble
The study and performance of chamber music for woodwind instruments. May be repeated for credit. Lab 2. **Cr 1.**

MUO 149 Chamber Music
The study and performance of chamber music. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Prerequisite: permission of instructor. Lab 2. **Cr 1.**

MUO 502 University Singers
Performance of choral concert repertoire. Public performance and extended concert tours. Five rehersals per week. May be repeated for credit. Prerequisite: audition. **Cr 1-2.**

MUO 503 Oratorio Society
Participation and a leadership role in the rehearsal and performance of choral concert repertoire. Attendance at all rehearsals and public performances required. May be repeated for credit. Prerequisite: audition. Lab 2. **Cr 1-2.**

MUO 504 Collegiate Chorale
Participation and a leadership role in the rehearsal and performance of choral music appropriate for choral singers with limited background and training. No audition required; open to all students. Attendance at all rehearsals and public performances required. May be repeated for credit. Lab 2. **Cr 1-2.**

MUO 505 Marching Band
Participation and a leadership role in the rehearsal and performance of marching band repertoire beginning four days prior to opening of classes. Rehearsal of concert music on limited schedule during final weeks of semester. Attendance at all rehearsals and public performances required. May be repeated for credit. Prerequisite: permission. Lab 4. **Cr 1-2.**

MUO 506 Concert Band
Participation and a leadership role in the rehearsal and performance (on and off campus) of a variety of concert band literature appropriate for the general University instrumentalist. Attendance at rehearsals and public performances required. May be repeated for credit. Prerequisite: permission. Lab 3. **Cr 1-2.**

MUO 507 Pep Band
Participation and a leadership role in the rehearsal and performance of band music appropriate for athletic events including current marching band selections. Attendance at all rehearsals and public performances required. May be repeated for credit. Prerequisite: permission. Lab 2. **Cr 1-2.**

MUO 508 Symphonic Band
Participation and a leadership role in the rehearsal and performance of the most challenging and significant band literature. Attendance at all rehearsals and public performances required. Occasional touring on class days. May be repeated for credit. Prerequisite: audition. Lab 3. **Cr 1-2.**

MUO 509 University Orchestra
Participation and a leadership role in the rehearsal and performance of standard orchestral repertoire. Attendance at all rehearsals and public performances required. May be repeated for credit. Prerequisite: audition. Lab 4. **Cr 1-2.**

MUO 511 Opera Workshop
Participation and a leadership role in the study and performance of standard opera repertory. May be repeated for credit. Prerequisite: audition. Lab 3. **Cr 1-2.**

MUO 512 Brass Ensemble
Participation and a leadership role in the study and performance of chamber music for brass instruments. May be repeated for credit. Lab 2. **Cr 1-2.**

MUO 514 UM Jazz Ensemble
Participation and a leadership role in the rehearsal and performance of music for the large (16-24 member) jazz ensemble. Attendance at all rehearsals and public performances required. May be repeated for credit. Prerequisite: audition. Lab 5. **Cr 1-2.**

MUO 518 Percussion Ensemble
Participation and a leadership role in the rehearsal and performance of

percussion ensemble repertoire. Attendance at all rehearsals required. May be repeated for credit. Lab 2. **Cr 1-2.**

Courses in Music: Performance (MUP)

MUP 205 Piano Class I
Designed to provide a basic command of the keyboard. Recommended especially for students preparing to take the proficiency examination in secondary piano. May be taken as an introduction to piano performance for the beginning student. Prerequisite: Music majors only. Lab 2. **Cr 1.**

MUP 206 Piano Class II
A continuation of MUP 205, designed to provide basic command of the keyboard. Prerequisite: Music majors only. Lab 2. **Cr 1.**

MUP 215 Piano Class I
A continuation of MUP 205, MUP 206 designed to complete the proficiency examination in secondary piano. Prerequisite: MUP 205, MUP 206 or permission. Music majors only. Lab 2. **Cr 1.**

MUP 216 Piano Class II
A continuation of MUP 205, MUP 206 designed to complete the proficiency examination in secondary piano. Prerequisite: MUP 205, MUP 206 or permission. Music majors only. Lab 2. **Cr 1.**

MUP 220 Masterclass
Supplements private lessons. Emphasizes proper preparation for performance and provides frequent opportunities for students to perform before others in the same studio. Open to all students studying voice or a particular instrument with a music department faculty member for credit. Offered at the discretion of the studio teacher. Prerequisite: permission. **Cr 1.**

MUP 251 Accompanying I
The study of Piano accompanying techniques and literature with a master accompanist. Includes lab work with soloists. Required of piano majors, and open to other advanced pianists. Lab 2. **Cr 1.**

MUP 252 Accompanying II
A continuation of MUP 251. Required of all piano majors. Lab 2. **Cr 1.**

MUP 340 Basic Conducting
Introduction to conducting techniques with emphasis on practical application to vocal and instrumental groups. Prerequisite: MUY 212. Lab 3. **Cr 2.**

MUP 341 Choral Conducting and Literature
Introduces basic choral conducting and studies of problems in the organization and training of choral groups. Prerequisite: MUP 340. **Cr 3.**

MUP 345 Instrumental Conducting and Literature
Introduces basic instrumental conducting, and study of problems in the organization and training of bands and orchestras. Prerequisite: MUP 340. **Cr 3.**

MUP 401 Performance-Secondary Instrument I
Applied study in voice, keyboard, strings, winds and percussion instruments as a secondary applied area for the graduate student. May be repeated for credit. Prerequisite: Permission. **Cr 2.**

MUP 402 Performance-Secondary Instrument II
A continuation of MUP 401. May be repeated for credit. Prerequisite: Permission of advisor. **Cr 2.**

MUP 405 Keyboard Musicianship I
A comprehensive application of the study of harmony to the keyboard, directed towards the development of sight-reading and accompanying skills, keyboard score-reading, transposition, harmonization at sight, improvisation and the realization of figured bass or other chording schemes. Prerequisite: MUY 212, MUY 214, MUP 216 or equivalent level, including completion of Piano Proficiency requirements. **Cr 2.**

MUP 406 Keyboard Musicianship II
A continuation of MUP 405. Prerequisite: MUY 212, MUY 214, MUP 216 or equivalent level, including completion of Piano Proficiency requirements. **Cr 2.**

MUP 511 Advanced Chamber Music I
The study and performance of the standard ensemble literature for string instruments, wind instruments, and piano. Prerequisite: permission. **Cr 2.**

MUP 512 Advanced Chamber Music II
A continuation of MUP 511. Prerequisite: permission. **Cr 2.**

MUP 530 Advanced Choral Conducting
Application of choral conducting in laboratory setting including works from the Renaissance through the present. Prerequisite: MUP 341 or permission. **Cr 3.**

MUP 540 Advanced Instrumental Conducting
Survey of literature for symphonic, concert, and marching bands. A study of performance problems and conducting techniques as related to these ensembles. Prerequisite: MUP 345 or permission. **Cr 3.**

Courses in Music: General (MUS)

MUS 100 Recital Lab
Experience in recital performance and in listening to performances of one's peers. May be repeated. Required of music majors enrolled in applied music. Lab 1. **Cr 0.**

MUS 121 Principles of Singing I
Emphasizes diction in the standard languages (French, German, Italian and English.) Introduces the international phonetic alphabet and classical vocal literature, technique and performance practice. Weekly private instruction arranged through the class. Required for first-year voice majors in B. M.Ed. and B.M. programs; open to others by permission. **Cr 3.**

MUS 122 Principles of Singing II
Continuation of MUS 121. Weekly private instruction arranged through the class. Required for first-year voice majors in B.M. Ed. and B.M. programs; open to others by permission. **Cr 3.**

MUS 298 Special Subjects in Music
Specific topics and approaches will be chosen jointly by interested students and the staff. This offering is designed to address advanced issues not covered in regular offerings. 01-Italian Diction; 02-French Diction; 03-German Diction; 04-Harpsichord; 05-Percussion Ensemble; 14-Field Practicum in Music Education; 20-Studies in European Culture; 25-Independent Study in Music History; 40-Athena Consort. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) Prerequisite: permission. **Cr 1-3.**

MUS 310 Studio Pedagogy/Literature
A presentation of literature and/or pedagogical materials for musical instruments or voice. Intended to prepare the professional performer who maintains adjunct activities as a studio teacher. (01-baritone horn; 02-bass; 03-bassoon; 04-violoncello; 05-clarinet; 06-flute; 07-french horn; 08-classical guitar; 09-harpsichord; 10-oboe; 11-organ; 12-percussion; 13-piano; 14-saxophone; 15-trombone; 16-trumpet; 17-tuba; 18-violin; 19-viola; 20-voice.) **Cr 1-2.**

MUS 498 Senior Project
A research paper, original composition, or by special permission a lecture-recital presented in lieu of a recital. Required of all music majors in the Bachelor of Arts degree program. Accomplished under the guidance of an assigned faculty member during the senior year. **Cr 1.**

MUS 510 Special Subjects in Music
Specific topics and approaches will be chosen jointly by interested students and the staff. This offering is designed to address the undergraduate course issues not covered in regular offerings. 01-Piano Pedagogy and Literature; 06-Seminar in Contemporary Music; 11-Harpsichord; Prerequisite: Permission. **Cr 1-3.**

Courses in Music: Theory (MUY)

MUY 101 Fundamentals of Music
An elemental study of the dimensions and basic characteristics of musical sounds, with primary emphasis upon the development of skills and concepts through creating, performing and analysis. For the general student. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) **Cr 3.**

MUY 102 Fundamentals of Music (Advanced)
A continuation of MUY 101 with emphasis on more advanced aspects of rhythm, melody and harmony in music. For the general student. Prerequisite: MUY 101 or permission. **Cr 3.**

MUY 111 Elementary Harmony I
Diatonic chordal relationships through written work, analysis, and keyboard application. Primarily for music majors. Prerequisites: MUY 101 or permission. **Cr 2.**

MUY 112 Elementary Harmony II
A continued study of chordal relationships. Primarily for music majors. Prerequisite: MUY 111. **Cr 2.**

MUY 113 Elementary Sight Singing and Ear Training I
Sight singing, ear training and dictation. To be taken concurrently with MUY 111. Prerequisite: MUY 101 or permission. **Cr 2.**

MUY 114 Elementary Sight Singing and Ear Training II
Sight singing, ear training and dictation. Prerequisite: MUY 113. **Cr 2.**

MUY 211 Advanced Harmony I
A continuation of MUY 112. Chromatic chordal relationships and 20th century harmonic practice. Prerequisite: MUY 112. **Cr 2.**

MUY 212 Advanced Harmony II
A continuation of MUY 112. Chromatic chordal relationships and 20th century harmonic practice. Prerequisite: MUY 211. **Cr 2.**

MUY 213 Advanced Sight Singing and Ear Training I
A continuation of MUY 114. Prerequisite: MUY 114. **Cr 2.**

MUY 214 Advanced Sight Singing and Ear Training II
A continuation of MUY 114. Prerequisite: MUY 213. **Cr 2.**

MUY 315 Twentieth Century Musical Techniques
Techniques for structural analysis of post-impressionist through contemporary music. Prerequisite: MUY 212 or permission. **Cr 2.**

MUY 422 Tonal Counterpoint
A study of contrapuntal techniques as practiced by composers of the 18th and 19th centuries. Prerequisite: MUY 112 or permission. **Cr 2.**

MUY 451 Analytical Orchestration I
The practical application of harmonic and structural analysis of musical forms as concerned with orchestral and band instrumentation and reductions. Prerequisite: MUY 212. **Cr 3.**

MUY 452 Analytical Orchestration II
The practical application of harmonic and structural analysis of musical forms as concerned with orchestral and band instrumentation and reductions. Prerequisite: MUY 212, MUY 451. **Cr 3.**

MUY 461 Composition I (Small Forms)
Composition in the Variation Forms, including ostinato, ground motive, passacaglia, chaconne and theme with variations. Prerequisite: MUY 451, MUY 452 or permission. **Cr 2.**

Course in Native American Studies (NAS)

NAS 101 Introduction to Native American Studies
Introduces the interdisciplinary perspective of Native American Studies. Examines the experience of Native Americans, past and present, focusing on diverse and distinct cultural areas and historical events. Explores Native Americans' integral part in the development of the Americas and the European impact on traditional Native societies, historically and currently. (Satisfies the General Education Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Lec 3. **Cr 3.**

Courses in Naval Science (NAV)

NAV 100 Naval Leadership Laboratory
By permission of instructor. (Pass/Fail Grade Only.) **Cr 0.**

NAV 101 Introduction to Naval Science
Examines the historical development of the Navy, the development of seapower, and its application in today's geopolitical world. Introduces the many career paths available in the navy and the Marine Corps. Focus on the responsibilities of the officer, the Navy's mission, general military information. **Cr 2.**

NAV 102 Naval Ships Systems I (Engineering)
Examines the engineering systems currently in use aboard a U.S. Naval Ship. Emphasis on shipboard propulsion systems with additional coverage of auxiliary equipment and ship structural design. **Cr 3.**

NAV 201 Naval Ships Systems II (Weapons)
An indepth study of the theory and principles of operation of contemporary naval weapons systems. Includes coverage of weapons system types, capabilities and limitations; theory of target acquisition, identification and tracking; trajectory principles; basics of naval ordnance. **Cr 3.**

NAV 202 Seapower and Maritime Affairs
An overview of United States Naval History. Introduces the nature of international challenges on the oceans of the world and explores current trends in maritime developments and national maritime policy. **Cr 3.**

NAV 301 Navigation and Naval Operations I
Provides fundamental understanding and practical working capability in safe navigation. Includes a comprehensive treatment of coastal piloting and introduces celestial and electronic navigation methods. **Cr 3.**

NAV 302 Navigation and Naval Operations II
Considers the functions and responsibilities of the Junior Naval Officer in the areas of shipboard operations and administration. Includes a comprehensive study of Naval communications procedures, formation maneuvering, replenishment at sea, fundamentals of three dimensional warfare and a thorough overview of inland and international rules. Prerequisite: NAV 301 and permission of instructor. **Cr 3.**

NAV 304 Naval Leadership and Management II
A study of the duties, responsibilities, and overall authority of a newly commissioned Officer including personnel and equipment management, couseling and interviewing, performance appraisal, the Navy Human Resource Management Support System, military law and division administration. By permission of instructor. **Cr 3.**

NAV 310 Evolution of Warfare
Traces historically the development of warfare from the dawn of recorded history to the present, focusing on the impact of major military theorists, strategists, tacticians and technological developments. The student requires a basic sense of strategy, develops an understanding of military alternative, and see the impact of historical precedent on military thought and actions. By permission of instructor. **Cr 3.**

NAV 410 Amphibious Warfare
A historical survey of the development of amphibious doctrine and the conduct of amphibious operations. Emphasis is placed on the evolution of amphibious warfare in the 20th century, especially during World War II. Present day potential and limitations on amphibious operations, including the rapid deployment force concept, are explored. By permission of instructor.

Cr 3.

Course in Natural Sciences, Forestry, and Agriculture (NFA)

NFA 117 Issues and Opportunities
The course will consist of weekly small group session (usually of 10 or fewer students) conducted by the students' first-year advisor. Not offered in all programs. (Pass/Fail Grade Only.) **Cr 1.**

Courses in Natural Resources (NRC)

NRC 100 Introduction to Natural Resources
Introduces resource issues. Provides initial framework for problem analysis, management consideration, and policy development in natural resources. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) **Cr 3.**

NRC 117 First Year Seminar in Natural Resources
An introduction to University life and the requirements of the Natural Resources Program. Emphasis on building skills in use of information resources, writing and oral presentations. Prerequisite: First Year Students in Natural Resources. **Cr 1.**

NRC 300 Junior Seminar in Natural Resources
Examines issues in natural resources from the perspective of particular agencies and legislative bodies involved with utilization, management and conservation. Emphasis in building research, library, writing, critical analysis and presentation skills. Prerequisite: Junior standing in Natural Resrouces program. **Cr 2.**

NRC 324 Environmental Protection Law and Policy
A survey of the law and policy of environmental protection in the United States with emphasis on Federal statutes and common law approaches to environmental protection. Material covered will include the basic statutes, the administrative law, the case law of air quality, water quality, hazardous substances and the National Environmental Policy Act. Students will develop an understanding of how the legal process works in the context of specific environmental case studies and will be encouraged through class dialogues and exercises to develop their analytic skills. (Satisfies the General Education Human Values and Social Contexts Population and the Environment Requirement.) Prerequisites: POS 100. **Cr 3.**

NRC 396 Field Experience in Natural Resources
Approved work experience for which academic credits is given. Students may work part time or full time for a semester in an approved program of work experience which contributes to the academic major. Students have the opportunity to gain practical experience in a job related to their professional career goals. Prerequisite: Junior standing and permission. (Pass/Fail Grade Only.) **Cr 1-16.**

NRC 397 Topics in Natural Resources Conservation and Management
The conservation and management of natural resources entail dynamic social, economic, and scientific problems. Students investigate a natural resource topic of current national or international concern. Topics vary; course may be repeated for credit. Transcript will show topic of study. Prerequisite: Natural Resources major or permission of instructor. **Cr 1-3.**

NRC 400 Senior Paper in Natural Resources
Students select a problem in natural resource utilization, management, or policy, and prepare a detailed research paper on the topic. Each student will work closely with one of the program faculty in natural resources. (Satisfies the General Education Demonstrated Writing Competency Requirement and together with NRC 489 satisfies the Capstone Experience Requirement.) **Cr 3.** Prerequisite: Natural Resource seniors.

NRC 489 Critical Issues in Natural Resource Policy
Current and historically important issues in natural resource management and conservation are evaluated by teams of students and faculty. Interdisciplinary approaches to problem analysis are stressed, with special attention to the ways scientific information and management options affect policy. (Together with NRC 400 Satisfies the General Education Capstone Experience Requirement.) Prerequisite: Natural resource seniors. **Cr 3.**

NRC 497 Independent Studies in Natural Resources
Analysis and investigation of current problems in natural resources in consultation with a faculty member in the program. May be repeated for additional credit. Prerequisite: Natural Resources Majors. **Cr 1-3.**

Courses in Nursing (NUR)

NUR 101 Issues and Opportunities in Nursing
Introduces first-year Nursing students to issues in nursing education and University resources. Assists with the development of writing and critical thinking skills. Seeks to enhance cultural growth and understanding and to influence the establishment of self-care and wellness as a priority for nursing students. Discussion of legal and ethical aspects and professional organizations in nursing. Students meet clinical faculty in order to explore their education and experiences in nursing. **Cr 1.**

NUR 200 Professional Concepts in Nursing
Introduces the profession of nursing and nursing theory by building on knowledge of humanities and social and physical sciences. Student acquire knowledge and beginning skills fundamental to nursing and to the application of nursing science within the health care system. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: Sophomore standing or by permission. Lec 2, Lab 3. **Cr 2-3.**

NUR 201 Fundamentals of Nursing Care Management
Clinical seminar and practicum which provides an opportunity for students to implement the health care concepts introduced in NUR 200. Prerequisite: NUR 200 or by permission. (Offered Summers Only.) **Cr 2.**

NUR 300 Health Assessment Through the Lifespan
Develops the knowledge and skills necessary to conduct an individual assessment utilizing functional health patterns. Emphasis on data collection through the development of communication, interviewing, history-taking and physical examination skills. Prerequisites: NUR 200, BIO 208, CHF 201 or by permission. Lec 2, Lab 3. **Cr 3.**

NUR 301 Nursing Care Management of Adults I
Presents scientific knowledge as the basis for professional practice of nursing. Functional health patterns are the basis of course organization. Students demonstrate psychomotor skills in the learning resource laboratory and begin clinical application of the nursing process in varied inpatient settings. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Corequisite: NUR 303, NUR 300. Prerequisites: Junior standing. NUR 200, BIO 208, BMB 300, BMB 305 and permission. (LPN students who successfully challenge the three credit didactic component of this course need register only for three credits, pass/fail.) Lec 3, Lab 3, Clin 6. **Cr 3-6.**

NUR 303 Pathophysiology
A study of the physiological, genetic and biochemical basis of disease. Prerequisite: BIO 208. **Cr 3.**

NUR 304 RN Transition
Offers the registered nurse an opportunity to explore the theoretical base of nursing practice. The adult learner is encouraged to explore the use of functional health pattern assessment, the nursing process framework and various nursing theories. Prerequisite: Registered Nurse and by permission. **Cr 5.** Lec 5.

NUR 308 Nursing Care Management of Individuals and Families Across the Lifespan
Students develop a comprehensive approach to caring for infants, children, women from menarche through childbearing years, and the elderly and their families. Utilize functional health patterns to achieve a holistic assessment. Provides clinical experience in inpatient and outpatient settings. Prerequisites: NUR 200, NUR 300, NUR 301, CHF 201, NUR 303, FSN 280; permission. Corequisite: NUR 404. Lec 6, Clin 9. **Cr 9.**

NUR 404 Fundamentals of Pharmacology
The basic concepts of pharmacology for health professionals, introducing pharmacodynamics and kinetics. Emphasis on clinical pharmacology of

major drug categories and major drug interactions. Prerequisites: A course in physiology (BIO 208 or BIO 377) and either two semester of organic chemistry (CHY 251, CHY 252) or one semester of organic and one semester of biochemistry (BMB 207 and BMB 208 or BMB 221 and BMB 322.) **Cr 3.**

NUR 409 Professional Issues: Leadership and Organization
Addresses health care policy within the framework of leadership and organizational theory, role and change theories. Students will have the opportunity to explore professional and ethical issues which affect the delivery of health care. Prerequisite: NUR 304. Licensure as a registered nurse. **Cr 3.**

NUR 410 Health Related Research
Presents qualitative and quantitative research methods. Students evaluate research studies and consider the implications of research for nursing practice. Prerequisite: Basic Statistics and NUR 200 or by permission.Lec 3. **Cr 3.**

NUR 411 RN Senior Seminar
A senior synthesis seminar and clinical course for RN students, building on concepts from NUR 304 and NUR 410, as well as clinical experience and general education of the participants. Independent clinical experience and seminars provide an opportunity to synthesize clinical judgement skills, discuss critical reasoning, apply ethical decision making and integrate concepts of health promotion throughout the lifespan. Prerequisites: NUR 304, NUR 410, NUR 312. Permission. Lec 2, Proj 3. **Cr 4.**

NUR 415 Socio-Cultural Issues in Health and Health Care
Examines the importance of the influence of culture, ethnicity, gender, age and lifestyle on health definition and behavior by both the provider and the client. Future successful health care delivery, whether in a hospital, clinic, or home setting, will depend upon both the provider's technical knowledge and cultural understanding to meet the needs of clients. MAINE ACCESS is used for enhanced communication among students and between students and faculty. (Satisfies the General Education Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: junior level in nursing or permission. **Cr 4.**

NUR 420 Women's Health
Explores political, economic and social factors influencing women's health from a feminist perspective. Philosophic emphasis on concepts of creativity, humanistic care, the autonomy and unique individuality of each participant, and the growth and development of all participants. Prerequisite: Junior standing or permission. **Cr 3.**

NUR 423 Ethical Issues in Health Care
Major ethical theories and principles are introduced and framework provided for discussion of ethical issues. (Satisfies the General Education Social Contexts and Institutions, Cultural Diversity and International Perspectives, Western Cultural Tradition and Ethics Requirements.) Prerequisite: permission. **Cr 3.**

NUR 440 Nursing Care Management of Adults II
Provides the student with an opportunity to develop an understanding of acute and chronic complex health problems with emphasis on major life-threatening illness. Functional health patterns provide the basis for course organization. The role of the nurse in regard to level of illness prevention is presented. Nursing strategies relating to health promotion, maintenance and restoration is discussed. Independent and collaborative nursing responsibilities are emphasized. Prerequisite: NUR 308, NUR 404. Senior standing in School of Nursing and permission. Lec 2, Clin 2. **Cr 4.**

NUR 441 Nursing Care Management of Adults III
A continuation of NUR 440. Content is organized on the basis of functional health patterns. The role of the nurse in regard to levels of illness prevention is presented. Nursing strategies relating to health promotion, maintenance and restoration are discussed. Prerequisite: NUR 440. Senior standing in the School of Nursing and permission. Lec 2. **Cr 2.**

NUR 442 Mental Health and Community Nursing Care Management Concepts I
Introduces the student to the concepts and principles of mental health and community health nursing. The student is introduced to the role of the community health nurse and the community as a client. Students will use the functional health patterns framework for nursing diagnoses of individuals, families and communities. Current issues influencing the health of communities are examined. The clinical focus includes health promotion, disease prevention, health maintenance and restoration. A variety of clinical experiences are offered in community based settings. Prerequisites: NUR 308 and NUR 404. Senior standing in the School of Nursing and permission. Lec 2, Clin 2. **Cr 5.**

NUR 443 Mental Health and Community Nursing Care Management Concepts II
Builds on NUR 442. Concepts and principles of mental health/psychiatric nursing and community health nursing will be further analyzed. The community as the client will be a primary focus of the semester. Students will have the opportunity to conduct a community assessment. Corequisite: NUR 444. Prerequisite: NUR 442; Senior standing in the School of Nursing and permission. Lec 2. **Cr 2.**

NUR 444 Management and Leadership in Health Care System I
Provides the student with content focusing on knowledge and skills essential to the professional role of nursing. Organizational and leadership theories are presented as they relate to the practitioner as a member of a group. Theoretical concepts of group structure and interactions in groups are discussed. Change and role theories are introduced as tools for understanding group and organizational dynamics. Corequisites: NUR 440, NUR 442, NUR 446. Prerequisite: NUR 308 and NUR 404; Senior standing in the School of Nursing and permission. Lec 2. **Cr 2.**

NUR 445 Management and Leadership in Health Care Systems II
Provides the student with the opportunity to apply theory to selected topics and issues that are essential for professional nursing. Content revolves around issues derived from the role of the Registered Nurse who manages both patient care and other health care providers. Prerequisite: Senior standing in the School of Nursing and permission. Lec 1. **Cr 1.**

NUR 446 Clinical Reflection Seminar I
Utilizes discourse to foster interpersonal and group communication skills, critical thinking, reflection upon clinical practice and integration of theory with practice. The course will take the form of a group process and communication laboratory in which students apply group theory learned in NUR 446. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: NUR 308; Corequisites: NUR 440, NUR 442 and NUR 444. Senior standing in the School of Nursing and permission. Sem 3. **Cr 1.**

NUR 447 Clinical Reflection Seminar II
A continuation of NUR 446. Utilizes discourse to foster interpersonal and group communication skills, group role-taking, critical thinking, reflection upon clinical practice and integration of theory with practice. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: NUR 446; Corequisite: NUR 441, NUR 443, NUR 445 and NUR 455. Senior standing in the School of Nursing and permission. Sem 3. **Cr 1.**

NUR 455 Senior Clinical Practicum
A capstone experience in which students apply knowledge gained from all prior semesters. Students are partnered with nurses in a community of their choosing and care for clients in acute, chronic, home and community settings. Students also participate in leadership activities either individually or in small groups. (Satisfies the General Education Capstone Experience Requirement.) Corequisites: NUR 441, NUR 443, NUR 445, NUR 447. Prerequisite: Senior standing in the School of Nursing and permission. Clin 24. **Cr 6.**

NUR 495 Independent Study in Nursing
Individualized study with permission of the instructor. May or may not have an experiential component. Prerequisite: permission. **Cr 1-3.**

NUR 497 Projects in Nursing
Individualized project with permission of the instructor. May or may not have an experiential component. Prerequisite: permission. **Cr 1-3.**

NUR 501 Advanced Professional Role
The role of the nurse practitioner in rural and other underserved areas;

impact of international, national, state and local systems on health and nursing care. Prerequisite: permission. Cr 2.

