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# Course Descriptions

## Non-Degree Credit Courses

These courses have content normally available in a standard secondary school curriculum and the credits cannot be used for a UMD degree. Students must pay a course fee equivalent to normal tuition for these courses. These courses are not eligible for reciprocity benefits. When appropriate, the credits may be used in determining financial aid. In some instances, the credits also may be used in determining

intercollegiate athletic eligibility; *contact the Department of Intercollegiate Athletics regarding the effect of non-degree credit courses on athletic eligibility.* Non-degree credits are not included in the total UMD credits earned, GPA, or in determining student classification. Non-degree credit courses in this catalog are Math 0102—Euclidean Geometry, and SSP 0103—Basic Mathematics and Introductory Algebra.

## Course Numbers

Semester courses have four-digit numbers as follows:

**0xxx** Courses that do not carry credit toward any University degree.

**1xxx** Courses primarily for undergraduate students in their first year of study.

**2xxx** Courses primarily for undergraduate students in their second year of study.

**3xxx** Courses primarily for undergraduate students in their third year of study.

**4xxx** Courses primarily for undergraduate students in their fourth year of study; graduate students may enroll in such courses. 4xxx courses may be counted for a Graduate School degree if the course is taught by a member of the graduate faculty and has been approved for graduate credit.

**5xxx** Courses primarily for graduate students; undergraduate students in their third or fourth year may enroll in such courses.

**6xxx** Courses for post-baccalaureate students in professional degree programs.

**7xxx** Courses for post-baccalaureate students in professional degree programs.

6xxx and 7xxx courses are to be used primarily for post-baccalaureate professional programs that are not offered through the Graduate School.

**8xxx** Courses for graduate students.

## Liberal Education Abbreviations

LE ..... Liberal education. Prerequisites show courses that can be taken for liberal education along with the category (i.e., LE 4).

LECD .... Cultural diversity

LEIP ..... International perspectives

For more information about liberal education categories and requirements, see page 39.

## Prerequisites

**QP**—The quarter prerequisite is intended to show what is required, particularly in terms of quarter courses, before taking the course.

**SP**—The semester prerequisite is intended to show what is required, particularly in terms of semester courses, before taking the course.

If no prerequisites are listed, there are none, except for the class standing requirement indicated by the course number. When no department designation precedes the course number listed as a prerequisite, that course is in the same department as the course being offered. Likewise, a prerequisite reading “6 cr” means 6 credits in courses offered by the same department.

## Symbols and Abbreviations

§...Credit will not be granted if credit has been received for the course listed after this symbol.

¶...Concurrent registration is allowed in the course listed after this symbol.

#...Consent of instructor is required before registration.

Δ...Consent of the department offering the course is required for registration.

□...Consent of the college unit offering the course is required before registration.

...In prerequisite listings, comma means “and.”

1–4 cr [max 6]...The course can be taken for 1 to 4 credits and may be repeated for up to 6 credits.

DGS .... Director of graduate studies

## Medical School Grading

O ... Outstanding

P .... Passing

E .... Excellent

N ... Failing

S .... Satisfactory

# Accounting (Acct)

## School of Business and Economics

**Acct 2001. Principles of Financial Accounting.** (3 cr; QP-30 cr or □; SP-20 cr or □; A-F only)

Concepts of financial accounting and external reporting. Nature and measurement of assets, liabilities, equities, revenues, expenses. Emphasis on use and understanding of external financial statements.

**Acct 2002. Principles of Managerial Accounting.** (3 cr; QP-1511, 1512 or □; SP-2001, SBE student or □; A-F only)

Information accumulation, analysis, and use for managerial decisions. Cost-volume-profit relationships; short- and long-term decisions; standards and budgets; segment and managerial performance evaluation.

**Acct 2005. Survey of Accounting.** (3 cr; QP-Not open to SBE students or Acct minors; SP-Not open to SBE students or non-SBE Acct minors; A-F only; LE 8)

Accounting information presented in published financial statements. Debt financing, stock issuance, alternative methods of accounting. Bookkeeping topics not emphasized.

**Acct 3096. Volunteer Income Tax Assistance.** (1 cr [max 2 cr]; QP-40 cr, Δ; may be repeated for 2 cr max; cr not available as Acct elective; SP-27 cr, Δ; cr not available as Acct elective; S-N only)

Introduction to preparation of federal and Minnesota state tax returns for low-income individuals. Preparation of actual tax returns as a volunteer, supervised by faculty.

**Acct 3101. Intermediate Accounting I.** (3 cr; QP-SBE candidate or Acct minor; SP-SBE candidate or non-SBE Acct minor or □; A-F only)

Review of financial accounting standard setting, conceptual framework, and accounting process. Income statement, balance sheet, and statement of cash flows. Present value concepts, cash, receivables, inventories, fixed assets, current liabilities, and contingencies.

**Acct 3102. Intermediate Accounting II.** (3 cr; QP-3501, 3502, SBE candidate or Acct minor or □; SP-3101, SBE candidate or non-SBE Acct minor or □; A-F only)

Long-term liabilities, stockholders' equity, earnings per share, revenue recognition, and tax allocation. Investments, pensions, leases, accounting changes and error analysis, financial statement analysis, and disclosures in financial statements.

**Acct 3110. Computer Applications in Accounting.** (3 cr; QP-SBE candidate or Acct minor; SP-SBE candidate or non-SBE Acct minor or □; A-F only)

Various microcomputer and mainframe applications for solving financial and managerial accounting problems. Main focus on electronic spreadsheets, quantitative and statistical analysis, and graphics. Completion of a computerized financial accounting practice set.

**Acct 3151. Income Tax Accounting.** (3 cr; QP-1512, SBE candidate or Acct minor or □; SP-2002, SBE candidate or non-SBE Acct minor or □; A-F only)

Principles involved in determining taxable net income and computation of federal and state income taxes. Individual and corporation taxes emphasized.

**Acct 3191. Independent Study.** (1-3 cr; QP-BAc candidate with 120 cr or Δ; SP-BAc candidate with 80 cr or Δ; cr not available as Acct elective; A-F only)

For students wishing to do special work in an accounting area that extends beyond, or in greater depth than, regular course offerings.

**Acct 3196. Internship in Accounting.** (3-6 cr [max 6 cr]; QP-3503; SP-3101 or Δ; only 3 cr may be applied to Acct electives; S-N only)

Participation in a professional work experience working full time for at least twelve weeks during any semester or summer. Professional skills workshops completed before employer interviews and registration.

**Acct 3201. Cost Accounting I.** (3 cr; QP-3102, SBE candidate or Acct minor or □; SP-SBE candidate or non-SBE Acct minor or □; A-F only)

Determining manufacturing costs, e.g., in a job order or process manufacturing environment. Cost-volume-profit relationships, activity-based accounting, standard costing techniques.

**Acct 4152. Advanced Income Taxation.** (3 cr; QP-3544, SBE candidate or Acct minor with 120 cr; SP-3151, SBE candidate or □; A-F only)

Emphasis on decision making and tax planning. Analysis of federal and state taxes relating to partnerships, corporations, and associations; corporate distributions and reorganizations; trust and foundations; estate, gift, and inheritance taxes.

**Acct 4160. Auditing.** (3 cr; QP-3503, SBE candidate with 120 cr or Acct minor with 90 cr or □; SP-3101, SBE candidate or □; \$3261; no grad credit; A-F only)

Theory and procedures in audit process.

**Acct 4201. Cost Accounting II.** (3 cr; QP-3507, SBE candidate or Acct minor or grad student or □; SP-3201, SBE candidate or □; A-F only)

Sophisticated use of cost information derived from accounting systems for effective management decision making, budgeting cost analysis and control, and performance evaluation. Relevant costs, cost behavior determination, cost allocation, transfer pricing, product profitability, and performance measurement.

**Acct 4261. Advanced Auditing.** (3 cr; QP-3546, SBE candidate with 120 cr or Acct minor with 90 cr or grad student or □; SP-3261, SBE candidate or □; A-F only)

Topics including, but not limited to, statistical sampling, EDP auditing, internal auditing. Seminar covers actual audit cases and simulation audit package.

**Acct 4501. Advanced Accounting.** (3 cr; QP-3503, SBE candidate with 120 cr or Acct minor with 90 cr or □; SP-3102, SBE candidate or □; A-F only)

Topics including consolidated financial statements, partnership, and fiduciary accounting.

**Acct 4505. International Accounting.** (3 cr; QP-3503, SBE candidate or Acct minor or grad student or □; SP-3102, SBE candidate or □; A-F only)

International comparative analysis, accounting measurement, and reporting issues unique to multinational business transactions and multinational enterprises; international financial markets; foreign exchange accounting; international audit environment; international taxation and transfer pricing; harmonization of worldwide accounting.

**Acct 4510. Fund and Not-For-Profit Accounting.** (3 cr; QP-1512, 90 cr or □; SP-2002 or SBE candidate or □; A-F only)

Accounting concepts and processes applied to government, hospital, education, charity, and other not-for-profit entities.

**Acct 4551. Accounting Theory.** (3 cr; QP-3503, SBE candidate or Acct minor with 120 cr or grad student or □; SP-3102, SBE candidate with 120 cr or □; A-F only)

Critical examination of accounting theories and a detailed study of alternative accounting models. Library research and case analysis.

## Aerospace Studies (Air)

### *College of Science and Engineering*

**Air 0100. AFROTC GMC Leadership Laboratory.** (0 cr; S-N only)

Practical environment giving leadership training while being instructed on military customs and courtesies, physical fitness, military drill and the general Air Force environment. This class is taken concurrently with AFROTC 1xxx and 2xxx academic classes.

**Air 1101. Foundations of the U.S. Air Force.** (1 cr; A-F only)

Two-part survey of U.S. Air Force as public-service organization. Role of military in U.S. society; military history; officership; professionalism; core values; career opportunities; customs/courtesies; communication skills. Leadership Laboratory (Air 0100) is mandatory for AFROTC cadets and complements this course by providing followership experiences.

**Air 1102. Foundations of the U.S. Air Force.** (1 cr; A-F only)

Two-part survey of U.S. Air Force as public-service organization. Role of military in U.S. society; military history; officership; professionalism; core values; career opportunities; customs/courtesies; communication skills. Leadership Laboratory (Air 0100) is mandatory for AFROTC cadets and complements this course by providing followership experiences.

**Air 1591. Leadership Practicum.** (1-4 cr [max 4 cr]; A-F only)

Leadership techniques and their practical application in structured problems and realistic situations; Air Force customs and courtesies.

**Air 2101. The Evolution of the U.S. Air Force Air and Space Power.** (1 cr; A-F only)

Air Force heritage; development/deployment of air power, a primary element of U.S. national security; leadership and quality principles; ethics and values. Leadership development based on student participation in group problem solving. Oral/written communication development. Leadership Laboratory (Air 0100) is mandatory for AFROTC cadets and complements this course by providing followership experiences.

**Air 2102. The Evolution of the U.S. Air Force Air and Space Power.** (1 cr; A-F only)

Air Force heritage; development/deployment of air power, a primary element of U.S. national security; leadership and quality principles; ethics and values. Leadership development based on student participation in group problem solving. Oral/written communication development. Leadership Laboratory (Air 0100) is mandatory for AFROTC cadets and complements this course by providing followership experiences.

**Air 2200. Introduction to Aviation.** (3 cr; A-F only)

Weather; Federal Aviation Administration regulations; dead-reckoning navigation; radio navigation; related topics required to complete FAA private pilot's license written examination. Open to any student interested in U.S. aviation or the private pilot's examination.

**Air 3000. AFROTC POC Leadership Laboratory.** (1 cr [max 4 cr]; S-N only)

Practical environment giving leadership training through teaching freshmen and sophomores military customs and courtesies, physical fitness, military drill and the general Air Force environment. This class is taken concurrently with AFROTC 3xxx and 4xxx level academic classes.

**Air 3101. Air Force Leadership Studies.** (3 cr; A-F only)

Comprehensive study of leadership/quality management fundamentals, professional knowledge, organizational doctrine and ethics, and communication skills required of today's Air Force officer. Leadership/management case studies. A mandatory Leadership Laboratory (Air 3000) provides advanced leadership experiences and the opportunity to apply the leadership and management principles of this course.

**Air 3102. Air Force Leadership Studies.** (3 cr; A-F only)

Comprehensive study of leadership/quality management fundamentals, professional knowledge, organizational doctrine and ethics, and communication skills required of today's Air Force officer. Leadership/management case studies. A mandatory Leadership Laboratory (Air 3000) provides advanced leadership experiences and the opportunity to apply the leadership and management principles of this course.

**Air 3400. Project Management.** (3 cr; SP-Econ 2020 or Pol 2700 or Psy 2023 or Soc 3151 or Stat 1411 or Stat 2411 or Stat 3611 or #; A-F only)

Concepts and elements of project/risk management within a systems approach to accomplish resource-, schedule-, and performance-constrained projects. Use and limitations of current computer software. Open to any student interested in management of multidisciplinary project teams.

**Air 3591. Leadership Practicum.** (1-4 cr [max 4 cr]; A-F only)

Practical application of leadership and management in structured realistic situations.

**Air 4101. National Security Affairs/Preparation for Active Duty.** (3 cr; SP-No grad credit; A-F only)

Advanced leadership development; national security processes, regional studies, advanced leadership ethics, doctrine, the military as a profession, officership, military justice, civilian control of the military. A mandatory Leadership Laboratory (Air 3000) provides advanced leadership experiences and the opportunity to apply the leadership and management principles of this course.

**Air 4102. National Security Affairs/Preparation for Active Duty.** (3 cr; SP-No grad credit; A-F only)

Advanced leadership development; national security processes, regional studies, advanced leadership ethics, doctrine, the military as a profession, officership, military justice, civilian control of the military. A mandatory Leadership Laboratory (Air 3000) provides advanced leadership experiences and the opportunity to apply the leadership and management principles of this course.

# American Indian Studies (Amln)

## College of Liberal Arts

**Amln 1103. Beginning Chippewa I.** (3 cr; A-F only; LE 3)  
Speaking and comprehension of basic Chippewa speech patterns. Development of rudimentary reading knowledge.

**Amln 1104. Beginning Chippewa II.** (3 cr; SP-1103 or #; A-F only; LE 3)  
Speaking and comprehension of basic Chippewa speech patterns. Development of rudimentary reading knowledge.

**Amln 1106. American Indian Prose, Poetry, and Oratory.** (3 cr; A-F only; LE 9)  
Survey of transcribed/translated American Indian oratory, post-1900 prose, and contemporary poetry by Indian writers/speakers. Works used to facilitate understanding of major themes in American Indian life.

**Amln 1120. American Indians in the 20th Century.** (3 cr; A-F only; LECD 7)  
Topical review of Indian-white contacts, antiquity to present. Historical analysis of the people and their cultures.

**Amln 2105. Survey of American Indian Arts.** (3 cr; A-F only; LE 9)  
Traditional arts of American Indians and the cultures that produced them; techniques, motifs, and aesthetics of Indian textiles and utilitarian and ceremonial arts.

**Amln 2115. Chippewa History and Culture.** (3 cr; A-F only)  
"Anishinabe," "Ojibway," and "Chippewa." Origins and lifestyle; relationship between traditional and contemporary times. Emphasis on Minnesota.

**Amln 2203. Intermediate Chippewa I.** (3 cr; SP-1104 or #; A-F only; LE 3)  
Speaking basic Chippewa sentences and paragraphs at fluent level so listener can understand speaking pattern context. Ability to write and read Chippewa language proficiently.

**Amln 2204. Intermediate Chippewa II.** (3 cr; SP-2203 or #; A-F only; LE 3)  
Speaking basic Chippewa sentences and paragraphs at fluent level so listener can understand speaking pattern context. Ability to write and read Chippewa language proficiently.

**Amln 2520. Tribal Law and Government.** (3 cr; SP-Intro soc sci course, 1120, 3106 or #; A-F only)  
Review of American Indian law and analysis of modern tribal government.

**Amln 3106. Indian-White Relations.** (3 cr; SP-1120 or #; A-F only; LECD 8)  
Ten to twelve significant events and their ramifications for contemporary Indian affairs. Variety of options for fulfilling course requirements.

**Amln 3260. American Indian Novel.** (3 cr; SP-1120 or #; A-F only)  
Approximately four novels by American Indian authors are read with an explication of the novels and the milieu that produced them.

**Amln 3300. Projects in American Indian Studies.** (1-5 cr [max 10 cr]; SP-1120; A-F only)  
Directed reading, research, or involvement in social action culminating in a paper.

**Amln 3301. Advanced Chippewa.** (3 cr; SP-2204 or #; A-F only)  
Taught entirely in Chippewa language. Fluent Chippewa speaking, writing, reading, and conversations to increase oral and comprehension abilities.

**Amln 3333. Introduction to Federal Indian Law.** (3 cr; SP-1120 or #; A-F only)  
Legal concepts, cases, and issues surrounding American Indian federal law (e.g., treaties).

**Amln 3410. Fur Trade in Canada and the United States.** (3 cr; SP-1120 or #; A-F only)  
Historical review and analysis of Canadian and U.S. Indians in the fur trade.

**Amln 3750. American Indian Psychology.** (3 cr; SP-Soc sci course, 1120, 3106 or #; A-F only)  
Reviews major theories of personality development and motivational psychology applicable to American Indian issues. Attributes of culturally appropriate developmental models are advanced through cross-cultural examination of general traits, perspectives, norms, and values. Relevant techniques of counseling.

**Amln 3905. Special Topics: (Various Titles to be Assigned).** (3 cr [max 12 cr]; SP-Intro soc sci course or 1120 or #; A-F only)  
Study of topics not included in regular curriculum. Topic announced before course offered.

**Amln 3997. Internship in American Indian Studies.** (4-8 cr [max 12 cr]; SP-Amln major; may not be taken final semester of sr yr; may be taken in 1 or 2 semesters; A-F only)  
Supervised lab experience in American Indian agency or project or with significant Indian clientele. Advance, concurrent, and follow-up written and oral presentations.

**Amln 4302. Independent Study of the Chippewa Language.** (1-6 cr [max 12 cr]; SP-1103 or #; no grad credit; A-F only)  
Individual opportunity to devise and/or be involved in programs to increase fluency.

**Amln 4630. American Indians and the Media.** (3 cr; SP-1120 or #; no grad credit; A-F only)  
Examination of images of American Indians in media such as literature, movies, TV, toys, music, and sports as they have contributed to and continue to perpetuate stereotypic and distorted images.

**Amln 4970. Tribal Economic Development and Management.** (3 cr; SP-1120 or #; no grad credit; A-F only)  
Management concepts and theories; tribal environment and its contemporary economic and governmental development; tribal managerial techniques.

**Amln 4990. Directed Research.** (1-6 cr [max 12 cr]; SP-#; max 8 cr to grad program; A-F only)  
Qualified seniors and graduate students may register for work on tutorial basis.

**Amln 5905. Legal Aspects of Federal Indian Policy for Human Services.** (3 cr; SP-Amln 1120 and one upper div soc sci course or #; A-F only)  
Examines federal Indian policy as a by-product of treaty rights, sovereignty and self-determination. Emphasis on federal policy impact on American Indian family life, education, child welfare, and religious freedom. Selected case studies used.

**AmIn 5910. Special Topics: (Various Titles to be Assigned).** (3 cr [max 12 cr]; SP—Intro soc sci course or 1120 or #; max 6 cr to grad program; A-F only)  
Focus on areas of particular relevancy to both Indian and non-Indian people in this region. Faculty-student-community consultation determines topic selection for a given semester.

## American Studies (AmS)

### College of Liberal Arts

**AmS 5091. Directed Study.** (1-4 cr; A-F only)  
Supervised independent study on selected American Studies topics or themes.

## Anatomy and Cell Biology (Anat)

### School of Medicine

**Anat 3100. Practical Human Anatomy.** (2 cr; SP-#)  
Lectures present gross structure of human body by regions: head/neck, thorax, abdomen, pelvis, limbs. For nurse/nurse practitioners, physician's assistants, emergency medical workers, and pre-medicine, physical education, athletic training, and coaching students. Selected study of predissected human specimens optional.

**Anat 5133. Developmental, Cell, and Tissue Biology.** (5 cr; SP—Upper div undergrad or grad student; A-F only)  
In-depth study of cytology, embryological origins, development, structure, and functions of basic tissues of the human body.

**Anat 5246. Seminar in Cell Biology.** (1 cr [max 1 cr]; QP—Biol 3245 and grad student or #; SP—Biol 2101 and grad student or #; P-N only)  
Presenting, critically evaluating, and discussing recent published work in selected areas of cell and molecular biology biomedical research.

**Anat 5521. Gross Anatomy.** (7 cr; SP-#; A-F only)  
Regional dissection of human body supplemented with normal topographic and radiographic anatomy of the body, basic clinical science correlation, and demonstrations of anatomy through use of fresh autopsy specimens.

**Anat 5523. Microscopic Anatomy.** (5 cr; SP-#; A-F only)  
Introduction to human microscopic structure and the cytochemical and functional aspects of cells, tissues, and organs. Emphasis on basic concepts of microscopic anatomy and identification of specific cells, tissues, and organs.

**Anat 5533. Neuroanatomy.** (4 cr; SP-#; A-F only)  
Structure of central nervous system, with correlation of structure, function, and clinical relevance. Consideration of special senses.

## Anthropology (Anth)

### College of Liberal Arts

**Anth 1095. Freshman Seminar: Topic: (Various Titles to be Assigned).** (3-4 cr; SP—Freshman, fewer than 30 cr; A-F only; LEIP 8)  
Seminar designed specifically for freshmen.

**Anth 1602. Prehistoric Cultures.** (4 cr; A-F only; LEIP 7)  
Origin and development of extinct and living human beings, including growth and differentiation of cultures from their beginnings to earliest stages of ancient civilizations.

**Anth 1604. Cultural Anthropology.** (4 cr; A-F only; LEIP 6)  
Introduction to representative cultures of the world and to concepts and methods of cultural anthropology, focusing on range of variation and degree of uniformity in human behavior and in cultural adaptations.

**Anth 1612. Introduction to Archaeology.** (4 cr; A-F only; LE 6)  
Basic principles of archaeology with examples of their application to world prehistory.

**Anth 3614. Peasant Societies and Cultures.** (3 cr; QP—1604, 40 cr or #; SP—1604, 30 cr or #; A-F only)  
Comparative study of peasant societies; their role in traditional urban nation-states, and their place in contemporary economic development and cultural change.

**Anth 3616. Cultures of Arctic North America.** (3 cr; QP—1604, 40 cr or #; SP—1604, 30 cr or #; A-F only)  
Ethnographic account of traditional and contemporary cultures of Eskimos and Indians in northern North America. Processes of cultural change that have produced the contemporary situations in this area.

**Anth 3618. Ancient Middle America.** (3 cr; QP—1604, 40 cr or #; SP—1604, 30 cr or #; A-F only)  
Survey of the Aztecs, Maya, and their predecessors.

**Anth 3622. Prehistoric Archaeology: Old World.** (3 cr; QP—40 cr or #; SP—30 cr or #; A-F only)  
Archaeological survey of Europe, Africa, and Asia.

**Anth 3624. Archaeology of North America.** (3 cr; QP—40 cr or #; SP—30 cr or #; A-F only)  
Archaeological survey of major cultural areas of North America north of Mexico.

**Anth 3628. Women in Cross-Cultural Perspective.** (3 cr; QP—1604, 40 cr or #; SP—1604, 30 cr or #; A-F only)  
Worldwide survey of the structure of gender systems, focusing on women's lives in selected, primarily non-Western, cultures; how gender relations are impacted by colonialism, industrialism, and economic development

**Anth 3631. Cross-Cultural Adaptation.** (1 cr; QP—Exper living in another culture, #; SP—Exper living in another culture, #; A-F only)  
Cultural adaptation, cultural shock, and problems of reentry for anthropological fieldworkers, students in study-abroad programs, and business students returning from internships or study in other cultures.