NUR 502 Family in Health and Illness
Foundation course focusing on the family as client. Prepares the student to provide primary care services to the family. Prerequisite: permission. Cr 3.

NUR 503 Advanced Health Appraisal and Physical Assessment
Health appraisal, health promotion and illness prevention throughout the lifespan. Covers interviewing, history taking, physical assessment and health risk appraisal. Prerequisite: permission. Cr 1-4.

NUR 504 Theory Development in Nursing
Historical development of nursing theories and the generation of scientific knowledge. Selected theories from other disciplines useful for understanding nursing phenomena are also presented. Prerequisite: permission. Cr 3.

NUR 505 Nursing Research
Explore inductive and deductive approaches to generating research emphasizing internal and external validity. Students will review and critique nursing studies and carry out an analysis project. Prerequisite: NUR 410 or permission. Cr 3.

NUR 507 Advanced Pathophysiology
Advanced study of normal and abnormal human physiology with a focus on the physiological, genetic and biochemical basis of human disease. Provides a theoretical basis for nurse practitioners to integrate clinical findings, diagnostic and therapeutic regimes. Prerequisite: permission. Cr 3.

NUR 508 Pharmacology and Therapeutics
Prepares primary care practitioners in drug therapy management for a variety of client populations with an emphasis on rural practice. Prerequisite: permission. Cr 3.

NUR 520 Family Nurse Practitioner Care: Neonate to the Adolescent
The first of three primary care clinial courses for Family Nurse Practitioners. Emphasis on assessment, evaluation and nurse practitioner care for children, from the neonate to the adolescent, as commonly encountered in a rural family practice setting. Prerequisite: NUR 503 and NUR 507. Permission. Lec 1-3, Clin 1-3. Cr 1-6.

NUR 522 Family Nurse Practitioner Care of Adults I
Assessment and primary care management of well adults and adults with common health problems. Emphasis is placed on primary health care of rural and other underserved populations. Prerequisites: NUR 503, NUR 507, NUR 508 and NUR 520. Permission. Lec 1-3, Clin 1-3. Cr 1-6.

NUR 523 Family Nurse Practitioner Care of Adults II
Continuation of NUR 522 with emphasis on health care needs of older adults and other underserved populations. Prerequisites: NUR 502, NUR 522. Permission. Lec 1-3, Clin 1-3. Cr 1-6.

Courses in Oceanography (OCE)

OCE 501 Biological Oceanography
Marine organisms and their interrelationships with chemical, geological and physical aspects of their environments. Prerequisites: BIO 204, BIO 319 or equivalent, or permission. Cr 3.

OCE 514 Ecology of Marine Sediments
A multi-disciplinary examination of factors controlling ecological processes in marine sediments. Emphasis on recent research integrating biological, geological, and chemical aspects of marine sedimentary environments. Prerequisite: OCE 501 and permission. Cr 3.

OCE 520 Chemical Oceanography
Distribution and cycling of elements in the marine system with emphasis on geochemical and biochemical interactions. Prerequisite: CHY 121, CHY 132. Cr 3.

OCE 525 Marine Biogeochemistry
Biogeochemistry and benthic-pelagic coupling of nutrients, organic substances, and trace elements in the marine system. Emphasis on coastal and sedimentary regimes. Prerequisite: OCE 520. Cr 3.

OCE 541 (OCE, CIE) Physical Oceanography
Covers physical properties of sea water, waves and tides, distribution of variables, dynamics, water masses and the general circulation. Prerequisite: PHY 121, PHY 122, MAT 126 or permission. Cr 3.

OCE 550 Fisheries Oceanography
The influences of physical and biological processes at various temporal and spatial scales on survival, growth, abundance, transport, and distribution of marine fishes and invertebrates are studied. Emphasis is on species of commercial or recreational importance. Prerequisite: OCE 501 or OCE 541. Lec 2, Rec 1. Cr 3.

OCE 560 (OCE, GES) Marine Geology
Topics include current theories of the origin of the earth as a planet and the development of continents and ocean basins, morphology and structure of the sea floor, interpretation of geological and geophysical evidence relevant to the origin and evolution of major tectonic features of ocean regions. Prerequisite: GES 101, GES 102 or permission. Rec 3. Cr 3.

OCE 568 Paleoceanography
A study of the geological history of the ocean basins, the oceanic circulation and the climate of the past as recorded in deep sea sediments. Prerequisite: permission. Courses in general biology and oceanography are strongly recommended. Cr 3.

Courses in the Onward Program: English (ONE)

ONE 011A Developmental Composition
This course in composing paragraphs that respond to reading helps beginning writers to express themselves in clear and correct prose. Students keep a writer's journal, draft and revise paragraphs, study English grammar and work on spelling and punctuation. Cr 3.

ONE 012A Onward Composition
Students write essays based on readings in American history. Each student drafts six or seven essays, revises each with the help of peers, and finally presents the paper in the class. A review of grammar, sentence structure and punctuation makes up the editing section of the course. Cr 3.

ONE 013A Advanced Onward Composition
This college-level course requires that students respond to reading by writing several essays and a research paper. Those students who earn a C in the course and pass the ENG 101 proficiency test will earn three university credits by examination. Prerequisite: ONE 012A. Cr 3.

ONE 014A English Grammar Workshop
Designed to provide the background in English grammar that is necessary to a solid understanding of the English language and the study of other languages. Cr 2.

Courses in the Onward Program: Mathematics (ONM)

ONM 011A Pre-Algebra
Operations including addition, subtraction, multiplication and division are reviewed and applied to fractions, decimals, percents and basic geometry. Briefly introduces signed numbers and simple linear equations. Prerequisite: permission. Cr 3.

ONM 012A Introductory Algebra
Topics include: graphing, writing and solving linear equations (including fractional equations), solving quadratic equations by factoring and by the quadratic formula, as well as practical applications. Prerequisite: ONM 011A or permission. Cr 3.

ONM 013A Intermediate Algebra
Solving radical and quadratic equations. An introduction to functions and their graphs, including conics. Logarithms and inequalities are introduced. Applications are stressed. Prerequisite: ONM 012A or permission. Cr 3.

Courses in the Onward Program: Orientation (ONO)

ONO 011A Onward Orientation I
Assists the transition of students entering the University of Maine through the Onward Program. Topics include: Academic Requirements of the Onward Program and the University of Maine, Goal Setting, Learning Styles, Time Management, Note Taking, Test Taking, Stress Management, Self-esteem, Communication and Relationship Skills, Career Information, AIDS and Responsible Sexuality. Prerequisite: permission of instructor. (Pass/Fail Grade Only.) **Cr 1.**

ONO 012A Onward Orientation II
A continuation of ONO 011A is required of all first year Onward students. This course continues to focus on study skills, career information and self-awareness. Introduces computer skills and requires community services of each participant. Prerequisite: permission of instructor. (Pass/Fail Grade Only.) **Cr 1.**

Courses in the Onward Program: Reading (ONR)

ONR 011A Onward Reading
For students whose level of reading and analytical skills need significant improvement before they enter regular university courses. Develops positive reading and study habits, as well as vocabulary building. Activities include discussion of assigned readings, frequent short writing assignments, and basic skills building. **Cr 3.**

ONR 012A Introduction to Academic Reading
For students who are already reasonably proficient readers, but who lack the critical skills required for university level courses. Introduces text analysis and methods of critical thinking. Activities include discussion of assigned readings, short papers, as well as some emphasis on effective reading skills, vocabulary building, and exam preparation. Prerequisite: ONR 011A. **Cr 3.**

ONR 013A Critical Reading
For students who already have a beginning acquaintance with the methods of critical reading, but who need to refine and strengthen their skills in order to succeed in regular university courses. Activities include concentrated text analysis, oral and written presentations and independent library research. Prerequisite: ONR 012A or permission. **Cr 3.**

Courses in the Onward Program: Science (ONS)

ONS 011A Onward Biology
Understanding life begins with ecological relationships, energy and nutrients in ecosystems and population ecology. Includes the birth of evolutionary theory, Mendelian genetics the molecules of life, cell organization, how chemical reactions transform energy and molecular evolution. Emphasis is placed on the unity of life. Prerequisite: permission. **Cr 3.**

ONS 012A Onward Chemistry
Introduces the basic fundamental laws and theories that govern matter and its behavior in nature. Includes an overview of chemical equations, formulas and their manipulation, gas laws, solutions, types of reactions, bonding and equilibria. Prerequisite: ONS011A or permission. **Cr 3.**

ONS 014A Onward Zoology
Introduces biological diversity, classification, life's history on earth and origin of life. Plant systems are studied as a key part of the living fabric of the earth. Much emphasis is place on animal systems, including anatomy and physiology, embryology, reproduction and animal behavior. Prerequisite: ONS011A or permission. **Cr 3.**

Courses in Public Administration (PAA)

PAA 100 Introduction to Public Administration
Origin and development of public administration as a discipline and profession. Citizen and the administrative state; rise of professionalism; growth of executive branch in federal government and the states. Public service within an environment of democratic, legal, ethical, political and economic considerations. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) **Cr 3.**

PAA 200 Public Management
An introduction to fundamental issues that underlie the field of public management. Topics include a history of the discipline, federalism, ethics and public service and public budgeting. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) **Cr 3.**

PAA 220 Introduction to Public Policy
Examines critical issues of contemporary public policy and treatment of these issues on international, national, state, local and intergovernmental levels. Assesses and compares relevant models of policy formulation, implementation and evaluation. **Cr 3.**

PAA 233 Urban Politics
Topics include: political behavior of local parties and interest groups, city councils, urban executives and the bureaucracy, intergovernmental relations, governmental alternatives, urban environment. Prerequisites: POS 100 or PAA 200. **Cr 3.**

PAA 240 Introduction to Governmental Accounting
The historical developments of governmental accounting, basic principles of governmental accounting, and details of the theory and practice of accounting for revenues and expenditures. **Cr 3.**

PAA 315 Statistics in Public Administration
Introduces the student to the statistical procedures and computer skills that are used in policy and management settings. Covers descriptive statistics, measure of central tendency, measure of association and anlaysis of variance. Topics are presented with related computer techniques. (Satisfies the General Education Mathematics Requirement.) Prerequisites: PAA 200 and COS 100. **Cr 3.**

PAA 340 Public Budgeting
Public budgets are the primary means to allocate a community's resources. Students will learn to prepare and analyze public budgets. Budget strategies and participants will be discussed as well as reforms in the field. Prerequisite: PAA 200. **Cr 3.**

PAA 350 Public Workforce Development
Examines public personnel by focusing on techniques, laws and policy issues. Covers development of management and supervisory skills. Prerequisite: PAA 200. **Cr 3.**

PAA 370 Local Government Administration
An analysis of the formation and implementation of policies at the local level. Municipal management concerns with human and financial resources, city and town planning and service delivery. In-depth cases are utilized throughout. Prerequisite: PAA 233 or PAA 200. **Cr 3.**

PAA 396 Critical Analysis in Public Administration
Designed to provide public management majors with an opportunity to coordinate knowledge of particular aspects of the discipline with effective and scholarly writing. A balance between scholarly writing within the discipline and administrative writing will be part of the format. Multiple submissions will be required and topics will address issues of relevance in the area of public administration. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: PAA 200. **Cr 3.**

PAA 400 Issues in Public Administration
An examination of basic issues in Public Administration. Case studies in such areas as public policy implementation and public management at the international, national, state, sub-state, and local levels in public and non-profit organizations. Prerequisite: PAA 200 or permission. **Cr 3.**

PAA 405 The Regulatory Process
Government regulation is perhaps the most criticized, least understood, aspect of modern American life. Introduces the student to an informed discussion of the legal context of public administration, the historical

development and growth of regulation and the practices and processes of administrative regulation at the national, state and local level. Prerequisite: PAA 200. Cr 3.

PAA 410 Local Government Law
Fundamentals of law relating to local government, viewed from the perspective of the public administrator. Prerequisite: PAA 200. Cr 3.

PAA 425 Health Care and Human Services Administration
Provides a historical and current overview of public/non-profit/for-profit health care and human services systems administration in the U.S. Addresses the evolution of the health care and human services delivery systems, their structures and dynamics, basics of financing, functions and roles of public and private institutions in policy implementation and administration, and ethical issues. Prerequisite: PAA 200. Cr 3.

PAA 430 Institutional Change
Covers how organizations and institutions change. Primary emphasis is given to the public sector, but relevant lessons from the private and non-profit sectors are included. Specific topics include: the role of leadership and rapid change in concepts of effective leadership, high performance organizations and quality management, the revolution in organizational structures and ideas for empowering people as the key resource of organizations. Prerequisite: PAA 200. Cr 3.

PAA 493 Public Administration Internship
Professional experience in a state government, nonprofit agency, healthcare agency, etc. Some opportunities exist through the Maine State Government Internship Program. Open to selected students. Reports and readings required. No more than 6 credits of internship or field experience may be taken during a semester. No more than 6 credits may be used toward the departmental major and no more than 12 credits may be used toward graduation. (Satisfies the General Education Capstone Experience Requirement.) Cr Ar.

PAA 495 Municipal Government Internship
Professional experience in local government. Reports and readings required. Majors within the department may not receive more than a total of 12 credit hours toward graduation for any combination of internships and field experiences, and not more than 6 credit hours may be used toward the departmental major. (Satisfies the General Education Capstone Experience Requirement.) Cr Ar.

PAA 498 Independent Readings in Public Administration
Prerequisite: permission. Cr 1-3.

PAA 505 Intergovernmental Relations
Study of federalism in the United States, including federal-state, federal-local, state-local and interstate relationships. Emphasis on politics of present-day intergovernmental administrative arrangements. Prerequisite: Graduate student or permission. Cr 3.

PAA 516 Information Technology and Public Policy
Impact and design of information systems in public and non-profit organizations. Prerequisite: Graduate Students or Permission. Cr 3.

PAA 520 Policy Studies
Examines approaches to the study of public policy such as public choice theory, implementation analysis, systems analysis, and impact analysis as they are applied to policy areas such as health, welfare, education, and criminal justice. Students participate in seminar discussions and complete a research project. Prerequisite: PAA 200 or permission. Cr 3.

PAA 540 Seminar in Public Financial Management I
Examines governmental financial conditions, revenue collection and spending processes, and specialized topics such as cash management, risk management, debt management and capital budgeting. Special emphasis on financial management in state and local governments. Prerequisite: Graduate student or permission. Cr 3.

PAA 550 Seminar in Public Personnel Management
Consideration of selected problems in the public personnel management process. Emphasis on empirical theories of motivation, satisfaction, productivity, supervisory patterns, and organizational conditions. Prerequisite: Graduate student or permission. Cr 3.

PAA 560 State Administration
Analysis of the place of the state executive in the politics of the American states. Emphasis on the role of the governor and administration in policy formulation. Prerequisite: PAA 200 or permission. Cr 3.

PAA 580 City and Regional Planning
Principles of city and regional planning; legislative aspects and court decisions; administrative organization and application; zoning and land use; financing; formulation of master plans, and their administration; political problems and public relations. Graduate students or permission. Cr 3.

PAA 585 Comparative Administrative Systems
Comparative study of administration systems across different cultures, with emphasis on administrative practices, structures, and processes. Prerequisite: PAA 200 or permission. Cr 3.

Courses in Peace Studies (PAX)

PAX 201 Introduction to Peace Studies
Introduces students to various concepts in the field of peace studies. Topics include forms of violence and their relationship to social structure and cultural practices; global militarization and environmental destruction and their impact on human needs; and peace-making and conflict resolution at both micro and macro levels. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Cr 3.

PAX 398 Topics in Peace Studies
Explores peace through more in-depth study of specific topics drawn from the introductory course, such as the roles of technology, religion, gender, ethnicity and social stratification in the establishment and maintenance of peace. Cr 3.

PAX 410 Underpinnings of Peace: Critical Perspectives
An exploration and critical discussion of various academic theories about basic core elements underlying conflict and peace. The particular focus may vary depending on the instructor in charge. There will be one two-hour seminar every week. Prerequisites: PAX 201 and junior standing or permission. Cr 2-3.

PAX 490 Senior Capstone in Peace Studies
Advanced integrative study in the theories and methods of peace. Designed to bring together the various elements and aspects of the Peace Studies curriculum and guide students in their application to current international, national and local problems. Students will attend weekly three-hour seminars in addition to individual involvement in a research or experiential project. Prerequisite: PAX 410 or permission. Cr 4.

PAX 498 Special Projects in Peace Studies
Advanced individual study, research and written projects in Peace Studies and related areas, conducted under the guidance of a faculty member associated with the Peace Studies Program. Arranged on request. Prerequisite: PAX 201 or permission. Cr 1-6.

Courses in Philosophy (PHI)

PHI 101 The History and Problems of Self-Knowledge
An introductory historical analysis of major theories of self-understanding from pre-history to the present. Readings include Lorenz, Plato, Kant and others. Lectures are supplemented by film presentations such as Clark's "Civilization." (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition Requirements.) Cr 3.

PHI 102 Philosophy and Modern Life
An introduction to philosophy through a reading of works by such thinkers as Plato, Nietzsche or Marx, as well as more recent philosophers on

problems of existence, knowledge and conduct. Discussion may include such topics as economic justice, affirmative action, abortion, animals and the environment. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition Requirements.) **Cr 3.**

PHI 103 Methods of Reasoning
A study of principles used to distinguish correct from incorrect reasoning including the nature of thought, uses of language, recognition of arguments, informal fallacies, purposes and types of definition, deduction and induction. Emphasis on understanding and mastering through practice some fundamental techniques for testing the soundness of many different kinds of reasoning. (Satisfies the General Education Human Values and Social Contexts Western Cultural Tradition Requirement.) **Cr 3.**

PHI 104 Existentialism and Literature
A critical study of philosophical significance of individual choices and actions involving questions of personal identity, responsibility and authenticity as these themes are developed in existentialist literature. Special attention will be given to existentialist literary techniques. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition and Artistic and Creative Expression Requirements.) **Cr 3.**

PHI 105 Introduction to Religious Studies
An analysis of religion as an expression of human culture past and present. Considers institutional and non-institutional manifestations of religion as conveyed through myth and symbol, religious experience, struggle for societal change, mysticism, and quests for the articulation of human values. Inquiry by various disciplines will be considered, e.g., anthropology, psychology, sociology, history, philosophy, and theology. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Social Contexts and Institutions Requirements.) **Cr 3.**

PHI 107 Existentialism
A critical study of the philosophical significance of individual choices and actions, involving questions of personal identity, responsibility and authenticity, and the possibility or desirability of "distinterested objectivity." Authors read include Kierkegaard, Heidegger and Sartre. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition Requirements.) **Cr 3.**

PHI 200 Problems in Recent Philosophy
Study of recent philosophical work in ethics, social philosophy, philosophy of mind, philosophy of religion with an emphasis on epistemological and metaphysical issues that are raised in this work. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: One course in philosophy or permission. **Cr 3.**

PHI 210 History of Ancient Philosophy
An analysis of Hellenic philosophy with emphasis on Plato and Aristotle, including Presocratic philosophy, Platonism, Aristotelianism, Stoicism and Epicureanism. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition Requirements.) Prerequisite: no first-year students or permission. **Cr 3.**

PHI 230 Ethics
Readings and discussions of works by Mill, Kant, Nietzsche, Tillich, Dewey, and some other systematic moral philosophy. In each case, the nature of the system, its summum bonum and defense is examined, criticized, and tested for its applicability to personal and public ethical predicaments. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition Requirements.) Prerequisite: no first-year students. **Cr 3.**

PHI 231 Topics in Applied Ethics
Deals with the ethical issues in various professions and practices as business, law, agriculture, government, science, teaching and journalism. Different sections may focus on specific professions or problem areas (eg., Business Ethics, Environmental Ethics, etc..) (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition and Social Contexts and Institutions Requirements.) Prerequisite: no first-year students or one course in philosophy. **Cr 3.**

PHI 232 Environmental Ethics
A critical survey of major contemporary discussions of human relationships to nature and the causes of the environmental crisis. Topics will include animal rights, biocentrism, deep ecology, ecofeminism, bio-regionalism, social ecology and sustainability. Special attention will be given to building an ethical vocabulary for interpreting the place of humans in relation to the non-human. (Satisfies the General Education Ethics, Human Values and Social Context/Social Contexts and Institutions and Population and the Environment Requirements.) Prerequisite: no first-year students or one course in philosophy. **Cr 3.**

PHI 235 Biomedical Ethics
Investigates physician, nursing, and hospital codes of conduct, the physician/patient relationship, concepts of health/disease, procreation/abortion decisions, genetics/reproductive technologies, health resources/social justice allocations, and other ethical dimensions of medical practice. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition and Social Contexts and Institutions Requirements.) Prerequisite: no first-year students. **Cr 3.**

PHI 240 Social and Political Philosophy
A critical study of major social and political philosophers from Plato to the present in light of their ethical and metaphysical systems. Topics include the problem of justice, the nature of the state and its relationship to other social institutions, and the individual. The primary focus will be on normative rather than descriptive theory. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition Requirements.) Prerequisite: no first-year students or permission. **Cr 3.**

PHI 244 Philosophy of Law
Topics include the nature of law, the limits of law, and legal responsibility. Special emphasis on selected cases in American legal history, the law of contracts and torts, positivisim, goal-based, rights-based and feminist jurisprudence. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition and Social Contexts and Institutions Requirements.) Prerequisites: no first-year students or permission. **Cr 3.**

PHI 250 Formal Logic
An introductory course in modern symbolic logic. Techniques of deductive inference, including decision procedures and axiomatization, are studied in developing the propositional and predicative logics. Some attention is given to metalogic and the philosophy of logic. (Satisfies the General Education Mathematics and the Human Values and Social Context Western Cultural Tradition Requirements.) Prerequisite: no first-year students. **Cr 3.**

PHI 260 Philosophy of Language
A study of major contemporary theories of language. Topics include the nature of meaning, uses of language, conventions in language, the nature of grammar, syntax and semantics. Philosophers studied include Searle, Quine and Chomsky, among others. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: no first-year students or permission. **Cr 3.**

PHI 262 Philosophy of Art
An investigation of the nature and importance of aesthetic experience and its objects, the possibility of standards of art and taste, and the relation of art to other areas of experience. Topics include art and morality, art and science, art and the environment. Readings from Tolstoy, Hume, Dewey, Langer, Bell, Danto, Dickie and Beardsley, among others. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Artistic and Creative Expression Requirements.) Prerequisites: no first-year students or permission. **Cr 3.**

PHI 265 Topics in Philosophy
A seminar relying on careful use of major philosophical resources, as well as attempts at fresh exploration of fundamental topics. Designed for students who have previously taken at least one course in philosophy. May be repeated for credit when different philosophers or problems are studied. Prerequisite: no first-year students or permission. **Cr 3.**

PHI 286 Religions and Philosophies of the East: Hinduism
The religious and philosophical foundations of Hinduism. Readings include the Vedas, the Bhagavad-Gita, the Upanishads, Yoga, and Vedanta. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: no first-year students. Cr 3.

PHI 287 Religions and Philosophies of the East: Buddhism
The religious and philosophical foundations of Buddhism including the basic teachings of the Buddha (Four Noble Truths, Noble Eightfold Path, Dependent Origination, etc.), Buddhist ethics, Buddhist meditation, and some later religious and philosophical developments. (Satisfies the General Education Ethics, Human Values and Social Context Cultural Diversity and International Perspectives Requirements.) Prerequisite: no first-year students. Cr 3.

PHI 312 History of Modern Philosophy
An interpretation of modern philosophy from Bacon and Descartes in the 17th century, developing through 18th century rationalism and empiricism and culminating in the system of Kant. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition Requirements.) Prerequisite: junior or senior standing or one course in philosophy or permission. Cr 3.

PHI 320 Topics in Recent Continental Philosophy
A critical study of topics addressed by major movements and thinkers in continental philosophy since the turn of the century. Readings include works by Husserl, Heidegger, Sartre, de Beauvoir, Merleau-Ponty, Levi-Strauss, Derrida, Lacan, Foucault, Habermas, and Gadamer. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: One course in philosophy or permission. Cr 3.

PHI 322 Philosophical Classics
A seminar dealing with an intensive study of the works of a major philosopher or school. Topics vary. May be repeated for credit. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: One course in philosophy or permission. Cr 3.

PHI 335 Contemporary Ethics
An analysis of current moral theories bearing on issues of gender equity, equality and ethical development. Included will be the contrasting ethics of care versus the ethics of right; virtue ethics versus principled ethics; pursuing moral relationships versus achieving moral autonomy; and other issues as they arise. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition Requirements.) Prerequisite: One course in philosophy or permission. Cr 3.

PHI 342 Marxist Philosophy I: The Philosophy of Karl Marx
Special attention is given to the Marxist theory of knowledge, ethics, political and social philosophy as formulated by Karl Marx in his theory of knowledge, ethics, economics and political philosophy. Additional readings from Friedrich Engels and Mao Zedong. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition Requirements.) Prerequisite: one course in philosophy or permission. Cr 3.

PHI 343 Marxist Philosophy II: Twentieth Century Marxist Philosophy
An examination of major works in twentieth century Marxist philosophy. Emphasized are the writings of Lenin, Luxemburg, Lukacs, Trotsky, Mao, Gramsci, Sartre, Habermas, and socialist feminists. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives and Demonstrated Writing Competency Requirements.) Prerequisite: One course in philosophy or permission. Cr 3.

PHI 344 Theories of Justice
A critical study of recent theories of social justice including utilitarian, social contract, entitlement, communitarian, feminist and postmodern approaches, and spanning the political spectrum from libertarianism to socialism. Topics include distribution of wealth and power, affirmative action, censorship and pornography and international justice. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition and the Demonstrated Writing Competency Requirements.) Prerequisite: one course in philosophy or permission. Cr 3.

PHI 353 Philosophy of Mind
New developments in behavioral science such as Cognitive Science and Mind-Brain Identity Theory bring this science and philosophy even closer together than earlier developments such as S-R, Operant Conditioning or Cognitive Dissonance theories. The rise of Cognitive Science in philosophy, psychology, computer science, linguistics. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Social Contexts and Institutions Requirements.) Prerequisite: one course in philosophy or permission. Cr 3.

PHI 364 Views of Self: East and West
An examination of major concepts of self: traditional views, both East and West; recent research from anthropology, sociology, psychology and other disciplines; Marxist, socialist, feminist and other critiques of dominant Western philosophical views; and comparative cultural studies. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Demonstrated Writing Competency Requirements.) Prerequisite: one course in philosophy or permission. Cr 3.

PHI 382 Theories of Myth
Examines theories of such interpreters of myth as Cassirer, Malinowski, Levi-Strauss, Jung and Eliade. Explores the renewed interest in myth in philosophy, religious studies, anthropology and other disciplines, as well as in the general culture. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Cultural Diversity and International Perspectives and Demonstrated Writing Competency Requirements.) Prerequisite: junior or senior standing or one course in philosophy or permission. Cr 3.

PHI 432 Environmental Philosophy and Policy
A critical study of issues in environmental ethics and philosophy, with special emphasis on exploring ethical problems in areas such as technology, agriculture, economics, urban design and development, resource management, biodiversity or genetic engineering. Special attention will be given to discussion of environmental justice and the social and political implications of public policy. (Satisfies the General Education Ethics, Human Values and Social Context/Social Contexts and Institutions, Population and the Environment and Demonstrated Writing Competency Requirements.) Prerequisite: junior, senior or graduate standing or PHI 232. Cr 3.

PHI 439 Feminist Social and Political Theory
A survey of the major feminist theoretical frameworks with emphasis on their respective practical implications in the areas of work, family life, and sexuality. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition, Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: junior, senior standing. Cr 3.

PHI 454 Foundations of the Human Sciences
A study of philosophical and ethical issues in the social sciences and history including: individualism and holism, structuralism/determinism versus voluntarism, explanation and interpretation, causes versus reasons, facts and values, predictability and rationality and relativism. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition and the Demonstrated Writing Competency Requirements.) Prerequisite: one course in philosophy or two courses in history or a social science and junior, senior or graduate standing. Cr 3.

PHI 465 Advanced Topics in Philosophy
Individual and small group study of problems or systems of philosophical concern relying on careful use of major philosophical resources, as well as attempts at fresh exploration of fundamental topics. Topics vary. May be repeated for credit when different philosophers or problems are studied. Prerequisite: Two courses in philosophy including PHI 200 or permission. Junior or senior standing. Cr 3.

PHI 466 Readings in Philosophy
Individual study of a selected topic, agreed upon by the student and the

instructor. Designed to address advanced issues not covered in normal offerings. Prerequisite: 9 hours in philosophy and permission of department and instructor. **Cr 1-3.**

PHI 475 Junior/Senior Philosophy Seminar
One semester of study is required for all philosophy majors. Normally offered each semester with topics of study varied depending upon the instructor and student interest. Provides upper-level philosophical study shared by philosophy majors and other students with an interest in advanced philosophical learning. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisites: 2 courses in philosophy including PHI 200; junior or senior standing. **Cr 3.**

PHI 490 Topics in Religious Studies
Small class study of a theme, thinker or fundamental problem in religious thought. Topics vary. May be repeated for credit. Prerequisite: Two courses in philosophy 200 level or above. One must be in religious studies; junior or senior standing or permission. **Cr 3.**

PHI 566 Graduate Readings in Philosophy
Individual study of a selected topic, agreed upon by the student and the instructor. Designed to address advanced issues not covered in normal offerings or on a graduate level. Prerequisite: graduate standing and permission of department and instructor. **Cr 1-3.**

Courses in Physics (PHY)

PHY 101 Physics by Inquiry I
A basic "hands-on" inquiry course. Students make observations in the laboratory which provide a basis for constructing physical concepts and developing the reasoning skills necessary to apply them to simple phenomena. Each semester, two or three topics will be chosen from the following list: properties of matter, observational astronomy, heat and temperature, light and optics (including color), electricity and magnetism and kinematics. (Satisfies the General Education Science Requirement.) Prerequisite: Education major or permission. **Cr 4.**

PHY 102 Physics by Inquiry II
A basic "hands-on" inquiry course. Students make observations in the laboratory which provide a basis for constructing physical concepts and developing the reasoning skills necessary to apply them to simple phenomena. Each semester, two or three topics will be chosen from the following list: properties of matter, observational astronomy, heat and temperature, light and optics (including color), electricity and magnetism and kinematics. (Satisfies the General Education Science Requirement.) (NOTE: PHY 101 is NOT a prerequisite for PHY 102. Different topics will be covered. See instructor for details. Prerequisite: Education majors or permission. **Cr 4.**

PHY 105 Descriptive Physics
A introduction to basic concepts of physics intended for the non-science major. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Lec with dem 3, Lab 3. **Cr 4.**

PHY 107 Technical Physics I
An introduction to the basic concepts of mechanics and heat with illustrations taken from technical applications. Calculus is not used. Intended for Engineering Technology students. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Lec 2, Rec 1, Workshop 1, Lab 2. **Cr 4.**

PHY 108 Technical Physics II
An introduction to the basic concepts of electricity, magnetism and light with illustrations taken from technical applications. Calculus is not used. Intended for Engineering Technology students. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: PHY 107. Lec 2, Rec 1, Workshop 1, Lab 2. **Cr 4.**

PHY 111 General Physics I
An introduction to the principles of mechanics, energy, heat, sound and properties of matter. Designed for science majors as well as premedical and predental students. No calculus. A working knowledge of algebra and trigonometry is required. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Lec with dem 2, Rec 1, Problem Workshop 1, Lab 2. **Cr 4.**

PHY 112 General Physics II
A continuation of PHY 111. Introducing electricity, magnetism, optics and atomic, nuclear, and quantum physics. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: PHY 111. Lec with dem 2, Rec 1, Problem Workshop 1, Lab 2. **Cr 4.**

PHY 121 Physics for Engineers and Physical Scientists I
An introductory calculus-based physics course, primarily serving students majoring in engineering or the physical sciences. Treats mechanics, acoustics, and thermodynamics. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Corequisite: MAT 126. Lec with dem 2, Rec 1, Problem Workshop 1, Lab 2. **Cr 4.**

PHY 122 Physics for Engineers and Physical Scientists II
A continuation of PHY 121 including electricity, magnetism, and optics. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisites: PHY 121, MAT 126. Lec with dem 2, Rec 1, Problem Workshop 1, Lab 2. **Cr 4.**

PHY 229 Physical Measurements Laboratory I
Experiments primarily in mechanics and modern physics. Normally taken with PHY 236. Prerequisite: PHY 112 or PHY 122, MAT 127. Lab 2. **Cr 2.**

PHY 230 Physical Measurements Laboratory II
Consists primarily of physical measurement techniques. Normally taken with PHY 238. Prerequisites: PHY 112 or PHY 122, MAT 127. Lab 2. **Cr 2.**

PHY 236 Introductory Modern Physics
The basic principles of relativity, quantum theory, atomic structure, nuclear structure, and some aspects of molecular, solid state, and elementary particle physics. Prerequisite: PHY 112 or PHY 122, MAT 127. Lec 3. **Cr 4.**

PHY 238 Mechanics
A detailed treatment of Newtonian mechanics including PHY 121. Newton's laws, work-energy theorem, impulse-momentum theorem, particle motion in a plane, linear oscillator, coupled oscillators, rigid body rotation, small oscillations and potential methods. Prerequisites: PHY 111 or PHY 121. Corequisite: MAT 259. Lec 2, Comp 2. **Cr 3.**

PHY 441 Physical Electronics Laboratory
Theories and practices in the measurement of physical quantities using both analog and digital techniques. Primarily for physics and engineering physics majors; others admitted by permission. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Lab 4. **Cr 2.**

PHY 442 Modern Experimental Physics
Experiments selected from various topics in physics including x-ray diffraction, microwaves, the photoelectric effect, Hall effect, etc. Students develop their own experimental methods. Normally taken by junior physics and engineering physics majors. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: PHY 236, MAT 228. **Cr 2.**

PHY 447 Molecular Biophysics
An introduction to physical properties of biological macromolecules including proteins, nucleic acids and membranes. Solution thermodynamics developed as needed. Some statistical mechanics introduced. Topics include macromolecular structure, dynamics and function, solution thermodynamics of macromolecules, helix-coil transitions, calorimetry, physical techniques used in macromolecular structure determination such as X-ray diffraction, magnetic resonance and optical spectroscopy. Four credit version contains additional term project to be arranged with instructor. Prerequisites: PHY 112 or PHY 122, MAT 126, CHY 121 or permission. **Cr 3-4.**

PHY 454 Electricity and Magnetism I
An intermediate level course in the fundamentals of the theory of electricity and magnetism. Treats electrostatics and magnetostatics, both in vacuum and

in matter. Prerequisites: PHY 112 or PHY 122. Corequisite: MAT 453. Rec 3
Cr 3.

PHY 455 Electricity and Magnetism II
A continuation of PHY 454. Treats electrodynamics by developing Maxwell's equations and applying them to systems of general interest. Prerequisite: PHY 454. Rec 3.
Cr 3.

PHY 462 Physical Thermodynamics
A theoretical study of the structure and concepts of equilibrium thermodynamics including the thermodynamic descriptions of the properties and phases of matter, analysis of processes and practical applications. Normally taken as a junior or senior elective by students in the sciences or engineering. Four credit version contains additional term project to be arranged with instructor. Prerequisite: PHY 111 or PHY 121, MAT 228. Rec 3.
Cr 3-4.

PHY 463 Statistical Mechanics
Introduces statistical mechanics and thermodynamics with examples chosen from magnetic systems, ideal gases, metals, superfluidity, chemical reactions, phase transformations, mixtures, semiconductors, kinetic theory or related topics. Normally taken as a junior or senior elective by students in the sciences or engineering. Prerequisites: PHY 236, MAT 453. Rec 3. Cr 3.

PHY 469 Quantum and Atomic Physics
Introductory quantum mechanics applied to simple systems and molecules. Wavepackets, Schroedinger equation, operator methods and angular momentum. Prerequisites: PHY 236, MAT 453 or permission. Rec 3. Cr 3.

PHY 470 Nuclear Physics
Properties of the nucleus, nuclear reactions, radioactive decay, nuclear models, nuclear reactors and nuclear health physics. Prerequisite: PHY 236; Corequisite: MAT 453 or permission. May be taken without the laboratory, PHY 471. Rec 2.
Cr 2.

PHY 471 Nuclear Physics Laboratory
Laboratory exercises to accompany PHY 470. Corequisite: PHY 470 or permission. Lab 2.
Cr 1.

PHY 472 Geometrical and Fourier Optics
Covers geometrical optics, refraction and reflection at plane and spherical surfaces, optical instruments; Fourier optics, interference of waves and diffraction by a single and a double aperture: Lasers - theory of their operation, mode locking and pulse formation. Prerequisite: PHY 112 or PHY 122; Corequisite: MAT 228. Rec 3.
Cr 3.

PHY 473 Modern Optics Laboratory
Laboratory exercises to accompany PHY 472, Geometrical and Fourier Optics. Corequisite: PHY 472 or permission of instructor. Lab 2-4. Cr 1-2.

PHY 480 Physics of Materials
A senior level introductory course in the physics of materials, primarily solid state physics. Structural, mechanical, electrical, magnetic, and optical properties of materials are discussed. Prerequisites: PHY 236, PHY 455, MAT 453. Rec 3.
Cr 3.

PHY 481 Project Laboratory in Physics I
An individual project laboratory tailored to the student's particular interests. In consultation with a faculty sponsor, each student is expected to develop a suitable project, approved by the sponsor and the course coordinator. The project may or may not be related to the sponsor's research. Full written reports are required. (Satisfies the General Education Capstone Experience Requirement.) Open to senior physics and engineering physics majors and others by permission. Lab 6.
Cr 3.

PHY 482 Project Laboratory in Physics II
Completion of the project begun in PHY 481. Prerequisite: PHY 481. Lab 6.
Cr 3.

PHY 488 Physics Seminar I
A senior level course required of all physics and engineering physics majors. Students prepare written reports on scientific topics of their own selection and give formal talks before an audience of classmates and faculty. Intended to develop the ability to discuss a scientific topic before a scientifically trained audience. (Satisfies the General Education Capstone Experience Requirement.)
Cr 1.

PHY 489 Physics Seminar II
A continuation of PHY 488. Prerequisite: PHY 488. Cr 1.

PHY 495 Engineering Physics Practice
Supervised engineering practice in an industrial setting. Placement is off-campus and usually of several month's duration. Prior approval of department chairperson is required. Prerequisite: Sophomore standing in Engineering Physics. Completion of 16 hours of physics. Cr 1-6.

PHY 496 Field Experience in Physics
Supervised research or development in an academic laboratory, government laboratory, or industrial environment. Placements are usually off-campus and of several month's duration. Prior approval of the department chairman is required. Prerequisite: completion of 16 hours of physics. Cr 1-6.

PHY 497 Topics in Physics
Selected topics in areas not already covered by regular course offerings in the department. Primarily for undergraduates. Cr Ar.

PHY 499 Problems in Physics
A thesis project primarily for undergraduates and ordinarily of an experimental nature.
Cr 1-3.

PHY 500 Topics in Materials Science and Technology
Prerequisites: PHY 463, PHY 469, PHY 480 or their equivalents. Cr 1-3.

PHY 501 Mechanics
Covers kinematics and dynamics of particle and rigid body motion, Lagrange's equations, variational principles, Hamilton's equations, canonical transformations, Hamilton-Jacobi theory. Prerequisite: PHY 238 or equivalent.
Cr 3.

PHY 502 Electrodynamics I
Topics include electrostatic fields of charge distributions, dielectric materials, boundary value problems, relativistic treatment of the electric and magnetic fields of moving charges, Maxwell's equations, reflection, refraction, and polarization. Prerequisite: PHY 455 or equivalent. Cr 3.

PHY 503 Quantum Mechanics I
Topics include Dirac notation, state vectors and operators, one dimensional systems, angular momentum, central forces, perturbation theory, scattering. Prerequisite: PHY 501 or permission.
Cr 3.

PHY 510 Graduate Laboratory
Experience with sophisticated techniques and specialized equipment acquaints students with different areas of experimental physics. For graduate students in physics and for scientists and engineers in allied studies or industry. Prerequisite: graduate standing in physics, chemistry, electrical engineering, or permission.
Cr Ar.

PHY 512 Statistical Mechanics
A study of macroscopic behavior of matter derived from a statistical consideration of microscopic properties of systems, as well as relationships to Thermodynamics and Kinetic Theory. Prerequisite: PHY 462 or equivalent. Corequiste: PHY 503.
Cr 3.

PHY 513 Physical Measurement and Data Analysis With Microcomputers
Covers microcomputer architecture, analog and digital data collection, A/D and D/A converters, data manipulation and display, synchronization, timing and triggers. Prerequisite: PHY 441 or permission. Lec 2, Lab 2. Cr 3.

PHY 574 Methods of Theoretical Physics I
Covers infinite series, infinite products, matrices, coordinate systems, theory of differential equations, special functions, applications from physics. Prerequisite: permission.
Cr 3.

PHY 575 Methods of Theoretical Physics II
Advanced topics in mathematical physics of special interest. May include chaos, complex analysis, theory of integral equations, calculus of variations,

tensor analysis, elements of group theory, Green's functions theory. Prerequisite: PHY 574 or equivalent. **Cr 3.**

PHY 598 Special Topics in Theoretical or Experimental Physics
Specific topics determined by current interests of students and staff. Offered on demand with approval of the Department Chairperson. **Cr Ar.**

Courses in Political Science (POS)

POS 100 American Government
Introduces the major principles, structures, processes and policies of United States government. Covers the Constitution and its development, civil liberties, federalism, the role of political parties and interest groups, and the nature of the presidency, the bureaucracy, the Congress and the national courts. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions Requirement.) **Cr 3.**

POS 120 Introduction to World Politics
A study of contemporary international politics focusing on the interaction of nation-states and including a review of the patterns of global politics from World War II to the Present. **Cr 3.**

POS 200 Political Ideologies
Focuses on competing political ideologies, such as liberalism, fascism and Marxism, with particular attention to the values shared by individuals within the regime. **Cr 3.**

POS 201 Introduction to Political Theory
An introduction to the fundamental questions of political philosophy—what is justice? how ought we to live our lives? what is the best regime?—through detailed study of a few central books in the history of political thought, such as Plato's Republic and Machiavelli's Prince. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) **Cr 3.**

POS 203 American State and Local Government
Examines the structure and activities of subnational governments, with particular attention to state modernization, intergovernmental relations, and comparisons between Maine and other states. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) **Cr 3.**

POS 241 Introduction to Comparative Politics
Provides an introduction to the major themes of comparative politics, including: comparative political legacies, processes of modernization, comparative governmental institutions, modern political parties and interest groups, comparative policymaking processes, and problems of establishing and maintaining democratic government. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) **Cr 3.**

POS 243 Canadian Government and Politics
Provides a historical background to the development of the Canadian political system. Introduces the institutions and processes of Canadian government, federalism, political parties, and interest groups. Considers major public policy issues in contemporary Canada. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 3.**

POS 256 American Political Parties
Examines the development and present organization of the party system, including topics such as the nature and function of parties, political action committees, and the nomination and election of candidates. Prerequisite: POS 100. **Cr 3.**

POS 273 International Relations
Issues and structures that shape contemporary international relations. Topics include philosophical schools of thought in international relations, instruments of national power, the role of international organizations and international political economy. Prerequisite: POS 100 or POS 120. **Cr 3.**

POS 282 Introduction to American Law
Examines the nature and function of law in America, emphasizing its evolution and incorporation as a dynamic social instrument. Prerequisite: sophomore, junior or senior standing. **Cr 3.**

POS 301 Classical Political Thought
A survey of ancient political philosophy through detailed study of selected writings of Plato, Xenophon, Aristotle, Thucydides and others. Prerequisite: POS 201 or permission or junior or senior standing. **Cr 3.**

POS 302 Medieval Political Thought
A survey of medieval political thought during the European middle ages (5th to 15th centuries) through detailed study of selected writings of Augustine, John of Salisbury, Aquinas, Marsilius, Dante and others. (Satisfies the General Education Ethics, Human Values and Social Context Western Cultural Tradition, Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: junior or senior standing or permission. **Cr 3.**

POS 303 Early Modern Political Thought
A survey of early modern political philosophy from the Renaissance to the Enlightment through detailed study of selected writings of Machiavelli, Descartes, F. Bacon, Hobbes, Locke and others. Prerequisite: POS 201 or junior or senior standing. **Cr 3.**

POS 304 American Political Thought
The development of political ideas in America from the founding period to the present as expounded in the writings of American statesmen and political theorists, and foreign commentators such as Tocqueville. Prerequisite: junior or senior standing or permission. **Cr 3.**

POS 305 Late Modern Political Thought
A survey of modern political philosophy from the French Revolution to the twentieth century through detailed study of selected writings of Rousseau, Hegel, Marx, Mill, Nietzsche, and contemporary authors. Prerequisite: POS 201 or junior or senior standing. **Cr 3.**