**Anth 3632. Latin American Cultures.** (3 cr; QP—1604, 40 cr or #; SP—1604, 30 cr or #; A-F only)  
Survey of social, political, economic, and religious organization of contemporary national and native cultures of Mexico, Central America, and South America.

## Course Descriptions

**Anth 3634. Cultures of Africa.** (3 cr; QP-1604, 40 cr or #; SP-1604, 30 cr or #; A-F only)

Ethnographic survey of human societies of sub-Saharan Africa focusing on precolonial life ways, the response to colonization, and post-imperial transformations and problems. Balanced emphasis on regional variability and pan-Africanism.

**Anth 3636. Anthropology of India.** (3 cr; QP-1604, 40 cr or #; SP-1604, 30 cr or #; A-F only)

Peoples and cultures of India with focus on village life within historical context of regional differences; importance of caste, kinship, and religion to unity and diversity of modern-day India and challenges it faces.

**Anth 3695. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 8 cr]; QP-1604, 40 cr or #; SP-1604, 30 cr or #; A-F only)

Seminar on contemporary topics in selected branches of anthropology.

**Anth 4616. Culture and Personality.** (3 cr; QP-1604, 70 cr or grad student or #; SP-1604, 60 cr or grad student or #; A-F only)

Role of culture in forming of personality; problems of individual adjustment to demands of culture. Psychological and sociopsychological approaches to culture.

**Anth 4621. Myth and Sacred Symbols.** (3 cr; QP-1604, 70 cr or grad student or #; SP-1604, 60 cr or grad student or #; A-F only)

Interpretation of myths and sacred symbols found in beliefs and rituals of selected traditional cultures.

**Anth 4623. Anthropology and Contemporary Human Problems.** (3 cr; QP-1604, 70 cr or grad student or #; SP-1604, 60 cr or grad student or #; A-F only)

Cultural roots of such interrelated contemporary human problems as over-population, food production and distribution, health and nutrition, social and ecological disorders. Review of alternative solutions to such problems as suggested by anthropological study and analyses.

**Anth 4628. Language and Culture.** (3 cr; QP-70 cr or grad student or #; SP-1604, 60 cr or grad student or #; A-F only)

Relationship between language and culture studied through comparative cases from diverse areas of the world.

**Anth 4631. Human Ecology.** (3 cr; QP-1604, 70 cr or grad student or #; SP-1604, 60 cr or grad student or #; A-F only)

In-depth study of some of the methods and concepts concerning the interrelations of certain human populations with their environments in diverse natural, cultural, historical, and evolutionary settings.

**Anth 4641. International Development: Women and Population.** (3 cr; QP-1604 or Soc 1100, Soc 1500, 70 cr or #; SP-1604, 60 cr or #; A-F only)

Impact of macrostructural and microstructural components of population and development on women's lives, with reference to women in Asia, Africa, and Latin America. Challenges facing women as sociocultural, political, and economic development occurs. Approached from demographic and culturally specific perspective.

**Anth 4651. Development of Anthropological Theory.** (4 cr; QP-1604, 70 cr or grad student or #; SP-1604, 60 cr or #; no grad credit; A-F only)

Theoretical perspectives from mid-19th century to the present; examines the interrelationship of method and theory, and implications for practice of anthropology.

**Anth 4653. Senior Seminar.** (3 cr; SP-1604, senior or #; no grad credit; A-F only)

Contemporary topics in selected branches of anthropology. Active participation in group research project to develop and enhance anthropological research skills.

**Anth 4654. Biological Anthropology.** (3 cr; QP-#; SP-1604 or grad student or #; A-F only)

The human skeleton as source of information about individual variations, population structure, and human evolution. Study of human remains from archaeological sites, morphology, paleopathology, and relevant statistical methods. Lectures and labs emphasize acquiring practical experiences in analysis and interpretation.

**Anth 4691. Independent Study in Anthropology.** (1-5 cr [max 10 cr]; QP-55 cr, Comp 31xx, #; SP-60 cr or #; no grad credit; A-F only)

Directed reading and research leading to presentation of paper.

**Anth 4695. Special Topics: (Various Titles to be Assigned).** (1-5 cr [max 10 cr]; QP-1604, 40 cr or #; SP-1604, 60 cr or #; A-F only)

Seminar on contemporary topics in selected branches of anthropology.

**Anth 4696. Field Research in Archaeology.** (1-10 cr [max 10 cr]; QP-1602 or 1612, #; SP-1602 or 1612, #; A-F only)

Archaeological field excavation, survey, and research in historic and prehistoric sites.

**Anth 4697. Anthropology Internship.** (2-6 cr [max 6 cr]; SP-#; no grad credit; S-N only)

Supervised experience in an anthropological work related setting: social service agency, museum, immigration services, school or other, approved by instructor. Setting learning objectives, techniques for measuring progress and report writing will be taught.

**Anth 4699. Honors Project.** (2 cr [max 4 cr]; QP-5626, Soc 1500, Soc 3500, Soc 3520, 120 cr; approval by dept honors program dir; SP-1604, 60 cr or #; no grad credit; A-F only)

Advanced individual project in any area of anthropology demonstrating sound theoretical and research foundations and resulting in a written report, oral presentation, Web page, or poster session.

**Anth 4997. Teaching Assistantship in Anthropology.**

(1-3 cr [max 6 cr]; SP-#, no grad credit; S-N only)  
Practical experience in teaching activities in beginning courses (Prehistoric Cultures and Cultural Anthropology) in the department. Students serve as teaching assistants alongside an instructor. Application deadline is one week before beginning of registration for the following semester.

## Art (Art)

### School of Fine Arts

**Art 0901. Graphic Design Portfolio Review.** (0 cr; SP-[repeatable one time], 9 cr in art courses, pre-graphic design major or Δ; S-N only)

Presentation of portfolio and other required evaluative materials for admission to graphic design major candidacy.

**Art 0903. Art Education Review.** (0 cr; SP-[repeatable one time], 9 cr in art courses, pre-art ed major or Δ; S-N only)

Presentation of portfolio and other required evaluative materials for admission to art education major candidacy.

**Art 1001. Art Today.** (3 cr; A-F only; LEIP 9)

Introductory survey of influence of art and roles of artists in varied sociocultural contexts, emphasizing recent art and its historical sources.

**Art 1002. Introduction to Art.** (3 cr; SP-\$1005; Not for art majors except those in art history; A-F only; LE 10)

Studio course with strong lecture component for those with little or no creative experience in art, introducing various materials, techniques, and concepts. Studio work, lectures, class discussions, viewing artworks, and outside reading.

**Art 1005. Freshman Seminar: Introduction to Art.** (3 cr; SP-Freshman, fewer than 30 cr; §1002; A-F only; LE 10)

Studio course with a strong analytical component for those with little or no creative experience in art; introducing various materials, techniques and concepts in the context of lectures, discussions, critical writing and analysis.

**Art 1006. Freshman Seminar: Fundamentals of Drawing.**

(3 cr; SP-Freshman, fewer than 30 cr; §1009; A-F only; LE 10) Development of visual and conceptual skills through drawing as well as lectures, presentations, group discussions, critiques.

**Art 1009. Fundamentals of Drawing.** (3 cr; SP-§1006; Not for art majors or minors; A-F only; LE 10)

Stimulation of visual and conceptual skills through dynamics of drawing as well as lectures/presentations and group discussions.

**Art 1010. Drawing I.** (3 cr; QP-¶1002 or art or art ed major or #; SP-Art or art ed major or art minor #; A-F only)

Introduction to the drawing experience and problems concerned with translation of three-dimensional visual experience into two-dimensional form.

**Art 1011. 2-D Design.** (3 cr; QP-1002 or art or art ed major; SP-Art or art ed major or art minor or #; A-F only)

Introduction to two-dimensional design through study of design elements and principles, including visual organization and color theory and their application in various media.

**Art 1012. 3-D Design.** (3 cr; QP-1002 or art or art ed major; SP-§1015; Art or art ed major or art or architecture and design studies minor or #; A-F only)

Introduction to basic concepts and materials of three-dimensional form and space.

**Art 1013. 2-D Digital Design.** (3 cr; QP-1002 or art or art ed major; SP-Art or art ed major or art or photography or arts in media or architecture and design studies minor or #; A-F only)

Two-dimensional studio and graphic design concepts using the computer as a creative tool.

**Art 1015. Freshman Seminar: 3-D Design.** (3 cr; SP-Freshman, fewer than 30 cr; §1012; A-F only; LE 10)

Introduction to the design, fabrication and analysis of three dimensional form and space based on principles and elements of design, hands on design assignments and study of 3-D design as a source of cultural artifacts in contemporary society.

**Art 1100. Painting I.** (3 cr; QP-1010 and 1011 or 1002 or art or art ed major; SP-1009 or 1010, 1011, art or art ed major or art minor or #; A-F only)

Color and pigment theory, basic concepts and explorations in technology and imagery. Painting traditions and contemporary directions.

**Art 1111. Freshman Seminar: Art and Design in the Communications Culture.** (3 cr; SP-Freshman, fewer than 30 cr; A-F only; LE 9)

Introduction to art theory/practice. Focuses on dynamics of visual communication. Interpretation/analysis of symbols, formal structures, context.

**Art 1125. Watercolor I.** (3 cr; QP-1010, 1011 or 1013 or #; SP-1002 or 1010 or #; A-F only)

Basic concepts and techniques.

**Art 1200. Sculpture I.** (3 cr; QP-Art or art ed major, 1012; SP-Art or art ed major or art minor, 1012 or #; A-F only)

Sculptural materials, methods, and concepts, with problems relating to form, time, and space; experience with various sculptural forms and media, emphasizing creative expression.

**Art 1300. Printmaking I: Intaglio, Relief.** (3 cr; QP-Art 1002 or art or art ed major, 1010, 1011; SP-Art or art ed major or art minor, 1010, 1011 or #; A-F only)

Introduction to methods and materials used in zinc plate etching and relief printing from wood and linoleum. Technical, aesthetic, and contextual considerations encountered in production of meaningful artwork. Theoretical, legal, critical, and historical aspects of printmaking.

**Art 1301. Printmaking I: Lithography and Silkscreen.**

(3 cr [max 6 cr]; QP-1002 or art or art ed major, 1010, 1011; SP-Art or art ed major or art minor, 1010, 1011 or #; A-F only)

Introduction to methods and materials used in lithographic printmaking from stones and plates and water-based screenprinting. Content includes technical, aesthetic, and contextual considerations encountered in the production of meaningful artwork. Additional information on theoretical, legal, critical, and historical aspects of printmaking.

**Art 1400. Ceramics I.** (3 cr; QP-1002 or art or art ed major, 1010, 1012 or #; SP-Art or art ed major or art minor, 1010, 1012 or #; A-F only)

Handbuilding methods, surface enhancement, and conceptual support for pottery and/or ceramic sculpture.

**Art 1405. Fundamentals of Ceramics.** (3 cr; QP-Not for art majors or minors; SP-Not for art majors or minors; A-F only; LE 10)

Basic handbuilding and glazing of earthenware ceramics.

**Art 1500. Jewelry and Metals I.** (3 cr; QP-1002 or art or art ed major, 1011 or 1013 or #; SP-Art or art ed major or art minor, 1011 or 1013 or #; A-F only)

Basic jewelry design, fabrication, and surface enhancement techniques.

**Art 1510. Weaving and Fibers I.** (3 cr; QP-1002 or art or art ed major, 1011 or 1013, 1012 or #; SP-1011 or 1013, 1012, art or art ed major or art minor or #; A-F only)

Contemporary weaving and fibers.

**Art 1600. Photography I.** (3 cr; QP-1002 or art or art ed major or #; SP-Art or art ed major or art or photography minor or #; A-F only)

Introduction to primarily silver-based photographic concepts, materials, history, and darkroom practice, in a creative context.

**Art 1605. Fundamentals of Photography.** (3 cr; QP-Not for art majors or minors; SP-Not for art majors or minors; §1607; A-F only; LE 10)

Basic photographic principles and primarily silver-based techniques through studio/lecture experiences.

## Course Descriptions

### **Art 1607. Freshman Seminar: Fundamentals of**

**Photography.** (3 cr; SP—Freshman, fewer than 30 cr; §1605; A-F only; LE 10)

Introduction to photography as a communicative tool and medium for creative expression. Investigation of photography's role in the communications culture and to the history of the medium. Students produce a final portfolio of photographic prints.

### **Art 2814. Creating Across Cultures.** (3 cr; A-F only; LECD 9)

Underrepresented visual arts of cultural groups within U.S. society.

### **Art 2900. Visual Literacy.** (3 cr; A-F only; LE 9)

Various forms of visual expression—art, commercial imagery, typography, architecture, graffiti, etc.—as rhetoric. Introduction to variety of theories and/or modes of criticism, and consideration of their value for explanation of visual expression.

### **Art 2905. Process and Design Production I.** (3 cr; QP–1011 or 1013 or #; SP–1013 and graphic design major or pregrad art and tech major or arts in media minor or #; A-F only)

Fundamentals of graphic reproduction and Web site design; application of digital programs used in preparing work for reproduction.

### **Art 2907. Typography.** (3 cr; SP—Graphic design major or #; A-F only)

Introduction to fundamentals of typography in print and screen media. Presents terminology, history, and theories of letterforms. Students will perform directed assignments to develop typographic skills on computer and by hand.

### **Art 2911. Graphic Design I.** (3 cr; QP–3040, 3052, 3053 or #; SP–1010, 1011, 1013, 2905 graphic design or pregrad art and tech major or #; A-F only)

Introduction to theory and practice of graphic design. Meaning and aesthetics of image juxtaposition; juxtaposition of type and image.

### **Art 3014. 3-D Digital Studio I.** (3 cr; SP–1013, art or art education major or art minor or architecture and design studies minor or #; §1014; A-F only)

Introduction to design using 3-D digital applications, particularly for the creation of images for the purpose of artistic expression or for use as graphic elements. The class will cover use of the software as well as artistic and design issues raised by this particular medium.

### **Art 3016. 2-D Digital Studio I.** (3 cr [max 6 cr]; QP–1002 or art or art ed major, 1013 or #; SP—Art or art ed major or art or photography minor, 1013 or #; A-F only)

Computer as a fine arts medium. Development of a serial approach to visual imagery.

### **Art 3030. Art in Technologies I.** (3 cr [max 6 cr]; QP–1013 or 1014 or #; SP–1013, art or art ed major or art minor or #; A-F only)

Interdisciplinary, collaborative investigations linking traditional to emerging electronically-based art technologies.

### **Art 3095. Special Topics: (Various Titles to be Assigned).**

(1–3 cr [max 12 cr]; QP–#; SP–#; A-F only)  
Intensive study of special topics in visual arts. Topic announced before course offered.

### **Art 3100. Painting II.** (3 cr [max 9 cr]; QP–3103 or #; SP–1100, art or art ed major or art minor or #; repeatable to 9 cr with #; A-F only)

Painting in specialized interest area, using student/instructor-generated semester goals outline.

### **Art 3125. Watercolor II.** (3 cr [max 6 cr]; QP–1125 or #; SP–1125 or #; A-F only)

Advanced concepts and techniques.

### **Art 3200. Sculpture II.** (3 cr [max 6 cr]; QP–3201 or #; SP–1200, art or art ed major or art minor or #; A-F only)

Sculptural materials, methods, and concepts, with problems relating to form, time, and space; experience with various sculptural forms and media, emphasizing creative expression.

### **Art 3300. Printmaking II.** (3 cr [max 6 cr]; QP–3301 or #; SP–1300 or 1301 art or art ed major or art minor or #; A-F only)

Continued exploration of processes explored in either or both of the introductory courses. Increased technical challenges combined with refinement of image and concept. Some photographic and mixed-media processes; increased experience in editing and critical review.

### **Art 3400. Ceramics II.** (3 cr [max 6 cr]; QP–3401 or #; SP–1400, art or art ed major or art minor or #; A-F only)

Advanced handbuilding and surface enhancement techniques; development of a stylistically consistent body of work.

### **Art 3405. Ceramics.** (3 cr [max 6 cr]; SP–1405 or #; not for art majors or minors)

Handbuilding, glazing, and firing of earthenware ceramics.

### **Art 3500. Jewelry and Metals II.** (3 cr [max 6 cr]; QP–3501 or #; SP–1500, art or art ed major or art minor or #; A-F only)

Advanced application of jewelry techniques and design.

### **Art 3511. Weaving and Fibers II.** (3 cr [max 6 cr]; QP–3511; SP–1510, art or art ed major or art minor or #; A-F only)

Weaving and related techniques in fibers and fabrics.

### **Art 3600. Photography II.** (3 cr [max 6 cr]; QP–1600 or 1605 or 3601; SP–1600 or 1605, art or art ed major or art or photography minor or #; A-F only)

Experience with varied digital and silver-based photographic processes and concepts in a creative context.

### **Art 3700. Drawing II.** (3 cr [max 6 cr]; QP–3713 or 3715; SP–1010, art or art ed major or art minor or #; A-F only)

Individually supervised projects supporting involvement in other studio areas.

### **Art 3800. Community Involvement Through Art.** (1–3 cr [max 3 cr]; SP–#; 1 cr for each 45 hrs of fieldwork; A-F only)

For students interested in working with public and private social agencies through an art program.

### **Art 3806. Early Childhood Art.** (1 cr; QP—Art or art ed major or admission to early childhood studies program or #; SP—Art or art ed major or admission to early childhood studies program or #; A-F only)

Aspects of preschool art development, including studio expenses.

### **Art 3810. Art in Elementary Education.** (2 cr; QP–1002 or art or art ed major or pre-el/middle school ed major or admission to elem ed program or #; SP—art ed major; or pre-el/middle school ed major and 1002; or admission to elem ed program and 1002, or #; A-F only)

Instructional problems; growth and development of artistic expression in children. Studio experience relating to elementary art curriculum.

### **Art 3811. Art Education Elementary-Level Experience.** (2 cr; QP—Art or art ed major or #; SP–3810, art ed major or #; A-F only)

Experience in curriculum development and teaching methods for art educators.

**Art 3815. Art in Secondary Education.** (4 cr; QP–Art or art ed major or #; SP–Art ed major or #; A-F only)  
Nature and objectives of art programs in secondary school; content and methods. Development of secondary art curriculum.

**Art 3895. Problems in Art Education.** (1-3 cr; QP–Art ed major or #; SP–Art ed major or #; A-F only)  
Individual supervised study for advanced art education students. Applied research in art education.

**Art 3922. Graphic Design II.** (3 cr; QP–3058 or #; SP–2911 and graphic design major or #; A-F only)  
Continuation of theory and practice of graphic design. Introduction to professional practices. Materials meaning, aesthetics, and practical use.

**Art 3933. Graphic Design III.** (3 cr; QP–3059 or #; SP–3922 and graphic design major or #; A-F only)  
Continuation of theory and practice of graphic design. Graphic design as an organizational and informative medium and as a purely aesthetic pursuit.

**Art 3950. Architecture Studio.** (3 cr; SP–1009, 1012, 1013, 1014, Hist 3361 and architecture and design studies minor or #; A-F only)  
Architectural concepts, methods, and materials, with experience in architectural planning and problem-solving.

**Art 4014. 3D Digital Studio II.** (3 cr [max 9 cr]; SP–3014, art or art ed major or architecture and design studies minor or art minor or #; A-F only)  
Advanced study in 3D digital applications, particularly for the creation of images and animation for the purpose of artistic expression or for use as graphic elements. The class covers use of the software as well as artistic and design issues raised by this particular medium.

**Art 4100. Painting III.** (3 cr [max 9 cr]; QP–5150 or #; SP–3100, art or art ed major or art minor or #; no grad credit; A-F only)  
Advanced individually supervised projects using both traditional and contemporary painting media and techniques.

**Art 4191. Individual Study in Painting.** (1-3 cr [max 8 cr]; QP–4 qtrs painting, Δ; SP–2 sem painting, #; no grad credit; A-F only)  
Instruction tailored to individual's needs outside of traditional class structure.

**Art 4200. Sculpture III.** (3 cr [max 6 cr]; QP–5250 or #; SP–3200, art or art ed major or art minor or #; no grad credit; A-F only)  
Sculpture in area of specialized interest.

**Art 4291. Individual Study in Sculpture.** (1-3 cr [max 8 cr]; QP–4 qtrs sculpture, Δ; SP–2 sem sculpture, #; no grad credit; A-F only)

**Art 4300. Printmaking III.** (3 cr [max 6 cr]; QP–3301, 3302, 5350 or #; SP–3300, art or art ed major or art minor or #; A-F only)  
Further exploration of print processes. Emphasis on refinement of technical skills as well as development of concepts and imagery. Experimentation encouraged in nontraditional, collaborative, and cross-disciplinary approaches. Increased experience in editing and alternative formats combined with a more comprehensive critical review.

**Art 4391. Individual Study in Printmaking.** (1-3 cr [max 8 cr]; QP–4 qtrs printmaking, Δ; SP–3300, Δ; A-F only)  
Graduate students complete a project by contract with instructor, supported by a research paper.

**Art 4400. Ceramics III.** (3 cr [max 6 cr]; QP–5452 or #; SP–3400, art or art ed major or art minor or #; no grad credit; A-F only)  
Technical and conceptual refinement of advanced body of ceramic work.

**Art 4491. Individual Study in Ceramics.** (1-3 cr [max 8 cr]; QP–4 qtrs ceramics, Δ; SP–2 sem ceramics, Δ; A-F only)  
Directed study in specific areas.

**Art 4511. Weaving and Fibers III.** (3 cr [max 6 cr]; QP–3511 or #; SP–3511, art or art ed major or art minor or #; no grad credit; A-F only)  
On- or off-loom studio projects for advanced student.

**Art 4581. Individual Study in Fibers.** (1-3 cr [max 8 cr]; QP–4 qtrs fibers, #; SP–2 sem fibers, #; no grad credit; A-F only)  
Fibers and weaving.

**Art 4600. Photography III.** (3 cr [max 9 cr]; QP–5650 or #; SP–3600, art or art ed major or art or photography minor or #; A-F only)  
Digital or silver-based photography in area of special interest. Graduate students complete a photographic project by contract with instructor, supported by a research paper.

**Art 4691. Individual Study in Photography.** (1-3 cr [max 8 cr]; QP–4 qtrs photography, Δ; SP–2 sem photography, Δ; A-F only)  
Graduate students complete a project by contract with instructor, supported by a research paper.

**Art 4700. Drawing III.** (3 cr [max 6 cr]; QP–5750 or #; SP–3700, art or art ed major or art minor or #; A-F only)  
Individually supervised projects supporting involvement in other studio areas. Graduate students produce a technically and conceptually sophisticated portfolio of drawing, supported by a research paper.

**Art 4702. Honors Studio.** (3 cr; QP–#; no grad credit; SP–#; no grad credit; A-F only)  
Directed, but largely independent, creative inquiry for students of exceptional ability.

**Art 4791. Individual Study in Drawing.** (1-3 cr [max 8 cr]; QP–4 qtrs drawing, #; SP–2 sem drawing, #; A-F only)  
Graduate students complete a project in drawing by contract with instructor, supported by a research paper.

**Art 4812. Art Seminar.** (3 cr; QP–Sr or #; no grad credit; SP–Sr or #; no grad credit; A-F only)  
Current visual arts issues investigated through directed study, lectures, assigned readings, and preparation of student presentations.

**Art 4891. Honors Art Education Research.** (3 cr; QP–#; no grad credit; SP–Art education major and #; no grad credit; A-F only)  
Directed, but largely independent, research in an area of art education for students of exceptional ability.

**Art 4892. Independent International Study.** (1-6 cr [max 9 cr]; QP–1-6 cr with Δ; max 6 cr to grad program; sr standing advisable; SP–Δ; no grad credit; sr standing advisable; A-F only)  
Travel and research in international museums, schools, arts organizations, and art centers. Requires advanced planning. Credit allowed depends on nature and scope of project.