POS 335 Major Governments of Western Europe
The political traditions, parties, governmental structures, and special political problems of Great Britain, France and Germany. Prerequisite: POS 100. Junior or senior standing. **Cr 3.**

POS 336 Government and Politics in Russia and Former Soviet Territories
Examines the political legacy of imperial Russia, the experience of Soviet rule from 1917 until Gorbachev's reforms, and the political developments surrounding and subsequent to the breakup of the Union of Soviet Socialist Republics. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: POS 100. Junior or senior standing. **Cr 3.**

POS 344 Public Policy in Canada
An analysis of policy making structures with emphasis on the Prime Minister, the Prime Minister's Office, the Cabinet, the Privy Council Office, and other central agents. Relations between the federal and provincial executives are also discussed. Policy making in specific issues of current interest considered. (Satisfies the General Education Human Values and Social Contexts Cultural Diversity and International Perspectives Requirement.) Prerequisite: Six hours of political science. **Cr 3.**

POS 351 The American Presidency
Covers the role of the president in a constitutional framework, theories of presidential leadership, the evolution of presidential roles and responsibilities, and the relationship between the presidency and other branches of government. Prerequisite: POS 100. **Cr 3.**

POS 352 American Public Opinion
Covers the role of public opinion in shaping the American political system. It focuses on defining and measuring citizen opinion, the way citizens develop their political views and the linkages between public opinion and public policy. Prerequisite: POS 100 or junior or senior standing. **Cr 3.**

POS 359 Topics in American Government
Offers a detailed examination of a selected topic in American politics; previous offerings have covered presidential/congressional relations and labor history. Prerequisite: POS 100. **Cr 3.**

POS 360 American Federalism and State Government
Examines the practices and policies of American states, with special attention to their role in the constantly evolving federal structure. Includes case studies of federal and state policymaking, administrative reorganization and executive/legislative interaction. Prerequisite: POS 100. **Cr 3.**

POS 362 Maine Government
Analyzes changes in the institutions and policies of the state of Maine in recent times. Covers the role of Maine in the federal system, the impact of institutional and organizational reform, and state policymaking. Prerequisite: POS 100 or junior or senior standing. **Cr 3.**

POS 372 Canadian Foreign Policy
Canadian theory and practice of foreign policy, with emphasis on the major international problems which Canada faces today. Special attention is directed to Canada's relations with the United States and other Western Hemisphere countries. (Satisfies the General Education Human Values and Social Contexts Cultural Diversity and International Perspectives Requirement.) Prerequisite: POS 100 or POS 120 or permission of the instructor. **Cr 3.**

POS 374 American Foreign Policy
American foreign policy and the major international problems facing the United States today. Special focus will be on United States relations with Europe, Russia, Japan and the Third World. Prerequisite: POS 100 or POS 120. **Cr 3.**

POS 377 International Law
Examines international legal principles relating to state territory and jurisdiction, the oceans, human rights and war. Prerequisite: POS 100 or POS 120 and junior or senior standing. **Cr 3.**

POS 378 World Order Through International Organization and Law
Uses a problem-solving approach, with emphasis on promoting human rights and economic development and on limiting violence and environmental pollution. (Satisfies the General Education Human Values and Social Contexts Cultural Diversity and International Perspectives and the Demonstrated Writing Competency Requirements.) Prerequisite: POS 100 or POS 120 and junior or senior standing. **Cr 3.**

POS 379 The Evolving United Nations
Examines the evolution of the United Nations and its role in the post-Cold War international system. Particular attention is given to peace-keeping, peace-making and humanitarian relief and intervention. Prerequisite: POS 100 or POS 120. **Cr 3.**

POS 383 American Constitutional Law
Examines the evolving nature of the U.S. Constitution through consideration of major Supreme Court decisions in areas such as federalism, legislative power, executive authority and judicial autonomy. Prerequisite: POS 100 or junior or senior standing. **Cr 3.**

POS 384 American Civil Liberties
Examines the tension between individual rights and the social order through consideration of major Supreme Court decisions involving the Bill of Rights and the Fourteenth Amendment. Prerequisite: POS 100 or junior or senior standing. **Cr 3.**

POS 401 Seminar in Political Theory
Detailed examination of the text(s) of a classic thinker in the history of political theory. Prerequisite: One course in political theory or permission of the instructor. **Cr 3.**

POS 451 The American Congress
Examines the legislative process and its components, with special attention to congressional elections, the committee structure, the impact of institutional reform and the influence of bicameralism. Prerequisite: POS 100 and junior or senior standing. **Cr 3.**

POS 452 American Interest Groups
Examines the proliferation and impact of interest groups in American politics, with particular attention to elite and pluralist theory, campaign finance law and lobbying. Prerequisite: POS 100 and junior or senior standing. **Cr 3.**

POS 453 Political Behavior and Participation
Looks at which citizens get involved in politics and why they do so. Examines theories involving individual choice and resources, community organizations, interest group activities and social movements. Additional topics include participation and democratic theory, historical reasons why participation has changes and proposals to increase citizen involvement in politics. Prerequisite: Junior or senior standing. **Cr 3.**

POS 463 Seminar in Canadian Politics
Contemporary issues in Canadian domestic and international affairs. Considers such topics as Québec nationalism, Canadian federalism, constitutional change, regionalism in English Canada, federal-provincial fiscal relations and Canada's trade and cultural relationships in North America. Prerequisites: POS 100 or POS 120 and junior or senior standing. **Cr 3.**

POS 467 African Politics
Analysis of the transition from colonialism to independence in selected countries of Sub-Saharan Africa. Discussion of nation-building, the one-party system, military intervention in politics, and neo-colonialism. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: 6 hours of Political Science. **Cr 3.**

POS 469 Politics of the Middle East
The politics of the Middle East from World War I to the present. Special attention to problems of Palestine and the creation of Israel, the interplay between the politics of the great powers and Middle East conflicts, and problems of nationalism, modernization, and revolution. Prerequisite: POS 100 or POS 120 and junior or senior standing. **Cr 3.**

POS 474 Instruments of American Foreign Policy Making
Examines the formulation and implementation of American foreign policy. Special focus will be placed on American Political culture; Presidential and congressional powers in foreign policy; government bureaucracies, such as the Departments of State, Defense and Treasury; and conceptual and theoretical approaches to policy making. Prerequisites: POS 100 or POS 120 and junior or senior standing. **Cr 3.**

POS 475 International Security
Examines national and international factors affecting the survival and security of states. Topics include components and use of military power, arms control and proliferation, the cause and resolution of conflict, negotiation and decision-making processes and structures. Prerequisite: POS 100 or POS 120 and junior or senior standing. **Cr 3.**

POS 476 Seminar in World Politics
A topical survey of conceptual and theoretical developments in the field of world politics. Examination of these developments in the context of contemporary issues and controversies will be emphasized. Prerequisite: POS 100 or POS 120 and junior or senior standing. **Cr 3.**

POS 493 American Politics Internship
Provides students with the opportunity to gain experience in a department or agency at the national, state, or local level, or to conduct a major research project. Reports and a research paper are normally required for an agency internship. **Cr 3 or 6.**

POS 495 Congressional Internship
Assignment to the Washington, D.C. office of a member of Congress, normally from the Maine delegation, during the spring semester. Readings and reports are required in addition to performing staff work in a congressional office. The internship is open to juniors and seniors on a competitive basis; applications and interviews are conducted each fall to fill the spring internship positions. Prerequisite: permission. **Cr 6 or 9.**

POS 496 International Affairs Internship
Provides students the opportunity to gain experience in a department or

agency, either in the United States or abroad, that deals with international affairs. Students may not receive more than 9 credit hours for this internship. **Cr 6 or 9.**

POS 498 Independent Study in Political Science
Provides students the opportunity to work closely with an individual member of the faculty, either as a research assistant or as the author of a major independent study paper. Prerequisite: permission. **Cr 3.**

POS 531 Topics in Comparative Politics
Examines various issues in comparative politics such as comparative democratization, regime types and conflict management, with emphasis on readings in the theoretical literature in the discipline of comparative politics through class discussions and individual research. **Cr 3.**

POS 549 Seminar in American Politics
Examines theoretical and practical issues in American politics in a small group setting, with emphasis on individual research and class participation. **Cr 3.**

Courses in Pulp and Paper Technology (PPA)

PPA 264 Survey of the Paper Industry
Introductory overview of the structure and technology of the U.S. pulp and paper industry. Considers the manufacture of paper from fibrous raw materials to the processing of finished products. Emphasis on papers produced from wood, non-wood, and secondary fibers. Suitable for non-technical students. Rec 3. **Cr 3.**

PPA 465 Pulp Technology
The chemical and engineering principles of manufacturing various wood pulps. Prerequisite: Junior standing, CHE 200, or permission. Rec 3. **Cr 3.**

PPA 466 Paper Technology
The chemical and engineering principles of paper manufacturing from the preparation of fiber furnishes to the final stage of drying. Prerequisite: CHE 200 or permission. Rec 3. **Cr 3.**

PPA 473 Pulp Manufacture and Testing
Problem-oriented laboratory course involving the process design criteria for the production of mechanical, semi-chemical and chemical wood pulps. Prerequisite: PPA 465 (may be taken concurrently.) Lab 8. **Cr 4.**

PPA 474 Paper Manufacture and Testing
A problem-oriented laboratory course involving the process design of paper making and finishing systems. Prerequisite: PPA 466 (may be taken concurrently.) Lab 8. **Cr 4.**

PPA 499 Undergraduate Thesis
Original investigation of a pulp and paper problem and reporting of the results. Prerequisite: permission. **Cr Ar.**

Courses in Parks, Recreation and Tourism (PRT)

PRT 225 Readings in Outdoor Recreation
Selected authors and literature will be studied and discussed to familiarize RPM majors with the breadth and complexity of the field. Rec 2. **Cr 2.**

PRT 345 Special Problems
Original investigation in Recreation Resources, the subject to be chosen after consultation with the staff. Open to high-ranking juniors and seniors. **Cr Ar.**

PRT 352 Forest Recreation Management
A broad yet comprehensive study of the theories, problems and techniques of managing recreation systems in both the public and private sectors. Emphasis given to current recreation management issues. Rec 3. **Cr 3.**

PRT 355 Visitor Behavior and Management
Study of outdoor recreation user behavior as it impacts the planning, design and management of outdoor recreation opportunities. Emphasis on social/psychological principles which alter behavior and satisfaction in recreation experiences. Rec. 3. **Cr 3.**

PRT 394 Cooperative Education
Practical experience for the undergraduate student, combining work in a business firm or public agency with academic courses and supervision. Opportunity for student to gain experience, to integrate classroom learning with job performance, and to develop future placement possibilities. Prerequisite: junior standing and permission. (Pass/Fail Grade Only.) **Cr 1-16.**

PRT 395 Internship
A professional activity under the general supervision of an experienced professional with a high degree of responsibility placed on the student. Learning objectives are pre-established and agreed upon between the faculty coordinator and the placement supervisor. Not normally repeated. **Cr Ar.**

PRT 396 Field Experience
A field experience is a professional activity participated in by students under the supervision of a practicing professional in the field. A high degree of responsibility is placed on the student for developing learning objectives and securing the approval of a faculty member for academic credit for the learning involved. May be repeated. **Cr Ar.**

PRT 452 Environmental Interpretation
An overview study of interpretation principles with special emphasis on the function of interpretation in park and recreation resource management. Topics include: planning and application of interpretive principles within the context of resource management and outdoor recreation opportunities. Student projects are required to demonstrate the application of interpretive principles. Prerequisite: PRT 352. **Cr 4.**

PRT 454 Cultural Resource Management
Study of social and legislative mandate to preserve the nation's cultural heritage. Emphasis on the total management of cultural resources through study of existing management systems. Prerequisite: PRT 352. Rec 3. **Cr 3.**

PRT 470 Principles of Tourism
Focus is on the application of tourism principles to natural environments in the public and private sectors. Topics range from the history of tourism to emerging trends, and include the structure and function of tourism organizations, tourist behavior, beneficial and adverse impacts of tourism, tourism demand, and appropirate tourism development. Prerequisite: PRT 352. Rec 3. **Cr 3.**

PRT 471 Commercial Recreation
Basic concepts of recreation management applied to commercial recreation enterprises. Topics include entrepreneurial strategies, economic concepts, the feasibility process, and leisure trends affecting the CR industry. Prerequisite: PRT 352. Rec. 3. **Cr 3.**

PRT 480 Wilderness and Wild and Scenic River Management
Development of a historical overview of wilderness and river management in the United States. Basic concepts of the unique management problems and opportunities associated with wilderness and wild and scenic river systems. Prerequisite: PRT 352. **Cr 3.**

PRT 540 Cultural History Interpretation
Theory and practice of interpreting cultural history in park, recreation sites and museums. Topics include visitor centers, on-site areas, living history re-enactment, research, libraries, archives, special collections, cemetery interpretation, site reconstruction and stabilization. Prerequisites: PRT 452 or permission. **Cr 3.**

PRT 554 Forest Recreation Planning
Measuring, analyzing, and forecasting recreational use of forest lands. Concepts of planning, and their application to forest recreation management problems. Prerequisite: PRT 352 or permission. **Cr 3.**

Courses in Psychology (PSY)

PSY 100 General Psychology
Lecture discussions of basic psychological processes, including learning, perception, motivation and emotion, higher mental processes, individual differences, personality and additional selected topics. (Satisfies the General

Education Human Values and Social Context/ Social Context and Institutions Requirement.) Cr 3.

PSY 305 Psychological Aesthetics
Topics include psychological factors related to the creation of art and to the perception and appreciation of aesthetic objects of all types. Also covers psychological bases of historical change in the content and style of the arts. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: PSY 100. Cr 3.

PSY 308 Theories of Personality
Examines the chief contemporary approaches to the study of personality including critical issues in personality. Also considers assessment techniques and research methods. Prerequisite: PSY 100. Cr 3.

PSY 309 Psychology of Consciousness
Examines the scientific approach to the study of consciousness and altered states of consciousness. Topics include the concept of consciousness, aspects of normal consciousness, introspection, the mind-body problem, brain research implications for consciousness, daydreaming, sleep, night dreaming, hypnosis, and meditation. Emphasis on research methods and results and theoretical interpretations. Prerequisite: PSY 100. Cr 3.

PSY 312 Abnormal Psychology
Examines the origin, development, and manifestations of abnormal behavior with emphasis on the biological, social, and psychological determinants of deviant behavior. Prerequisite: PSY 100. Cr 3.

PSY 323 Psychology of Childhood
A systematic study of childhood behavior and psychological development. Emphasis on principles underlying development, methods of child study and practical implications. Prerequisite: PSY 100. Cr 3.

PSY 324 Psychology of Adolescence
A study of adolescent development in the physical, intellectual, emotional, and social spheres. Adolescent personality and problems of adjustment considered in relation to the family, the school and the community, and the world of work. Covers delinquency and abnormality in adolescents. Prerequisite: PSY 100. Cr 3.

PSY 325 Psychology of Infant Development
Surveys current concepts and findings in infancy research. Focus will address perinatal behavioral adaptations, development of motor and sensory systems, early parent-infant interactions, cognition and language acquisition and assessment methods for evaluating developmental delay. Prerequisite: PSY 323. Cr 3.

PSY 330 Social Psychology
An introduction to the study of social behavior from a psychological perspective. Representative topics include culture and personality, attitude formation and change, conformity, leadership and prejudice. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Prerequisite: PSY 100. Cr 3.

PSY 332 Environmental Psychology
The study of the transactions between people and their physical environments. Representative topics include territoriality, crowding, personal space, privacy, architectural design of space and self-control and development phenomena. Prerequisite: PSY 100. Cr 3.

PSY 339 Political Psychology
Study of the mutual influence of politics and individual psychology. Topics include the motivation and ideology of political actors, decision-making, authoritarian personality, between-group conflict and nuclear war. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Prerequisite: PSY 100 or POS 100. Cr 3.

PSY 341 Statistics in Psychology I
A survey of techniques used to obtain, display, analyze, and interpret data in psychology. The lecture section will emphasize the theoretical bases of the topics, while the recitation section will allow students to focus upon the computational procedures involved in the various statistical techniques. (Satisfies the General Education Mathematics Requirement.) Prerequisite: PSY 100. Lec 3, Rec 2. Cr 4.

PSY 342 Statistics in Psychology II
Presents techniques of practical value to the psychologist in analyzing psychological experiments. Prerequisite: PSY 341. Cr 3.

PSY 345 Principles of Psychological Research
Discussion of various research methods used in the scientific approach to the study of behavior. Laboratory will demonstrate these methods and develop skills in statistically analyzing data using computers. Students will learn to interpret the statistical analyses and write papers discussing the results of the experiments. Prerequisite: PSY 341, COS 100. Lec 2, Lab 2. Cr 2.

PSY 350 Cognition
An introduction to the psychological study of human information processing and thinking. Representative topics included attention, pattern recognition, short and long-term memory, semantic memory, visual memory, mental imagery, problem solving and creativity. Prerequisite: PSY 100. Cr 3.

PSY 351 Psychology of Motivation
A survey of theory, research methodology and experimentally obtained facts related to the activation and direction of behavior. Prerequisite: PSY 100. Cr 3.

PSY 352 Learning
Principles and theories of learning and adaptation in different species. Relations to behavioral ecology as well as quantitative issues will be covered. Prerequisite: PSY 100 and MAT 105 (or a more advanced mathematics course) or permission. Cr 3.

PSY 358 Decision Making and Risk Taking
A discussion of the process of choosing between alternative actions in the pursuit of goals, with an emphasis on risky decision making, where the outcome is uncertain and there is a possibility of loss or injury. We will consider normative principles of rational decision making, and research on human judgment, decision making and risk taking, including factors leading to biased or irrational decisions. Besides theories and research, we will also discuss practical applications such as personal life decisions and public policy decisions. Prerequisite: PSY 100 or junior standing. Cr 3.

PSY 361 Sensation and Perception
Principles and theories of the ways we make contact with our environment by seeing, hearing, smelling, tasting and feeling. Psychophysics is covered. Prerequisite: PSY 341 or permission. Cr 3.

PSY 363 Mechanisms of Animal Behavior
Topics include learning, motivation, sensory processes, behavior genetics, innate behavior, social behavior, and the development of behavior. Evaluates methods of investigating and classifying animal behavior. Prerequisite: PSY 100 and a basic course in zoology or biology or permission. Cr 3.

PSY 365 Physiological Psychology
Explores the physiological bases of behavior with emphasis on the function of the nervous system and the relation between physiological and psychological processes. Prerequisite: PSY 100 and a basic course in zoology. Cr 3.

PSY 401 Health Psychology
Presents a biopsychosocial approach to the study of lifestyles, behaviors, response styles and personality factors that may impact an individual's health. Research comes from the areas of psychology, neuroscience, public health and medicine. Topics will include the relationship of psychological and social factors on physical conditions and recent research in these areas. Prerequisite: PSY 312 and junior or senior standing. Cr 3.

PSY 412 Foundations of Clinical Psychology
Provides an overview of clinical psychology. Topics include the helping professions, historical development of clinical psychology, approaches to psychological assessment and psychotherapy, controversies in the field, and new directions in the field. Prerequisites: PSY 312 and junior or senior standing. Cr 3.

PSY 420 Child Study Laboratory I
Observation and study of preschool children, as well as participation in

guiding activities. Students undertake individual projects, supplemented by reading and class discussion. Emphasis on social development in early childhood. PSY 323 recommended. Rec 2, Lab 3. **Cr 3.**

PSY 421 Child Study Laboratory II
Observation and study of preschool children. Individual projects, supplemented by reading and class discussions. Opportunity to assist in guiding the children's activities. Emphasis on cognitive development. It is recommended that student take PSY 323 before enrolling. Prerequisite: PSY 100. Rec 2, Lab 3. **Cr 3.**

PSY 425 Social Issues in Developmental Psychology
An introduction to the research on current social issues in developmental psychology. Topic areas may include sex-role development, maternal employment, day care, mass media effects, the role of fathers, compensatory education, the effects of poverty, teacher expectancy effects. Prerequisites: PSY 323. **Cr 3.**

PSY 465 Hormones, Brain and Behavior
An introduction to behavioral neuroendocrinology: the study of hormonal effects on brain and behavior in both humans and animals. Topics include the role of hormones in behvioral gender differences; sexual, parental and aggressive behaviors; and various non-sexual behaviors. Prerequisites: PSY 100, BIO 100; recommended: PSY 363 or PSY 365. **Cr 3.**

PSY 470 History and Systems of Psychology
Surveys the development of psychology as an experimental science. beginning with Greek views of human nature through Christian theology, the Renaissance and British Associationism. Considers Scottish and German Faculty Psychology and the 19th century developments in physiology that led directly to the birth of experimental psychology. Brief consideration of Gestalt Psychology and Behaviorism, vitalism in the life sciences and the mind-body problem in psychology. Prerequisite: PSY 100, Junior or Senior. **Cr 3.**

PSY 490 Seminar in Issues in Contemporary Psychology
A review of the current theoretical issues and research findings in the general areas of psychology. Prerequisite: PSY 100. **Cr 3.**

PSY 491 Senior Seminar in Psychology
One or more current topics in psychology, chosen by the instructor, will be discussed. Students will conduct library research, make oral presentations and write a comprehensive review paper on each topic. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisites: PSY 341 and PSY 345; seniors only. **Cr 3.**

PSY 492 Problems in Psychology
Provides the opportunity to carry out a particular research problem under supervision. Only 6 hours of credit will count toward the psychology major. Prerequisite: PSY 345 and permission. **Cr Ar.**

PSY 493 Field Experience in Psychology
Practical experiences in a wide variety of applied settings such as schools, psychological clinics, hospitals, and government and private agencies. Requirements include a written proposal outlining the experience planned, goals of the plan, relationship of the course to the student's program, periodic conferences with the faculty supervisor and a final written report. Three credit hours may fulfill major requirements and only 6 hours may count toward graduation. Prerequisites: Nine hours in psychology and permission. **Cr 1-3.**

PSY 494 Senior Research Project
The student will develop a research project in consultation with the instructor. The student will do an extensive library search of background material, write a proposal, conduct the research and write an APA style report. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisites: PSY 341, PSY 345 and permission. **Cr 3.**

PSY 503 Behavior Therapy
The study of behavior therapy as an approach to the treatment or management of undesired or dysfunctional behavior, thoughts, and feelings. Includes description and origins of therapeutic techniques, and the results of experimental studies. Prerequisite: permission. **Cr 3.**

PSY 520 Biological Bases of Infancy and Development
Advanced review of psychobiological research and theory on infancy. Physiological, perceptual, cognitive, linguistic and social-emotional topics. Prerequisite: PSY 323. **Cr 3.**

PSY 521 Emotion Development and Adaptation
Critical review of theory and research on emotional development and social adaptation/maladaptation. Biological, cognitive, behavioral and developmental aspects of emotion systems will be discussed. Prerequisite: PSY 323. **Cr 3.**

PSY 522 Social Development in Children
An advanced survey of current theories and research. Topics include the development of parent-child attachments, prosocial behavior, peer competence, self control, sex-role stereotypes and moral behavior. Prerequisite: permission. **Cr 3.**

PSY 524 Cognitive Development in Children
An advanced survey of theories and research. Topics include perceptual development, children's learning and memory functioning, and language acquisition. Prerequisite: PSY 323, PSY 345 or equivalent. **Cr 3.**

PSY 540 Advanced Psychological Statistics and Methods I
A two semester advanced-level course. Topics include control, reliability of measurement, and validity in relation to both experimental and nonexperimental approaches. Prerequisite: PSY 341 or equivalent. **Cr 3.**

PSY 541 Advanced Psychological Statistics and Methods II
A two semester advanced-level course. Topics include control, reliability of measurement, and validity in relation to both experimental and nonexperimental approaches. Prerequisite: PSY 341 or equivalent. **Cr 3.**

PSY 546 Multivariate Methods for Behavioral Sciences
Examines the use of multivariate regression in the context of behavioral investigations in which more than one dependent variable is used. Multivariate analysis used in behavioral studies as a protection scheme and as a method for deriving a meaningful composite of behavioral scores, will be discussed. Prerequisite: PSY 540 and PSY 541. **Cr 3.**

PSY 551 Advanced Physiological Psychology
Reading and discussion on topics of current interest including memory, brain stimulation, neurotransmitter systems and neuronal plasticity. Prerequisite: permission. **Cr 3.**

PSY 556 Advanced Perception
Current theories and research in perception. Topics include theories of seeing, signal detection theory, depth perception, and perception in its ecological context. Prerequisite: PSY 361 or permission. **Cr 3.**

PSY 558 Advanced Theories of Learning
An advanced survey of the most important S-R and cognitive theories of learning. Fundamental learning phenomena are described along with the explanations offered by the classical learning theories of Hull, Tolman, Skinner and others. Recent research with important theoretical implications is also discussed. Prerequisites: PSY 352 or permission. **Cr 3.**

PSY 561 Advanced Social Psychology
Consideration of current theoretical and methodological issues in social psychology including interpersonal perception, attitude and attitude change, communication and persuasion, language and cognition. Prerequisite: permission. **Cr 3.**

PSY 565 Attitudes and Opinions
A study of the nature, development, and measurement of social attitudes including applications to understanding, prejudice, intergroup conflict, political and religious behavior. Prerequisite: PSY 330. **Cr 3.**

PSY 567 Advanced Cognitive Psychology
Representative topics include a comparison of the cognitive or information processing paradigm with behavioristic and psychodynamic paradigms,

eature analysis and pattern recognition, memory storage and retrieval, ttention, psycholinguistics, problem solving and neuropsychological bases f cognitive processes. Prerequisite: permission. Cr 3.