## Course Descriptions

**Art 4897. Arts Internship Experience.** (1-9 cr [max 9 cr]; QP-#; SP-#; 1 cr for each 45 hrs of fieldwork; no grad credit; A-F only)

For advanced students. Field research and experience working with arts programming, practice, or management in public or private agency, including the University.

**Art 4899. Senior Presentation/Exhibition.** (1 cr; SP-Sr art major or #; no grad credit; A-F only)

Students, singly or in pairs, plan/prepare/present under guidance of faculty/museum staff an exhibition of their best work in Tweed Museum of Art or an approved alternative public venue.

**Art 4901. Honors Graphic Design.** (3 cr [max 6 cr]; QP-1906 or #; SP-Graphic design major and #; no grad credit; A-F only) Directed, but primarily independent, creative research for outstanding students.

**Art 4903. Art Education Student Teaching Seminar.** (1 cr; SP-Art education major and ¶Educ 4500, EdSe 4600, ElEd 4650; no grad credit; A-F only)

For students currently teaching art (K-12). Students will share concerns and situations, suggestions, and gain group support. The seminar will supplement the field experiences and supervision, evaluation, and art education portfolio development.

**Art 4904. Graphic Design Workshop.** (1-3 cr [max 3 cr]; QP-3040 or #; SP-graphic design major and #; A-F only) Concentrates on graphic design and printing topics.

**Art 4905. Process and Design Production II.** (3 cr; QP-3041 or #; SP-2905, graphic design major or #; A-F only) Graphic reproduction techniques in preparing work for printing. Planning, preparation, material selection, production methods. Graduate students produce offset printed pieces using a range of applications and techniques, and written analysis and research on history and philosophy of modern print processes.

**Art 4910. Senior Design Studio.** (3 cr [max 6 cr]; SP-3933, sr graphic design major or #; no grad credit; A-F only) Investigation of long-term and complex design projects for print and/or screen, done individually and in groups.

**Art 4950. Architecture Capstone/Portfolio.** (3 cr; SP-3950, architecture and design studies minor, ArTH 3331 or ArTH 3361 or Hist 3365 or #; no grad credit; A-F only) Continued work in architectural concepts, methods, and materials, culminating in a capstone portfolio.

**Art 4972. Professional Practices.** (3 cr [max 6 cr]; QP-¶3020, 3040, 3059, 3062, 5041 or #), sr graphic design major or #; SP-3933, sr graphic design major or #; no grad credit; A-F only)

Discussion and practice of professional concerns of graphic design field related to opportunities, technology, ethics, and workplace.

**Art 4973. Interdisciplinary Team Project.** (3 cr [max 6 cr]; SP-SFA or CSE or SBE or CLA major, #; no grad credit; A-F only) Design students and students from other departments collaborate on 'real world' interdisciplinary projects involving information organization and use of technology.

**Art 5016. 2-D Digital Studio II.** (3 cr [max 6 cr]; QP-3016 or #; SP-3016, art or art ed major or art minor or #; A-F only) Advanced work in digital artmaking.

**Art 5030. Art in Technologies II.** (3 cr [max 6 cr]; QP-1013, 1014, 3016 or #; SP-3030, art or art ed major or art minor or #; A-F only)

Advanced interdisciplinary, collaborative investigations linking traditional to emerging electronically-based art technologies.

**Art 5091. Individual Study in Electronic Arts.** (1-3 cr [max 8 cr]; QP-1014 or 3016 and #; SP-1014 or 3016, art or art ed major or art minor and #; no grad credit; A-F only) Individually supervised projects in electronic arts media.

**Art 5795. Intermedia Studio Problems.** (1-3 cr [max 9 cr]; QP-3 qtrs in each area with Δ, #; SP-2 sem in each area with Δ, #; A-F only)

Directed study emphasizing intermedia concerns.

**Art 5902. Graphic Design Theory and Criticism.** (3 cr; QP-ArTH 3310 or #; SP-ArTH 4901 and graphic design major, or grad or #; A-F only) Introductory course.

**Art 5907. Motion Graphics I.** (3 cr; QP-3058, 3053 or #; SP-2911 and graphic design major or pregrad art and tech or grad, or #; A-F only) Introduces aesthetics, mechanics, and meaning of motion graphics.

**Art 5909. Interactive Design.** (3 cr [max 6 cr]; QP-3054 or #; SP-Graphic design major and 5907 or #; A-F only) Interactivity in graphic design, concentrating on computer-based interactive presentations.

**Art 5991. Independent Study in Graphic Design.** (1-3 cr [max 8 cr]; QP-4 qtrs graphic design, Δ; SP-2 semesters work in graphic design and graphic design major and #; A-F only) Independent work in graphic design

**Art 5997. Art Museum Internship.** (3 cr [max 12 cr]; QP-1001, 12 cr ArTH, 1 cr for ea 30 hrs. of work; #; SP-1001, 6 cr art hist; #; no grad credit; 1 cr for each 45 hrs of work; A-F only) Supervised practicum in art museum operation.

**Art 5999. Special Projects in Design.** (3 cr [max 6 cr]; QP-3059, 3062 or #; SP-Graphic design major or grad, #; A-F only) Specific projects in graphic design practice.

**Art 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser and DGS consent)

**Art 8901. Graduate Seminar.** (4 cr [max 16 cr]; SP-¶8980; A-F only) Critique of student work and discussion of readings. Faculty presentations on design history, criticism, theory, and analysis.

**Art 8903. Art Teaching Practicum.** (1 cr [max 4 cr]; SP-Grad teaching asst or #; A-F only) Theory of and experience in teaching college-level art.

**Art 8980. Graduate Studio.** (4 cr [max 16 cr]; SP-¶8901, grad student; A-F only) Production of graphic designs based on problems and topics that are discussed in Art 8901—Graduate Seminar, in which students enroll concurrently.

**Art 8990. M.F.A. Creative Thesis.** (3-6 cr [max 6 cr]; SP-#; A-F only) In consultation with advisor, completion of major project as culmination of M.F.A. studies.

# Art History (Arth)

## School of Fine Arts

### Arth 1303. History of World Art I. (3 cr; A-F only; LE 9)

Development of world art and architecture from prehistory through Middle Ages.

### Arth 1304. History of World Art II. (3 cr; A-F only; LEIP 9)

Development of world art and architecture from Renaissance to present.

### Arth 2305. Classical Themes in Art History. (3 cr; A-F only; LE 9)

Genres of painting and related subjects in Western art, 1400-1800.

### Arth 2390. American Art of the 20th Century. (3 cr; A-F only; LECD 9)

American art from Armory Show of 1913 to present examined in social and historical contexts.

### Arth 2815. Women Artists in History. (3 cr; A-F only; LECD 9)

Survey of contributions women have made in the visual arts throughout history.

### Arth 3091. Honors Research in Art History. (1-3 cr; SP-#; A-F only)

Directed research in an art history area for students of exceptional ability. Students must be invited by art history faculty to register for this course.

### Arth 3320. Ancient Art. (3 cr; A-F only)

Art and architecture of Minoans, Mycenaeans, Greeks, and Romans.

### Arth 3330. Renaissance Painting and Sculpture. (3 cr; A-F only)

Developments in Europe, 1300-1600.

### Arth 3331. European Architecture, 1400-1800. (3 cr; A-F only)

Developments during Renaissance and Baroque periods.

### Arth 3340. Baroque and Rococo Art. (3 cr; A-F only)

Developments in European painting and sculpture during 17th and 18th centuries.

### Arth 3360. European Art in an Age of Revolution. (3 cr; A-F only)

European art from French Revolution through pan-European revolutions of 1848, examined in social and historical contexts.

### Arth 3361. European Art: Impressionism and Post-Impressionism. (3 cr; A-F only)

European art from mid-19th century through 1900, including late Realism, Impressionism, pan-European Symbolism and Art Nouveau, examined in social and historical contexts.

### Arth 3370. European Art, 1900-1945. (3 cr; A-F only)

Includes Cubism, Futurism, Dada, de Stijl, German Expressionism, New Objectivity, Surrealism, art of Bauhaus, and art of National Socialists, examined in social and historical contexts.

### Arth 3380. Art of the United States: Colonial to Impressionist. (3 cr; A-F only)

U.S. art from colonial period through 1900, examined in social and historical contexts.

### Arth 3395. Special Topics: (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F only)

Title announced before course is offered.

### Arth 4491. Directed Study in 19th- and 20th-Century European Art. (1-4 cr [max 9 cr]; SP-Grad or #; max 6 cr for undergrad; A-F only)

Independent research in an area of the student's interest; fundamental knowledge of period or subject required. Graduate students complete a substantial research paper on a topic chosen in consultation with instructor.

### Arth 4901. History of Graphic Design. (3 cr; QP-1906 or #; SP-Art or art ed maj or art or communication arts minor or grad student or #; A-F only)

Introduction, from origins of written communication to present. Graduate students write several research papers and produce a design artifact related to a historical topic of their choice.

### Arth 4991. Directed Study in the History of Graphic Design. (3-4 cr [max 8 cr]; SP-Grad student or #; A-F only)

Independent research in an area of the student's interest, culminating in a paper or project. Fundamental knowledge of subject required. Graduate students complete a substantial research paper or project on a topic chosen in consultation with instructor.

### Arth 5191. Directed Study in Ancient and Medieval Art. (1-3 cr [max 9 cr]; SP-#; max 6 cr for undergrads; A-F only)

### Arth 5391. Directed Study in Renaissance and Baroque Art. (1-3 cr [max 9 cr]; SP-#; max 6 cr for undergrads; A-F only)

### Arth 5591. Directed Study in American Art. (1-3 cr [max 9 cr]; SP-#; max 6 cr for undergrads; A-F only)

# Astronomy (Ast)

## College of Science and Engineering

### Ast 1040. Introductory Astronomy. (3 cr; A-F only; LE 5)

Survey of present knowledge of solar system, interstellar space, stars, galaxies, and universe. Historical development of astronomy as a science. Taught in day school and in Individualized Learning Program format.

### Ast 2040. The Solar System. (3 cr; QP-1040, Math 1210 or Math 1250 or #; SP-1040, Math 1250 or #; A-F only)

Survey of terrestrial and jovian planets and their satellites; asteroids, comets, interplanetary debris; examination of lunar rocks and meteorite samples when available; origin and evolution of solar system.

# Behavioral Science (BhSc)

## School of Medicine

### BhSc 5432. Clinical Psychopharmacology. (3 cr; A-F only)

Clinical application of pharmacological principles; overview of major psychological disorders, such as depression, anxiety, psychosis, ADHD, substance abuse, and sleep disorders; appropriate treatments of psychological disorders with psychotropic medications. Clinical guidelines for psychotropic drugs.

## Course Descriptions

### **BhSc 5491. Problems in Medical Behavioral Sciences.**

(1-6 cr; SP–Med or upper div or grad student, #; max 6 cr to grad program; A-F only)

Independent study on a tutorial, seminar, or lecture basis. Investigative work, lecture material, and/or appropriate reading and discussions designed according to interest and capabilities of individual student.

### **BhSc 5591. Studies in Medical Behavioral Sciences.** (2 cr; SP–Regis med student, #; P-N only)

Selectives on topics in general medical behavioral science, typically including social psychology of deviance, alternatives in health care delivery, family dynamics, and others.

### **BhSc 6200. Behavioral Medicine.** (2 cr; SP–Regis med student; O-N only)

Introduction to contemporary behavioral medicine. Interface of biological, psychological, and social factors in a range of health issues, including stress, substance abuse, chronic pain and illness, cardiovascular disease, obesity, and infectious diseases.

### **BhSc 6211. Medical Sociology.** (2 cr; SP–Regis med student; P-N only)

Advanced aspects of sociology and its application to areas of medical science. Emphasis on doctor-patient relationship, role of medicine in society, and institutionalization of medical care through hospitals, medical schools, and medical profession.

### **BhSc 6230. Medical Psychology: Interviewing.** (1 cr; SP–Regis med student; O-N only)

Psychological aspects of interviewing in health care settings; interpersonal communicative skills and problems; techniques of rapport building and history taking.

### **BhSc 6260. Psycho-Social-Spiritual Aspects of Life-Threatening Illness.** (2 cr; SP–Regis med student; O-N only)

Psychological, social, and spiritual coping of patients, families, and health care professionals as they experience life-threatening illnesses. Effective intervention strategies for health care professionals are emphasized. Post-death responses of families and care providers.

### **BhSc 6301. Biostatistics and Epidemiology.** (2 cr; SP–Regis med student; no grad credit; O-N only)

Basic elements of biostatistics, including descriptive and inferential statistics, study design, probability statistics, and ordering and interpreting diagnostic tests. Topics in clinical epidemiology and epidemiologic methods.

### **BhSc 6652. Human Behavioral Development and Problems.** (4 cr; SP–Regis med student; O-N only)

Human psychological development throughout life; normal cognitive, learning, social, and personality development; problems expressed during various stages of life in the family and other settings. Assessment/treatment described as relevant to practice of family medicine.

### **BhSc 6701. Medical Ethics.** (2 cr; SP–Regis med student; no grad credit; O-N only)

Basic concepts and skills of medical ethics, including core values, clinical issues, and case analysis.

## Biochemistry and Molecular Biology (MdBc)

### *School of Medicine*

#### **MdBc 5501. Neurobiochemistry.** (2 cr; QP–Chem 3311 or 5337; SP–Chem 3322 or 4342 or #; O-N only)

Current concepts on anatomical and compositional properties of brain; membranes and transport; neurotransmission; receptors and signal transduction mechanisms; energy, carbohydrate, protein, lipid, and nucleic acid metabolism; development and diseases of the central nervous system.

#### **MdBc 8151. Biochemistry Seminar.** (1 cr [max 4 cr]; SP–Biochem or chem grad student or #; P-N only)

Current topics in biochemistry.

#### **MdBc 8294. Current Research Techniques.** (1-3 cr [max 4 cr]; SP–Biochem or chem grad student or #; P-N only)

Research projects in biochemistry, each carried out in research lab of a faculty member.

#### **MdBc 8333. FTE: Master's.** (1 cr; SP–Master's student, adviser and DGS consent)

#### **MdBc 8444. FTE: Doctoral.** (1 cr; SP–Doctoral student, adviser and DGS consent)

#### **MdBc 8666. Doctoral Pre-Thesis Credits.** (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

#### **MdBc 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

#### **MdBc 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

## Biology (Biol)

### *College of Science and Engineering*

#### **Biol 1001. Biology and Society.** (4 cr; SP–For nonmajors; A-F only; LE 4)

Contemporary issues in biology. (3 hrs lect, 2 hrs lab)

#### **Biol 1010. Home Horticulture.** (3 cr; A-F only)

Concepts of plant identification, growth and culture with practical application to home landscape, house plants and fruit, flower and vegetable gardening. Labs include plant propagation, grafting, computer landscape design and one field trip.

#### **Biol 1011. General Biology I.** (5 cr; SP–1 yr high school chem or 1 sem college chem; A-F only; LE 4)

Fundamental concepts of biology, including chemical basis of life, cell structure and function, energy transformations, photosynthesis, cellular respiration, genetics, molecular biology, DNA technology, development, origin of life, and evolution. (4 hrs lect, 2.5 hrs lab)

#### **Biol 1012. General Biology II.** (5 cr; SP–1011; A-F only)

Fundamental concepts of biology, including classification and diversity of life, anatomy, physiology, and development of prokaryotes, protists, fungi, animals, and plants; behavior; population, community, and ecosystem ecology. (4 hrs lect, 2.5 hrs lab)

**Biol 1090. Freshman Seminar: Women in Science: From the Margins to the Mainstream.** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LECD 8)

Survey of women's roles in science and medicine including a discussion of the social and political (historical and contemporary) barriers to the success of women in these fields.

**Biol 1091. Freshman Seminar: Recent Breakthroughs in Medical Research.** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 5)

Fundamental concepts of a specific area within the biological sciences; in this case, recent breakthroughs in medical research. Students will develop the biological knowledge necessary for the critical analysis of current reporting of medical advances by the popular press.

**Biol 1092. Freshman Seminar: Earth's Life Support System.** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 5)

Fundamental concepts of a specific area within the biological sciences; in this case, consideration of global perspectives and their relationship to current societal problems and issues. Students will develop the biological knowledge necessary for the critical analysis of current literature dealing with environmental problems: population, industrial growth, the economy and other issues critical to the plant's life support systems.

**Biol 1093. Freshman Seminar: Biological Illustration.**

(3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 5)  
Develops student's observational abilities by having them draw animals and plants in various settings. Recent ongoing but as yet unpublished research at the University of Michigan indicates that retention of biological concepts is enhanced when a drawing class is included at the introductory level.

**Biol 1094. Freshman Seminar: Northern Stream**

**Ecosystems and the Angler.** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 5)

Fundamental concepts of nature and history of stream ecosystems, their inhabitants, and ecological concepts of stream organization in addition to appreciation of stream conservation and angling. Acquisition of skills and techniques for participation in the sport of flyfishing.

**Biol 1096. Freshman Seminar: Current Issues in Conservation.** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 5)

Investigation of the intersection between science, science policy, and social policy present in a current, regional issue of environmental conservation. Actual conservation issue explored will vary from semester to semester.

**Biol 1097. Freshman Seminar: Topics (Various Titles to be Assigned).** (3 cr [max 6 cr]; SP–Fewer than 30 cr; A-F only; LE 5)

Presentations, discussions, and literature reviews of selected topics in basic/applied biological sciences. Topic announced before course is offered.

**Biol 1113. Plant Biology.** (3 cr; SP–1111; A-F only)

Introduction to fundamental concepts of biology, including plant anatomy, physiology and development; plant-water relations; classification and diversity of fungi, algae, bryophytes, and vascular plants; plant-animal interactions; ecosystem ecology. (3 hrs lect, 4 hrs lab)

**Biol 1761. Human Anatomy.** (4 cr; SP–1 yr high school biol or 1011; A-F only)

Gross and microscopic structure of body from functional standpoint using charts, models, skeletons; cat and sheep organ dissection demonstrates mammalian anatomy. Not

for biology majors/minors; primarily for students in nursing, allied health professions, preprofessional programs, communication disorders, physical education. (2 hrs lect, 4 hrs lab)

**Biol 2101. Cell Biology.** (3 cr; SP–1012, 4 cr organic chem or #; A-F only)

Structure and function of prokaryotic and eucaryotic cells, including cell surface, membranes, organelles, cytoskeleton, cell growth, cell physiology, and experimental methods used in cell studies. (3 hrs lect)

**Biol 2201. Genetics.** (3 cr; SP–1012, Math 1004; A-F only)

Basic principles of Mendelian inheritance, molecular genetics, chromosomal aberrations, and population genetics. (3 hrs lect)

**Biol 2763. Biology of Women.** (2 cr; QP–1102 or 1111; SP–1001 or 1011; A-F only; LECD 5)

Fundamental principles of biology unique to women. Evolution of sex and gender; sex determination, differentiation, and development; sexual brain differences; anatomy and physiology; menstruation; oogenesis; ovulation; fertilization; pregnancy and birthing; birth control; menopause; aging; cancer; and nutrition. (2 hrs lect)

**Biol 2801. General Ecology.** (3 cr; SP–1012 or #; A-F only)

Relationships between life and environment for individuals, populations, communities, and ecosystems; surveys of environmental factors and biomes. May be taken without lab 2802. (3 hrs lect)

**Biol 2802. Ecology Laboratory.** (2 cr; SP–2801 or #2801; A-F only)

Experience in methods of measuring environmental factors, interpreting data. (4 hrs lab)

**Biol 2803. Issues in Global Ecology.** (3 cr; QP–1102 or 1110 or 1111 or #; SP–1001 or 1012 or #; A-F only; LEIP 5)

Holistic approach to current status and future prospects of Earth's life support systems.

**Biol 2961. Introduction to Veterinary Medicine.** (1 cr; SP–1012 or #; S-N only)

Lecture and discussion on principles and practices of veterinary medicine.

**Biol 3601. Plant Diversity.** (3 cr; SP–1012; A-F only)

Evolutionary survey of plants, focusing on diversity of life histories and patterns of organization. Fossil and extant groups, including algae and nonvascular and vascular land plants. (2 hrs lect, 2 hrs lab, field trip)

**Biol 3603. Plant Taxonomy.** (3 cr; SP–1012; A-F only)

Introduction to taxonomy of vascular plants, emphasizing seed plants; representative families; terminology; literature; use of keys. (2 hrs lect, 2 hrs lab)

**Biol 3701. Animal Diversity.** (4 cr; SP–1012; A-F only)

Survey of major animal phyla, focusing on phylogeny, anatomy, physiology, and ontogeny. (2 hrs lect, 4 hrs lab)

**Biol 3703. Animal Physiology.** (3 cr; SP–1011, 1012, one semester college chemistry; A-F only)

Examination of principles, patterns, and mechanisms of biological function from the level of cells and tissues to the whole animal. Primary focus on comparative vertebrate physiology.

**Biol 3990. Special Topics: (Various Titles to be Assigned).** (1-5 cr [max 5 cr]; SP–1012 or #)

Specific topics submitted for biology department review. Topic announced before course offered.

## Course Descriptions

**Biol 3993. Laboratory Teaching Experience.** (1-2 cr [max 2 cr]; SP-Biol or cell biol major, 90 cr incl 25 cr Biol, #; 2 cr may be applied toward biol major; S-N only)  
Participation in teaching biology lab courses: help set up labs, participate in teaching of labs, and share in instruction of review labs.

**Biol 3994. Undergraduate Research.** (1-3 cr [max 6 cr]; SP-1012, jr, #; 4 cr may be applied to biol or cell biol major or biol minor as upper div elective; S-N only)  
Advanced independent work in special fields.

**Biol 3996. Internship in Biology.** (1-2 cr [max 2 cr]; SP-1012, #, Δ; 1 cr may be applied to biol or cell biol major; S-N only)  
Credit given for professional work experience outside an academic department. Requires prior department approval and coordination with faculty sponsor.

**Biol 3997. Seminar I.** (.5 cr; SP-Jr or #; S-N only)  
Students attend and evaluate department seminars.

**Biol 3998. Seminar II.** (.5 cr; SP-3997, jr or sr or #; S-N only)  
Experience in oral presentation of student-initiated field, lab, or library research findings. (1 hr sem)

**Biol 4501. General Microbiology.** (4 cr; SP-2101 or #; A-F only)  
Morphology of microorganisms; growth; environmental and physiological types; physical and chemical control; taxonomy; viruses; genetics of bacteria; practical applications, including medical, water, soil, and food microbiology. (2 hrs lect, 4 hrs lab)

**Biol 4701. Invertebrate Biology.** (3 cr; SP-1012 or #; A-F only)  
Survey of major invertebrate phyla, emphasizing classification, phylogeny, morphology, physiology, and ecological relationships. Lab includes dissection of selected invertebrates, and collection and identification of local species. (2 hrs lect, 3 hrs lab, field)

**Biol 4731. Entomology.** (3 cr; SP-1012 or #; A-F only)  
Structure, life history, ecology, classification, evolution, principles of control, and significance of insects in our society. Field collections. (2 hrs lect, 3 hrs lab and field)

**Biol 4761. Ichthyology.** (3 cr; SP-2801 or #; A-F only)  
Physiologic, taxonomic, ecologic, economic, and behavioral aspects of fishes. Lab emphasis on fishes of Great Lakes region, including field conducted independent study. (2 hrs lect, 3 hrs lab, field)

**Biol 4763. Ornithology.** (3 cr; QP-1110 or 1112, 1113 or #; SP-2801 or #; A-F only)  
Lab and field identification of birds, their migration and habitats; biological, taxonomic, and economic considerations. (2 hrs lect, 8 hrs lab and field for 7 weeks)

**Biol 4765. Vertebrate Embryology.** (3 cr; SP-2101 or #; A-F only)  
Comparative morphogenesis of vertebrate embryo, including reproductive cycles, gametogenesis, fertilization, cleavage, gastrulation, embryonic adaptations, and detailed consideration of mammalian organogenesis. Lab study of developmental anatomy of frog, chick, and pig embryo. (2 hr lect, 4 hrs lab)

**Biol 4767. Comparative Anatomy of Vertebrates.** (4 cr; SP-1012; A-F only)  
Review; emphasizes phylogeny. (2 hrs lect, 4 hrs lab)

**Biol 4801. Evolution.** (2 cr; SP-1012, 2201 or #; A-F only)  
Origin, history, opposition, and evidence supporting evolutionary ideas. Basic concepts: origin of life, phylogeny, biological history, mechanisms of

evolutionary change, population genetics, speciation, tempo of evolution, macroevolution, extinction, biogeography, evolution of social systems, altruism. (2 hrs lect)

**Biol 4891. Animal Behavior.** (2 cr; SP-1012, 2801 or #; A-F only)  
Known behavior of various vertebrate and invertebrate phyla, emphasizing adaptive significance and the genetics and ontogeny of behavioral patterns. Mating, aggressive, nutritive, and nurturing behavior and relation to ecology of animal populations. (2 hrs lect)

**Biol 4892. Animal Behavior Laboratory.** (1 cr; SP-2801, 4891 or ¶4891 or #; A-F only)  
Lab exercises and student projects to examine and demonstrate principles of animal behavior.

**Biol 5121. Plant Biochemistry and Molecular Biology.** (4 cr; SP-2101, jr, or #; A-F only)  
One hr lab/lect per week. Biochemistry unique to photosynthetic organisms. Photosynthetic electron transport, respiration, nitrogen fixation, carbon dioxide fixation, lipid metabolism, carbon partitioning, cell walls, and biosynthesis of plant hormones. Recent advances in molecular biology of plants

**Biol 5133. Mechanisms of Cell Communication.** (4 cr; SP-2101; A-F only)  
Molecular and cellular mechanisms of cell-cell and cell-matrix interactions. Signal transduction mechanisms. (2 hrs lect, 4 hrs lab)

**Biol 5199. Frontiers in Cell Biology.** (1 cr; SP-2101, 2201, cell biol major, 90 cr; S-N only)  
Analysis and discussion of current literature and topics. (1 hr lect)

**Biol 5231. Molecular Biology.** (3 cr; SP-2101, 2201 or #; A-F only)  
Contemporary topics dealing with molecular biology and genetics of prokaryotic and eucaryotic organisms. (3 hrs lect)

**Biol 5232. Molecular Biology Laboratory.** (2 cr; SP-5231 or ¶5231 or #; A-F only)  
Regulation of gene expression in prokaryote and eukaryotes explored through use of recombinant DNA technologies. (6 hrs lab)

**Biol 5331. Plant Development.** (2 cr; SP-2101, 2201, 3601 or #; A-F only)  
Basic cellular events of plant development: cell division, cell-to-cell interaction, cell polarity, and cell death. Genetic control and environmental regulation of plant cells and their development. (2 hrs lect)

**Biol 5332. Plant Development Laboratory.** (2 cr; SP-5331 or ¶5331; A-F only)  
Laboratory study of basic cellular events during plant development: advanced computer image analysis, cell and tissue measurement, in situ cell labeling, plant labeling, plant culture, sample isolation, and data analysis. Research paper required. (4 hrs lab)

**Biol 5361. Developmental Biology.** (4 cr; SP-2101, 2201 or #; A-F only)  
Molecular and cellular mechanisms of development, emphasizing animal systems and including cell cycle, gametogenesis, fertilization, morphogenetic movements, cytodifferentiation, cell interactions, pattern formation, gene expression, organogenesis, metamorphosis, regeneration, and aging. (2 hrs lect, 6 hrs lab)

**Biol 5401. Coevolution of Plants, Animals, and Microbes.**

(3 cr; SP-2801, 2802; A-F only)

Explores the evolution of interactions between species ranging from strongly antagonistic such as predator-prey interactions to strongly cooperative such as obligate mutualisms. The behavior, ecology, and genetics of interacting organisms are studied to understand their evolution. (2 hrs lect, 3 hrs lab)

**Biol 5511. Virology.** (3 cr; SP-4501; A-F only)

Viruses and hosts; effects of viral infections on cells; expression of viral genome in prokaryotic and eukaryotic cells; epidemiology and pathogenesis of viruses, including emerging ones; viral evolution. (2 hrs lect, 2 hrs lab)

**Biol 5513. Experimental Immunology.** (4 cr; SP-4501 or #; A-F only)

Principles and practices of basic and advanced immunological lab techniques. (2 hrs lect, 6 hrs lab)

**Biol 5601. Plant Physiology.** (2 cr; SP-2101 or #; A-F only)

Study of plant functions, emphasizing higher plants. Biochemical and physical aspects of plants: growth, nutrition, metabolism, and relationship to light, water, and other environmental factors. Research paper required of graduate students. (2 hrs lect)

**Biol 5602. Plant Physiology Laboratory.** (2 cr; SP-15601; A-F only)

Experimental basis for interpretation of certain physiological phenomena in plants; research problems, methods, and techniques. Research problem required of graduate students. (6 hrs lab)

**Biol 5765. Histology.** (4 cr; SP-2101; A-F only)

Mammalian tissues, organs, systems studied at light and electron microscopic levels. Cellular elements (epithelium, peripheral blood, connective tissues, mineralized tissue and joints, muscle, nerve, cardiovascular, myeloid); organs; systems (lymphoid, respiratory, urinary, integumentary, digestive, endocrine, reproductive).

**Biol 5801. Microbial Ecology.** (2 cr; SP-2101, 2801 or 4501 or #; A-F only)

Microorganisms in natural environments: diversity, distribution, energetics, and growth of heterotrophic and autotrophic microbes in oxic and anoxic habitats. Roles of microbial populations and communities in biogeochemical cycling, ecosystem functioning, landscapes, and industrial, agricultural, and environmental applications.

**Biol 5802. Microbial Ecology Laboratory.** (2 cr; SP-5801 or 15801 or #; A-F only)

Lab and field-oriented exercises that teach concepts about microbial populations and their communities, energetics, food webs, biogeochemistry, and biodiversity while providing an introduction to research methods. Students master advanced microscopic, culturing, spectroscopic, molecular, radioisotopic, and computational techniques.

**Biol 5803. Water Pollution Biology.** (3 cr [max 3 cr];

SP-5861 or #; A-F only)

Systems approach to responses of aquatic organisms, communities, and ecosystems to pollutants and human use. Case studies of stressed aquatic ecosystems. (2 hrs lect, 3 hrs lab)

**Biol 5805. Fisheries Ecology.** (3 cr; SP-2801, college-level statistics course; A-F only)

Lectures, readings, and computer exercises relating to current issues in fisheries ecology. Computer exercises emphasize techniques used by scientists working in the field and prepare students for the use of quantitative research tools for independent research. Includes 2 one-hour lectures and 1 three-hour lab weekly.

**Biol 5807. Mathematical Ecology.** (3 cr [max 3 cr];

SP-2801, Math 1290 or Math 1297; A-F only)

Development and use of mathematical models to describe ecological patterns and processes.

**Biol 5811. Plant Autecology.** (2 cr; SP-2801; A-F only)

Survey of environmental factors, responses to these by an individual plant. Ecological life histories. Biotic interactions. Intraspecific variation. Use of instrumentation. Emphasizes seed plants.

**Biol 5831. Plant Population and Community Ecology.**

(4 cr; SP-2801; A-F only)

Structure and dynamics of plant populations and plant communities in relation to environment; emphasis on seed plants. (2 hrs lect, 4 hrs lab) Schimpf

**Biol 5833. Stream Ecology.** (4 cr; SP-2801 or #; A-F only)

Studies of stream communities and ecosystems as influenced by biological interactions and physical factors. Emphasis on North Shore streams. (2 hrs lect, 6 hrs lab and field)

**Biol 5839. Coral Reef Field Studies.** (3 cr; SP-2801 and #; A-F only)

Biological studies of the coral reef complex and associated habitats of Florida Keys. Ecology and taxonomy of associated biota. Field study in Florida.

**Biol 5861. Lake Ecology.** (3 cr; SP-2801 or #; A-F only)

Ecology of lakes and reservoirs. (3 hrs lect)

**Biol 5862. Advanced Lake Ecology.** (3 cr [max 3 cr];

SP-15861; A-F only)

Lake and laboratory approaches to evaluation of ecosystem health and experimental aquatic ecology. (1 hr lect, 4 hrs lab)

**Biol 5863. Ecosystems Ecology.** (3 cr; SP-2801 or #;

A-F only)

Survey of terrestrial and aquatic ecosystems, emphasizing current literature on ecosystem processes. (3 hrs lect) Hershey

**Biol 5864. Ecosystems Ecology Laboratory.** (1 cr; SP-5863 or 15863, 2802; A-F only)

Lab and field investigations of ecosystem processes. (3 hrs lab)

**Biol 5865. Conservation Biology.** (2 cr; SP-2801; A-F only)

Introduction to science of species, habitat, and ecosystem conservation and management. (4 hrs lect, for 7 wks)

**Biol 5867. Managing and Monitoring Lakes and Streams.**

(3 cr; SP-2801 and 2802, 5833 or 5861 or #; A-F only)

Review of basic concepts in the ecology and management of lakes, streams, and wetlands. Common water resource problems and technical tools for assessing problems will be presented along with strategies for restoring and remediating disturbed aquatic ecosystems.

**Biol 5990. Special Topics: (Various Titles to be Assigned).**

(1-5 cr [max 10 cr]; SP-1012, #; A-F only)

Special topics submitted for biology department review. Topic announced before course offered.

**Biol 8099. The Biological Practitioner.** (1 cr; SP-Grad

student in biol or related field, #; S-N only)

Research ethics and professional communication.

**Biol 8139. Seminar in Cell Biology.** (1 cr [max 10 cr]; QP-

3245; SP-2101, grad student in biol or related field, #; S-N only)

Analysis of current topics.

**Biol 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser and DGS consent)

## Course Descriptions

**Biol 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Biol 8899. Seminar in Ecology.** (1 cr [max 10 cr]; QP–3775; SP–2801, grad student in biol or related field, #; S-N only) In-depth analyses of topics in ecology.

**Biol 8993. Graduate Seminar.** (1 cr [max 10 cr]; SP–Grad student in biol or related field, #; S-N only) Reports on recent development in biology and on research projects in the department.

**Biol 8994. Graduate Research.** (1-4 cr [max 10 cr]; SP–Grad student in biol or related field, #; S-N only) Directed research or study on an advanced topic.

## Business Law (BLaw)

### School of Business and Economics

**BLaw 2001. The Legal Environment.** (3 cr; QP–30 cr; SP–20 cr; A-F only; LE 8)

Introduction to U.S. legal system and its impact on modern business operations. Ethical, economic, social, and political perspectives of legal environment.

Constitutional law, administrative regulation, torts and products liability, contracts, business organizations, employment/labor law.

**BLaw 3101. Business Law.** (3 cr; QP–1106, SBE candidate or Bus Adm minor or □; SP–2001, SBE candidate or □; A-F only)

Introduction to advanced topics of law related to business; emphasis on laws having an impact on accounting profession. Common law of contracts, sales and lease contracts, negotiable instruments, secured transactions, securities regulation, and accountants' liability.

**BLaw 3201. Law for Entrepreneurs.** (3 cr; QP–1106, SBE candidate or Bus Adm minor or □; SP–2001, SBE candidate or □; A-F only)

Introduction to legal topics relevant to entrepreneurs, including law of agency, government regulation of employment, property and bailments, forms of business organizations bankruptcy.

## Chemical Engineering (ChE)

### College of Science and Engineering

**ChE 1011. Introduction to Chemical Engineering.** (3 cr; QP–High school chem, high school algebra; SP–High school chem, high school algebra; A-F only; LE 5)

Differences between natural sciences and chemical engineering. Continuous processing concept and waste disposal. Hazardous waste; engineering economy, including value of money and rate of return. Chemical engineering equipment and flow sheets. Process paths based on economics. Species allocation and separation.

**ChE 1095. Freshman Seminar: Topics (Various Titles to be Assigned).** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 5)

Will present an experience for freshmen involving some area of interest to chemical engineering

**ChE 2001. Introduction to Environmental Engineering.**

(3 cr; QP–High school chem, high school algebra; SP–High school chem, high school algebra; A-F only; LE 4) Comprehensive survey of environmental engineering. Fundamental science and engineering principles as basis for analyzing environmental issues. Federal laws on air pollution, wastewater discharge, and hazardous waste. Wastewater treatment, air pollution control, waste minimization, resource recovery, and recycling.

**ChE 2011. Design of Engineering Experiments.** (3 cr; QP–Math 1297; SP–Math 1297; A-F only)

Basic theories of experimental design, data analysis, and statistical process control, emphasizing their application to chemical engineering practice.

**ChE 2111. Material and Energy Balances.** (3 cr; QP–Chem 1112 or Chem 1132H; SP–Chem 1151 or Chem 1161)

Elementary principles of chemical processes, emphasizing material and energy balances.

**ChE 2121. Chemical Engineering Thermodynamics.** (3 cr; QP–3110, Math 1297; SP–11011; 2111, Math 1297; A-F only)

Application of thermodynamic principles to chemical engineering, emphasizing pressure-volume-temperature relationships, thermodynamic laws, thermochemistry, chemical equilibrium, and phase relationships.

**ChE 3111. Fluid Mechanics.** (3 cr; QP–Engr 3015, Math 3380; SP–Engr 2015, Math 3280; A-F only)

Mass and energy balances, Bernoulli's equation, momentum balance, laminar and turbulent flow, boundary layer theory, pumps, compressors, and turbines.

**ChE 3112. Heat and Mass Transfer.** (3 cr; QP–3210; SP–3111; A-F only)

Theory and practice of heat and mass transfer. Fundamentals of diffusion, conduction, convection, and radiation with application to design of heat and mass transfer equipment and systems.

**ChE 3211. Chemical Engineering Laboratory I.** (3 cr; QP–3210; SP–3111; A-F only)

Introduction to statistical uncertainty analysis and design of experiments. Experiments illustrating physicochemical, fluid mechanics, and heat and mass transfer principles. Technical report writing and presentation. Standard laboratory practice and safety.

**ChE 3231. Properties of Engineering Materials.** (3 cr; SP–2121, Chem 2521, Chem 4641; A-F only)

Thermodynamic, mechanical, and kinetic properties of materials: structure and bonding in metals, alloys, corrosion, crystals, semiconductors, polymers, colloids, ceramics, interfaces, and composites.

**ChE 3791. Independent Study.** (1-3 cr [max 3 cr]; QP–BChE candidate, Δ; SP–BSChE candidate, Δ)

Directed individual study arranged with instructor and head of department before registration.

**ChE 3894. Chemical Engineering Research.** (1-3 cr [max 6 cr]; QP–BChE candidate, Δ; SP–BSChE candidate, max 6 cr in 3994)

Experience in a selected research area. Student must present a satisfactory written report and oral presentation. Course may also be used for portion of a research proposal.

**ChE 3951. Cooperative Education.** (1-6 cr [max 20 cr]; QP–BChE candidate, Δ; SP–BSChE candidate, Δ)

Practical work experience with an employer closely associated with student's academic area. Arranged by

mutual agreement among student, department, and employer. Formal written report of work completed must be submitted to department at end of experience.

**ChE 3994. Honors Chemical Engineering Research.**

(1-3 cr [max 6 cr]; QP-BChE candidate, Δ; SP-BSChE candidate, Δ; A-F only)

Experience in selected area of research in chemical engineering for honors students. Student must present a satisfactory written report and oral presentation. Course may also be used for preparation of research proposal for a department honors program.

**ChE 4111. Separations.** (3 cr; SP-3112; no grad credit; A-F only)

Application of principles of mass transfer. Design of distillation, gas absorption, liquid extraction, drying, leaching, and membrane separation processes.

**ChE 4211. Chemical Engineering Laboratory II.** (3 cr;

QP-3230, grade of C or better in 3411, BChE candidate or #; SP-3211; no grad credit; A-F only)

Statistical design of engineering experiments. Experiments illustrating principles of separations and reactor design. Technical report writing and presentation. Standard laboratory practice and safety.

**ChE 4301. Chemical Reaction Engineering.** (3 cr; QP-3110,

Chem 5622, Math 3380, BChE candidate; SP-3112; no grad credit; A-F only)

Theory of rates of chemical reactions. Application of rate data to design of batch, tubular, continuous stirred-tank, and catalytic-chemical reactors.

**ChE 4401. Process Control.** (3 cr; QP-3110, 3230, Math

3380, BChE candidate; SP-2121, 3112, 4301, Math 3280; no grad credit; A-F only)

Dynamic behavior of open-end closed-loop system. Design of automatic controller, emphasizing chemical process systems.

**ChE 4501. Chemical Engineering Design I.** (4 cr; QP-3110,

3230, 3601, 3611, 3621, 3631, 5535, BChE candidate; SP-2121, 3231, 4111, 4211, 4301; no grad credit; A-F only)

Preliminary design of chemical processing or hazardous waste treatment plant. Use of engineering economics and calculation of rate return and hazardous waste management as applied to chemical plants. Market survey, flow sheet preparation, material and energy balances.

**ChE 4502. Chemical Engineering Design II.** (4 cr; QP-3701;

SP-4501; no grad credit; A-F only)

Continuation of ChE 4501. Equipment design, instrumentation, process control, hazardous waste management plan, plant safety, economic feasibility, and institute analysis for process chosen.

**ChE 4601. Biochemical Engineering.** (3 cr; SP-4301, #; A-F only)

Application of chemical engineering principles to design and operation of industrial microbial processes, emphasizing enzyme and microbial growth kinetics.

**ChE 4611. Advanced Wastewater Treatment.** (3 cr;

SP-2111, Chem 2521)

Tertiary treatment of industrial wastewater. Treatment plant design, aerobic and anaerobic digestion, nitrogen and phosphorous treatment, heavy metal and hazardous waste removal and treatment. Environmental regulations.

**ChE 4612. Hazardous Waste Processing Engineering.**

(3 cr; QP-Chem 3513 or Chem 3542, Chem 5621, Phys 1109 or Phys 1109H; SP-2111, Chem 2521; A-F only)

Identification of hazardous substances and their effects. Federal and state regulations. Design of waste treatment processes. Management of hazardous wastes. Modifications of processes to avoid hazardous waste formation.

**ChE 4613. Air Pollution Control.** (3 cr; SP-2111, Math 3280,

jr, sr; A-F only)

Analysis of what air pollution is, where it comes from and where it goes on the local, regional and global scales. Discussion of the regulatory apparatus concerning air quality. Design of air pollution control equipment.

**ChE 4621. Particle Technology.** (3 cr; QP-3110; 3210;

SP-2111; 3111; A-F only)

Applications of particle technology, especially in the chemical and minerals industry context. Particle concepts including: particle characterization, slurry characterization, size reduction, size enlargement, particle separation, and multi phase processes. The major unit operations common to solids processing: mining, crushing, concentration by sedimentation, filtration, flotation, and pyrometallurgy.

**ChE 5021. Transport Phenomena.** (3 cr; SP-3112 or grad

student or #; A-F only)

Study of the fundamentals and field equations for momentum, heat and mass transport with emphasis on the prediction of transport rates in chemical engineering applications.

**ChE 5031. Chemical Engineering Analysis.** (3 cr; SP-4111

or grad student or #; A-F only)

Development of mathematical and statistical models for chemical engineering systems; simulation of these systems using digital computers; and system optimization and analysis of results.

**ChE 5894. Chemical Engineering Research.** (1-3 cr [max 6

cr]; SP-Grad student, #; A-F only)

Experience in a selected research area. Student must present a satisfactory written report and oral presentation. May be used for portion of a research proposal.

**ChE 5895. Special Topics: (Various Titles to be Assigned).**

(1-4 cr [max 10 cr]; QP-#; SP-#; no grad credit)

Study of current and special topics not available in regular department curriculum. May involve specialties of department or visiting faculty.

## Chemistry (Chem)

### College of Science and Engineering

**Chem 1022. Freshman Seminar: Human Influence on the**

**Earth's Chemistry.** (3 cr; SP-Freshman, fewer than 30 cr; A-F only; LEIP 5)

Examine the impact that humans have had on the Earth's chemistry over the past 200 years. We will discuss specific examples of how humans have a daily impact on the planet's chemistry as well as its future chemistry.

**Chem 1102. Aspects of Chemistry.** (3-4 cr; SP-§1113,

§1151, §1161, §2172; A-F only; LE 5)

Topics in general, organic, and biological chemistry. Study of chemical principles, their application, and their impact on daily life. Independent unit in contrast to Chem 1113, 1151, 1161 or 2172; 4 credit option with lab. Three cr meets lib ed cat 5, four cr meets lib ed cat 4.

## Course Descriptions

**Chem 1113. Introduction to General, Organic, and Biological Chemistry I.** (5 cr; SP-\$1151, \$1161, \$2172; for students terminating study of chem with no more than 10 cr; A-F only; LE 4)

Chemical principles and their applications: atomic and molecular structure, solutions, acids, bases, salts, equilibria; physical and chemical properties of organic compounds, organic chemistry of living systems; carbohydrates, lipids, proteins, enzymes, nucleic acids, and metabolic pathways.

**Chem 1114. Introduction to General, Organic, and Biological Chemistry II.** (5 cr; QP-1105, 1106; SP-\$2521, \$3322, 1113; A-F only)

Chemical principles and their applications: atomic and molecular structure, solutions, acids, bases, salts, equilibria; physical and chemical properties of organic compounds, organic chemistry of living systems; carbohydrates, lipids, proteins, enzymes, nucleic acids, and metabolic pathways.

**Chem 1151. General Chemistry I.** (5 cr; QP-High school chem, high school algebra or  $\Delta$ ; SP-\$1113, \$1161, \$2172, high school chem, high school algebra; A-F only; LE 4)  
Fundamental principles exemplified by study of elements, compounds, and their reactions.

**Chem 1152. General Chemistry II.** (5 cr; QP-1110; SP-1151, \$1114, \$1162, \$2172; A-F only)  
Fundamental principles exemplified by study of elements, compounds, and their reactions.

**Chem 1161. Honors Course: General Chemistry I.** (5 cr; QP-High school chem, high school algebra or  $\Delta$ ; primarily for chem majors and others selected for aptitude and interest; SP-\$1113, \$1151, \$2172, high school chem or  $\Delta$ ; A-F only; LE 4)  
Fundamental principles exemplified by study of elements, compounds, and their reactions.

**Chem 1162. Honors Course: General Chemistry II.** (5 cr; QP-1131; SP-\$1114, \$1152, \$2172, 1161; A-F only)  
Fundamental principles exemplified by study of elements, compounds, and their reactions.

**Chem 1191. Independent Study.** (1-2 cr [max 4 cr]; QP- $\Delta$ ; SP- $\Delta$ ; A-F only)  
For students wishing to do special work in areas useful to individual programs and objectives when such are not available in regular course offerings.

**Chem 2095. Special Topics: (Various Titles to be Assigned).** (4 cr; SP-10 cr college chem or #; A-F only)  
Selected topics that fall outside currently offered courses. Topic announced before course offered.

**Chem 2107. Introductory Environmental Chemistry.** (3 cr; QP-1112 or 1132H; SP-1152 or 1162; A-F only)  
Introduction to air and water chemistry. Sources and reactions of C, N, O, P, S, and trace metals. Pollution and waste disposal. Field trips to local labs.

**Chem 2172. General Chemistry.** (4 cr; QP-Phys 1108, ECE or IE or Phys or applied Phys major with 42 cr; SP-\$1113, \$1151, \$1161, Math 1290 or Math 1296; A-F only; LE 4)  
Fundamental principles exemplified by study of elements, compounds, and their reactions.

**Chem 2222. Quantitative Analysis.** (3 cr; QP-1112 or 1132H; SP-1152 or 1162; A-F only)  
Theory in analytical techniques; introduces gravimetric, volumetric, and spectrophotometric methods.