SY 592 Directed Readings:(area)
Opportunity to read in a particular area of psychology under faculty lirection. Prerequisite: permission. Cr not to exceed 6.

Courses in Resource Economics and Policy (REP)

REP 254 Introduction to Production Economics
Theory and tools of production economics including economic theory of the irm and microcomputer analysis of firm costs. Cr 3.

REP 286 Resource Policy Analysis
ntroduction to the economics of public policies with a particular emphasis n resource issues. Topics to be covered include the efficiency of market nechanisms, sources of market failure, the tools of public policy and the olitical process of instituting policies. Each semester a special topic or opics will offer a focal point for applications of the subject matter. Prerequisites: ECO 120 or INT 110. Cr 3.

REP 371 Introduction to Natural Resource Economics and Policy
Economic aspects of natural resource management and policy are presented. Both consumptive and nonconsumptive uses of natural resources are liscussed along with the socially optimal use of renewable and ionrenewable resources. Contemporary environmental problems and policies re presented. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Population and the Environment Requirements.) Prerequisites: INT 110 or ECO 120. Cr 3.

REP 381 Sustainable Development Principles and Policy
The principles of sustainable development are investigated and considered against a number of ethical and philosophical concepts. Possible ecological, economic and social criteria for evaluating development proposals against hose principles are surveyed. Selected issues relevant to Maine are evaluated by sustainable development criteria. (Satisfies the General Education Human Values and Social Context Population and the Environment and the Demonstrated Writing Requirements.) Prerequisite: Sophomore standing or higher. Cr 3.

REP 396 Field Experience in Resource Economics and Policy
An approved program of work experience which contributes to the academic major and for which academic credit is given. Students may work part time or full time for a semester in a job related to their professional career goals. Prerequisite: junior standing and permission. (Pass/Fail Grade Only.) Cr 1-16.

REP 458 Principles of Resource Business Management
Fundamental economic concepts and tools related to the management of esource based businesses. Managerial decision making in the food roduction and processing, marine and similar resource-based business is mphasized. Prerequisites: ECO 420, MAT 114 or permission of instructor. Rec 3. Cr 3.

REP 459 Resource Based Business Finance
Designed to assist the student to develop skills necessary to deal with inancial aspects of resource-based businesses. Topics include financial tatement spreading and analysis, analyzing cash flow, business plan levelopment, negotiation and entrepreneurship. Rec 3. Cr 3.

REP 465 Food and Fiber Marketing
A study of economic principles applied to marketing structures, services and gencies, including analysis of costs and efficiencies and the impact of ndustry organization and government. Prerequisite: INT 110 or ECO 120. Rec 3. Cr 3.

REP 468 Quantitative Analysis and Forecasting
An examination of quantitative techniques for managerial decision making n resource-based industries. Prerequisite: REP 458. Cr 3.

REP 471 Resource Economics
A study of the principal economic and institutional factors affecting the use of natural and environmental resources including supply, demand and future requirements; economics of resource allocation, functioning of the market, benefit cost analysis, planning for more efficient use of environmental resources. (Satisfies the General Education Human Values and Social Contexts Population and the Environment Requirement.) Prerequisite: INT 110 or ECO 120. Rec 3. Cr 3.

REP 473 Land Economics
Principle economic and institutional factors affecting land use. Emphasis on land rent, economics of land conservation, public measure for directing land use and taxation of landed property. Prerequisite: INT 110 or ECO 120. Rec 3. Cr 3.

REP 474 Land Use Planning
Principles of planning for coordinated use and development of the land resource base. Survey of emerging concepts and problems that relate to land use policies and control measures. Emphasis on economics, legal, institutional, and social issues. Cr 3.

REP 489 Senior Seminar
A writing intensive and discussion based course focusing on current economic, social and environmental problems. Students are required to prepare a major research paper and presentation in conjunction with the instructor. (Satisfies the General Education Demonstrated Writing Competency and Capstone Experience Requirements.) Prerequisite: seniors and graduate students. Rec 3. Cr 3.

REP 497 Independent Studies
Analysis of current problems in resource economics and policy, and community development. Prerequisite: permission of instructor. May be repeated for additional credit. Cr 1-3.

REP 511 Advanced Applications of Agricultural Economic Theory
Economic principles applicable to agricultural and resource problems and their use in policy evaluation. Comparative statics used to illustrate the application of consumer demand theory, the theory of the firm, production economics, market structure and welfare economics. Prerequisite: ECO 420. Cr 3.

REP 517 Research Methods in Resource Economics and Policy
A study of the nature of economic and social analysis including the scientific method and the formulation and testing of hypotheses. Introduces economic research quantitative techniques, including matrix algebra and with computer applications. Prerequisite: MAT 232. Cr 3.

REP 518 Mathematical Optimization Techniques
Provides a working knowledge of mathematical optimization techniques and their application to relevant economic problems. Cr 3.

REP 527 Community Development-Principles
Analysis of the principles of community economic development in rural settings, with emphasis on social analysis, strategy planning and policy formulation. Cr 3.

REP 528 Community Development Applications
Introduces skills and strategies needed by community development practitioners including community development process, group process, social and behavioral change and manpower retraining. Selected presentations by practicing professionals in the field. Prerequisite: REP 527. Cr 3.

REP 554 Production Economics
The principles of optimum resource allocation applied to the agri-business firm including advanced techniques for attaining optimum resource allocation. Cr 3.

REP 565 Marketing Theory and Concepts in Agri-Business
Examines the economic theory underlying the policies of agricultural marketing firms as well as current marketing problems and market practices for selected commodities and segments of the agri-business sector of the U.S. economy. Prerequisite: REP 465, ECO 420. Cr 3.

REP 571 Advanced Resource Economics
Analysis of economic theory as it relates to the development and management of exhaustible and renewable natural resources. Examines the unique characteristics of resource markets, the determination of optimal pricing and use, resource policy, and management issues. Prerequisite: INT 514. **Cr 3.**

REP 572 Agricultural Trade and Economic Growth
Theories and applications of international and interregional agricultural trade and economic growth. Prerequisite: ECO 420. **Cr 3.**

REP 581 Sustainable Resource Systems and Public Policy
Surveys current management protocols of agricultural, energy, fisheries and forest resources in context of principles of sustainable development, considering ethical and socio-cultural as well as economic and environmental values; evaluates influences of public policy on management strategies. Seminar requires active student participation. Prerequisite: permission. **Cr 3.**

REP 593 Graduate Seminar
Analysis of current problems in community development, resource use, management. Emphasis on economic and social effects. Problem areas vary from semester to semester. May be repeated for a total of 6 credits. **Cr 1-3.**

REP 597 Independent Studies
Analysis of current problems in resource economics and policy and community development. May be repeated for a total of six credits. **Cr 1-3.**

Courses in Russian (RUS)

RUS 101 Elementary Russian I
A systematic study of the basics of the Russian language. Equal emphasis is placed on developing reading, comprehension, speaking and writing skills. For students with no previous study of Russian or fewer than two years in high school. **Cr 3-4.**

RUS 102 Elementary Russian II
A continued study of the basics of the Russian language. Equal emphasis is placed on developing reading, comprehension, speaking and writing skills. For students with no previous study of Russian or fewer than two years in high school. Prerequisite: RUS 101 or equivalent. **Cr 4.**

RUS 121 Elementary Russian-(Accelerated)
For students with no previous study of Russian or fewer than two years in high school. A full year's work covered in one semester. **Cr 6.**

RUS 199 Review Russian
For students who have taken 2 or more years of high school Russian, but do not feel ready to complete the RUS 203-204 sequence. Fast-paced review of basic grammar, pronunciation and vocabulary, with strong emphasis on oral communication. This is not the equivalent of RUS 203/204 level language courses. 2 class meetings per week, with substantial listening and writing assignments. Prerequisite: 2 years of high school Russian or permission. Lec 2. **Cr 2.**

RUS 203 Intermediate Russian I
An integrated approach. Reading texts as well as various audiovisual materials will be employed to strengthen reading, writing and especially speaking and comprehension skills. The course also includes a systematic but gradual review of the essentials of Russian grammar. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 3-4.**

RUS 204 Intermediate Russian II
A continuation of RUS 203 designed to strengthen reading, writing, speaking and comprehension skills. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: RUS 203 or equivalent. **Cr 4.**

RUS 223 Intermediate Russian (Accelerated)
For students who have completed RUS 102 or RUS 121 or equivalent in high school. A full year's work covered in one semester. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 6.**

RUS 250 Multidisciplinary Readings in Russian
Intended to be taken in conjunction with course from another department, this course supplements the content areas of the course to which it is attached and promotes increased proficiency in Russian through reading and discussion in Russian. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: RUS 204 or equivalent or permission. May be repeated for credit. **Cr 1.**

RUS 490 Topics in Russian
Specific topics vary from semester to semester. May be repeated for credit. **Cr 3.**

Courses in Education: Special Education (SED)

SED 401 Introduction to Students with Severe Disabilities
Provides an overview of issues, practices and strategies for educating students with severe and multiple disabilities in today's public schools. Prerequisite: SED 402 or permission. **Cr 3.**

SED 402 Adapting Instruction for Students with Disabilities
Develops knowledge and understanding of students with disabilities. Topics include: adaptation of instruction, legal and ethical issues, family and social relationships and collaboration between school and community agencies. (Satisfies the General Education Ethics Requirement.) Prerequisites: EDB 204 and EDB 221. **Cr 3.**

SED 509 Curriculum Development for Students with Severe Disabilities
In-depth study of curriculum for students with severe disabilities. Emphasizes the development, implementation and evaluation of curriculum designs as well as co-teaching and peer-mediated strategies. Prerequisites: SED 401, SED 402, SED 536 or permission. **Cr 3.**

SED 515 Organization and Management of Special Education Services
Explores the rationale, history, and current status of public school efforts to meet the needs of students with mild-to-moderate disabilities. Various models of service delivery in special education are examined. Prerequisite: SED 402. **Cr 3.**

SED 520 Law and Policy Affecting Individuals
Examines state and federal laws and policies that affect individuals with disabilities in both school and the community. Prerequisite: SED 402. **Cr 3.**

SED 532 Behavior Management and Intervention
Approaches to behavior management and behavior change in educational settings. Examines principles of cognitive behavior modification, social skills training and crisis intervention. Prerequisite: SED 402 or equivalent. **Cr 3.**

SED 536 Educational Strategies For Students with Severe Disabilities
Examines instructional strategies that have been effective in the education of students with severe disabilities. Emphasis on models of inclusive education; nonverbal communication strategies; and behavioral supports. Prerequisite: SED 401. **Cr 3.**

SED 550 Theories of Exceptionality
Examines diverse perspectives in exceptionality using conceptual models derived from medicine, psychology, education, sociology and anthropology to explore the influence of theory on special education practice and policy. Prerequisite: SED 402. **Cr 3.**

SED 551 Methods and Curriculum for Students with Mild-to-Moderate Disabilities
A consideration of educational principles and practices essential to the development of effective instructional strategies for students with mild-to-moderate disabilities. Prerequisite: SED 402. **Cr 3.**

SED 552 Working with Families of Students with Disabilities
Models for consulting with families of children and youth with disabilities. Prerequisite: SED 402. **Cr 3.**

SED 553 Assessment in Special Education I
Provides introductory experiences with procedures used to assess the educational functioning of students with mild/moderate to severe disabilities. Prerequisites: SED 402 and SED 550 or permission. Cr 3.

SED 554 Mild/Moderate Disabilities Assessment II
Provides advanced training in assessing the educational functioning of students with mild-to-moderate disabilities. Prerequisite: SED 553. Cr 3.

SED 555 Transition Services for Adolescents with Disabilities
Explores models for preparing youth with disabilities in secondary level programs for post-secondary opportunities. Prerequisite: SED 402. Cr 3.

SED 556 Severe Disabilities: Assessment II
Provides advanced training in assessing individual learning needs of students with severe disabilities, emphasizing ecological inventories, person-centered planning and quality of life indicators. Cr 3.

SED 560 Systems and Practices in Vocational Education for Individuals with Disabilities
Explores current practices in vocational education with an emphasis on the secondary and postsecondary levels. Topics will include the history of vocational education in inclusive settings, life-long learning and career development. Cr 3.

SED 561 Community and Residential Supports for Individuals with Disabilites
Knowledge and strategies and service delivery models used to support people with disabilities in integrated community environments. For secondary special educators and transition specialists. Cr 3.

SED 562 Supported Employment for Individuals with Disabilities
Knowledge and strategies for supporting people with various types and degrees of disability in paid, integrated employment in community settings. For secondary special educators and transition specialists. Cr 3.

SED 563 Positive Supports for Challenging Behavior
Knowledge and skills in positive behavioral support strategies to assist individuals with developmental disabilities and challenging behaviors to live and participate in inclusive community settings. For special educators and adult service providers. Prerequisite: SED 402. Cr 3.

SED 570 Technology for Individuals with Disabilities
Develops strategies for identifying and implementing adaptive and assistive technology in educational settings. Explores current technology available to assist students with disabilities. Prerequisite: EDT 520. Cr 3.

SED 572 Educational Needs of Students with Physical and Medical Disabilities
An overview of the physical and medical aspects of children and youth with severe and multiple handicaps. Course taught by skilled health, medical and special education professionals who work directly with students with severe handicaps. Course is appropriate for educators, therapists and other professionals who work directly with students with severe handicaps. Cr 3.

SED 575 Consultation, Collaboration and Teamwork in Special Education
Discusses background information and field-tested recommendations for helping teachers, parents, administrators and support personnel work together within their school context. Stresses the importance of word analysis and semantics, school context, processes and content. Cr 3.

SED 586 Workshop in Special Education (Activity)
Provides insight into practices and problems associated with the education of individuals with disabilities. Cr 3-6.

SED 592 Introduction to Behavior Disorders
Examines issues and research related to the education and treatment of children and adolescents with behavior disorders. Prerequisite: SED 402 or equivalent. Cr 3.

Courses in Spatial Information Engineering (SIE)

SIE 101 Introduction to Spatial Information
An overview of the discipline including introduction to the measurement sciences of surveying, geodesy, photogrammetry and remote sensing; discussion of geographic information systems and related, tools and techniques for analyzing, displaying and communicating spatial data; introduction of legal and professional issues. Lec 1. Cr 1.

SIE 102 Principles of Information Systems
Students develop the fundamental knowledge of information systems, including formal systems and models. Starts with a discussion of how humans perceive reality, mental models about space, representation of data in information systems, data vs. information. Focuses on formal languages and formal theories. Cr 1.

SIE 211 Surveying
Procedures for angle, distances and elevation changes measurements. Use of total stations and levels in survey data collection. Coordinate computations. Closure and error propagation. Conversion of survey measurements and attribute information to digital map products. Route curve geometry and calculations. Automated survey layout procedures. Prerequisite: high school trigonometry. Lec 3, Lab 3. Cr 4.

SIE 225 Land Development Design
Basic design covering all phases of the land development process. Site evaluation includes consideration of boundary surveys, topographic surveys, soil analysis, hydrographic analysis, traffic evaluation, plus environmental, aesthetic and cultural considerations. Students design lot and building arrangements and design streets, drainage channels, detention basins, culverts, sanitary sewers system and consider the layout of water lines and storm sewers. Prerequisite: Sophomore standing in an engineering curriculum. Lec 3, Lab 3. Cr 3.

SIE 271 Geographic Information Systems
Covers traditional representation of spatial data and techniques for representing spatial data in digital form. Combines an overview of general principles associated with the implementation of geographic information systems and practical experience in the analysis of geographic information. Also covers typical operations on spatial information and techniques for analyzing spatial information. Students convert map data to digital form, perform coordinate transformations and analysis. Prerequisite: Sophomore standing. Lec 2, Lab 1. Cr 3.

SIE 321 Legal Aspects of Land Surveying
Covers property law, boundary law, conveyance of property, recording systems and procedures, interpretation and writing of land description. Prerequisite: SIE 211. Lec 3. Cr 3.

SIE 322 Writing Effective Property Descriptions
Covers principles of interpretation, writing techniques, forms for descriptions and writing of land descriptions. The course is divided into several subsets. Successful completion requires the student take a pre-test, read the assignments, perform practical exercises, turn in assignments for grade, and pass an examination. Web based-Lec 0. Cr 1.

SIE 325 Surveyors Ethics
Introduces students to ethics theory, general concepts and principles pertaining to surveying ethics and handling ethical situations in practice. Throughout the course, students will be presented with a combination of practical exercises, explanation and discussion narratives. Web based-Lec 0. Cr 1.

SIE 331 Photogrammetry
Includes procedures and methods used for deriving metric information from photographs, analog processes for using aerial photographs in production of topographic maps, flight planning and cost estimation in aerial mapping work. Introduction to photocoordinate measurement devices and their calibration. Prerequisite: SIE 211. Lec 2, Lab 3. Cr 3.

SIE 394 Field Practice
Work experience in surveying and spatial information engineering through the cooperative education program. Prerequisite: sophomore standing and 2.5 GPA. Cr 3.

SIE 401 Adjustment Computations
Covers least squares adjustment as applied to surveying, propagation of random errors and variance-covariance propagation, observation equation model, conditions between parameters, sequential solutions, observed parameters, minimal constraint solutions, statistical tests, laboratories. Some concepts from linear algebra and statistics reviewed. Prerequisite: MAT 262 and MAT 332 or permission. Lec 3. **Cr 3.**

SIE 411 Hydrographic Surveying
Examines functions of hydrographic instruments operating from different types of marine platforms as well as the planning and operational aspects of hydrographic surveys. Emphasis on measurement instruments for position, tidal control and depth and magnetic, bottom, water and geological parameters. Prerequisites: SIE 211, MAT 228, SIE 441. Lec 3. **Cr 3.**

SIE 412 Advanced Surveying
Advanced topics in route location, geometry and design; automated survey data collection procedures; digital terrain models; integration of total station and global positioning system (GPS) observations; surveying astronomy; analysis of survey observations; automated topographic data collection. Prerequisite: SIE 401. Lec 3, Lab 3. **Cr 4.**

SIE 432 Advanced Photogrammetry
Advanced topics in metric photogrammetry including advanced stereoscopic plotting instruments, analytical methods in stereoplotter orientation, aerial mapping control requirements, creation of digital data bases, design criteria in stereoscopic digital data collection, photogrammetric control extension, orthophotography. Prerequisite: SIE 331, SIE 401 or equivalent. Lec 3, Lab 3. **Cr 4.**

SIE 433 Remote Sensing
Provides definition and overview of remote sensing principles, sensors and interpretaion techniques. Topics include: energy sources and interaction, photographic systems, airphoto interpretation, electro-optical sensors, non-imaging sensors, radar systems, space platforms, data processing, classification, application to spatial information engineering, term project. Prerequisite: MAT 228, PHY 122. Lec 3, Lab 1. **Cr 4.**

SIE 434 Digital Image Processing and Analysis
Introduction to image processing and analysis techniques suitable to the processing of remotely sensed data. Topics include elements of digital image processing and analysis systems; image digitization, quantization and sampling; image storage, display and image file management; geometric operations, rectification, registration and resampling techniques; image enhancements, point operations and filtering; transformations in spatial and frequency domains; image restoration and compression; image segmentation and feature extraction; automated interpretation and spatial information extraction; term project. Prerequisite: SIE 433. Lec 2, Lab 1. **Cr 3.**

SIE 441 Geodetic Models
Includes three dimensional geodesy, computations on the ellipsoid, conformal mapping, geometric properties of ellipsoids, normal sections, geodesics, geodetic datum definitions, direct and inverse solutions; adjusting networks on the ellipsoid, on the mapping plane and in space; reduction of observations and elements of physical geodesy; review of spherical trigonometry, differential geometry and complex variables. Prerequisite: SIE 401. Lec 3, Lab 1. **Cr 4.**

SIE 451 Engineering Databases and Information Systems
Theoretical foundation for representation of knowledge in information systems and logic based programming as a tool for fast prototyping and design of data structures. Database management systems and their suitability for engineering data, the structure of a network DBMS, physical data storage and basic datastructures (list, tree, hashing), transaction concept, design of database scheme for engineering application. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: COS 220 and SIE 271. Lec 3, Lab 1. **Cr 3.**

SIE 460 Spatial Information Systems Design
A capstone design course for seniors in Spatial Information Engineering. Integrates knowledge and skills acquired in previous courses and has a practical focus in which theory must be applied in a realistic problem solving environment. Students will function in the role of consultants and be responsible for the development of design options and solutions for a designated client. Students are required to work in groups to define project scope, conduct research and produce a final report. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: Permission. Lec 2, Lab 2. **Cr 4.**

SIE 480 Digital Analysis of Times Series
Methods for digitalization and analysis of multidimensional signals, spectral analysis, FFT, autocorrelation, leakage, image restoration, enhancement, transformation. FIR, IIR and Kalman filtering. Prerequisites: MAT 258 and MAT 434 or equivalents. **Cr 4.**

SIE 498 Selected Studies in Spatial Information Engineering
Topics in surveying, photogrammetry, geodesy, remote sensing, geographic information systems, land information systems and legal issues not covered in other courses. Content varies. May be repeated for credit, with departmental permission. Prerequisite: permission. **Cr 1-3.**

SIE 499 Senior Thesis
For seniors in Spatial Information Science and Engineering. Students select an area of study, perform a full literature search, conduct the necessary research and report results in thesis format. The thesis must meet University format requirements. Prerequisite: permission. Lec 1. **Cr 3.**

SIE 501 Introduction to Graduate Research
Covers process of successful graduate research from identification of a researchable question, preparation of a thesis proposal, to completion or the research and its publication. Focus on engineering research methods for spatial information. **Cr 1.**

SIE 502 Research Methods
Covers process of successful graduate research, including the written and verbal presentation of plans and results. Student formulate hypotheses, perform a literature search, write abstracts and introductions of research papers, learn about presentation styles and techniques, make two presentations (3-minutes and 10-minutes) about research proposals. Prerequisite: SIE 501 and students must have selected a thesis topic. Lec 1. **Cr 1.**

SIE 510 GIS Applications
Introduces both the conceptual and practical aspects of developing GIS applications. Covers issues from project planning through project implementation. Students will be required to develop specific applications. Course grades will be based on class participation, completion of several exercises and satisfactory development and completion of a project. Exercises will be used to develop specific skills and will be completed individually. Projects will be implemented by groups and each group will be responsible for a final project report, an interactive demonstration and presentation to the class and outside agency representatives as appropriate. Prerequisite: SIE 271. Lec 3, Lab 1. **Cr 4.**

SIE 512 Spatial Analysis
Introduces students to techniques for spatial analysis. Covers methods and problems in spatial data sampling, issues in preliminary or exploratory analysis, problems in providing numerical summaries and characterizing spatial properties of map data and analysis techniques for univariate and multivariate data. Students will be responsible for completing several hands-on exercises. Prerequisite: SIE 271 and an introductory statistics course. **Cr 3.**

SIE 520 Advanced Survey Data Collection
Electronic Field Books: examples, theory, practical issues, history. Electronic Field Book Processing: examples, theory, analysis, practical issues. Automated Map Definition: chains, point vs. curve, digital terrain models. Electronic Layout Procedures: theory, procedures, data checking. Future Issues in Electronic Field Books. Prerequisite: SIE 412. Lec 2, Lab 1. **Cr 3.**

SIE 521 U.S. Public Land Survey System
Historical basis of the U.S. Public Land Survey System. Original and dependent retracement surveys; geodetic aspects; proportioning; subdivision of sections; fractional survey problems; evaluation of field evidence; uniqueness with regard to particular states; land information systems within the U.S.P.L.S.S. Prerequisite: SIE 321 or permission of instructor. Lec 3. **Cr 3.**

SIE 522 Environmental Law and Resource Regulation
Selected topics in common law solutions to environmental problems, major statutes in air, water, solid waste, and coastal zone management, environmental litigation, land use controls, water rights. Prerequisite: permission. Lec 3. Cr 3.