**Chem 2223. Quantitative Analysis Laboratory.** (1 cr; SP-1222; A-F only)  
Lab companion to 2222 involving the quantitative analysis of organic and inorganic samples using classical and instrumental techniques. Students are instructed in the use of classical and modern computer-controlled instrumentation and techniques, as applied to the acquisition and analysis of experimental data.

**Chem 2521. Organic Chemistry I.** (4 cr; QP-1112 or 1132H; SP-1152 or 1162; A-F only)  
Structure and bonding, stereochemistry, functional group reactions.

**Chem 2522. Organic Chemistry II.** (4-5 cr; QP-3512; SP-2521; A-F only)  
Functional group reactions, bioorganic chemistry.

**Chem 3184. Undergraduate Seminar.** (1 cr [max 2 cr]; QP-BS chem or biochem/molecular biol majors; SP-BS chem or biochem/molecular biol majors; S-N only)  
Practice in preparation and oral presentation of reports on articles from literature or on senior research. (2 hrs per wk for 2 sems)

**Chem 3194. Undergraduate Research.** (1-3 cr [max 30 cr]; QP- $\Delta$ ; SP- $\Delta$ ; S-N only)  
Experience in a selected area of research.

**Chem 3322. Biochemistry.** (3 cr; QP-3513 or #; SP-2522; A-F only)  
Survey of biochemistry, emphasizing enzyme catalysis, cellular energetics, and major metabolic processes.

**Chem 3324. Biochemistry Laboratory.** (1 cr; QP-3311; SP-3322 or 13322; A-F only)  
Identification and analysis of biological molecules with emphasis on the macro-molecules, polysaccharides, proteins, and nucleic acids (RNA, DNA).

**Chem 4242. Instrumental Analysis.** (2 cr; QP-3210, 5611 or 5622; SP-2222, 4362 or 4642; A-F only)  
Theory of instrumental methods of chemical analysis, including electrochemistry, spectroscopy, and separations.

**Chem 4243. Instrumental Chemistry Laboratory.** (2 cr; SP-14242; A-F only)  
Lab companion to 4242 involving the use of computerized chemical instrumentation in the analysis of organic and inorganic samples. Students learn the use of modern programming tools as applied to the control of chemical instrumentation and acquisition and analysis of data therefrom.

**Chem 4341. Biochemistry and Molecular Biology I.** (4 cr; QP-3513 or 3542, Math 1296; physical chem recommended; SP-2522, Math 1296; physical chem recommended; A-F only)  
Introduction to properties of biochemically important compounds and their interactions in living systems, emphasizing bioenergetics, enzyme mechanisms, major metabolic pathways, and metabolic regulation.

**Chem 4342. Biochemistry and Molecular Biology II.** (4 cr; QP-Biol 3154, 5337; SP-4341, Math 1296; physical chem recommended; A-F only)  
Introduction to properties of biochemically important compounds and their interactions in living systems, emphasizing bioenergetics, enzyme mechanisms, major metabolic pathways, and metabolic regulation.

**Chem 4363. Biochemistry Laboratory.** (2 cr; QP-3210, 3311 or ¶3311 with # or 5337 or ¶5337 with #; SP-2222, 3322 or ¶3322 with # or 4342 or ¶4342 with #; A-F only)  
Applications of biochemistry and molecular biology techniques.

**Chem 4364. Molecular Biology Laboratory.** (2 cr; QP-5361, ¶5338 or #; SP-4342, 4363; A-F only)  
Applications of biochemistry and molecular biology techniques.

**Chem 4434. Inorganic Chemistry.** (4 cr; QP-5610 or 5620; SP-4632 or 4641; A-F only)  
Atomic structure and properties of elements based thereon. Chemical bonding. Chemistry of coordination compounds. Mechanisms of selected inorganic reactions; survey of chemistry of representative elements. Organometallic chemistry. Bioinorganic chemistry.

**Chem 4435. Inorganic Chemistry Laboratory.** (1 cr; SP-¶4434; A-F only)  
Preparation and study of the properties of selected inorganic compounds.

**Chem 4632. Physical Chemistry.** (4 cr; QP-3513 or #, Math 1297, Phys 1109 or 11109H; SP-2522 or #, Math 1297, Phys 1204; A-F only)  
Properties of gases, liquids, and solutions; thermodynamics and equilibria; electrochemistry; chemical kinetics; quantum mechanics; spectroscopy.

**Chem 4633. Physical Chemistry Laboratory.** (1 cr; SP-¶4632; A-F only)  
Laboratory program in physical chemistry, including thermodynamics, spectroscopy, kinetics and quantum mechanics.

**Chem 4641. Physical Chemistry I.** (3 cr; QP-2 yrs chem, Math 3298, Math 3320, Phys 1109 or Phys 1109H; SP-2 yrs chem, Math 3280, Phys 1204, ¶4643; A-F only)  
Quantitative treatment of physical principles and theories in chemistry, including topics in thermodynamics and kinetics.

**Chem 4642. Physical Chemistry II.** (3 cr; QP-2 yrs chem, Math 3298, Math 3320, [Phys 1109 or Phys 1109H]; SP-4641; A-F only)  
Quantitative treatment of physical principles and theories in chemistry, including topics in quantum mechanics and spectroscopy.

**Chem 4643. Physical Chemistry Laboratory I.** (1 cr; SP-¶4641; A-F only)  
Laboratory program in physical chemistry, accompanying lecture Chem 4641.

**Chem 4644. Physical Chemistry Laboratory II.** (1 cr; SP-¶Chem 4642; A-F only)  
Laboratory program in physical chemistry, accompanying lecture Chem 4642.

**Chem 5123. Advanced Chemistry Laboratory.** (2 cr; QP-3210, 5620, [5420 or ¶5420 and 5621 or ¶5621 for 5121], [5622 or ¶5622 for 5122]; 6 hrs lab each; A-F only)  
Integrated lab program in chemistry, including thermodynamics, spectroscopy, kinetics, synthesis, and instrumental analysis.

**Chem 5350. Research Topics for High School Chemistry Teachers.** (2-4 cr [max 8 cr]; QP-Ed MA or MEd student, Δ; SP-Ed MA or MEd student, Δ)  
Experimental work and philosophy associated with a selected research topic.

**Chem 5714. Applications of Spectroscopy.** (3 cr; QP-Grad student or #; SP-5774; A-F only)  
Application of spectroscopic techniques to structure elucidation, including NMR, FTIR, MS, UV-Vis, X-ray, EPR spectroscopy.

**Chem 5725. Intermediate Analytical Chemistry.** (3 cr; QP-5230 or equivalent or #; SP-4242 or equivalent or #; A-F only)  
Intended for advanced undergraduate and beginning graduate students in chemistry and related fields. Augments basic coursework in wet and instrumental analytical chemistry. Topics include statistical and chemometric methods for experimental design and data analysis, electronics and computers in chemical instrumentation, and selected techniques of instrumental analysis such as mass spectrometry, inductively coupled optical emission spectroscopy and analytical gas chromatography.

**Chem 5754. Synthesis.** (3 cr; QP-Grad student or #; SP-5774; A-F only)  
Inorganic, organic, organometallic synthesis.

**Chem 5764. Thermodynamics and Kinetics.** (3 cr; QP-Grad student or #; SP-Grad student or #; A-F only)  
Basic classical and statistical thermodynamics, phenomenological kinetics, elementary reaction rate theory, and the relationship between thermodynamics and kinetics.

**Chem 5774. Structure and Bonding.** (4 cr; QP-Grad student or #; SP-Grad student or #; A-F only)  
Group theory to support its application to spectroscopy, bonding, reactions. Theoretical models to support MO theory.

**Chem 8184. Seminar.** (1 cr [max 1 cr]; SP-Grad chem major or #; S-N only)  
Practice in preparation and oral presentation of reports on articles from the literature or on graduate research.

**Chem 8224. Advanced Analytical Chemistry.** (4 cr; SP-Grad chem major or #; A-F only)  
Advanced treatment of selected methods in analytical chemistry.

**Chem 8324. Advanced Biochemistry and Molecular Biology.** (4 cr; QP-5337 or equiv; SP-4342 or equiv; A-F only)

**Chem 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser and DGS consent)

**Chem 8424. Advanced Inorganic Chemistry.** (4 cr; QP-5720; SP-5774; A-F only)  
Discussion of structure, reactions, and bonding in inorganic and organometallic compounds in terms of valence bond, molecular orbital, and ligand field theories.

**Chem 8444. FTE: Doctoral.** (1 cr; SP-Doctoral student, adviser and DGS consent)

**Chem 8524. Advanced Organic Chemistry.** (4 cr; QP-5730, 5750; SP-5754, 5764; A-F only)  
Advanced treatment of synthetic methods and reaction mechanisms in organic chemistry.

**Chem 8624. Advanced Physical Chemistry.** (4 cr; QP-5720, grad student or #; SP-5714, 5764, 5774; A-F only)  
Advanced topics selected from quantum and computational chemistry, reaction kinetics and dynamics, statistical mechanics, and thermodynamics.

## Course Descriptions

**Chem 8666. Doctoral Pre-Thesis Credits.** (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

**Chem 8750. Selected Topics in Chemistry.** (1-4 cr [max 8 cr])  
Topics not available in standard curriculum.

**Chem 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Chem 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

## Coaching Certification (CC)

### *College of Education and Human Service Professions*

**CC 3100. Sports Science for Coaches.** (2 cr; QP–Coaching minor or #; not open to PE majors; SP–Coaching minor, not open to PE or Ex Sci majors; A-F only)  
Scientific basis of athletic performance and conditioning

**CC 3116. Care and Prevention of Sport Injuries.** (3 cr; QP–Coaching minor or #; not open to PE majors; SP–Coaching minor or #; not open to PE majors; A-F only)  
Sport training programs; reconditioning and preconditioning regimens.

**CC 3150. Coaching Methods.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
Study and application of educational methods in an athletic setting. Skill development, learning styles, biological considerations, practice development, conditioning for sport, and skill analysis.

**CC 3160. Psychological Aspects of Coaching.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
Introduction to coaching field: its educational value and the psychological and sociological dimensions of high-level performance.

**CC 3161. Administrative Aspects of Coaching.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
State and federal governing organizations, budgeting, scheduling, insurance, contest administration, and public relations procedures.

**CC 3170. Coaching and Officiating Football.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
Systems of offense and defense, strategy, and methods of organizing practices and working with team members.

**CC 3171. Coaching and Officiating Basketball.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
Fundamentals, styles of offense and defense, training suggestions.

**CC 3172. Coaching and Officiating Volleyball.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
Coaching and officiating offenses and defenses; conditioning programs; coaching and officiating philosophies.

**CC 3173. Coaching and Officiating Baseball.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
Fundamentals, practice sessions, training techniques, and offensive and defensive strategies.

**CC 3174. Coaching and Officiating Soccer.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
Fundamental skills, systems of offense and defense, strategy and rules of the game, methods of organizing practices.

**CC 3175. Coaching and Officiating Ice Hockey.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
Fundamental skills, systems of offense and defense, strategy and rules of the game, methods of organizing practices.

**CC 3176. Coaching and Officiating Swimming.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
Theory of coaching and teaching aquatics. Review of literature on the competitive swimming and diving field, coaching and officiating philosophy, techniques, and methods.

**CC 3177. Coaching and Officiating Tennis.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
Strategies, fundamentals, psychology of tennis, attack and defensive patterns.

**CC 3178. Coaching and Officiating Track and Field.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
Fundamentals, mechanical analysis of events, training techniques and strategies.

**CC 3179. Coaching and Officiating Softball.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
Fundamentals, practice sessions, training techniques, and offensive and defensive strategies.

**CC 3991. Independent Study.** (2 cr; QP–Coaching minor or #; SP–Coaching minor or #; A-F only)  
A coaching methods experience. Directed individual study must be arranged with coaching coordinator before registration.

**CC 3997. Coaching Practicum.** (1 cr; QP–20 cr in coaching minor; SP–18 cr in Coaching minor and #; S-N only)  
Supervised coaching experience in a school setting.

## Communication (Comm)

### *College of Liberal Arts*

**Comm 1000. Human Communication Theory.** (3 cr; A-F only; LE 3)  
Introduction to fundamental concepts, models, and theories of human communication. Issues concerning verbal and nonverbal symbolic processes, language and meaning, and the relationship between communication and understanding. Communication processes and problems in various contexts.

**Comm 1112. Public Speaking.** (3 cr; A-F only; LE 3)  
Application of the theoretical bases of rhetoric to the public speaking situation.

**Comm 1222. Interpersonal Communication.** (3 cr; A-F only; LECD 3)  
Analysis of the role communication plays in interpersonal relationships.

**Comm 1500. Media and Society.** (3 cr; A-F only; LE 8)  
Manipulative influence of contemporary media on American society. Examples drawn from campaigns, commercial advertising, and editorials.

**Comm 2101. Foundations of Mass Communication.** (3 cr; A-F only; LE 8)

Theories, research, regulation, and ethical concerns surrounding contemporary mass media. Identifies U.S. media's role within the international marketplace. Survey of contemporary media content, industry structures, technology, and delivery systems.

**Comm 2505. Analysis of Public Discourse.** (3 cr; SP-1112; A-F only)

Guided investigation of public discourse within selected periods. Topics vary.

**Comm 2929. Intercultural Communication.** (4 cr; LEIP 6)

Understanding variations among international cultures regarding communication practices. Potential difficulties in intercultural communication; effective means of engaging in intercultural communication.

**Comm 3115. Persuasion and Argumentation in Public Speaking.** (4 cr; SP-1112; A-F only)

Advanced theories. Developing persuasive strategies, carefully managing logical and argumentational structures within the speech, and fostering critical thinking tools in creation, analysis, and evaluation of persuasive speech.

**Comm 3116. Professional Communication.** (4 cr; SP-1112; A-F only)

Theory and practice of communication skills related to the workplace. Skill development in presentational speaking and vocational interviewing.

**Comm 3200. Interpersonal Communication Theory.** (3 cr; SP-1000 or 1222; A-F only)

Role of communication in developing, maintaining, and changing personal relationships.

**Comm 3205. Relationship Communication.** (3 cr; SP-1222; A-F only)

Study of advanced interpersonal communication skills in context of family and gender issues.

**Comm 3210. Group Communication.** (4 cr; SP-30 cr or #; A-F only)

Small group approaches to problem management. Useful for anyone intending to participate in decision-making groups.

**Comm 3215. Conflict Management.** (3 cr; SP-30 cr or #; A-F only)

Application of interpersonal conflict management theory and skills to small group, organizational, and community conflicts.

**Comm 3223. Communication and Creativity.** (3 cr; SP-§3123, 30 semester cr or #; A-F only)

Examines the relationship between communication and creative processes. Content includes techniques of deliberate creativity; creativity audits; the necessity of creative approaches to group, organizational, and social circumstances; the psychological and social aspects of creativity; and creative versus critical thinking.

**Comm 3300. Teaching Assistantship in Communication.** (1-3 cr [max 6 cr]; SP-60 cr, comm major or minor, #; max 3 cr toward comm major or minor; S-N only)

Practical experience in teaching beginning courses in the department. Students serve as intern teachers assisting the instructor in administration of the course. Application deadline is one week before beginning of registration for following semester.

**Comm 3390. Special Topics: (Various Titles to be Assigned).** (3 cr [max 6 cr]; A-F only)

Relationship between communication and creative process. Techniques of deliberate creativity audits. Necessity for creative approaches in group, organizational, and social circumstances. Physical/social aspects of creativity.

**Comm 3500. Principles of Persuasion.** (3 cr; SP-Soc sci course or #; A-F only)

Social scientific theory and research on communication techniques used to influence attitudes, perceptions, and behaviors of others. Research evidence regarding persuasion processes and effects on individuals and society.

**Comm 3505. Media Communications.** (3 cr; SP-Comp 1120; A-F only)

Journalistic and public relations writing techniques: fact gathering; selection and editing of news-editorial content of newspapers, magazines, television, and radio; reporting and editing court and municipal and county agency news; and practical application of public relations principles.

**Comm 4000. Communication Portfolio.** (2 cr; SP-Sr comm major; no grad credit; S-N only)

Compilation by senior communication major of portfolio of representative academic work, internship/employment/faculty evaluations, and/or other such materials as student and faculty adviser deem necessary.

**Comm 4200. Communication in Organizations.** (4 cr; SP-60 cr or #; A-F only)

Relationship between communication and organization design. Emphasis on development and impact of organization culture. Communication issues, including power, networks, gender, race, and decision making. Explores qualitative and field research.

**Comm 4390. Seminar.** (3 cr [max 9 cr]; SP-60 cr; max 6 cr toward grad program; A-F only)

Directed study and preparation of papers on subjects of current interest. Subjects announced before registration.

**Comm 4394. Directed Research in Communication.**

(1-3 cr [max 6 cr]; SP-60 cr, comm major, #; max 3 cr toward comm major; A-F only)

Individual research project, written under the supervision of a regular faculty member, to result in a research paper.

**Comm 4397. Internship in Communication.** (1-8 cr [max 8 cr]; SP-79 cr, comm major or minor, 2.50 GPA in major or minor; max 3 cr toward comm major or minor; no grad credit; S-N only)

Students work in pre-approved program with a public agency, private organization, or other service agency; work must be in specific area of communication. Application deadline is one week before beginning of registration for following semester.

**Comm 4399. Directed Projects in Communications.**

(1-3 cr [max 6 cr]; SP-60 cr, comm major, #; max 3 cr toward comm major; no grad credit; S-N only)

Individual projects in the communication discipline, undertaken under the supervision of a regular faculty member.

**Comm 4500. History of Rhetoric.** (3 cr; SP-1112 or #; no grad credit; A-F only)

Development of rhetorical thought as expressed by representative writers.

## Course Descriptions

**Comm 4505. Media Theory and Research.** (4 cr; SP-1500 or 2101, 60 cr or #; no grad credit; A-F only)

Theoretical concepts and research perspectives currently used to understand intricacies of a mediated society. Introduction and application of basic research methods to study questions concerning impact of media on society and individuals.

**Comm 4949. Intercultural Communication Practicum.** (4-12 cr [max 12 cr]; SP-#; no grad credit; repeatable 3 times at different designated sites; S-N only)

Practice of intercultural communication at culturally diverse sites. Students will immerse themselves in Non-European/American cultures and participate in intercultural communication with members of those cultures. Offered at various sites within the U.S. and internationally.

**Comm 5095. Special Graduate Topics: (Various Titles to be Assigned).** (3 cr [max 36 cr]; SP-Grad standing and #; A-F only)

Theory and research in communication. Extensive readings, mastery of the material through oral/written examinations, and employ to develop a proposal for original research.

**Comm 5300. Teaching Methods in Communication.** (3 cr; SP-79 cr or grad student or #; S-N only)

Issues in teaching communication theory and skills; suggested methods and materials of instruction. Public speaking, interpersonal communication, effective listening, media literacy, and group communication.

**Comm 5390. Workshop: (Various Titles to be Assigned).** (1-3 cr [max 3 cr]; SP-Jr or sr or #; S-N only)

Intensive study of various aspects of communication.

on broad spectrum of human activities. Professional roles and responsibilities of speech-language pathologists and audiologists.

**CSD 3000. Deafness in Society: A Historical, Cultural and Educational Perspective.** (3 cr; A-F only)

Introduction to effects of deafness on human communication, educational placement, scholastic achievement, and psychosocial development. Past practices in terms of management of deaf listeners will be discussed, as well as current trends of rehabilitation.

**CSD 3100. Normal Aspects of Human Communication.**

(3 cr; QP-3111, CSD major or #; SP-2230, CSD major or #; A-F only)

Introduction to normal processes and development of language, articulation, fluency, voice, and auditory behaviors. Some outside observation required.

**CSD 3103. Anatomy of Speech and Hearing Mechanisms.**

(3 cr; QP-CSD major or #; SP-CSD major or #; A-F only)

Anatomy and physiology as they relate to hearing and speech processes including respiration, phonation, and articulation.

**CSD 3105. Fundamentals of Hearing and Speech**

**Science.** (5 cr; QP-3111, CSD major or #; SP-3103, CSD candidate or #; A-F only)

Basic principles and research methods underlying current theories of psychoacoustics, physiological and acoustic phonetics, and speech perception. Lab.

**CSD 3130. Language Development and Disorders.** (4 cr;

QP-CSD major or #; SP-CSD candidate or #; A-F only)

Normal processes of language development in children. Incidence, etiology, diagnosis, and intervention strategies for children with language disorders.

**CSD 3200. Articulation and Phonological Disorders.** (3 cr;

QP-1990, 3111, 3211; SP-1100, 2230, 3100, CSD major or #; A-F only)

Differential diagnosis, assessment, and treatment considerations for articulation and phonological disorders. Outside observation required.

**CSD 3230. Diagnostic and Treatment Methods in**

**Communication Disorders.** (2 cr [max 4 cr]; QP-3111, CSD major or #; SP-2230, 3100, 3130, CSD major or #; A-F only)

Introduction to clinical assessment and treatment principles and procedures in communication disorders. Basic skills necessary for functioning in a clinical setting. Students must take the course fall semester (2 credits) and repeat it spring semester (2 credits) in the same academic year.

**CSD 4097. Introduction to Clinical Practicum in Communication Disorders.** (1 cr; QP-CSD major, C grade or better in 3906, 25 hours clinical observation; SP-CSD

candidate, C grade or better in 3230, 25 hrs clinical observation; A-F only)

Clinical practicum with speech, language, and/or hearing impaired persons in an on-campus clinic under supervision of an ASHA-certified speech-language pathologist. (1 hr seminar per wk)

**CSD 4197. Clinical Practicum in Communication**

**Disorders.** (3 cr [max 6 cr]; QP-CSD candidate, C grade or better in 3906, 25 hours clinical observation; SP-3230, CSD candidate, C grade or better in 3230, 25 hours clinical observation or #; A-F only)

Supervised clinical practicum with speech, language, and/or hearing impaired persons in an on-campus clinic under supervision of an ASHA-certified speech-language pathologist. (1 hr seminar per wk)

# Communication Science and Disorders (CSD)

## College of Education and Human Service Professions

**CSD 1100. Phonetics.** (2 cr; LE 3)

Study and practice of International Phonetic Alphabet. English and non-English speech sounds as they occur separately and in connected speech. Variations in speech production as related to regional and/or class distinctions.

**CSD 2001. American Sign Language Studies I.** (3 cr; LECD 3)

Application of basic vocabulary in American Sign Language and the fingerspelling alphabet. Introduction to various sign systems and their use by the deaf community.

**CSD 2002. American Sign Language Studies II.** (3 cr;

QP-5730, 5735 or #; SP-2001 or #; LECD 3)

Expansion of vocabulary base in American Sign Language. Comparative linguistic study of various sign systems, their use by the deaf community. In-depth study of principles of American Sign Language as used receptively and expressively in communication with deaf individuals.

**CSD 2230. Human Communication Disorders.** (3 cr; LECD 8)

Receptive and expressive human communication disorders. Importance of communication to human behavior; influence that communication disorders exert

**CSD 4200. Introduction to Fluency Disorders.** (2 cr; QP-3111, 3211; SP-2230, 3100, CSD candidate or #; A-F only) Etiologies, characteristics, and development of stuttering and other fluency disorders.

**CSD 4400. Hearing Disorders and Evaluation.** (3 cr; QP-3211, CSD major or #; SP-3105, CSD candidate or #; A-F only) Characteristics, development, and etiologies of typical auditory pathologies. Overview of basic hearing assessment and diagnostic techniques. Clinical observation required.

**CSD 5000. Departmental Seminar.** (1-3 cr [max 6 cr]; QP-CSD major or Δ; SP-CSD major or Δ) Recent developments in speech, language, and hearing; reports on current faculty/student research projects within department.

**CSD 5003. American Sign Language Studies III.** (3 cr; QP-5740 or #; SP-2002 or #; no grad credit) Intermediate-level study of grammatical and linguistic features of ASL; focus on understanding deaf culture and fluency in expressive and receptive skills.