SIE 525 Information Systems Law
Current and emerging status of computer law in electronic environments: rights of privacy, freedom of information, confidentiality, work product protection, copyright, security, legal liability; impact of law on use of databases and spatial datasets; legal options for dealing with conflicts and adaptations of law over time. Cr 3.

SIE 526 Cadastral and Land Information Systems
Colonial Spanish, English, French land records traditions and alternatives reviewed; goals and purposes of land tenure systems with attention to social, political, legal, economic, organizational, technical issues examined; U.S. modernization efforts and problems of developing countries explored. Cr 3.

SIE 531 Analytical and Digital Photogrammetry
Orientations, optimization of data collection for control extension by photogrammetry and semianalytical and analytical methods of aerotriangulation. Reliability considerations in large blocks of aerial photographs. Real-time and a posteriori blunder detection techniques including sparsity of equations in large blocks of photographs, recursive partioning techniques, self-calibration in aerotriangulation. Digital cameras, matching techniques, automated digital photogrammetric processes. Digital orthophotography, automated GIS data capture. Prerequisite: SIE 401, SIE 432. Lec 3, Lab 1. Cr 4.

SIE 532 Close Range Photogrammetry
Topics include network optimization in non-topographic mensuration, auxiliary constraints in photogrammetric adjustments, methods of calibration of close-range cameras, use and limitations of non-metric cameras, accident and crime scene reconstruction, applications in architecture, construction, industry, mining, biomedicine, X-ray photogrammetry, and scanning electron microscopy. Prerequisite: SIE 401, SIE 432. Cr 3.

SIE 541 Satellite Geodesy
Topics include: stellar coordinate systems, precession, nutation, time systems, troposphere, ionosphere; satellite orbital theory, Global Positioning System (GPS), space segment, correlating receivers and code-less receivers; pseudo ranges; single, double, and triple difference phase processing; point positioning, relative positioning; dual frequency processing; code smoothing techniques; positioning of moving platforms; simultaneous orbital and baseline estimation; GPS vector adjustments and combination with terrestrial observations; astronomical azimuth, latitude and longitude determination; proper motion, aberration, parallax. Prerequisite: SIE 401. Lec 3. Cr 3.

SIE 542 Integrated Geodesy
Topics include: measurement of gravity and gravity gradients; gravimeters; reduction due to height, terrain, and tides; isostasy; normal gravity fields, geodetic reference systems; height systems, spirit leveling and gravity; elements of potential theory, spherical harmonic expansions of global fields such as geoid undulations, deflections of the vertical, gravity anomolies; Bruns, Stokes and Meinesz formulae; the integrated geodetic model; local geoid from GPS satellites and gravity. Prerequisite: SIE 401. Lec 3. Cr 3.

SIE 543 Positioning with GPS
GPS dual-frequency data collection and processing, vector network adjustments, internal and external reliability of vector networks, continuously operating reference stations, impact of satellite constellation geometry, vector processing strategies, ionospheric constraints on long baselines, ambiguity fixing on the fly, centimeter navigation versus surveying, precise ephemeris generation, differential correction services, GPS support on the Internet. Prerequisite: SIE 401. Lec 2, Lab 1. Cr 3.

SIE 551 GIS User Interface Design
Covers concepts of human-computer interaction (affordance, feedback, etc.), interaction styles (e.g., direct manipulation, Windows-Icons- Menus-Pointers-Interfaces.) Students will design a user interface for a particular spatial application. Lec 3. Cr 3.

SIE 553 Geometry for Geographic Information Systems
A study of analytical geometry on computer systems, including representation of topological and metric properties of two dimensional geometric structures. Overview of raster based systems. Examines computer graphics hardware, design of device independent programs for graphics output, coordinate systems and transformation, principles of effective visual communication and their applications. Prerequisite: SIE 451 or permission. Lec 2, Lab 1. Cr 3.

SIE 561 Advanced Adjustment Computations
Topics include: condition equation model, mixed model, generalized inverses of matrices, inner constraint solutions; multi-dimensional normal distributions and confidence regions, generalized linear hypothesis testing; internal and external reliability of geodetic networks; blunder detection and data snooping; variance component estimation; deformation networks and analysis; large systems (banded and patterned normal matrices, reordering.) Prerequisite: SIE 401. Lec 3. Cr 3.

SIE 598 Selected Studies in Spatial Information Engineering
Topics in surveying, photogrammetry, remote sensing, land information systems and geodesy. Content varies to suit current needs. May be repeated for credit. Cr 1-3.

Courses in Marine Sciences (SMS)

SMS 100 Introduction to Ocean Science
A non-laboratory survey of the broad field of marine science, stresses the interconnections among aspects of oceanography, marine biology and ecology, living marine resources and human interactions with the marine environment. Practical applications of basic scientific principles are stressed. (Satisfies the General Education Applications of Scientific Knowledge and Population and the Environment Requirements.) Cr 3.

SMS 200 Topics in Aquatic Science
A survey of current issues related to aquaculture will be researched by students who will present the issues in a series of debates. Each student will be responsible for organizing one debate team and serving on several debate teams. Lec 1. Cr 1.

SMS 211 Introduction to Aquaculture
Principles and practices of aquaculture from international, national and local perspectives. (Satisfies the General Education Science Applications of Scientific Knowledge Requirement.) Includes field trip. Lec 3. Cr 3.

SMS 220 Introduction to Marine Resources
An overview of current issues and knowledge relating to marine resources including socio-legal concerns, resource utilization, environmental quality, and the impact of marine trades. Limited to first and second year students. Lec 2. Cr 2.

SMS 270 Oceanography I
First semester of general oceanography offered as semester sequence. Covers geological, chemical, physical and biological oceanography. Topics include plate tectonics and evolution of ocean basins, physical and chemical characteristics of sea water, atmosphere-ocean coupling, three-dimensional oceanic circulation, waves and tides, sedimentation, marine organisms, productivity and marine ecosystems, biogeochemical cycles. Weekend field trips (required) and laboratories introduce oceanographic methods and provide application of concepts. Prerequisite: SMS 100 or permission. Lec 3, Lab 2. Cr 4.

SMS 271 Oceanography II
Second semester of general oceanography offered as two semester sequence. Stresses the interdisciplinary nature of oceanography by considering comprehensive processes that reinforce the geological, chemical, physical and biological oceanographic principles of the first semester. Variability in processes at a range of spatial and temporal scales will be considered. Topics may include interplay of seasonal productivity and nutrient cycling, particle dynamics and sedimentation, hydrothermal vent systems, upwelling systems and productivity, current systems and transport of biota, air-sea interactions

and global climate change. Weekend field trips (required) and laboratories introduce oceanographic methods and provide application of concepts. Prerequisite: SMS 270 or equivalent. Lec 3, Lab 2. **Cr 4.**

SMS 300 Marine Ecology
An introduction to fundamental ecological principles in the context of marine communities. Uses examples from marine ecosystems to illustrate general principles of general ecology such as predation, competition, and nutrient cycling. Focuses on the ecology of major marine ecosystems such as estuaries, sea shores and benthic communities and on aspects of applied ecology such as fisheries management. Includes two days of field work at the Darling Marine Center. Not open to students who have taken BIO 319. Prerequisite: BIO 204. **Cr 3.**

SMS 301 Concepts in Oceanography
Basic concepts in physical, geological, chemical and biological oceanography. Prerequisite: one introductory level University science course or permission. **Cr 3.**

SMS 309 Techniques in Shellfish Aquaculture
Residential course taught at the University's Darling Marine Center. Explores the theory and practice of marine bivalve culture as conducted in the Northeastern U.S. Includes lectures, considerable "hands-on" experience, and field trips to commercial hatcheries and farms. Prerequisite: General knowledge in biology or relevant work experience. **Cr 4.**

SMS 320 Techniques in Aquaculture
A hands-on laboratory course in selected techniques in aquaculture, anatomy of aquaculture species of fin and shellfish, reproductive physiology of bivalves, larval fish feeding, diagnostic procedures, drug residue testing, fish handling and anaesthesia and computer applications. Prerequisites: SMS 211, SMS 340 or permission. Lab 4. **Cr 2.**

SMS 325 Marine Geology
A view of the oceans in the context of modern plate tectonics. The origin of mid-ocean ridges, ocean margins, seamounts and other geological features. The geology of marine sediments as related to the physical and biological processes that form and shape them through time. An overview of the significant geological resources from the sea. An introduction to past oceans that differed greatly from those of today. Prerequisites: SMS 270, SMS 271 or GES 101 or GES 102 or GES 106. **Cr 3.**

SMS 330 Descriptive Physical Oceanography
A comprehensive introduction to descriptive physical oceanography. Topics considered will range in scale from global to estuarine, and from decades to seconds. The course emphasis is the characterization of physical oceanic features and phenomena, how and why they arise and their practical importance. Prerequisites: PHY 121, PHY 122. **Cr 3.**

SMS 340 Finfish Aquaculture
A survey of culture techniques used in growing common fish species, including salmon, trout, eels, catfish, bream and tilapia. Aspects of hatchery management and grow out will be discussed covering genetic selection, nutrition and feeding, health maintenance, fish farm structure, processing fish and environmental factors. Prerequisites: SMS 211, SMS 220 or permission. Lec 3. Offered in spring of even numbered years. **Cr 3.**

SMS 409 Shellfish Aquaculture
Examination of shellfish production methods (including hatchery, nursery and growout phases) and underlying biological principles. Offered in spring of odd numbered years. Prerequisite: BIO 100. Lec 3. **Cr 3.**

SMS 410 Marine Physics
Introduction to fluid mechanics, thermodynamics, ocean optics and marine acoustics. Each part includes principles and applications in the marine environment. Prerequisites: MAT 126, MAT 127 and PHY 121, PHY 122. **Cr 4.**

SMS 420 Fish Health Management
Principles and practical methods of health management of farmed fish will be discussed. Causes of disease, environmental factors and disease agents will be covered. Principles and examples of disease prevention and control, such as husbandry, treatment, vaccination, natural defenses and biosecurity will be covered. Majors diseases of farmed fish and control measures will be presented. Prerequisites: SMS 211, SMS 340, BMB 300 or permission. **Cr 2.**

SMS 422 Biology of Fishes
A comprehensive course in evolution, morphology, physiology, life histories and ecology of fishes. Emphasis will be integrating knowledge of functional and physiological design to understand how fish function and how they have adapted to diverse environments. Prerequisite: BIO 204. **Cr 3.**

SMS 440 Satellite Oceanography
A general introduction to the use of remote sensing technologies for making measurements of the marine environment. Introduces the various sensors used by oceanographers, their background, the principles behind their operation and measurement retrieval as well as the concepts of coupled spatial/temporal variability which make remote sensing data so valuable in oceanographic studies. Emphasis is placed on bio-geophysical oceanographic applications and limitations of the data and its interpretation, rather than on the physics/optics of the actual measurement. Prerequisites: PHY 112 or PHY 122, SMS 100, SMS 270, SMS 271 or permission of instructor. **Cr 3.**

SMS 460 Climate Change: Understanding the Forecast
Principles and factors that determine global climate with emphasis on the atmospheric processes and the role of the ocean in climate change. The science behind the global climate models will be presented, the technique and uncertainties of the forecast models are examined. Prerequisites: MAT 126, PHY 111, SMS 100. **Cr 3.**

SMS 467 Fish Nutrition and Feeding
Principles of nutrient requirements as it applies to fish. Feeding management of several commercially important species will be discussed. Prerequisites: BMB 208. **Cr 3.**

SMS 491 Problems in Oceanography I
Undergraduate studies of current problems in oceanography directed by individual faculty. May be experimental or theoretical independent research or directed readings by an individual student, or it may be a course on a specialized topic by a faculty member. May be repeated for credit. Prerequisite: permission of instructor. **Cr Ar.**

SMS 492 Problems in Oceanography II
Undergraduate studies of current problems in oceanography directed by individual faculty. May be experimental or theoretical independent research or directed readings by an individual student, or it may be a course on a specialized topic by a faculty member. May be repeated for credit. Prerequisite: permission of instructor. **Cr Ar.**

SMS 497 Independent Study in Marine Science
A readings, lecture, laboratory or seminar study course arranged between instructor and individual students, covering selected topics or areas within the field of Marine Science. May be repeated for credit. Prerequisite: Permission of instructor. **Cr 1-3.**

SMS 524 Population Biology
Topics in the ecology and genetics of species and populations: population genetics, population dynamics, population structure, selection, speciation. Prerequisites: BIO 319 (or equivalent) and BIO 462 or BIO 465, or permission. Lec 2, Lab 2. **Cr 3.**

SMS 530 Physiology of Fishes
Analysis of the functional biology of fishes with emphasis on the mechanistic bases of physiological functions and their adaptive significance in a variety of environmental situations. Prerequisites: BIO 377 or equivalent, or permission. Lec 3. **Cr 3.**

SMS 531 Coral Reefs
An exploration of the combined geological, physical, chemical and biological factors that make coral reefs among the most diverse and productive systems in the world. Examines biology, taxonomy and ecological interactions of dominant reef organisms. Explores modern reef processes such as primary productivity, competition, predation and herbivory

along with some geological processes such as the role of sea level in reef formation and growth. Prerequisite: BIO 353 or permission. Cr 3.

SMS 532 Physiology of Fishes Laboratory
Independent student projects involving field collection of fishes and laboratory analysis of their physiological function. Prerequisite: SMS 530 (previously or concurrently) and permission. Lab 4. Cr 2.

SMS 535 Evolution in the Marine Realm: A Paleontological Perspective
Evolutionary change in marine communities from the Precambrian to recent, integrates aspects of paoeontology, biology, oceanography and evolutionary theory. Prerequisite: BIO 353 or permission. Cr 3.

SMS 542 Physical Oceanography of Estuaries
Focuses on the physical processes in estuaries: estuarine definition and classification; brief review of fluid dynamics; salt and mass balance equations; dynamic (momentum) balance equations; estuarine flushing and residence times; theoretical models of estuarine flow and salt distributions. Prerequisites: calculus, introductory physics and differential equations or permission of instructor. Cr 3.

SMS 565 Introduction to Field Methods in Oceanography
Covers basic geological, chemical, biological and physical oceanography field survey and sampling methodologies. Focus is on the variety and technological development of oceanographic field methods and tools and the implications of such development on research design, data analysis and data interpretation. Field use and demonstration of equipment as well as introduction to some standard laboratory analyses of collected samples and data sets will be emphasized. Prerequisites: SMS 270, SMS 271 or two SMS 500-level core courses or equivalent. Undergraduate enrollment with permission of instructor. Cr 4.

SMS 585 Marine System Modeling
Covers ocean circulation models, coupled atmosphere-ocean models, sea ice models, modeling oceanic carbon and nutrient cycles, and marine ecosystem models: beginning with theory, followed by model development and the most recent research results. Examines model representation of interactions among physical, chemical and biological processes in the ocean. Term project required. Prerequisite: permission of instructor. Cr 3.

SMS 591 Dynamical Oceanography I
Covers physical principals fundamental to the study of the oceans; the equations of motion for rotating fluids; circulation theorem and conservation of potential vorticity; scale analysis; boundary conditions; surface gravity waves; rotation effects in homogeneous oceans. Prerequisite: OCE 541 or equivalent. Cr 3.

SMS 592 Dynamical Oceanography II
Covers internal gravity waves; rotation effects in stratified oceans; instabilities and energy conversion; fronts and eddies; mid-latitude ocean circulation; coastal dynamics; tropical ocean dynamics. Prerequisite: SMS 541 or equivalent, SMS 591. Cr 3.

SMS 595 Spectral Analysis and Principal Component Analysis
Provides theoretical and computational guidance on techniques commonly used in the analysis of data arising from many of environmental sciences, emphasizing hands-on understanding of the methods and correct interpretation of results. Part one covers spectral analysis of time series: theoretical development analysis of real data. Part two covers analysis of time-space data, centered around Principal Component Analysis (PCA). Term project required. Prerequisites: calculus, probability theory and statistics. Cr 3.

SMS 597 Independent Study
A graduate-level readings course, lecture course, laboratory or seminar study course arranged between instructor and individual graduate students, covering selected topics or areas within the field of Marine Science. May be repeated for credit. Prerequisite: permission of instructor. Cr 1-3.

SMS 598 Special Topics in Marine Science
A graduate-level readings, lecture, seminar or laboratory course covering timely topics in Marine Science. May be repeated for credit. Prerequisite: permission of instructor. Cr 1-3.

Courses in Sociology (SOC)

SOC 101 Introduction to Sociology
Introduces the fundamental concepts, principles, and methods of sociology, analyzes the influence of social and cultural factors upon human behavior and evaluates effect of group processes, social classes, stratification, and basic institutions on contemporary society. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Cr 3.

SOC 201 Social Inequality
Structural analysis of social inequality within American society and the global community. Emphasis on the causes, extent and social consequences of inequality, especially those based on race, gender, social class and the level of economic development. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: SOC 101 or permission. Cr 3.

SOC 202 Social Problems
Introduction to the structure of inequality in American society and the consequences for community and democracy. Topics include economic inequality, poverty, social inequity and social stigma, the connections between wealth and power, societal priorities. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: SOC 101 or permission. Cr 3.

SOC 205 The Sociology of Close Relationships
The study of informal,"primary" relations in modern societies, including intimate couples, friendships, close co-workers, and others. The content will focus on how dyads are shaped by the larger social structures within which they are embedded (e.g., "networks," nuclear families, extended families, organizations, and cultural value frameworks.) Attempts will also be made to identify gender, age, social class, and race differences, where appropriate. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Prerequisite: SOC 101 or permission. Cr 3.

SOC 208 Problems of Violence and Terrorism
The nature and causes of revolutionary and government-sponsored international terrorism. The future of terrorism and how to cope with it. The institutionalization of terrorism in pre-modern and contemporary totalitarian states. The social causes of war and social conflict. Social preconditions for the maintenance of a sustainable peace. An examination of the nature of human aggression. (Satisfies the General Education Ethics and Human Values and Social Context/Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) Prerequisite: SOC 101 or permission. Cr 3.

SOC 210 Sociology of Popular Culture
The distinction between popular culture and high culture. The origins of popular culture and the reasons for changes in the popularity of particular styles of popular culture. The relation between people's tastes in popular culture and their self-conceptions. The impact of popular culture upon the larger society. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Prerequisite: SOC 101 or permission. Cr 3.

SOC 213 Deviance and Social Control
Behavior defined by society as deviant. The processes by which an act or actor becomes defined as deviant and the nature of occupying a deviant role. The "techniques" of deviance and the acquisition of a deviant self concept. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Prerequisite: SOC 101 or permission. Cr 3.

SOC 214 Crime and Criminal Justice
The causes, extent and nature of crime in American society and the operation of the criminal justice system. Emphasis given to theories and dynamics of criminal behavior and to the efforts of police, courts and prisons to prevent and to control criminality. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Prerequisite: SOC 101 or permission. **Cr 3.**

SOC 215 Juvenile Delinquency
The causes, prevention and control of delinquent behavior. Emphasis given to theories of delinquency; the role played by families, schools and peers in fostering delinquency; and the efforts of the juvenile justice system to detect, prevent and control delinquent behavior. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Prerequisite: SOC 101 or permission. **Cr 3.**

SOC 240 Topics in Sociology
A second-level study of topics such as "Sociology of Youth." "Sociology of Countercultures," "Sociology of Sport," and "Urban Sociology." May be repeated for credit if the topics differ. Prerequisite: SOC 101 or permission. **Cr 3.**

SOC 301 Social Organization: The Micro Picture
The study of social interaction in small social settings, with emphasis on power and status. The impact of group structures on the self. Conversations as construction of social reality. Informal group structures in large organizations. Prerequisite: junior Sociology major and 6 hours of Sociology or permission. **Cr 3.**

SOC 302 Social Organization: The Macro Picture
An examination of the structure and dynamics of large scale social organizations. Particular emphasis on institutional, formal, or bureaucratic and community structures characteristic of the industrialized and post-industrialized world. Prerequisite: junior Sociology major, SOC 201, SOC 301 and HTY 106 or permission. **Cr 3.**

SOC 310 Quantitative Reasoning in Sociology
The use of statistical methods in sociological research. Topics include descriptive and inferential statistics and hypothesis testing. Special emphasis placed on sociological applications of statistical techniques, an understanding of when they are appropriate to use, and the information they yield. (Satisfies the General Education Mathematics Requirement.) Prerequisite: 6 hours of Sociology or permission. **Cr 3.**

SOC 312 Political Sociology
Applies sociological conceptual frameworks and theories to the interpretation and explanation of political phenomena such as voting behavior, power systems, and political processes and revolutions. Prerequisite: 6 hours of Sociology or permission. **Cr 3.**

SOC 314 Law and Society
Presents a sociological perspective on law and the legal system in the United States. Topics include problems in defining law, sociological theories of the origins and consequences of law, the relation between law and social change, studies of the legal profession and legal discretion in the criminal justice system. Prerequisite: SOC 101 and either SOC 213, SOC 214 or POS 100 or permission. **Cr 3.**

SOC 316 Sociology of Aging
Analysis of the demographic and sociocultural factors in aging, the aging individual as a person, older people as groups and aggregates within the culture and structure of a changing society, the manner in which society attempts to meet the needs of aging people. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: 6 hours of Sociology or permission. **Cr 3.**

SOC 318 Sociology of the Family
A sociological approach to the study of the family, including the structure of social relationships, the modern American family as a social institution, the cultural background of the family, and the impact of social change. Prerequisite: 6 hours of Sociology or permission. **Cr 3.**

SOC 319 Domestic Violence and Social Structure
Examines domestic conflict and violence both nationally and within the state of Maine. Emphasizes the social and political context of domestic violence including the ways in which a society's culture and social organization contribute to and reinforce this behavior. Incidence, processes and consequences of domestic violence are explored as well as strategies for social change. Prerequisite: 6 hours of Sociology or permission. **Cr 3.**

SOC 320 Perspectives on Applying Sociology
Examines the ways in which sociology can be used in non-academic settings, and can contribute to generating options for development and change in a variety of occupations and social settings. Exploration of: the history and development of applied sociology; the knowledge, contributions, and roles of practicing sociologists in a variety of fields; the skills and knowledge needed for using sociology in different jobs and programs; the integration of sociological theory, knowledge, and methods with strategies for social action, values, politics and ethics in applying sociology. Prerequisite: 6 hours of Sociology or permission. **Cr 3.**

SOC 329 Sociology of Gender
Analysis of contemporary definitions of femininity and masculinity within American society. Emphasis on the interpersonal and institutional dimensions of sexism and the prospects of social change. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SOC 101 and either SOC 201 or WST 101 or permission. **Cr 3.**

SOC 330 Perspectives on Women
Multidisciplinary analysis of the personal, interpersonal and institutional dimensions of women's lives. Explores commonalties among women as well as differences based on race, social class, age, and sexual identity. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: Either SOC 201 or WST 101 or permission. **Cr 3.**

SOC 337 Sociology of Mental Illness
Examination of the sociological concepts of mental illness. Analysis of the relationship between mental illness and the sociological factors responsible for these disorders. Cross-cultural examination of mental illness. The nature and structure of mental care institutions. (Satisfies the General Education Ethics Requirement.) Prerequisite: 6 hours of Sociology or SOC 101 and PSY 100 or permission. **Cr 3.**

SOC 338 Race and Ethnicity
Explores dominant/subordinate relations, with emphasis on socially defined racial and ethnic groups. Origins, nature, and consequences of racial/ethnic oppression and inequality; historical and social contexts of intergroup relations and conflicts; implications of changing racial/ethnic diversity. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SOC 101 and SOC 201 or permission. **Cr 3.**

SOC 339 Sociology of Health and Medicine
Explores issues of health, illness and medicine from a sociological perspective. Topics will include: the organization of U.S. health care; causes of, and possible solutions to, problems in the health care system; definitions of health and illness; social factors in illness and disease; history and dynamics of health care professions; the doctor/patient relationship; and gender, race and class inequalities in health care delivery. Prerequisite: 6 hours of Sociology or permission. **Cr 3.**

SOC 340 Intermediate Topics in Sociology
An intermediate-level study of topics such as "Sociology of Emotions," "Sociology of Science and Technology," and "Modern Sociological Theory." May be repeated for credit if the topics differ. Prerequisite: 6 hours of sociology or permission. **Cr 3.**

SOC 343 Sociology of Work and Labor
Analysis of work and the labor process, focusing on Western societies. Course examines the role of work in the social structure and in the lives of individuals. Theories of the labor process, work in organizational settings.

ature of labor markets, paid and unpaid work. Historical and current erspectives on worker/capitalist relations, role of organized labor. Relationship of work to class, race and gender; potential for reorganizing work. Prerequisite: SOC 101 and SOC 201 or permission. Cr 3.

SOC 345 Women, Crime and Criminal Justice
Examines theories of women's criminality; patterns of women's criminal behavior; crimes committed against women; and the experience of women as defendants, prisoners, and professionals in the criminal justice system. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SOC 101 and either SOC 213, SOC 214 or SOC 215 or permission. Cr 3.

SOC 347 Wealth, Power and Prestige
Analysis of social inequality within society. Theories and topics within the area of social stratification. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SOC 101 and SOC 201 or permission. Cr 3.

SOC 350 Organizations in Modern Society
Formal or complex organizations are the immediate setting or context for much of modern social life. This course examines the structures, processes, impacts and environments of organizations, using both mainstream and critical theoretical perspectives. Topics include: hierarchy and mobility within organizations, organizational behavior, processes of innovation and diffusion, and the role of gender, race, and class. The course will also explore the relationship of organizations to the wider societal context, formal and informal power, and the development of non-hierarchical organizational models. Prerequisite: SOC 101 and SOC 302, or SOC 302 concurrent with SOC 350 or permission. Cr 3.

SOC 390 Logic of Sociological Inquiry
Explores the relationship between theory and research. Specific topics include the nature of scientific proof in the social sciences, measurements of variables, hypothesis and theory testing, sampling, research design, ethical issues in research, and the relationship between research and policy-making. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: junior Sociology major and 6 hours of Sociology. Cr 3.

SOC 391 Survey Research
An examination of survey research, including questionnaire design, sampling, index and scale construction, and statistical analysis. Using data analysis software, students will do original research on data from a random sample of the U.S. population. Prerequisite: SOC 390 or permission. Cr 3.

SOC 425 Sociology of Social Policy and Social Change
How can sociology play an active role in social policy and social change? What contributions can be made by sociologists to organizational and community development? We often think of social change as a natural and uncontrollable force, or else as an issue for technical "experts" to solve. This course will challenge those beliefs, exploring the diverse ways in which sociological skills, knowledge, and perspectives can be used in understanding and developing options for social policy and social change. Prerequisite: 6 hrs of Sociology or permission. Cr 3.

SOC 442 Population and Society
Population processes and their effects on society. Includes fertility, migration, mortality; population, resources and technology; population, social change and economic development; family planning and population policy. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) Prerequisite: 6 hours of Sociology or permission. Cr 3.

SOC 460 Major Ideas in Sociology
The sociological theories of Marx, Weber, Durkheim, Mead and others. Developments in sociological theory as related to methodology, social issues, and current trends in contemporary sociology. Prerequisite: junior standing, 6 hours of Sociology and HTY 106 or permission. Cr 3.

SOC 463 The Sociology of Knowledge
The relationship between knowledge and social interaction. The general characteristics of knowledge as a social phenomenon. The problem of knowledge as being both influenced by and an influence upon the social structure. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisite: SOC 301, SOC 302 and 3 additional hours of Sociology or permission. Cr 3.

SOC 465 Evolution, Revolution and the Future
Review and analysis of major principles in social change such as social evolution and revolution and their relevance in understanding contemporary social processes in American, Western, Communist and developing societies. Considers problems of future society. Prerequisite: 6 hours of Sociology or permission. Cr 3.

SOC 482 The Sociology of Religion
Topics include: the social construction of religious beliefs; institutionalized religions and the resurgence of new sects and cults; major world religions and the way religion preserves and changes the social order; the encounter between religion and contemporary developments in science. Secularization and the future of religion. Prerequisite: SOC 101, juniors or seniors only or permission. Cr 3.

SOC 495 Internship in Sociology
A supervised internship providing practical experience in a field placement and requiring parallel readings and study. Emphasis on the guided application of concepts and principles from related courses and structured readings to applied situations in the field. Students may take 3-9 credits. Not more than 6 credit hours may be used toward the departmental major. Prerequisite: SOC 320, major in Sociology, junior or senior standing and permission of instructor. Cr 3-9.

SOC 497 Departmental Projects I
By permission only. Cr 1-3.

SOC 498 Departmental Projects II
Prerequisite: permission only. Cr 1-3.

SOC 499 Senior Seminar
Selected theoretical and empirical topics in Sociology. Serves as the capstone course for Sociology majors and will assume a knowledge of and will build upon, the material presented in the other required courses in the major. The intent of the course is to help students integrate their Sociology knowledge and to apply it in dealing with fundamental questions of social life and social theory. (Satisfies the General Education Capstone Experience Requirement.) Prerequisites: major in Sociology with senior standing; SOC 390 and
SOC 460. Cr 3.

Courses in Spanish (SPA)

SPA 101 Elementary Spanish I
A systematic study of the basics of the Spanish language. Equal emphasis on developing reading, comprehension, speaking and writing skills. For students with no previous study of Spanish or fewer than two years in high school. Cr 3-4.

SPA 102 Elementary Spanish II
A continued study of the basics of the Spanish language. Equal emphasis is placed on developing reading, comprehension, speaking and writing skills. For students with no previous study of Spanish or fewer than two years in high school. Prerequisite: SPA 101 or equivalent. Cr 3-4.

SPA 199 Review Spanish
For students who have taken 2 or more years of high school Spanish, but do not feel ready to complete the SPA 203-204 sequence. Fast-paced review of basic grammar, pronunciation and vocabulary, with strong emphasis on oral communication. This is not the equivalent of SPA 203/204 level language courses. 2 class meetings per week, with substantial listening and writing assignments. Prerequisite: 2 years of high school Spanish or permission. Cr 2.
Lec 2.

SPA 203 Intermediate Spanish I
An integrated approach. Reading texts as well as other materials will be

employed to strengthen reading, writing and especially speaking and comprehension skills. Includes a systematic but gradual review of the essentials of Spanish grammar. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 102 or equivalent. **Cr 3-4.**

SPA 204 Intermediate Spanish II
A continuation of SPA 203 designed to strenghten reading, writing, speaking and comprehension skills. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 203 or equivalent. **Cr 3-4.**

SPA 205 Spanish Conversation and Composition I
Develops proficiency in spoken and written Spanish through selected vocabulary and grammar exercises, discussions, skits, speeches, and compositions. Conducted in Spanish. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 204 or equivalent. **Cr 3.**

SPA 206 Spanish Conversation and Composition II
Develops proficiency in spoken and written Spanish through selected vocabulary and grammar exercises, discussion, skits, speeches, and compositions. Conducted in Spanish. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 204, SPA 205 or equivalent. **Cr 3.**

SPA 250 Multidisciplinary Readings in Spanish
Intended to be taken in conjunction with a course from another department, this course supplements the content areas of the course to which it is attached and promotes increased proficiency in Spanish through reading and discussion in Spanish. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 204 or equivalent or permission. May be repeated for credit. **Cr 1.**

SPA 307 Readings in Peninsular Literature
An overview of Peninsular Spanish literature. Provides practice in reading and analyzing culturally important texts. Includes a selection of genres and periods will be included. May be taken either before or after SPA 308. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 206 or permission. **Cr 3.**

SPA 308 Readings in Spanish American Literature
Emphasis on changes in the cultural phenomena, styles, themes and ideological position of texts from the beginnings of Hispanic American literature through romanticism, naturalism, the novel of the land, the "Boom" and avant-garde movements. May be taken before or after SPA 307. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 206 or permission. **Cr 3.**

SPA 400 Advanced Spanish Grammar, Composition, and Stylistics
Designed to provide an adequate foundation in Spanish grammar, syntax, and composition for prospective teachers. Applied stylistics for students with proficiency of expression interested in creative writing. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 205 or SPA 206, SPA 307 or SPA 308 or permission. **Cr 3.**

SPA 401 Golden Age
A study of masterpieces of poetry and prose from the 16th and 17th centuries provides an overview of the period and critical abilities. Poetry by Garcilaso, Fray Luis, San Juan, Gongora, and Quevedo, etc. Prose readings include *Lazarillo de Tormes, Diana, Suenos y discursos, and Novelas ejemplares* etc. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308 or permission of the instructor. **Cr 3.**

SPA 403 Cervantes
A careful reading of the Spanish masterpiece, .us Don Quixote, including its historical background and continuing influence. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308 or permission. **Cr 3.**

SPA 405 Spanish Literature of the Nineteenth Century
Discussion of the novel from "costumbrismo" to "realismo," the compromise of Spanish naturalism, and the Romantic movements between tradition and revolt. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308 or permission of the instructor. **Cr 3.**

SPA 406 Spanish Literature of the Twentieth Century
Selections from the poetry, essays, and novels of the pre and Civil War period contextualized through readings in the history and thought of the times. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308 or permission of the instructor. **Cr 3.**

SPA 407 Contemporary Spanish Novel
Experimental Novel of the Twentieth Century. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308 or permission of the instructor. **Cr 3.**

SPA 408 Latin-American Masterpieces
A selection of key essays, poems, short stories, and novels from the colonial period to the 20th century. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308 or permission. **Cr 3.**

SPA 409 Contemporary Latin-American Short Story
A study of Latin-American short story writers including discussion of such significant contemporary concerns as poverty, politics and religion, and such themes as the interplay of fantasy and reality and the relativity of madness. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308 or permission. **Cr 3.**

SPA 410 Latin American Novel
The contemporary novel in Spanish America, with special attention on some of the novelists of the "Boom". (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308 or permission. **Cr 3.**

SPA 411 Contemporary Latin American Theater
A study of the major Latin-American playwrights of the 20th century. Reading and analysis of plays, class discussion. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308 or permission. **Cr 3.**

SPA 412 Contemporary Peninsular Theater
A study of major Spanish playwrights of the 20th Century. Reading and analysis of plays, class discussion. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308 or permission. **Cr 3.**

SPA 413 Hispanic Women Writers
A critical study of poetry and prose produced by Spanish and Spanish-American women writers from the 17th century to the present. Focus on the discourse of these women as it confronts a male oriented and a male controlled field. Specific topics vary from year to year. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisites: SPA 307 or SPA 308. or permission. **Cr 3.**

SPA 457 Spanish Civilization
A study of Spain, its people, institutions and culture providing the background essential to an understanding of Spanish literature, thought and artistic expression. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308 or permission. **Cr 3.**

SPA 458 Spanish American Civilization
A study of Latin America, its people, institutions, and culture providing the background essential to an understanding of Latin American literature, thought and artistic expression. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308 or permission. **Cr 3.**

SPA 490 Topics and Individual Authors in Spanish
Specific topic varies semester to semester. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) Prerequisite: SPA 307 or SPA 308. May be repeated for credit. **Cr 1-3.**

SPA 497 Projects in Spanish I
Independent study on topics selected by student and instructor. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 1-3.**

SPA 498 Projects in Spanish II
Independent study on topics selected by student and instructor. (Satisfies the General Education Human Values and Social Context Cultural Diversity and International Perspectives Requirement.) **Cr 1-3.**

SPA 597 Projects in Spanish I
Specific projects vary from semester to semester depending on the needs of the graduate student and the skills of the faculty member. May be repeated for credit. **Cr 3.**

SPA 598 Projects in Spanish II
Specific projects vary from semester to semester depending on the needs of the graduate student and the skills of the faculty member. May be repeated for credit. **Cr 3.**

Courses in Education: Student Teaching (STT)

STT 490 Full-Day Student Teaching (Elementary)
A full-day, off-campus internship program in a selected school. (Satisfies the General Education Capstone Experience Requirement.) (Pass/Fail Grade Only.) Prerequisite: Early application and permission. **Cr 1-12.**

STT 491 Full-Day Student Teaching (Secondary)
A full-day, off-campus internship program in a selected school. (Satisfies the General Education Capstone Experience Requirement.) (Pass/Fail Grade Only.) Prerequisites: Early application and permission. **Cr 1-12.**

STT 494 Student Teaching K-12 (Music, Art or Physical Education)
Observation and student teaching in selected elementary and/or secondary schools. (Satisfies the General Education Capstone Experience Requirement.) (Pass/Fail Grade Only.) Prerequisites: EDB 202, EDB 204, EDB 221 or their equivalents, methods course, and senior standing. **Cr 1-12.**

STT 496 Advanced Internship (Elementary)
A full-day, off-campus advanced internship, teaching in a selected school. Seminars and conferences. (Satisfies the General Education Capstone Experience Requirement.) (Pass/Fail Grade Only.) Prerequisite: STT 490 and permission of the Director of Educational Field Experiences. **Cr 2-6.**

STT 497 Advanced Internship (Secondary)
A full-day, off-campus advanced internship, teaching in a selected school. Seminars and conferences. (Satisfies the General Education Capstone Experience Requirement.) (Pass/Fail Grade Only.) Prerequisite: STT 491 and permission of the Director of Educational Field Experiences. **Cr 2-6.**

Courses in Social Work (SWK)

SWK 320 Values, History and Practice in Social Work and Social Welfare
Focus on the history and development of social welfare and social work, the basic values and concepts of social work practice and the major fields of social work practice. Second semester students or sophomore level. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Prerequisite: SOC 101 or permission. **Cr 3.**

SWK 330 Contemporary Issues in Diversity and Pluralism
Examines plurality and diversity from a standpoint of difference created by culture, race, social structure, religious affiliation, gender, age, sexual orientation and ability. Issues of prejudice and discrimination examined on an individual and societal level. (Satisfies the General Education Human Values and Social Contexts Cultural Diversity and International Perspectives Requirement.) Prerequisite: SOC 101. **Cr 3.**

SWK 350 Human Behavior and the Social Environment
Examines normative development, development of sense of self, behaviors, attitudes and values of adults in relationship to the social structures, organizations, institutions and societal groups with which they interact. Connections are made to social work theory, social welfare institutions and social work practice. Prerequisite: PSY 100, SOC 101, and PSY 323 or CHF 201 or permission. **Cr 3.**

SWK 361 Social Work Methods I
Explores the functions and roles of the social worker, the value base of social work practice, and the processes of providing service. Social Work majors only. Prerequisite: SWK 350 or permission. **Cr 3.**

SWK 365 Problems of Child Abuse and Neglect: A Multidisciplinary Approach
Examines the roles of the major disciplines, agencies and professions involved in the prevention, early detection, assessment, intervention, treatment and management of child abuse and neglect. Focus on victims and their families. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Prerequisite: SOC 101 or permission. (Continuing Education Only.) **Cr 3.**

SWK 368 Psychosocial Aspects of Disability
Examines the impact of disability, including hidden disabilities, on people's development, self-concept, and self-esteem. The effects of societal attitudes, structures, legislation and institutions on the disabled individual also are examined critically. Prerequisite: SOC 101 or permission. (Continuing Education Only.) **Cr 3.**

SWK 395 Beginning Field Experience in Social Work
Preparation for field practicum, exploration of interest in professional social work and introduction to social welfare agency milieux through volunteer experience. Students must register for both fall and spring semesters. (Pass/Fail Grade Only.) Prerequisite: Social Work majors or permission only. **Cr 2.**

SWK 397 Independent Projects in Social Welfare I
By permission only. **Cr 1-3.**

SWK 440 Social Welfare Policy and Issues
Provides an analytic perspective on the provision of social services and the interrelatedness of practice and policy analysis. The dimensions of choice in social welfare policy and major issues in provision of services are examined. (Satisfies the General Education Human Values and Social Context/Social Contexts and Institutions Requirement.) Prerequisite: SWK 320 or permission. **Cr 3.**

SWK 462 Social Work Methods II
Develops knowledge, values and skills necessary for provision of social services to individuals, families and small groups. Includes knowledge and skill building in interpersonal communication, planning and carrying out interventions, and evaluating interventions within the context of generalist social work practice. Integrates classroom and field instruction experiences. Prerequisite: SWK 361. Limited to senior social work majors. **Cr 3.**

SWK 463 Social Work Methods III
Explores the theory and practice of purposive social change in social agencies and communities, participation of social workers in politics, and social worker roles of advocate, resource mobilizer, program planner, and organizer. Integrates the classroom and field instruction experience. Prerequisite: SWK 462. Limited to senior social work majors. **Cr 3.**

SWK 491 Methods of Social Work Research
Beginning methods of social work research. Strategies and methods of developing knowledge in the context of social work practice and social welfare. The place of theory in research, problem formulation, ethical

concerns, research designs, including practice research and evaluation, methods of data collection, sampling, introduction to program evaluation, and basic procedures in data analysis and statistics **Cr 3.**

SWK 492 Directed Research in Social Work
The application of research methodology to problems and issues in social work practice or social welfare. The design, implementation and analysis of a research topic selected from the student's practice or related social welfare issues. Students will conduct an evaluation of their own practice, a program evaluation, or an agency-based or community-based project using systematic methodologies of knowledge development. Must be taken for two semesters in senior year. Prerequisite: SWK 491 or equivalent. **Cr 1-2.**

SWK 495 Field Practicum in Social Work
Generalist social work practice in community agencies provides opportunities to apply social work knowledge and skills directed toward planned intervention and change efforts. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: SWK 361 and SWK 440. Limited to social work majors who have completed at least 75 course credit hours. Taken concurrently with SWK 462 (fall semester) and SWK 463 (spring semester.) Twelve credit hours required; six per semester, variable by permission only. **Cr 1-6.**

SWK 497 Special Topics in Social Work
Content varies to suit needs of Individual students or small groups. May be repeated for credit. Prerequisite: permission. **Cr 1-3.**

SWK 540 Social Welfare Policy and Issues for Generalist Practitioners
Analysis of the provision of social services and the interrelatedness of practice and policy analysis with emphasis on dimensions of choice in social welfare policy and major issues. Prerequisite: permission. **Cr 3.**

SWK 550 Human Behavior and The Social Environment I
Examines normative adult behaviors, values and attitudes as influenced by age, gender, social class, social structures and other environmental factors. Considers implications for social work practice and social welfare policy. Prerequisite: MSW students or by permission. **Cr 3.**

SWK 560 Practice in Generalist Social Work I
Develops knowledge, values and skills necessary for direct practice of generalist social work with small systems, including individuals, small groups and families. Covers social systems and problem solving framework. Corequisite: SWK 595. Prerequisite: first year MSW students. **Cr 3.**

SWK 563 Practice in Generalist Social Work II
Topics include theory and practice of purposive social change in social agencies and communities, participation of social workers in politics, and social worker roles as advocate, resource mobilizer, program planner and organizer. Integrates classroom and field experience. Corequisite: SWK 595. Prerequisites: SWK 560 or permission. **Cr 3.**

SWK 591 Social Work Research I
Integration of social work theory, practice and research including problem formulation, research design, ethical concerns and protocols for protection of human subjects. Prerequisite: permission. **Cr 3.**

SWK 595 Field Practicum in Social Work
Supervised generalist social work practice in community agencies provides opportunities to apply social work knowledge and skills toward planned intervention and change efforts. Corequisites: SWK 560 or SWK 563.**Cr 4-6.**

SWK 597 Advanced Topics in Social Work
Content varies to suit student needs. May be repeated for credit. Prerequisite: Permission. **Cr 1-3.**

Courses in Theatre (THE)

THE 111 Introduction to Theatre
Introduces basic theatrical elements and techniques. Emphasis on the principles that underlie theatre practice and the process by which plays are translated into theatrical expression. For the general student as well as prospective theatre majors. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) **Cr 3.**

THE 112 Masterpieces of World Drama I
Greek and Roman drama as literature and as theatre. Stress on dramatic form and content, and on the capacity of the play form to reflect the philosophical, social, and political environment. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) **Cr 3.**

THE 113 Masterpieces of World Drama II
European drama from the 15th century to the present, and modern American drama, studied as literature and as theatre. Stress on dramatic form and content, and on the uniqueness of the drama to reflect the philosophical, social, economic and political environment. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) **Cr 3.**

THE 115 Production Support
Students receive credit during the semester in which they are enrolled for working on productions of the Division of Theatre/Dance in a non-performance capacity. Each student is on call to work constructing, painting, stitching, hanging lights, marketing or various other assignments for a minimum of 60 hours or at the discretion of the faculty. Must be taken in four different semesters and is mandatory for all theatre majors. May not be taken during the semesters that a student is enrolled in the THE 224L, THE 225L, THE 226L or THE 227L sequence. May be repeated. **Cr 1.**

THE 116 Play Production
Covers the basic principles of stage directing including choosing and analyzing plays, scheduling rehearsals, blocking action, and determining stage business. Backstage work on major and laboratory theatre production is recommended. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) **Cr 3.**

THE 117 Fundamentals of Acting
Focus on the basic skills of acting, including internal preparation for playing a role and development of external techniques for projecting to an audience. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) **Cr 3.**

THE 118 Stage Makeup
Study of principles and techniques of stage makeup including practical application in class and production experience opportunities. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) **Cr 3.**

THE 119 Fundamentals of Theatre Practice
An examination of the world backstage. Team taught by design and production faculty and staff, this course provides the student with the knowledge and experience to perform comfortably backstage. Students explore the development of scenery, properties, costumes, lighting and sound and their relationship to the final product, the performance. (Satisfies the General Education Human Values and Social Context Artistic and Creative Expression Requirement.) **Cr 3.**

THE 201 Fundamentals of Characterization
Designed to help student actors develop a methodology and technique for analyzing and performing scenes from the modern theatre repertoire. Prerequisite: THE 117 or permission. **Cr 3.**

THE 224 Stage Properties and Scene Painting
Two-part stagecraft module explores the intricacies of stage properties; script analysis, acquisition, construction and performance management. Classroom studio activities, assignments, and practical experience with the productions of the department and the Maine Masque Theatre. Part two offers experience in the planning and execution of scene painting. The practical application of color theory and painting technique is explored through the creation of drops and scenic units dependent upon paint for their effectiveness. Additional experience may be gained in the course's companion laboratory, THE 224L. Theatre majors are required to enroll in the lab and it is highly recommended to all others. Prerequisite: THE 119 or permission. **Cr 3.**

THE 224L Stage Properties and Scene Painting Laboratory
Conducted in connection with the department's stage productions and offers the student a practical application of the course material. Prerequisite: THE 119. Corequisite: THE 224. **Cr 1.**

THE 225 Stage Lighting and Theatre Sound
Examines the aesthetics and mechanics of two rapidly growing design and technical areas. The development of designs in each component are explored through studio and assignment work in script analysis, conceptual development, and communication. Craft mechanics and their relationship to the design are taught through studios in drafting, equipment identification and handling, and through a companion laboratory providing practical experience in the productions of the department and the Maine Masque Theatre. Theatre majors are required to enroll in the laboratory, THE 225L, and it is highly recommended for all participants. Prerequisite: THE 119 or permission. **Cr 3.**

THE 225L Stage Lighting and Theatre Sound Laboratory
Conducted in connection with the department's staged productions and offers the student a practical application of the course material. Prerequisite: THE 119. Corequisite: THE 225. **Cr 1.**

THE 226 Introduction to Scenic Construction and Design
The evolution of the designs from script interpretation through its execution in the shops and installation on the stage will be explored. Class and studios will provide experience in the drafting and graphic presentation of designs and the analysis and application of contemporary construction techniques. Practical experience may be gained through the companion laboratory, THE 226L. This lab is a requirement for theatre majors and highly recommended to all participants. Prerequisite: THE 119 or permission. **Cr 3.**