**CSD 5004. American Sign Language Studies IV.** (3 cr; QP-5755, 5760 or #; SP-5003 or #; no grad credit) Advanced-level study of grammatical and linguistic features of ASL; understanding deaf culture and fluency in expressive and receptive skills.

**CSD 5005. American Sign Language V.** (3 cr; SP-5004 or #, no grad credit; A-F only) Continued study of American Sign Language vocabulary and structure. Expressive and receptive skill development. Additional focus on use of ASL by the deaf community.

**CSD 5091. Independent Study.** (1-3 cr [max 6 cr]; QP-Sr or grad in CSD or SpEd, Δ; SP-Sr or grad in CSD or SpEd, Δ) Directed study, readings, and/or projects of student interest in communication disorders.

**CSD 5095. Special Topics: (Various Titles to be Assigned).** (5-3 cr [max 6 cr]; SP-no grad credit) Special topics of interest to speech-language pathologists, audiologists, special educators, and related professionals. Workshop and seminar format.

**CSD 5098. Workshop: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]) Opportunities for speech-language pathologists, audiologists, other related professionals, and students to concentrate study on a specific topic presented in a workshop format.

**CSD 5200. Dysphagia.** (3 cr; QP-3211 or equiv, CSD grad student or #; SP-3103 or equiv, CSD major or #) Anatomy and physiology of normal and disordered deglutition. Etiology, diagnosis, and management of swallowing disorders, including head and neck cancer.

**CSD 5230. Assistive Technology.** (4 cr; QP-Sr or #; SP-CSD major #; offered summer only) Assistive technology approaches and devices designed to improve communication skills of persons who do not speak or whose speech is not intelligible. Hands-on experience adapting computers into communication aids and operating computers with alternate access methods.

**CSD 5300. Language Disorders in Children and Adolescents.** (4 cr; QP-Sr or grad student in CSD or #; SP-Sr or grad student in CSD or #; A-F only) Advanced study of language disorders in individuals aged birth to 21 years. Etiology, diagnosis, and clinical

techniques and study of relevant research. Relationship of language disorder to personal adjustment and academic success.

**CSD 5400. Rehabilitative Procedures for the Hard of Hearing.** (3 cr; QP-3711, CSD major or #; SP-4400 or equiv, CSD major or #; A-F only)

Theories, principles, and methods regarding current approaches to aural rehabilitation of hard-of-hearing children and adults.

**CSD 8097. Internship: Communication Disorders.** (1-3 cr [max 12 cr]; QP-25 hrs clinical observation, CSD grad student or #; SP-25 hrs supervised clinical observation, CSD grad student or #; max 4 cr toward grad program; A-F only) Supervised clinical practicum in on-campus clinic and/or an approved professional setting under supervision of an ASHA-certified speech-language pathologist. (1 hr seminar per wk)

**CSD 8099. Projects in Communication Disorders.** (2 cr; QP-CSD grad or #; SP-CSD grad or #; A-F only) Plan B project or individual research under faculty supervision.

**CSD 8197. Externship: Communication Disorders.** (4 cr; QP-25 hrs clinical observation, CSD grad student or #; max 4 cr toward grad program; SP-25 hrs supervised clinical observation, CSD grad student or #; max 4 cr toward grad program; A-F only) Full-time professional clinical experience in an approved professional setting under supervision of an ASHA-certified speech-language pathologist.

**CSD 8200. Voice Disorders.** (4 cr; QP-CSD grad student or #; SP-CSD grad student or #) Theoretical and practical study of voice and voice disturbances in children and adults. Ventilator dependence and alaryngeal considerations.

**CSD 8205. Advanced Fluency Disorders.** (3 cr; QP-3510 or equiv; SP-4200 or equiv, CSD grad student or #) Differential diagnosis, assessment, and treatment considerations for developmental stuttering and other fluency disorders.

**CSD 8210. Professional Issues in Speech-Language Pathology.** (1 cr; QP-#, SP-CSD grad student or #) Identification and discussion of current issues and trends in the profession of speech-language pathology. Topics include professional work settings, credentialing agencies and requirements, federal and state laws influencing delivery of services, advocacy organizations, securing employment.

**CSD 8230. Neurogenic Language Disorders.** (3 cr; QP-3211 or equiv, CSD grad student or #; SP-3103 or equiv, CSD grad student or #) Advanced study of diagnosis, treatment, and research of acquired language disorders resulting from neurological impairment: aphasia, right brain damage, dementia, and traumatic head injury.

**CSD 8231. Neurogenic Speech Disorders.** (3 cr; QP-3211 or equiv, CSD grad student or #; SP-3103 or equiv, CSD grad student or #) Advanced study of neuroanatomical bases for motor speech disorders; diagnostic and therapeutic procedures used in speech disorders related to central and peripheral nervous system damage.

## Course Descriptions

**CSD 8235. Counseling Applications in Communication Disorders.** (2 cr; QP–CSD grad student or #; SP–CSD grad student or #)

Applications of interviewing and counseling theories and behaviors to field of speech-language pathology.

**CSD 8297. Audiology Practicum.** (1-2 cr [max 4 cr]; QP–8305, 5600, CSD grad student or #; SP–5400, 8400, CSD grad student or #; max 2 cr toward grad program; 5-N only) Clinical assessment and rehabilitative experiences in an on-campus clinic under supervision of an ASHA-certified audiologist.

**CSD 8333. FTE: Master's.** (1 cr; SP–Master's student, adviser and DGS consent)

**CSD 8400. Clinical Methods: Audiology.** (1 cr; QP–3711, 3811, CSD grad student or #; SP–4400 or equiv, 5400, CSD grad student or #; offered intersession only; A-F only) Review of principles and practices underlying clinical assessment of auditory integrity; theoretical and practical approaches to fitting appropriate amplification systems.

**CSD 8402. Clinical Seminar in Audiology.** (2 cr; QP–5600, CSD grad student or #; SP–5400, CSD grad student or #) Directed readings in current trends in rehabilitation of hard-of-hearing individuals.

## Composition (Comp)

### College of Liberal Arts

**Comp 1005. Freshman Seminar: Cyber Theory and Practice.** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 7) Analyze some of the most recognized theoretical work on cybertheory, comparing theorists' characterizations of the emergent technologies to students' own experiences with them. Students will interact with many of the newest technologies, such as WWW, IRC, and MOO.

**Comp 1006. Freshman Seminar: Journal and Memoir Writing.** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 9) Study various published and unpublished journals and memoirs, write journals and memoirs entries, and read about social context of journals and memoirs.

**Comp 1007. Freshman Seminar: The Rhetoric of Popular Culture.** (3 cr; A-F only; LE 8) Students will reflect on the ways they are products of popular culture, in that the ways their thoughts, feelings and actions are in some sense constructed in response to the popular culture that surrounds them.

**Comp 1100. Word Processing for Writing.** (.5 cr; QP–\$Engl 1100; no credit toward Engl major or minor; 5-N only) Basic computer literacy in word processing and Computer-Aided Instruction (CAI). Completes the computer component of freshman composition for students with transfer credit for composition that does not include the computer component of the course.

**Comp 1120. College Writing.** (3 cr; SP–Students speaking English as a second language must have TOEFL score of 550; A-F only; LE 1) Instruction and practice in writing argumentative prose for academic situations with integrated word processing lab.

**Comp 1506. Literacy, Technology, and Society.** (3 cr; A-F only; LE 7) Historical survey of cultures without writing systems and cultures with writing systems and then later with printing,

telegraph, radio, telephone, television, computers as well as other forms of technology. Survey of attitudes toward technology from Thoreau to Gandhi and beyond.

**Comp 3100. Advanced Writing: Language and Literature.** (3 cr; QP–\$Engl 3100; 1110 or 1120 or Engl 1110, 90 cr, upper div papers filed; SP–1120, 60 cr; A-F only) Writing critical essays and analyses using oral, published, and archival materials on liberal arts topics.

**Comp 3110. Advanced Writing: Arts and Letters.** (3 cr; QP–\$Engl 3110; 1110 or 1120 or Engl 1110, 90 cr, upper div papers filed; SP–1120, 60 cr; A-F only) Writing practice.

**Comp 3121. Advanced Writing: Business and Organizations.** (3 cr; QP–\$Engl 3120; 1110 or 1120 or Engl 1110, 90 cr, upper div papers filed; SP–1120, 60 cr; A-F only) Study of and practice in the main forms of business and organizational writing: letters, memos, proposals, and reports.

**Comp 3130. Advanced Writing: Engineering.** (3 cr; QP–\$Engl 3130; 1110 or 1120 or Engl 1110, 90 cr, upper div papers filed; SP–1120, 60 cr; A-F only) Writing practice.

**Comp 3133. Writing From International Fieldwork Experience.** (1-3 cr; SP–\$WS 3896; A-F only) Students travel abroad with an instructor and write about their experiences in journals, interviews, essays, and/or nonfiction articles. Experiences may include community visits, presentations by community members, guest lectures, community-service work, reading, and follow-up discussion.

**Comp 3140. Advanced Writing: Human Services.** (3 cr; QP–\$Engl 3140; 1110 or 1120 or Engl 1110, 90 cr, upper div papers filed; SP–1120, 60 cr; A-F only) Writing practice.

**Comp 3150. Advanced Writing: Science.** (3 cr; QP–\$Engl 3150; 1110 or 1120 or Engl 1110, 90 cr, upper div papers filed; SP–1120, 60 cr; A-F only) Writing practice.

**Comp 3160. Advanced Writing: Social Sciences.** (3 cr; QP–\$Engl 3160; 1110 or 1120 or Engl 1110, 90 cr, upper div papers filed; SP–1120, 60 cr; A-F only) Writing practice.

**Comp 3220. Practical Graphics.** (3 cr; SP–1120; A-F only) Practical graphics techniques essential for effective presentations and Web page design. Students will learn Photoshop and PageMaker software packages, and the techniques of video capturing, scanning, and digital photography. They will be introduced to the basic principles of document design and layout.

**Comp 3555. Internet Research and Evaluation Methods.** (3 cr; SP–1120; A-F only) Research and critical thinking class that will introduce students to Internet research, showing them how to wade through the vast amounts of information available on the Web by using search engines effectively. The course will develop their analytical skills, teaching them astutely to evaluate internet resources and Web sites.

**Comp 3595. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; SP–1120, 30 cr; A-F only) General composition topics not included in regular curriculum. Topic announced before course offered.

**Comp 5197. Internship in Writing.** (1-3 cr [max 3 cr]; QP-\$Engl 5115; SP-#; A-F only)

Practical writing experience arranged by student with a media organization, business, or government agency.

**Comp 5220. Document Design and Graphics.** (3 cr [max 6 cr]; QP-Max 4 cr toward grad program; SP-1120, 60 cr; max 3 cr toward grad program; A-F only)

Principles and practice of using computer programs to design, create, and print documents that effectively integrate verbal and graphic texts.

**Comp 5230. Web Pages, Application, and Presentation.** (3 cr; SP-60 cr or grad standing or #; A-F only)

Design, creation, and posting of Web pages; theory of the World Wide Web; practical background in design principles; uploading and updating of Web sites; registering and marketing Web sites; HTML coding and Web design software, such as Dreamweaver.

**Comp 5591. Independent Study.** (1-3 cr [max 6 cr]; QP-#; max 6 cr toward grad program; SP-#; max 3 cr toward grad program; A-F only)

Students choose projects with their instructor.

**Comp 5595. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; SP-60 cr; A-F only)

Intensive study of rhetoric or composition topics not focused on in regular upper-division composition courses or related offerings. Topic announced before course offered.

**Comp 8500. Graduate Seminar.** (3-6 cr [max 6 cr]; A-F only) Varying topics appropriate to study of composition, English, language, and rhetoric.

**Comp 8902. Teaching College Composition.** (3 cr; QP-\$Engl 8902; #; required for tchg assts in comp and Engl depts; SP-#; required for tchg assts in comp and Engl depts; A-F only)

Methods, materials, and objectives of college composition, including practice in writing, teaching writing, and evaluating writing.

**Comp 8910. Practicum in Teaching Composition.** (3 cr; QP-\$Engl 8910; SP-#; A-F only)

Teaching, tutoring, and assisting in composition courses; experience in preparation of materials, microteaching, and grading student work.

**Comp 8994. Directed Research in Composition.** (1-3 cr [max 3 cr]; SP-8902, #; A-F only)

Controlled research in methods, materials, and theories (both linguistic and rhetorical) used in composition classes, sometimes involving experiments with composition students in secondary schools and colleges.

## Computer Science (CS)

### College of Science and Engineering

**CS 1011. Introduction to Computers and Software.** (3 cr; QP-1 yr high school algebra, Comp 1100 or Comp 1120 or #; SP-1 yr high school algebra, Comp 1100 or Comp 1120 or #; A-F only; LE 3)

Introduction to computing systems. Survey of widely used software: operating systems, database systems, spreadsheets, graphics, programming languages. Brief introduction to computer hardware organization, microprocessors, networks.

**CS 1094. Freshman Seminar: Computers and Society.**

(3 cr; SP-Freshman, fewer than 30 cr; A-F only; LE 8)

Explores the impact of computers on daily life. We will examine the writings of industry analysts, computer scientists and futurists. Discussion topics include: cyberculture, the "digital divide", and the future of software, networks, information systems and artificial intelligence.

**CS 1111. Introduction to Programming in Pascal.** (3 cr; QP-1 yr high school algebra or #; SP-1 yr high school algebra or #; A-F only; LE 3)

Basic concepts such as assignment, selection, repetition, modularity with procedures. For students with no prior programming experience.

**CS 1121. Introduction to Programming in Visual BASIC.**

(3 cr; QP-1 yr high school algebra or #; SP-1 yr high school algebra or #; A-F only; LE 3)

Event-driven Windows programming, data types, operators, objects and properties, menus, procedures, control structures, and database file processing.

Applications of computers in instruction. For students with no prior programming experience.

**CS 1131. Introduction to Programming in FORTRAN.**

(3 cr; QP-3 1/2 yrs high school algebra or Math 1250 or #; SP-\$1135, 3 1/2 yrs high school algebra or Math 1250 or #; A-F only; LE 3)

Study of FORTRAN 90 and its application in science and engineering. Basic syntax and data types, input and output, subprograms, control structures (if, select case, do, while, for), arrays, structured data, pointers, recursion, and vector operations.

**CS 1135. Introduction to Programming in FORTRAN 77.**

(2 cr; QP-3 1/2 yrs high school algebra or Math 1250 or #; SP-\$1131, 3 1/2 yrs high school algebra or Math 1250 or #; A-F only; LE 3)

Study of FORTRAN 77 and its application in science and engineering. Basic syntax and data types, input and output, subprograms, control structures (if, for), and arrays.

**CS 1211. Introduction to Programming in C.** (3 cr;

QP-3 yrs high school math, 1 qtr college programming or #; SP-\$1511, \$1581, 3 yrs high school math, 1 sem college programming or #; A-F only; LE 3)

For programmers experienced in another programming language.

**CS 1511. Computer Science I.** (5 cr; QP-3 1/2 yrs high school math or #; SP-\$1581, 3 1/2 yrs high school math or #; A-F only; LE 3)

Introduction to structured programming; use of subprograms, inter-module communication. Control structures, structured data. Elementary search and sort algorithms and their complexity. Recursion for problem solving. Introduction to data abstraction.

**CS 1521. Computer Science II.** (5 cr; QP-1622; SP-1511; A-F only)

Procedural and data abstraction. Elementary abstract data types, including stacks and queues, and their applications. Intermediate abstract data types, including trees, heaps, hash tables, and their applications. External methods.

**CS 1581. Honors: Computer Science.** (5 cr; QP-3 1/2 yrs high school math, #; SP-\$1511, 3 1/2 yrs high school math, #; A-F only; LE 3)

Same as CS 1511, but in greater depth and with more challenging assignments. For high-ability students.

## Course Descriptions

**CS 2111. Introduction to Programming in C++.** (3 cr; QP-1 yr high school or college computer programming in C or 1623 or 3104 or #; SP-\$1521, 1 yr high school or college computer programming in C or 1211 or 1511 or #; A-F only) For programmers experienced in C programming language.

**CS 2121. Introduction to Programming in Java.** (3 cr; QP-3 yrs high school math, programming course or #; SP-3 yrs high school math, programming course or #; A-F only; LE 3) Design and implementation of applets and applications using Java programming language, including exception handling, abstract window toolkit, file system interface, network interface, and threads.

**CS 2301. Fundamentals of Information Systems.** (4 cr; QP-SBE 1100; SP-SBE 1101 or #; A-F only) Introduction to systems theory, quality, decision making, and organizational role of information systems. Information technology, including computing and telecommunications systems. Introduction to concepts of organizational and information systems growth and re-engineering.

**CS 2311. Data, File, and Object Structures.** (4 cr; QP-3104; SP-2111 or #; A-F only) Object-oriented and procedural software engineering methodologies in data definition and measurement, and in abstract data type construction; their use in developing screen editors, reports, and other information systems applications using data structures and file structures.

**CS 2511. Software Development.** (4 cr; QP-1623 or #; SP-1521 or #) Techniques for creation and management of large-scale software. Experience with group implementation and design of software. Modularity, reusability, data abstraction, and algorithm analysis. Includes large-scale group project.

**CS 2521. Computer Organization.** (4 cr; QP-1623, ECE 1315; SP-1521, ECE 1315, Math 1296 or #) Internal representation of programs and data. Computer organization and introduction to computer architecture. Machine and assembly language programming. Data and procedural structures. Addressing methods. Macros and conditional assembly.

**CS 2991. Independent Study.** (1-4 cr [max 8 cr]; QP-#; SP-#) Directed study of special interest topics not available in standard curriculum. Must be arranged with instructor before registration. May include readings, research, or special projects.

**CS 3011. Information Technology and Hardware and Software.** (4 cr; SP-2301 or FMIS 3201 or SBE 1101, 2511 or #; A-F only) Principles and application of telecommunication and computer systems hardware and software presented through lecture, installation, configuration, and operations experiences.

**CS 3111. Computer Ethics.** (4 cr; QP-3620; SP-2511 or #; A-F only) Ethical issues faced by computing professionals, including those related to property rights, privacy, crime, liability, database security, and network access and communication.

**CS 3121. Interactive Multimedia Technology.** (4 cr; QP-1 qtr college programming, jr or #; SP-2301 or FMIS 3201 or SBE 1101, 2511 or #; A-F only) Systems topics. Fundamentals of multimedia computing and theoretical understanding of multimedia

technologies; digitizing and manipulating images, voice, and video materials, including authoring a multimedia package. Large-scale project.

**CS 3131. Introduction to Computer Graphics.** (4 cr; QP-3620, Math 3320; SP-2511, Math 1297 or #; A-F only) Computer graphics and data structures and algorithms useful for presenting data visually on a computer. Graphical display techniques, user interfaces, and use of software applications supporting data visualization.

**CS 3211. Database System Concepts.** (4 cr; QP-1 qtr college programming, jr or #; SP-2301 or FMIS 3201 or SBE 1101, 2511 or #; A-F only) Design and use of database management systems. Basic data models, logical and physical data structures, comparisons of models, logical data design, and database usage. Issues such as data independence, integrity, privacy, security, and role of database administrator.

**CS 3221. Operating Systems Practicum.** (4 cr; QP-1 qtr college programming, jr or #; SP-IST majors only, 3011 or #; A-F only) Hands-on introduction to operating systems and tools. Operating systems such as UNIX and X Windows, and Windows. Program development tools. Local/wide area networks.

**CS 3996. Internship in Computer Science.** (1-3 cr; QP-Comp sci jr, #; SP-Comp sci jr, #; S-N only) Practical, independent project in commercial or industrial setting. Department approval required before beginning project.

**CS 4311. Human-Computer Interaction.** (4 cr; SP-3121 or #; A-F only) Design and evaluation of user interfaces for information systems. User models; task analysis; dialogue analysis and design; tradeoffs among alternative technologies; system models; evaluation techniques, help and documentation issues.

**CS 4411. Communications and Network Technology.** (4 cr; SP-IST majors only, 3011 or #; A-F only) In-depth experience of telecommunications fundamentals, including voice-video-data for LAN, MANN, and WAN, including the switched network systems. Data communication and telecommunication models and standards, concepts, and standard organizations. Installation, configuration, systems integration, and management of the technologies.

**CS 4511. Automata, Computability, and Formal Languages.** (4 cr; QP-1623, 3710; SP-1521, Math 3355 or #; A-F only) Finite-state deterministic and non-deterministic machines, regular expressions, and closure. Formal grammars, pushdown automata, and grammar algorithms. Computability, Turing machines, and the halting problem.

**CS 4521. Advanced Data Structures and Algorithms.** (4 cr; QP-1623, 3710 or #; SP-2511, Math 3355 or #; A-F only) Common abstract data types such as lists, maps, sets, trees, tries, heaps, priority queues, graphs definitions. Time and space analysis of related algorithms such as sorting, hashing, graph search, shortest paths, strongly-connected components, order statistics, string compression, search.

**CS 4531. Software Engineering.** (4 cr; QP-3620, 3710; SP-2511, Math 3355 or #; A-F only) Formal methods of software design and development. Recognition of conditions for production of high quality

software. Organization and management of software development projects. Introduction to design methodologies.

**CS 4611. Database Management Systems.** (4 cr; QP-3620 or #; SP-2511, 2521 or #; A-F only)

Database management fundamentals: relational, hierarchical, and network data models. Implementation topics, including file organization, query processing, concurrency control, recovery, integrity, and view implementation.

**CS 4811. Systems Software.** (4 cr; QP-3610, 1623 or #; SP-2511, 2521 or #; A-F only)

Design and implementation of basic systems software, including assemblers, macroprocessors, linkers/loaders, and compilers, utilizing a software engineering approach.

**CS 4821. Computer Security.** (4 cr; QP-3620, 3710; SP-2511, 2521 or 3011, Math 3355 or #; \$4711; A-F only)

Underlying characteristics of text. Encryption (including RSA, DES, PGP, Clipper, and key escrow). Access, information flow and inference control. Network and Internet security. Firewalls. Surreptitious attacks. Privacy and legality. Intellectual property and ethical issues.

**CS 4991. Independent Study.** (1-4 cr [max 8 cr]; QP-#; SP-#; A-F only)

Directed study of special interest topics not available in standard curriculum. Must be arranged with instructor before registration. May include readings, research, or special projects.

**CS 4993. Seminar.** (1 cr; SP-2511, Comm 1112, Comp 3130 or 3150, CS and IST major, no grad credit; A-F only)

Written report and presentation of current topic or current research in the department.

**CS 4994. Honors Project.** (2-3 cr; QP-Consent of comp sci honors prog committee; SP-Consent of comp sci honors prog committee; A-F only)

Required for students who wish to participate in the computer science honors program. Students must complete a research project under supervision of a faculty adviser.

**CS 4995. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 8 cr]; QP-#; SP-#; A-F only)

Study of selected topic announced in *Class Schedule*.

**CS 5541. Artificial Intelligence.** (4 cr; QP-1623, 3610, 3710 or #; SP-2511, Math 3355 or #; A-F only)

Introduction to principles and programming methods of AI. Advanced Lisp programming. Knowledge representation methods, state space search strategies, and use of logic for problem solving. Applications chosen from among expert systems, planning, natural language understanding, and uncertainty reasoning.

**CS 5551. User Interface Design.** (4 cr; QP-3620, Math 3320; SP-2511, Math 1297 or #; A-F only)

Introduction to major topics: handling input data, menus, user feedback, command-line systems, window systems, interface management systems, use of color, help systems, error handling and avoidance, and design for users with disabilities.

**CS 5621. Computer Architecture.** (4 cr; QP-3620, ECE 1315; SP-2521 or #; A-F only)

Computer organization from a software point of view. Relations among CPU organization, assembly language, and operating systems. System organization, including memory, I/O, and peripherals. Introduction to pipelining and CPU design. Alternative CPU organizations.

**CS 5631. Operating Systems.** (4 cr; QP-3620 or #; SP-2511, 2521 or #; A-F only)

Operating system as resource manager. Processor management and scheduling, deadlocks, concurrency, memory management, performance evaluation, and their application in modern operating systems. Introduction to networking and distributed systems.

**CS 5641. Compiler Design.** (4 cr; QP-3620, 3710; SP-2511, 2521, Math 3355 or #; A-F only)

Finite-state grammars, lexical scanners, and implementation of symbol tables. Context-free languages and parsing techniques. Syntax-directed translation. Run-time storage allocation. Intermediate languages. Code generation methods. Local and global optimization techniques.

**CS 5651. Computer Networks.** (4 cr; QP-3620 or #; SP-2511, 2521 or #; A-F only)

Introduction to computer networking and associated software protocols. ISO reference model from software point of view, and commonly used protocols, such as TCP/IP. Design of computer networking software.

**CS 5721. Computer Graphics.** (4 cr; QP-3620, Math 3320; SP-2511, Math 1297 or #; A-F only)

Computer graphics hardware and software, including displays, hardcopy devices, graphics packages, transformations, projections, scan conversion and clipping, 3-dimensional viewing, hierarchical object modeling, and rendering.

**CS 5741. Object-Oriented Design.** (4 cr; QP-3620, 3710; SP-2511, Math 3355 or #; A-F only)

Overview of software design and design methods, focusing on object-oriented design. Software implementation issues, emphasizing object-oriented development environments. Implementation of a significant project using object-oriented methods and tools.

**CS 5751. Machine Learning.** (4 cr; QP-3620, Stat 3562; SP-2511, Stat 3611 or #; A-F only)

Introduction to primary approaches to machine learning. Methods selected from decision trees, neural networks, statistical learning, genetic algorithms, and reinforcement learning. Theoretical concepts associated with learning, such as inductive bias and Occam's razor.

**CS 5831. Information and Text Processing.** (4 cr; QP-3620, 3710; SP-2511, 2521, Math 3355 or #; A-F only)

Properties underlying text processing and their application in terms of compression and encryption. Retrieval models. Digital libraries. Web applications (browsing, hypertext).

**CS 5994. Advanced Topics in Computer Science.** (4 cr; QP-Grad student or #; SP-Grad student or #; A-F only)

Research-oriented study of topics of current academic or industrial interest, such as parallel algorithms, VLSI design, computational geometry, logic programming languages, program correctness, information retrieval systems, and decision support systems.

**CS 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser and DGS consent)

**CS 8511. Advanced Theory of Computation.** (4 cr; QP-5766 or #; SP-4511 or #)

Deterministic Turing machines and class P, nondeterministic computation and class NP, relationship between P and NP, polynomial transformations, and NP-completeness. Solutions and approximation algorithms for NP-complete problems. Cook's Theorem, halting problem, Church's thesis, polynomial hierarchy.

## Course Descriptions

**CS 8621. Advanced Computer Architecture.** (4 cr; QP-5510 or #; SP-5621 or #; A-F only)

Hardwired and microprogrammed controllers. Memory devices and memory subsystem organization, including virtual memories and caches. Computer networks. Pipelined, vectorized, and parallel computer systems. Algorithmically specialized functional units.

**CS 8631. Advanced Systems Programming.** (4 cr; QP-5520, 5746 or #; SP-5631, 5641 or #; A-F only)

Overview of systems programs with emphasis on unifying themes common to major application areas, such as compiler construction, operating systems, and networks. Advanced study of practical aspects of one of these systems, including a substantive software development project.

**CS 8721. Advanced Computer Graphics.** (4 cr; QP-5736 or #; SP-5721 or #; A-F only)

Currently available computer graphics techniques. Curve and surface representation, solid modeling, visible surface determination, rendering, and illumination techniques. Advanced algorithms for scan-conversion, clipping, and anti-aliasing.

**CS 8731. Information Retrieval.** (4 cr; QP-5798 or #; SP-5731 or #)

Methods, major models, and theoretical issues in automatic processing and retrieval of text. Statistical and syntactic approaches in automatic text transformation. Very large database issues (data mining and fusion). Internet applications, knowledge-based processing. Hypertext and multimedia approaches.

**CS 8751. Artificial Intelligence and Machine Learning.**

(4 cr; QP-5776 or #; SP-5751 or #; A-F only)

Overview of advanced artificial intelligence topics such as machine learning, knowledge representation, machine vision, natural language processing, search, logic and deduction, problem solving, planning, and robotics. Significant software project required.

**CS 8761. Natural Language Processing.** (4 cr; SP-5761 or #; grad student; A-F only)

Seeks to analyze, generate, and understand human language via computational techniques. This course focuses on empirical approaches to lexical and syntactic analysis, semantic interpretation, and discourse processing. Specific applications include part-of-speech tagging, machine translation, and authorship attribution.

**CS 8771. Advanced Computational Logic.** (4 cr; SP-4511 or #; grad student; A-F only)

Review of mathematical logic. In-depth introduction to one or more applications of logic in computer science, such as automated theorem proving, model checking, declarative logic programming, hardware and software verification. Includes hands-on experience with implemented computational logic systems.

**CS 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; SP-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**CS 8993. Seminar.** (1 cr [max 3 cr]; QP-#; SP-#; A-F only)

Presentation and discussion of articles in literature and/or of current research in department.

**CS 8995. Special Topics: (Various Titles to be Assigned).**

(1-4 cr [max 8 cr]; QP-CS grad student, #; SP-CS grad student, #; A-F only)

Topics not available in standard curriculum. Topic announced in *Class Schedule*.

## Cultural Studies (CSt)

### College of Liberal Arts

**CSt 1010. Romanticism and Revolution.** (4 cr; SP-5HmCl 1005, 5HmCl 1007; A-F only; LE 9)

Exploration of the changes in the arts and humanities produced by political, scientific, social, and revolutions that spring from the industrial revolution and the Romantic response to that revolution.

**CSt 1020. Landscapes, Environments, and U.S. Culture.** (3 cr; \$AmS 1031; A-F only; LE 7)

Interdisciplinary study of U.S. landscapes and environments as an index to the diverse cultures of the United States. Readings from travelers, naturalists, ecologists, geographers, poets, and fiction writers; slides of paintings and photographs; films.

**CSt 1030. Frontier Heritage in Canada and the United States.** (4 cr; \$AmS 1041; A-F only; LECD 7)

The frontier experience examined through primary documents, film, art, myth, literature, and historiography, with emphasis on cross-cultural comparisons of the Canadian and American frontiers from perspective of Europeans and Native Americans of both genders.

**CSt 1040. American Immigrant Heritage.** (3 cr; \$AmS 1061; A-F only; LECD 8)

Immigrant and ethnic experiences in the 20th century as depicted in prose, poetry, and the arts; patterns of contemporary prestige and status.

**CSt 1095. Freshman Seminar: Bodies and Culture Through Film.** (4 cr; SP-Freshman, fewer than 30 cr; A-F only; LE 8)

Explores the ways in which our bodies are culturally constructed through gender, race, and sexual orientation. Using documentary film as a primary pedagogical tool, attention will focus on how marginalization is embodied in everyday life.

**CSt 1101. Introduction to Cultural Studies.** (4 cr; A-F only; LE 8)

Examines how cultural practices relate to everyday life by introducing students to each of the four core areas of the cultural studies minor: identity politics, media cultures, cultures of space and place, and cultures of science, technology, and medicine.

**CSt 1201. American Working Class History and Culture: The Struggle for Control.** (4 cr; A-F only; LE 7)

Introduces students to working class history and culture and examines the struggle by workers to control their work, communities, identity, and social norms.

**CSt 3010. Popular Culture in the 1960s.** (3 cr; QP-40 cr or #; SP-5HmCl 3221, 30 cr or #; A-F only)

Interrelationships among the arts, popular culture, politics, and social change as found in literature, theatre, film, photography, painting, and music in the United States during the 1960s.

**CSt 3020. Science and Civilization.** (3 cr; QP-30 cr or #; SP-5HmCl 3051, 30 cr or #; A-F only)

Nontechnical survey of critical periods and/or themes in history of science and their interconnections with other cultural issues.

**CSt 3030. Science Fiction.** (3 cr; SP-\$HmCl 3221, 30 cr or #; A-F only)

Selected science fiction short stories, novels, films, videos, and music that explore impact of physical, biological, and social sciences in producing changing views of human nature, values, institutions, and societies.

**CSt 3040. The Music and Lives of the Beatles.** (3 cr; QP-30 cr or #; SP-\$HmCl 3035, 30 cr or #; A-F only)

Impact on our culture of music and lives of the Beatles. Their music; influence on music, fashion, and attitudes; Beatles' movies; interrelationship with political and social movements; later careers; their legacy.

**CSt 3050. Utopian Images.** (3 cr; SP-\$HmCl 3231, 30 cr or #; A-F only)

Ways that humans imagine a better existence in a finer world, with examples from such expressive forms as utopian treatises, science fiction, pastoral poetry and art, religious traditions, landscape architecture, urban designs.

**CSt 3060. Women and Men in Popular Culture.** (3 cr; QP-40 cr or #; SP-\$HmCl 3241, 30 cr or #; A-F only)

Analysis of popular culture texts (literature, television, advertisements, music) and audiences to understand cultural construction of gender as reflected in representations of masculinity and femininity. Introduction to range of methods for cultural analysis.

**CSt 3095. Special Topics: (Various Titles to be Assigned).** (3-4 cr [max 8 cr]; SP-1101; A-F only)

Special topics courses will be offered at least one time per year in order to increase possible course offerings in the cultural studies minor and give students the opportunity to work with a wide range of interdisciplinary faculty and topics.

**CSt 3715. Popular Culture.** (3 cr; QP-1100, 40 cr or #; SP-Soc 3701, 60 cr or grad student or #; no grad credit; A-F only)

What qualifies as American popular culture, methodologies used to study popular culture, and sociological significance of such study.

**CSt 4653. Cultural Studies Senior Seminar/Capstone.** (4 cr; SP-Cultural studies minor, no grad credit; A-F only)

As the capstone for the cultural studies minor, this course asks students to engage with current work produced in the field of cultural studies, including (but not limited to) texts, documentary videos, and experimental films produced for both popular and academic audiences.

**CSt 4691. Independent Study in Cultural Studies.** (1-4 cr [max 8 cr]; SP-60 cr or #, no grad credit; A-F only)

Directed reading, research, or involvement in an issue leading to the preparation of a paper or other product.

## Dance (Dn)

### School of Fine Arts

**DN 1001. Introduction to the World of Dance.** (3 cr; A-F only; LEIP 9)

Appreciation of dance as an art and entertainment form using aesthetic, sociocultural, historical, and genre studies. Video and concert viewing, readings on choreographers and dancers, critiques, and lab experiences.

**DN 1101. Modern Dance Technique I.** (2 cr [max 12 cr]; A-F only; LE 10)

Beginning work, emphasizing modern dance as a performing art form.

**DN 1111. Jazz Dance Technique I.** (2 cr [max 8 cr]; QP-# for wtr and spr qtrs; A-F only; LE 10)

Beginning work, emphasizing jazz dance as a performing art form.

**DN 1121. Tap Dance Technique I.** (2 cr [max 8 cr]; QP-6 cr of 1101 or 1111, #; SP-4 cr of 1101 or 1111, #; A-F only)

Beginning work, emphasizing tap dance as a performing art form.

**DN 1131. Ballet Technique I.** (2 cr [max 12 cr]; A-F only; LE 10)

Beginning work, emphasizing ballet as a performing art form.

**DN 3201. Modern Dance Technique II.** (2 cr [max 12 cr]; QP-#; SP-#; A-F only)

Intermediate work, emphasizing modern dance as a performing art form.

**DN 3211. Jazz Dance Technique II.** (2 cr [max 18 cr]; QP-#; SP-#; A-F only)

Intermediate work in lyrical and percussive jazz dance techniques.

**DN 3221. Tap Dance Technique II.** (2 cr [max 8 cr]; QP-1121 or #; SP-1121 or #; A-F only)

Intermediate work, emphasizing tap dance as a performing art form. Tap dance composition and development of improvisational skills.

**DN 3231. Ballet Technique II.** (2 cr [max 12 cr]; QP-#; SP-#; A-F only)

Intermediate work, emphasizing ballet as a performing art form.

**DN 3401. Dance Composition.** (3 cr; QP-3201, 3231 or 3211, #; SP-3201, 3231 or 3211, #; A-F only)

Study and development of dance choreography through creative experiences.

**DN 3611. Dance History.** (3 cr; QP-1500 or #; SP-1001 or #; A-F only)

Religious, social, political, and artistic forces that have contributed to development of dance in Western civilization, emphasizing Romantic era through present.

**DN 3991. Independent Study in Dance.** (1-3 cr [max 6 cr]; QP-#; undergrads take max 6 cr in 3171 and 5171 combined; SP-#; undergrads take max 6 cr in 3991 and 5991 combined; A-F only)

Directed readings and projects arranged between student and faculty mentor.

**DN 4116. Musical Theatre Audition Techniques.** (3 cr; QP-#; SP-#; no grad credit; A-F only)

Advanced dance, song, acting, and marketing capstone course for professionally oriented musical theatre student.

**DN 4311. Jazz Dance Technique III.** (2 cr [max 12 cr]; SP-#; no grad credit; A-F only)

Advanced work, emphasizing jazz dance as a performing art form.

**DN 4331. Ballet Technique III.** (2 cr [max 12 cr]; SP-3231, #; no grad credit; A-F only)

Advanced work, emphasizing ballet as a performing art form.

## Course Descriptions

**DN 5991. Independent Study in Dance.** (1-3 cr [max 6 cr]; QP-#; undergrads take max 6 cr in 3171 and 5171 combined; SP-#; undergrads take max 6 cr in 3991 and 5991 combined, no grad credit; A-F only)  
Advanced directed readings and projects arranged between student and faculty mentor.

**DN 5997. Internship in Professional Dance.** (1-12 cr [max 12 cr]; QP-Δ; 1 cr for each 30 hrs of work, max 6 cr toward grad program; SP-Δ; 1 cr for each 45 hrs of work, no grad credit; A-F only)  
Internship with a cooperating professional, commercial, or regional dance company.

# Early Childhood Studies (Ech)

## College of Education and Human Service Professions

**Ech 2010. Introduction to Early Childhood Education: Birth-Age Eight.** (3 cr; SP-CS 1011)  
Historical, contemporary, and future scenarios in education for children from birth to age eight; personal and professional goals; use of technology for information gathering and record keeping.

**Ech 2910. Caring for Infants and Toddlers.** (3 cr; SP-2010 or #)  
Current research in development in infants and toddlers; creation of culturally and developmentally appropriate environments for infants and toddlers and their families; observational tools related to infants and toddlers.

**Ech 3006. Early School Years.** (2 cr; SP-¶EIEd 1010; A-F only)  
Theoretical, historical, and cultural influences that impact early childhood education. Environments, methods, and materials that facilitate development. Collaborating with families and communities.

**Ech 3010. Programs for Education of Young Children: Birth-Age Eight.** (4 cr; SP-Ech major; A-F only)  
Historical and theoretical models for education of young children from birth through age eight. Methods for facilitating development and collaborating with families and communities. Use of technology with young children. Practicum.

**Ech 3020. Literacy, Language, and Mathematics: Birth-Age Eight.** (5 cr; SP-Ech major, ¶3030, ¶4011, ¶SpEd 3103)  
Research and developing curriculum for emerging language, literacy, and mathematics for young children from birth through age eight. Use of technology to enhance curriculum. Practicum.

**Ech 3030. Inquiry Social Studies and Science Learning: Birth-Age Eight.** (5 cr; SP-2010, 3010, ¶3020, ¶4011, ¶SpEd 3105)  
Exploratory and socially sensitive environments for children from birth through age 8; inquiry, physical knowledge, social processes in children's play; planning, implementing, evaluating culturally and developmentally appropriate science and social studies learning experiences; integrated, thematic curricula and use of technology to enhance learning.

**Ech 3050. Observing and Guiding Behavior: Birth-Age Eight.** (4 cr; SP-2010, ¶3010, SpEd 3103)  
Observing, recording, and guiding behaviors in children from birth through age eight. Focuses on informal methods for observation. Practicum is required. Use of technology for behavioral observation.

**Ech 3950. Guided Observations in Diverse Settings: Birth-Age Eight.** (1-6 cr; SP-Ech major)  
Observing interaction and environment with children from birth through age eight and their families in diverse settings.

**Ech 4009. Early Childhood Administration.** (2 cr; SP-Ech major or #; no grad credit; A-F only)  
Developing knowledge and competencies in administration of programs for young children; personnel and financial management; teacher selection, training, and supervision; parent involvement; program evaluation.

**Ech 4011. Parent Education.** (4 cr; SP-¶3020, ¶3030, ¶SpEd 3105, Ech major or #; no grad credit; A-F only)  
Planning, presenting, and evaluating educational programs for parents; adult learning and development; philosophy of Minnesota early childhood family education program; teaching strategies; curriculum development.

**Ech 4251. Parenting.** (3 cr; SP-Educ 1000 or Psy 2021 or Psy 3371 or #; no grad cr; A-F only)  
Parent-child interaction, roles and responsibilities throughout the life cycle; analysis of parenting strategies; contemporary variation of family cultures, structures, and lifestyles; sources of education and support.

**Ech 4400. Professional Development Seminar.** (1 cr [max 3 cr]; SP-#, no grad credit; S-N only)  
Professional development through documentation, reflection, synthesis of learning as related to standards. Development of process and product portfolios. Presentation of and dialogue about emergent learning.

**Ech 4600. Student Teaching in Early Childhood/Primary.** (3-12 cr; SP-3005, 3007 or #; no grad credit; S-N only)  
Application of skills, understanding, and knowledge related to working with children from birth through age eight.

**Ech 4610. Professional Issues Seminar in Early Childhood Education.** (2 cr; SP-¶4600; no grad credit)  
Reflections on current issues and ethical dilemmas in field of early childhood education, birth through age eight; preparation for professional job-seeking and interviewing.

**Ech 4991. Independent Study.** (1-6 cr [max 6 cr]; SP-#; no grad credit; A-F only)  
Individualized reading and research in a special topic.

**Ech 4993. Special Area Project.** (1-4 cr; SP-#; no grad credit; A-F only)  
Independent project for advanced students to substantially further their theoretical knowledge base or professional competencies in early childhood, birth through age eight.

**Ech 5010. Programs for Education of Young Children: Birth-Age Eight.** (4 cr; SP-Ech major; A-F only)  
Historical and theoretical models for education of young children from birth through age eight. Methods for facilitating development and collaborating with families and communities. Use of technology with young children. Practicum.

**ECh 5020. Literacy, Language, and Mathematics: Birth-Age Eight.** (5 cr; SP–ECh major, ¶3010, ¶3030, ¶SpEd 3103) Research and developing curriculum for emerging language, literacy, and mathematics for young children from birth through age eight. Use of technology to enhance curriculum. Practicum.

**ECh 5030. Inquiry Social Studies and Science Learning: Birth-Age Eight.** (5 cr; SP–2010, 3010, ¶3020, ¶4011, ¶SpEd 3105) Exploratory, socially sensitive environments for children from birth through age eight; inquiry, physical knowledge, social processes in children's play; planning, implementing, evaluating culturally, developmentally appropriate science and social studies learning experiences; integrated, thematic curricula; use of technology to enhance learning.

**ECh 5040. Creative Expression.** (3 cr; SP–No grad credit) Developing curriculum for creative expression involving aesthetic and physical development.

**ECh 5050. Observing and Guiding Behavior: Birth-Age Eight.** (4 cr; SP–2010, ¶3010, ¶SpEd 3103) Observing, recording, and guiding behaviors in children from birth to age eight. Focuses on informal methods for observation. Practicum is required. Use of technology for behavioral observation.

**ECh 5060. Literacy and Mathematics in Primary Grades.** (3 cr; QP–Admission to ECh program or 180 cr; no grad credit; SP–120 cr or #; no grad credit; A-F only) Research and developing curriculum for communication, literacy and mathematics in kindergarten through grade three. Use of technology to enhance curriculum.

**ECh 5065. Inquiry Social Studies and Science Learning in K-3.** (3 cr; QP–Admission to ECh program or 180 cr; no grad credit; SP–120 cr or #; no grad credit; A-F only) Exploratory and socially sensitive environments for children in grade K-3; inquiry, physical knowledge, and social processes in children's play; planning, implementing, and evaluating culturally and developmentally appropriate science and social studies learning experiences; integrated, thematic curricula.

**ECh 5107. Issues in the Education of Younger Learners.** (6 cr; SP–60 cr, #; no grad credit; offered summer only; A-F only) Societal effects on education and care of younger learners; efficacy research; multicultural and anti-bias curricula; integration of children with special needs; curriculum, systems, technology, and evaluation models.

**ECh 5910. Caring for Infants and Toddlers.** (3 cr; SP–No grad credit) Current research in brain development in infants and toddlers; creation of culturally and developmentally appropriate environments for infants and toddlers and their families; observational tools related to infants and toddlers.

**ECh 5950. Guided Observations in Diverse Settings: Birth-Age Eight.** (1-6 cr; SP–ECh major) Observing interaction and environment with children from birth through age eight and their families in diverse settings.

**ECh 5991. Independent Study.** (1-6 cr [max 6 cr]; SP–#; no grad credit; A-F only) Directed independent study, readings, and/or projects of student interest.

**ECh 5993. Special Area Project.** (1-4 cr; SP–No grad credit; A-F only) Independent project for advanced students to substantially further their theoretical knowledge base or professional competencies.

**ECh 7600. Seminar I: Professional and Portfolio Development for Study of Children and Families.** (2 cr; SP–Offered summer only; A-F only) Professional ethics and philosophy of interdisciplinary programs for children and families; preparation of professional portfolio.

**ECh 7602. Seminar II: A Case Approach to Dichotomies of Theory and Practice.** (3-6 cr; SP–MEd student or #; offered summer only; A-F only) Advocacy, conflict resolution, resource systems, cultural differences, special needs, collaboration among families and agencies. Preventing and solving problems and implementing solutions.

**ECh 7603. Seminar III: Participatory Leadership—Challenges and Rewards.** (4 cr; SP–MEd student or #; offered summer only; A-F only) Participatory leadership models in different settings, including educational, community, global, and cultural. Analyzes useful aspects of models highlighting interpersonal communication. Students collaboratively design a participatory leadership development program and an evaluation component

**ECh 7605. Field Observation.** (2 cr; SP–MEd student or #; A-F only) Field observation in a program serving children and families; examination of systems issues; reflective seminar.

## Economics (Econ)

### School of Business and Economics

**Econ 1003. Economics and Society.** (3 cr; QP–No cr toward econ major or minor or BAC or BBA majors; SP–No cr toward Econ major or minor or BAC or BBA majors; LE 8) General description of U.S. economy and analysis of contemporary economic problems. Introduction to major economic issues and problems of the day, providing a simple framework used by economists for analysis. Offered in both classroom and alternative formats.

**Econ 1014. Freshman Seminar: Economics of Income Inequality and Poverty.** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 8) Exploration of the nature, causes and consequences of income inequality and poverty globally and within the U.S. Microeconomic principles will provide a framework for analysis of these issues. Study of the role of firms and government in addressing these issues.

**Econ 1022. Principles of Economics: Macro.** (3 cr; A-F only; LE 6) Analyzing overall performance of an economic system. National income accounting and theory, unemployment, inflation, fiscal policy, money, monetary policy, economic growth, international trade, non-U.S. economies, and real-world application of these concepts.

## Course Descriptions

**Econ 1023. Principles of Economics: Micro.** (3 cr; A-F only; LE 6)

Analyzing free enterprise system through study of product and resource markets. Supply and demand, utility, production and cost, market structure, resource use, market failures, regulatory role of government, and real-world application of these concepts.

**Econ 1040. Personal Financial Management.** (3 cr; A-F only)

Practical applications of concepts and techniques in managing personal finances.