THE 226L Introduction to Scenic Construction and Design Laboratory
Conducted in connection with the department's staged productions and offers the student a practical application of the course material. Prerequisite: THE 119. Corequisite: THE 226. **Cr 1.**

THE 227 Introduction to Costume Construction and Design
Basic processes of theatre costume construction and design. Includes measuring, building and fitting techniques developed through participation in the construction of a costume. Design portion includes introduction to script analysis, elements of design, and fabric and color selection. A lab in related production work, THE 227L, is required for majors, optional for others. Prerequisite: THE 119 or permission. **Cr 3.**

THE 227L Introduction to Costume Construction and Design Laboratory
Laboratory in costume production work. Required for theatre majors. Prerequisite: THE 119. Corequisite: THE 227. **Cr 1.**

THE 268 Theatre Practicum, Technical
Supervised experience in Theatre and Dance Division productions in the areas of stage managing, publicity, scenery, lighting, costumes and makeup. Prerequisite: 6 hours of theatre courses and permission of the Director. May be repeated for a maximum of six hours. **Cr 1-3.**

THE 269 Theatre Practicum in Acting
Laboratory work in acting. Credit assigned by agreement of advisor and show director, based on learning opportunities of role. Prerequisite: 6 hrs of Theatre courses and permission of the director. May be repeated for a maximum of three hours. **Cr 1-3.**

THE 400 Voice and Speech for the Actor
A studio course in the principles and development of the actor's voice and speech, through physical exercises that encourage freer expression. **Cr 3.**

THE 401 Script Analysis
Examines modern literature written for the theatre. Because the literature will be presented from a production perspective, this course is oriented for use by actors, directors and designers. The objective is to stimulate greater clarity, logic, depth and imagination of interpretation, and to achieve more effective preparatory techniques to use in preparation for performance. Prerequisites: THE 112, THE 113, THE 116, THE 117 or THE 119 or any English course beyond 101. **Cr 3.**

THE 402 Movement Training for Actors
Methods of acting based on non-naturalistic approaches, which may include mime; puppetry; mask work; circus and clown techniques; guerrilla, environmental or street theatre; and choral and sound expression. Prerequisite: THE 117, DAN 101. **Cr 3.**

THE 403 Styles and Techniques of Acting
Concentrates on technical problems in acting, such as verse, non-modern language, historical styles and theatre conventions. Prerequisite: THE 117, THE 201. Juniors and Seniors. **Cr 3.**

THE 418 Advanced Costume Techniques
Examination of the major aspects of the costumer's craft, including drafting and pattern modification, mask and accessory construction, and dyeing and other fabric modification techniques. Emphasis may vary, depending upon the production requirements of the plays offered each semester. Prerequisite: THE 227 or permission. **Cr 3.**

THE 419 Advanced Theatre Technology
Detailed examination of techniques, materials and methodology for scenery and lighting. Preparation for professional work. Prerequisites: Completion of the stagecraft requirement. Students must pick two out of the four following courses. THE 224, THE 225, THE 226 and THE 227. **Cr 3.**

THE 430 Children's Theatre Production
Production and performance of plays for young children. Includes hands-on experience with set and costume design and construction, acting, directing, writing, and stage management. Prerequisite: THE 116 or permission. **Cr 3.**

THE 440 Playwriting, Directing and Performing Lab
Providing a matrix for playwriting, directing, and performing, this lab class affords the student an opportunity to work on a wide variety of original projects. Each student will create a traditional script or a non-traditional performance piece that will be written, analyzed and rewritten. There will be regular "Readers Theatre" style presentations of the material by members of the class. Prerequisite: THE 116 or permission. **Cr 3.**

THE 461 Theatre History I
The development of the drama, the physical theatre, and its modes of production. Ancient Egyptian and Greek theatre into the Renaissance. Limited to juniors and seniors or by permission. **Cr 3.**

THE 462 Theatre History II
The development of the drama and the physical theatre, with its modes of production via the actors, writers and designers. Renaissance to the present day. Limited to juniors and seniors or by permission. **Cr 3.**

THE 466 Stage Directing
Studies the task of all aspects of the theatre production into an artistic unity with emphasis on theatre aesthetics. Provides practice in the directing of short plays, with particular attention to working with actors. Prerequisite: THE 116. Limited to juniors and seniors. **Cr 3.**

THE 470 Women Playwrights
Reading and analysis of plays written by women throughout history. Development of a critical approach with which to examine the works; both within the context of their times, and within the larger context of women's perspectives, styles, ideas, and symbols as expressed in dramatic literature. Prerequisite: 3 credit hours of dramatic literature (THE 112, THE 113, ENG 447, ENG 467) or permission. **Cr 3.**

THE 473 Scene Design
Study of principles, methods, and materials used in scene designing. Laboratory projects includes preparation of a complete design for a particular production, including drawing and plans. Prerequisite: THE 224 and THE 226. **Cr 3.**

THE 474 Stage Lighting
Study of principles, methods, and materials used in stage lighting, including artistic and technical applications. Projects include problems in lighting particular productions. Shop work required. Prerequisite: THE 225. **Cr 3.**

THE 475 Costume Design Theory and Practice
Principles of theatrical costume design, including script interpretation, methods of research, illustration techniques and fabric selection. Techniques learned are applied in design projects with selected scripts. Prerequisite: THE 227 or permission. **Cr 3.**

THE 497 Independent Study in Theatre I Cr 1-3.

THE 498 Independent Study in Theatre II Cr 1-3.

THE 563 American Theatre
A study of the development of the American Theatre from its beginning to the present day. Prerequisite: permission. Cr 3.

THE 564 Asian Theatre
A study of the traditional theatres of India, Japan and China; classical and folk theatres of India, Noh, Kabuki and Bunraku of Japan; Beijing Opera and 20th century forms in China. Prerequisite: permission. Cr 3.

THE 574 Aesthetics of Modern Scene Design
Studies approaches, techniques and theories of modern scenic designers. Includes intensive practice in rendering and visual design techniques. Prerequisite: THE 473 or acceptable portfolio. Cr 3.

THE 596 Field Services in Theatre Production
Provides experience in producing theatre in the field, through stage directing, designing scenery, costumes, and/or lighting, building scenery, stage managing, costuming, handling publicity, etc. at a local elementary or secondary school, community or professional theatre. Prerequisite: Senior theatre majors and graduate students with permission of the Director. Credit depends on length and complexity of assignment. Cr 1-3.

Courses in Technical Mathematics for Engineering (TME)

TME 151 Technical Mathematics I: Precalculus
Introductory mathematics course with engineering examples. Topics include exponents and radicals, operations with polynomials, linear and quadratic equations and inequalities, functions and graphs of linear, quadratic and higher degree polynomials; trigonometric functions and graphs; and triangle solutions. Problem solving techniques are emphasized. (Satisfies the General Education Mathematics Requirement.) Prerequisite: Engineering Technology majors or permission. Cr 3.

TME 152 Technical Mathematics II: Precalculus and Introductory Calculus
Calculus preparation and introduction with engineering examples. Topics include exponential and logarithmic functions, trigonometric identities and equations, inverse trigonometric functions, matrix algebra, determinants, method of least squares, sums of series, conic sections, limits and continuity and introductory calculus including derivative and its applications. The developed math skills are used to analyze engineering problems. (Satisfies the General Education Mathematics Requirement.) Prerequisite: TME 151. Cr 3.

TME 253 Applied Calculus for Engineering Technology
Introduces fundamental concepts and applications of the derivative, as well as integration and its applications, derivatives of transcendental functions and a variety of integration techniques. Applications of these concepts to problems in science and engineering technology are stressed. Prerequisite: TME 152. Cr 4.

TME 354 Ordinary Differential Equations With Engineering Applications
An introduction to linear and nonlinear ordinary differential equations, Laplace Transforms and their applications. Mathematical modeling of differential equations applicable to electrical and mechanical engineering and interpretation of the solutions are presented. A brief introduction to Fourier Series and partial differential equations is also included. Prerequisite: Engineering Technology majors; TME 253 or equivalent. Cr 3.

TME 355 Applied Statistics for Engineering Technology
Introduces basic concepts of probability and probability distributions, such as Gaussian distribution and the Poisson distribution. Emphasis on applications to engineering technology. Mathematical expectation, decision making, quality control, random processes and Monte Carlo methods discussed. Also covers inferences concerning means, variance and proportions. Prerequisite: TME 253 or equivalent. Cr 3.

Courses in Technology and Society (TSO)

TSO 198 Technology and Society I
A survey of the development of modern technology. The interaction of engineering with other facets of modern society examined in relation to issues of current or recent interest. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition and Social Contexts and Institutions Requirements.) (This course is identical to HTY 197) Cr 3.

TSO 199 Technology and Society II
A survey of the interaction of modern technology and contemporary societies with emphasis on particular cases and technologies of current interest. Concludes with discussion of possible scenarios for future technological and societal developments based on present trends. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition, Social Contexts and Institutions and Population and the Environment Requirements.) (This course is identical with HTY 198.) Cr 3.

TSO 288 Issues in Environmental Pollution
Major air, water and solid waste pollution issues, toxicity and health risk assessment and control. Environment and the economy, environmental laws and ethics. Consumption and population issues. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) Cr 3.

TSO 351 Transportation and Social Change
An interdisciplinary study of the technological development and social impacts of rail, air, and automobile transportation taught by engineers, social scientists, and humanists working as an interactive team. One or more appropriate field trips will be held. (Satisfies the General Education Human Values and Social Context Western Cultural Tradition Requirement.) Prerequisite: At least sophomore standing or permission. Cr 3.

TSO 360 Engineering Ethics
Introduces students to ethics theory, general concepts and principles pertaining to engineering ethics and handling ethical situations in practice. Throughout the course, students will be presented with a combination of lecture, engineering ethical situations using a case or example approach and discussion sessions. (Satisfies the General Education Ethics Requirement.) Prerequisites: ENG 101 or equivalent and junior standing. Cr 1.

TSO 398 Special Topics in Technology and Society
Selected subjects in the field of technology and society studies and related areas not covered in other university courses. (Satisfies the General Education Ethics Requirement.) May be repeated for credit. Prerequisite: junior standing or permission. Cr 1-3.

TSO 488 Environmental Risk Assessment
After introducing concepts in toxicology and epidemiology, this course will work through these steps of the chemical risk assessment process and then examine the comparative risk process. Prerequisite: one biology or chemistry course or TSO 288 or permission of instructor. Cr 3.

Courses in University Studies (UST)

UST 100 Introduction to the Bachelor of University Studies
Introduces the student to the nature of higher education as a learning community. Particular emphasis given to academic resources, the learning process, academic skills, developmental advising and career counseling. Students participate in extensive reading and writing assignments relevant to their college transition and degree goals. Prerequisite: B.U.S. majors; others by permission. (Pass/Fail Grade Only.) Cr 1.

UST 300 Topics in the Bachelor of University Studies
Provides understanding and insight into a specific area of interest across disciplines. Emphasis on research analysis. Subjects vary by semester. Subjects vary by semester. (Satisfies the General Education Writing Intensive Requirement.) Prerequisite: junior standing, B.U.S. major; others by permission. Cr 3.

UST 499 Senior Capstone
Interdisciplinary team taught senior seminar. Senior students will use their

areas of foci to build on their knowledge and apply it to a specific senior project or internship. Students will integrate program knowledge and demonstrate synthesis, analysis and evaluation of their specific project/ internship. (Satisfies the General Education Capstone Experience Requirement.) Prerequisite: senior standing, B.U.S. major. **Cr 3.**

Courses in Wildlife Ecology (WLE)

WLE 100 Introduction to Wildlife Resources
A seminar introducing the opportunities, concerns, and professional responsibilities of the wildlife profession. Intended for first-year and transfer students interested in wildlife management. Majors only or permission. (Pass/Fail Grade Only.) Lec 1. **Cr 1.**

WLE 200 Ecology
The relationships between living organisms and their environment. The ecosystem, ecological factors, succession, community distribution, populations and the role of ecology in natural resources. NRFA majors only. No first-year students. (Together with WLE 201 Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: BIO 100. Rec 3. **Cr 3.**

WLE 201 Ecology Laboratory
A course emphasizing field and laboratory studies of plants and animals and their environments. A diversity of organisms and ecosystems will be investigated. NRFA majors only. (Together with WLE 200, Satisfies the General Education Science Basic or Applied Sciences Requirement.) Prerequisite: An ecology lecture course (may be taken concurrently.) **Cr 2.**

WLE 220 Introduction to Statistical Ecology
Statistical methods appropriate to ecological field measurements. Design of field experiments. Prerequisite: MAT 232 or equivalent. Lec 3, Lab 2. **Cr 4.**

WLE 230 Introduction to Wildlife Conservation
Basic principles of wildlife ecology and conservation are illustrated with examples from Maine and around the world. (Satisfies the General Education Human Values and Social Context Population and the Environment Requirement.) **Cr 3.**

WLE 250 Wildlife Field Survey
Three week field course stressing the use and application of wildlife research and management techniques. Collection and analysis of biological data and the recognition of wildlife species and their habitats. Wildlife Majors Only. Prerequisites: WLE 100, WLE 200, WLE 201. **Cr 3.**

WLE 260 Field Ornithology
A course stressing field identification of birds by sight and sound. Avian communities in a variety of aquatic and terrestrial habitats will be studied. Students will learn methods to quantitatively census bird populations. Museum specimens and tape recordings will be used as aids in identification. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) **Cr 3.**

WLE 270 Wetlands Ecology
A field course emphasizing wetland classification, identification of plants and animals and their functional interrelationships, quantitative sampling methods, and marsh management. Daily field trips to representative wetlands in central and coastal Maine. **Cr 1.**

WLE 280 Winter Ecology
Adaptations of plants and animals and their interrelationships in winter. Field identification, sampling methods, impacts of forestry and properties of snow are highlighted as well as basic winter survival. Prerequisite: permission. **Cr 1.**

WLE 410 Management of Wildlife Populations
Characteristics of wildlife populations and principles for protection and manipulation of populations as part of a wildlife management program. (Satisfies the General Education Demonstrated Writing Competency Requirement.) Prerequisites: WLE 200, WLE 201 and WLE 250. Rec 3, Lab 3. **Cr 4.**

WLE 420 Forest Wildlife Management
Managing forest ecosystems for wildlife, especially as it pertains to maintaining natural diversity. Prerequisites: WLE 200 or WLE 230; FES 408 or FTY 349. **Cr 1.**

WLE 430 Cooperative Education
Cooperative education in wildlife involves a work experience related to the student's academic program. It involves two or more academic terms of work experience, either full-time alternating with on-campus classwork, or part-time while taking a part-time class load on campus of approximately equal significance. (Pass/Fail Grade Only.) **Cr Ar.**

WLE 435 Field Experience
A field experience in wildlife is a professional activity participated in by students under the supervision of a practicing professional in the field. A high degree of responsibility is placed on the student for developing learning objectives and securing the approval of a faculty member for academic credit for the learning involved in the experience. It may be paid or unpaid, it may last any length of time, and it may be repeated. **Cr Ar.**

WLE 440 Undergraduate Wildlife Seminar
Current topics of interest will be explored in a seminar format. Prerequisite: Wildlife majors or permission. **Cr Ar.**

WLE 450 Wildlife-Habitat Relationships
A study of the interrelationships among wildlife species and their habitats stressing application to resource planning and management. Prerequisites: WLE 250 and WLE 410 or permission. Rec 3, Lab 2. **Cr 4.**

WLE 470 Wildlife Policy and Administration
Development and state and federal wildlife policy in the United States. Procedures for establishing and implementing policy and current policy issues. (Satisfies the General Education Capstone Experience Requirement.) Prerequisites: WLE 450. Rec 3. **Cr 3.**

WLE 480 International Conservation
Loss of biological diversity, human overpopulation, desertification, sustainable forestry and agriculture, and similar topics will be covered in an examination of the biological, political, social and economic basis of international conservation. Prerequisite: Junior Standing. **Cr 1-2.**

WLE 490 Special Problems
Original investigation in wildlife work, the subject to be chosen after consultation with the staff. Open to high-ranking juniors and seniors. **Cr Ar.**

WLE 515 Introduction to Wildlife Computer Models
Theory and practice of elementary computer modeling in wildlife ecology. Analytical, matrix and individual based models in ecosystem, population, environment and behavioral studies. Prerequisite: a course in basic statistics. Lec 2, Rec 1. **Cr 3.**

WLE 520 Resource Issues on Public and Private Lands
Resource concerns for managers of public and private lands, and integration of wildlife management with forestry and recreation. Numerous field trips. Prerequisite: WLE 420, WLE 450, WLE 470 or permission. Alternate years. **Cr 2.**

WLE 540 Advanced Conservation Biology
Theory and practice of maintaining biological diversity at the genetic, species and ecosystem levels through population and ecosystem management. Prerequisite: Permission. **Cr 2.**

WLE 555 Landscape Ecology and Conservation
Ecological aspects of landscape structure, development, and dynamics and their implications for natural resource management. Prerequisite: permission. **Cr 1.**

WLE 565 Predator Ecology and Management
Factors influencing population density and management of carnivorous mammals including: habitat selection, spatial requirements, reproductive performance, population assessment, interspecific relationships, social organization, predator-prey dynamics, legal and jurisdictional responsibilities, and socio-political issues. Prerequisite: Permission. **Cr 3.**

WLE 570 Wildlife Nutrition
The nutritional ecology of wildlife species, with emphasis on specific nutritional requirements, means of nutrient acquisition, and management applications of such knowledge. Prerequisites: AVS 455 or permission. Lec 3, Lab 1. (Alternate Years.) **Cr 4.**

WLE 580 Evaluation of Wildlife Populations
Estimation and interpretation of abundance, mortality, fecundity, dispersal, spatial pattern, and numerical trends in wildlife populations. Prerequisites: One course each in statistics and ecology. Lec 2, Rec 2. (Alternate Years.) **Cr 3.**

WLE 590 Evaluation of Wildlife Habitats
Theory and practice of evaluating wildlife habitats, including carrying capacity, measuring habitat quality and quantity, and related topics. Critical review of methodologies currently in use. Prerequisite: WLE 450 or permission. (Alternate years.) **Cr 2.**

Courses in Wood Science and Technology (WSC)

WSC 212 Introduction to Wood Science and Technology I
All about wood; from the basics of how it is formed i the tree to the practical use of wood. Topics range from acoustical properties of wood to understanding why wood shrinks and swells. Practical aspects of use and production of wood products are also covered. (Satisfies the General Education Science Applications of Scientific Knowledge Requirement.) Lec 3. **Cr 3.**

WSC 213 Hand Lens Identification of Wood Laboratory
(Satisfies the General Education Science Applications of Scientific Knowledge Requirement.) **Cr 1.**

WSC 314 Wood and Wood-Fiber Processing
An overview of the machinery and processes used for manufacturing wood-based composites, veneer, lumber, pulp and paper, etc. Timber defects and their effect on finished product quality. Methods of measuring process control. Lec 3, Lab 3. **Cr 4.**

WSC 318 Wood and the Environment
Basic wood-moisture relationships and how they affect the strength and performance of wood products and structures. Drying systems for solid wood and wood products such as flakes, chips and poles. Recognizing and preventing defects that are caused by drying and shrinkage. Comparative energy savings using wood in construction. Prerequisites: permission. Lec 2, Lab 3. **Cr 3.**

WSC 319 Wood Deterioration and Protection
Covers how wood is attacked by fungi, insects and other agents, and how wood may be protected from decay, etc. to prolong its useful life. Taught at a general level, topics include the importance of the decay of woody materials in carbon cycling, and the mechanisms which fungi use to penetrate and degrade the cellular structure of wood. The course also addresses environmental concerns associated with the use of wood preservatives and wood coatings. Practical methods for preserving and protection in-service wood from deterioration are addressed. (Satisfies the General Education Science Basic or Applied Sciences Requirement.) Lec 2, Lab 3. **Cr 3.**

WSC 345 Special Problems
Original investigation in wood science and technology, the subject to be chosen after consultation with the staff. Open to high-ranking juniors and seniors. **Cr Ar.**

WSC 395 Internship
A professional activity under the general supervision of an experienced professional with a high degree of responsibility placed on the student. Learning objectives are pre-established and agreed upon between the faculty coordinator and the placement supervisior. Not normally repeated. **Cr Ar.**

WSC 396 Field Experience
Practical experience for the undergraduate student, combining work in a business firm, industry or public agency with academic courses and supervision. Opportunity for student to gain experience, to integrate classroom learning with job performance, and to develop future placement possibilities. Prerequisite: junior standing and permission. Open to Wood Products students only. **Cr Ar.**

WSC 416 Wood Anatomy
Structural characteristics of wood and wood fibers, and the use of these features to identify species, determine wood and paper properties and assess wood quality; Prerequisite: WSC 212 or BIO 435 or permission. Lec 2, Lab 4. **Cr 3.**

WSC 425 Mechanical Properties of Wood
The mechanical properties of wood and wood composites and their use in structural applications. The relationship of mechanical and physical properties to basic processing techniques. Prerequisite: WSC 212 or permission. Rec 3, Lab 3. **Cr 4.**

WSC 430 Wood Composites and Adhesion
Principles of adhesion and evaluation of adhesive systems. Effect of process variables on physical and mechanical properties of oriented strand board, medium density fiberboard, particleboard, hardboard, plywood and wood/ polymer composites. Prerequisite: WSC 314 or permission. Lec 2, Lab 3. **Cr 3.**

WSC 530 Wood Physics
Study and evaluation of non-mechanical physical properties of wood; response to liquids, vibrational stimulation, heat, electricity and ionizing radiation. Prerequisite: understanding of basic physics, wood anatomy or permission. Lec 2, Lab 2. **Cr 4.**

WSC 531 Mechanics of Wood and Wood Composites
Application of orthotropic and nonlinear constitutive relations, laminate theory, and failure criterion on the prediction of mechanical properties of solid wood, wood fibers, laminated, and other wood composite materials. Prerequisites: WSC 425 or equivalent or permission. **Cr 3.**

Courses in Women's Studies (WST)

WST 101 Introduction to Women's Studies
Introduces the perspective and interdisciplinary nature of Women's Studies. Examines women's positions in Western culture and explores the genesis, development, and impact of our culture's assumptions about women's nature and women's roles. (Satisfies the General Education Human Values and Social Context/ Social Contexts and Institutions and Cultural Diversity and International Perspectives Requirements.) **Cr 3.**

WST 201 Topics in Women's Studies
An interdisciplinary, second-level study of topics such as "Women in the Hispanic World," "Women and Aging," "Lesbian Literature." May be taken more than once for credit if the topic differs. Prerequisite: WST 101 or permission. **Cr 3.**

WST 298 Directed Study in Women's Studies
Individual study, research, field experience and writing projects in Women's Studies and related areas, conducted under the guidance of a faculty member associated with the Women's Studies Program, arranged on request. Prerequisite: WST 101 and permission. (Contact the WIC Office for an information sheet.) **Cr Ar.**

WST 301 Intermediate Topics in Women's Studies
An interdisciplinary, intermediate level study of topics such as "Women and the Legal System" and "Lesbians Through Three Lenses." May be taken more than once if the topics differ. Prerequisite: Sophomore standing or above and WST 101 or permission. **Cr 3.**

WST 401 Advanced Topics in Women's Studies
An advanced, interdisciplinary study of topics such as "Women and Science" or "Global Feminism." May be taken more than once if the topics differ. Prerequisite: WST 101 and junior or senior standing or permission. **Cr 3.**

WST 410 Feminist Theory
An advanced, interdisciplinary, multicultural introduction to the main traditions of feminist theory. Prerequisite: 6 hours of Women's Studies, including WST 101 or permission. **Cr 3.**

WST 480 Senior Seminar in Women's Studies
This integrated, interdisciplinary, and multicultural course provides advanced study of a specific topic in Women's Studies, such as "Women's Spirituality," "Ecofeminism," and "Educating Women Across the Lifespan." Prerequisites: WST 101, WST 410 and senior standing or permission. **Cr 3.**

WST 498 Directed Study in Women's Studies
Advanced, individual study, field experience, research and writing projects in Women's Studies and related areas, conducted under the guidance of a faculty member associated with the Women's Studies Program, arranged on request. Prerequisite: WST 101 and Junior or Senior standing and permission. (Contact the WIC Office for an information sheet.) **Cr Ar.**