**Econ 1042. Freshman Seminar: The Great Depression and Macroeconomic Thought.** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 7)

Development of macroeconomic thought from historical perspective of the Great Depression, 1929–41.

**Econ 1063. Freshman Seminar: Business and Public Policy.** (3 cr; SP–Freshman, fewer than 30 cr; LE 6)

Examine the intricate relationship between the public and private sectors in both the domestic and international context. Questions of how and why the government intervenes in the economy and how business can respond are addressed. We will discuss problems with the effective functioning of the economy and how the tools of regulation can be bought to bear to promote satisfactory outcomes.

**Econ 1072. Freshman Seminar: Economics and the Environment.** (3 cr; SP–Freshman, fewer than 30 cr; LE 8)

Exploration of environmental issues from the economic perspective of the natural environment as a scarce, valuable asset. Issues include resource use, waste management, valuation of environmental services, sustainable development, and the role of markets and economic incentives in environmental decisions.

**Econ 1094. Freshman Seminar: Understanding Regional Economic Development in Minnesota.** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 8)

Will break Minnesota into regions. Methods for measuring the economic base, base trends, and impacts from trends, especially in Northeast Minnesota, will be presented. Economic theory and practice will be introduced as they apply to regional analysis.

**Econ 2020. Statistics: Methods and Analysis.** (5 cr; SP–24 cr; A-F only)

Statistical analysis of business and economic data; emphasizes problem solving and computer-based methods. Data analysis presentation, probability and sampling distributions, estimation, hypothesis testing, survey and experimental design, analysis of variance, qualitative data analysis, regression. Case studies.

**Econ 3022. Macroeconomic Analysis.** (3 cr; QP–1004, 1005, Math 1160; SP–1022, 1023, Math 1160; A-F only)

Determinants of national income, employment, and price levels with particular attention to aggregate demand and aggregate supply, and monetary and fiscal policy.

**Econ 3023. Microeconomic Analysis.** (3 cr; QP–1004, 1005, Math 1160; SP–1022, 1023, Math 1160; A-F only)

Behavior of households as consuming units and suppliers of resources; analysis of decision making by firms under various market conditions.

**Econ 3030. Economic Research Methodology.** (3 cr; QP–1004, 1005, 1203, 1204, Math 1160; SP–1022, 1023, 2020, Math 1160; A-F only)

Techniques used in modeling and estimating economic relationships; emphasis on computer methods and

research applications/case studies involving real data. Model building, multiple regression, logistic regression, residual and influence analysis, time in regression analysis. Research report.

**Econ 3031. History of Economic Thought.** (3 cr; QP–1002 or [1004, 1005]; SP–1003 or [1022, 1023]; A-F only; LE 7)

Development of economic ideas, principles, and systems of analysis from early times to present, emphasizing personalities and historical events surrounding development of economic thought.

**Econ 3036. Radical Economics.** (3 cr; QP–1002 or [1004, 1005]; SP–1003 or [1022, 1023]; A-F only; LE 7)

Radical Marxist critique of traditional economic models and of methodology used in developing and applying these models. Alternatives to market system. Analysis of current economic issues from radical's perspective.

**Econ 3311. Money and Banking.** (3 cr; QP–1005; SP–1022; A-F only)

Role of financial institutions and markets, emphasis on Federal Reserve System and its control of commercial banking system, monetary theory and policy, and international economics.

**Econ 3410. International Economics and Finance.** (3 cr; QP–1004, 1005; SP–1022, 1023; A-F only)

Classical and modern theory of international trade. Extension, empirical verification, and applications of modern theory. Alternative theories of international trade. Concept and measurement of balance of payments. Methods of balance of payments adjustments. Alternative international monetary systems. Selected current issues.

**Econ 3512. Managerial Economics.** (3 cr; QP–1004, 1203, 1204; SP–1023, 2020; A-F only)

Application of economic theory to management decision making and policy formulation within the firm. Demand analysis, production and cost analysis, price analysis, capital budgeting.

**Econ 3595. Special Topics: (Various Titles to be Assigned).** (1–3 cr; QP–[1002 or 1004, 1005] or #; SP–[1003 or 1022, 1023] or #; A-F only)

Topics announced in *Class Schedule*.

**Econ 3613. The Economics of Antitrust and Regulation.** (3 cr; QP–1004; SP–1023; A-F only)

Alternatives open to a free-enterprise economy when economic goals have not been satisfactorily achieved by the private sector. Public regulation and antitrust legislation and enforcement examined as a means of social control when unacceptable market failures exist.

**Econ 3821. Labor Economics: Theory and Issues.** (3 cr; QP–1004; SP–1023; A-F only)

Labor markets from theoretical and institutional perspectives, including wage theories, labor supply, labor demand and employment, human capital investments, and occupational choice.

**Econ 3920. Consumer Economics.** (3 cr; QP–[1004, 1005] or □; SP–[1022, 1023] or □; A-F only)

Role of household demand for various types of consumer goods and services. Introduction to absolute, relative, and lifetime income hypothesis of consumption demand theory. Development of consumer demand under perfect and imperfect information about product quality.

**Econ 4040. Tools: Applications of Economic Analysis.** (3 cr; QP–1204, 5333; SP–3030 or equiv; A-F only)

Development and application of tools of economic research and analysis; emphasis on critical thinking using

computer-based statistical methods. Econometrics (theory and practice), applied research techniques, economic forecasting, and time series analysis. Research report.

**Econ 4213. Mathematical Economics.** (3 cr; QP-1004, 1005, Math 1160; SP-1022, 1023, Math 1160; A-F only)

Application of fundamentals of differential and integral calculus and linear algebra to static, comparative static, and dynamic topics in microeconomics and macroeconomics.

**Econ 4315. Monetary Theory and Policy.** (3 cr; QP-3105; SP-3022; A-F only)

Development of monetary theory and implications of theory for Federal Reserve System's control of money supply and financial institutions, money market strategy, and monetary policy, including goals, targets, and indicators.

**Econ 4397. Half-Time Internship.** (3 cr [max 6 cr];

QP-[Econ major, 3104, 3105] or #; SP-\$4497, [Econ major, 3022, 3023] or #; S-N only)

Following written approval of proposal, student engages in supervised program of half-time work experience in public agency, private business, or other organization. Advance, concurrent, and follow-up written and oral presentations required. 20 hours per week over a 15 week period.

**Econ 4497. Full-Time Internship.** (6 cr; QP-[Econ major, 3104, 3105] or #; SP-\$4397, [Econ major, 3022, 3023] or #; S-N only)

Following written approval of proposal, student engages in supervised program of full-time work experience in public agency, private business, or other organization. Advance, concurrent, and follow-up written and oral presentations required. 40 hours per week over a 15 week period.

**Econ 4570. Public Finance.** (3 cr; QP-1004, 1005; SP-1022, 1023; A-F only)

Theory and practice of determining governmental expenditures and revenues, including consideration of public goods, welfare economics, raising of revenues, debt policy, and economic stabilization.

**Econ 4610. Industrial Organization.** (3 cr; QP-3104 or 3411; SP-3023 or 3512; A-F only)

Industrial structure and firm's trade practices. Methodology links observed market behavior with microeconomic models. Strategic behavior of firms analyzed by integrating areas of production, finance, and marketing. Public policies evaluated in terms of their efficiency and equity.

**Econ 4721. Natural Resource and Energy Economics.** (3 cr; QP-1004; SP-1023; A-F only)

Microeconomic analysis of natural resource and energy markets. Role of these resources in production processes and waste generation, use and pricing of nonrenewable and renewable resources over time, resource availability, sustainable development, and ecological economics.

**Econ 4777. Environmental Economics.** (3 cr; QP-1004; SP-1023; A-F only)

Microeconomic analysis of environmental quality as an economic good. Pollution control, benefit-cost analysis, valuation methodologies and their application to air and water quality, hazardous waste management, preservation, and global pollutants.

**Econ 4935. Urban/Regional Economics.** (3 cr; QP-1002 or [1004, 1005]; SP-1003 or [1022, 1023]; A-F only)

Allocation of unevenly distributed and imperfectly mobile resources. Alternative theories relating to urban and regional growth processes. Analysis of intraregional structures as contributors to growth process. Selected economic problems unique to urban communities.

**Econ 4991. Independent Study.** (1-6 cr [max 6 cr]; QP-Δ; SP-[Econ major, 12 cr of 3xxx and above Econ] or #;

A-F only)

For students wishing to do special work in areas useful to individual programs and objectives and not available in regular course offerings.

**Econ 5012. Economic Education.** (1-3 cr; QP-Δ; SP-Δ; A-F only)

Basic economic concepts, curriculum and course design, materials, teaching strategies and methodologies, and research relevant to teaching economics at the K-12 level.

## Education (Educ)

### College of Education and Human Service Professions

**Educ 1000. Human Development.** (3 cr; A-F only)

Patterns and theories of development from conception through late adulthood emphasizing early childhood through adolescence; analysis of individual, family, and environmental factors which affect development over the life span.

**Educ 1100. Human Diversity.** (3 cr; A-F only; LECD 8)

Cultural, physical, socially constructed, and psychological differences in people. Social, political, and economic implications of human diversity in modern society. Practicum in community agency.

**Educ 1101. Education in Modern Society.** (3 cr; A-F only; LE 7)

Survey of educational institutions and practices used in different sectors of society. Historical and philosophical foundations of American education.

**Educ 1111. Developing Critical Thinking Skills.** (3 cr; A-F only; LE 2)

Experiences in learning concepts through discovery, induction, and critical reasoning by use of real materials and real situations. Problem-solving approaches and techniques.

**Educ 1201. Managing Planet Earth.** (3 cr; A-F only; LE 8)

Environmental education; exploration of key concepts and principles that govern how nature works; potential solutions to environmental and resource problems.

**Educ 1313. Freshman Seminar: Values and Education.** (3 cr; SP-Less than 30 cr; A-F only; LE 8)

Examination of values and their expression in and effects on educational policies and practices in classrooms, schools, communities, and societies. Philosophical, historical, and comparative approaches to the study of educational values and issues involving conflicts of values.

**Educ 1450. Freshman Seminar: Childhood Studies: Local, National, Global.** (3 cr; SP-Fewer than 30 cr; A-F only; LE 8)

Problems/issues facing contemporary children from perspectives of anthropological, sociological, legal, educational, and medical knowledge. Cross-cultural variations in experiences/status of children.

## Course Descriptions

### **Educ 1500. Violence Prevention for Young Children, Birth to Grade 3.** (2 cr; SP-#; A-F only)

Social skills development for young children (empathy, impulse control, problem solving, anger management). Development processes for social skill development in young children (teaching, modeling, practicing, reflecting).

### **Educ 2605. Introduction to Environmental Education.** (2 cr [max 2 cr])

Overview of history, foundations, and processes of environmental education. Emphasis on lesson planning and instructional strategies.

### **Educ 3412. The Computer in Education.** (1-4 cr [max 6 cr]; A-F only)

Introduction to computer use in instructional settings. PC and Mac platforms. Develops basic skills using software commonly used by educators. Teaching strategies using computer-based instruction.

### **Educ 3804. Programs for Young Children: Global Perspectives.** (4 cr; SP-Ech 3010, Ech 3020, Ech 3030 or #)

Cross-cultural perspectives on elementary education and early childhood education. Intercultural communication in different cultures; teaching and administrative behavior and differing educational structures in various foreign countries.

### **Educ 4163. Outdoor Education Methods.** (3 cr; SP-Rec 3342 or #; no grad credit; A-F only)

Methods and theoretical basis for teaching outdoor education. Emphasis on application at outdoor sites. Weekend experience at a regional nature center required.

### **Educ 4223. Advanced Course: Mathematics Teaching.** (2 cr; SP-No grad credit; A-F only)

Methods, materials, curriculum development; preparation and evaluation of tests and other assessments of learning; application of principles of teaching and learning mathematics.

### **Educ 4225. Mathematics Education: Current Trends.** (2 cr; SP-No grad credit; A-F only)

Review of research and current literature; trends and experimental approaches to teaching mathematics; criteria for program development and evaluation.

### **Educ 4226. Geometry for Teachers in Grades 5-8.** (3 cr; SP-Math 1141 or instructor's consent; no grad credit; A-F only)

The development of geometry concepts through investigations of geometric relationships and informal properties provides the basis for examining the teaching and learning of geometry in grades 5-8.

### **Educ 4227. Number Theory for Teachers in Grades 5-8.** (3 cr; SP-Math 1141 or #; no grad credit; A-F only)

The development of number concepts and theories through investigations and applications of discrete mathematics strategies provides the basis for examining the teaching and learning of number theory in grades 5-8.

### **Educ 4233. Secondary School Curriculum.** (2 cr; SP-No grad credit; A-F only)

Design and organization of curriculum with special consideration of issues, approaches, research, and recommendations for high school programs; effectiveness of selected curricular designs.

### **Educ 4234. Science, Technology, and Society.** (3 cr; SP-No grad credit; A-F only)

Nontechnical study of historical and cultural impact of natural science and technology on the earth and its inhabitants.

### **Educ 4235. Energy Education for Teachers.** (2-3 cr; SP-No grad credit)

Energy and energy-related problems; resources and field experiences to prepare teachers to implement energy-related learning experiences into K-12 curriculum.

### **Educ 4381. Teaching American Indian Students.** (2 cr; SP-10 cr educ; no grad credit; A-F only)

Survey of contemporary Indian education; evaluation of one's attitudes toward Indian students; direct interaction with Indian parents and students; development of culturally sensitive teaching plans regarding Indians.

### **Educ 4500. Professional Issues in Teaching.** (1 cr;

SP-Admission to educ or CSD program, sr, Δ; no grad credit; A-F only)

Issues related to professional status and activity of teachers, historical and philosophical foundations of education, communication, job seeking skills, and current national and state study group results.

### **Educ 4601. Wilderness Philosophy.** (2 cr; SP-#; no grad cr)

People and social forces that have influenced land-use related to designated wilderness; philosophical and historical basis for wilderness management.

### **Educ 4650. Student Teaching in Parent Education.** (1-3 cr; QP-FamL 5620, FamL 5325; SP-Admission to parent ed program, #; no grad credit; S-N only)

Application of knowledge, understandings, and skills related to working with adult learners in parent education or early childhood/family education programs.

### **Educ 4991. Independent Study.** (.5-3 cr [max 6 cr]; SP-#; no grad credit; A-F only)

Directed independent study, readings, and/or projects of interest to education students.

### **Educ 4993. Special Area Project.** (1-4 cr; SP-#; no grad credit; A-F only)

Independent project for advanced students to substantially further their theoretical knowledge base or professional competencies.

### **Educ 5001. Mentor Clinical Supervision Model.** (1 cr; SP-Tchg exper or #; no grad credit; A-F only)

Overview of clinical supervision model, including cycles of supervision, development of observation and assessment skills; analysis of case studies in supervision.

### **Educ 5002. Observation and Assessment Skills for Supervision.** (1 cr; SP-Tchg exper or #; no grad credit; A-F only)

Overview of observation and assessment tools used in clinical supervision; experience in using tools; facilitating professional development in teachers.

### **Educ 5128. Urban Education.** (3 cr; SP-No grad credit)

Combines on-site experience in an urban educational setting with reading and reflection. Develops knowledge, skills, attitudes, motivation, and commitment to work individually and collectively with poor children in urban schools.

### **Educ 5132. Motivational Strategies for Teachers.** (2 cr; SP-No grad credit; A-F only)

Description and analysis of design, impact, and outcome of effective and unusual motivational strategies employed in education, business, and industry. Opportunities to adapt procedures to fit unique characteristics of participants' clients and institutional settings.

**Educ 5146. The Future and Education.** (2 cr; SP—No grad credit)

Effects of technological and social changes on education; the future-conscious educational program.

**Educ 5164. Environmental Education In-Service Training.** (.5-10 cr [max 10 cr]; SP—#; no grad credit; A-F only)

Environmental education methods, materials, and curricula for educators wishing to enhance their environmental education training.

**Educ 5165. Theories and Models in Outdoor Education.** (2 cr; SP—#; no grad credit; A-F only)

Overview of theoretical foundations of outdoor education. Definitions of terms related to outdoor education, historical antecedents, future adventure education, social and psychological benefits of outdoor education.

**Educ 5167. Research and Issues in Outdoor Education.** (2 cr; SP—#; no grad credit; A-F only)

Research literature and related issues pertaining to outdoor education, including research design and methods. Application of research to specific issues.

**Educ 5222. Supervision of Secondary Instruction.** (2 cr; SP—No grad credit; A-F only)

Review of research on supervision of instruction; application of principles to improvement of instruction in secondary schools.

**Educ 5236. Environmental Education for Teachers.** (.5-3 cr [max 3 cr]; SP—#; no grad credit; A-F only)

Combines environmental study with field experiences to prepare pre-service and in-service teachers for implementation of environmental learning experiences in the school curriculum, grades K-12, all subject areas.

**Educ 5340. Interacting With Diverse Families.** (3 cr; SP—90 cr or #; A-F only)

Issues relating to working with and advocating for families from diverse backgrounds and/or with diverse needs. Emphasis on linguistically diverse families, immigrant families, families headed by single parents, families with members with a disability, families headed by lesbian/gay parents.

**Educ 5350. Literacy for ESL Learners.** (3-5 cr; SP—#; no grad credit; A-F only)

Rationale and specific techniques for teaching of reading to non-English speaking or reading students.

**Educ 5381. Teaching American Indian Students.** (2 cr; SP—No grad credit; A-F only)

Survey of contemporary Indian education; evaluation of one's attitudes toward Indian students; direct interaction with Indian parents and students; development of culturally sensitive teaching plans regarding Indians.

**Educ 5401. Creative and Intellectually Gifted Children.** (2 cr; SP—No grad credit; A-F only)

Identification, characteristics, and service needs of creative and intellectually gifted children; various programs to meet needs.

**Educ 5412. The Computer in Education.** (.5-4 cr [max 6 cr]; SP—No grad credit; A-F only)

Introduction to computer use in instructional settings. PC and Mac platforms. Develops basic skills using software commonly used by educators. Teaching strategies using computer-assisted instruction.

**Educ 5413. Teaching With Technology.** (4 cr; SP—3412 or 5412, jr or sr or grad or #; A-F only)

Develops basic computer and educational technology skills focusing on using microcomputers for communications.

**Educ 5414. Using Technology for the Administrative Tasks of Teaching.** (4 cr; SP—3412 or 5412, 5413 or #; A-F only)

Develops basic computer and educational technology skills focusing on using microcomputers for administrative tasks of teaching.

**Educ 5415. Advanced Educational Media Production.** (4 cr; SP—3412 or 5412, 5413, 5414 or #; A-F only)

Advanced multimedia design; hardware, software and peripherals including video and audio production and editing, compression software, virtual reality; development of an advanced multimedia project for production to CD Rom or the World Wide Web.

**Educ 5421. Research Methods in Education.** (2 cr; SP—Admission to MED or #; no grad credit; A-F only)

Planning, design, implementation, analysis of data, evaluation, and reporting associated with classroom research and research within school systems.

**Educ 5422. Qualitative and Quantitative Research Methods in Education.** (3 cr; SP—Grad student or #; no grad credit; offered summer only; A-F only)

Qualitative and quantitative field research in educational settings; methodology, philosophical and ethical perspectives, and practice.

**Educ 5555. Environmental Education for Practicing Educators.** (2 cr; SP—No grad credit; A-F only)

Provides information base for informed decision making about environmental issues. Develops knowledge, skills, attitudes, motivation, and commitment to work individually and collectively toward sustaining a healthy world environment.

**Educ 5560. Current Research and Issues in Science Education.** (2-3 cr [max 6 cr]; SP—#; offered summer only; A-F only)

Examines science education research literature. Trends in research and teaching.

**Educ 5570. Exemplary Models for Science Education.** (2-3 cr [max 6 cr]; SP—#; offered summer only; A-F only)

Emphasis on hands-on and/or integrated curriculum models.

**Educ 5600. Practicum in Education.** (1-12 cr [max 12 cr]; SP—#; no grad credit; 5-N only)

Arranged opportunity for persons interested in gaining practical experience in a nontraditional educational program under direction and supervision of faculty. Location, type of experience, duration of experience, and assessment are determined in consultation with faculty supervisor.

**Educ 5650. Families in Crisis.** (3 cr; SP—Grad student or #; A-F only)

Examines impact of various crises on family members. Analysis of coping strategies, reorganization of family roles, and survey of community resources for assistance in crisis situations.

**Educ 5666. Creating Social Studies Curriculum Materials.** (3 cr; SP—No grad credit)

Using historic sites and related materials to create curriculum materials; implementing and evaluating living history learning experiences in classrooms.

## Course Descriptions

**Educ 5784. Multicultural Literature for Children and Adolescents.** (3 cr; SP—no grad credit; A-F only)  
Current literature.

**Educ 5804. Programs for Young Children: Global Perspectives.** (4 cr; SP—ECh 3010, ECh 3020, ECh 3030 or #)  
Cross-cultural perspectives on elementary education and early childhood education. Intercultural communication in different cultures; teaching and administrative behavior and differing educational structures in various foreign countries.

**Educ 5823. Teacher as Researcher.** (1-4 cr; SP—Tchg exper or #; A-F only)  
For practicing teachers who ask questions about their classrooms, seek answers from literature reviews and classroom research, and interpret and use the results.

**Educ 5850. Classroom Learning Applications.** (2 cr; SP—Admission to MEd or #; A-F only)  
Cognitive processes in education in preparation for developing curriculum and teaching. Emphasis on application of brain-based learning theory to development of knowledge systems in education.

**Educ 5991. Independent Study.** (.5-4 cr [max 8 cr]; QP—#; SP—#; no grad credit; A-F only)  
Directed independent study, readings, and/or projects of interest to students in education.

**Educ 5993. Special Area Project.** (.5-4 cr; SP—No grad credit; A-F only)  
Independent project for advanced students to substantially further their theoretical knowledge base or professional competencies.

**Educ 5994. Current Issues in Education.** (.5-4 cr; SP—Tchg exper or #; no grad credit; A-F only)  
Issues such as school reform and educational innovations.

**Educ 5995. Special Topics: (Various Titles to be Assigned).** (.5-4 cr [max 4 cr]; SP—No grad credit; A-F only)  
Topics selected from education to meet needs and interests of different groups of students.

# Education and Human Service Professions (EHS)

## College of Education and Human Service Professions

**EHS 5000. Human Service Systems.** (4 cr; SP—Course in human dev or ed psy or multicultural ed or spec ed, grad student or #; no grad credit; A-F only)  
Theoretical base for human service professions. Various theories critically analyzed to develop a conceptual framework. Current practices and future directions.

**EHS 5050. Applied Human Development.** (2-4 cr; SP—#; no grad credit; A-F only)  
Independent study incorporating a life span approach to understanding human development and using this approach to better understand aspects of one's personal and professional life. Reading, viewing videotapes, listening to audiotapes, and completing assignments through independent learning contract.

**EHS 5595. Special Topics: (Various Titles to be Assigned).** (.5-4 cr; SP—Course in human dev or ed psy or multicultural ed or spec ed, grad student or #; may be repeated under different topics for 12 cr max; no grad credit; A-F only)  
Topics announced in *Class Schedule*.

**EHS 5711. American Indian Culture and Tradition: Self-Assessment.** (2 cr; SP—No grad credit; A-F only)  
Provides a general historical background of American Indian post-Europe-contact history, explores culture and tradition while promoting professional self-assessment.

**EHS 5712. American Indian Culture and Tradition: Family and Community.** (2 cr; SP—No grad credit; A-F only)  
Provides an overview of American Indian family and community cultural and traditional interactions.

**EHS 5713. American Indian Culture and Tradition: Oral Tradition and History.** (2 cr; SP—No grad credit; A-F only)  
Explores historical and current methods and issues in oral tradition and education with emphasis on Woodlands and Plains Indians.

**EHS 5714. American Indian Culture and Tradition: Sovereignty and Treaty Rights.** (2 cr; SP—No grad credit; A-F only)  
Presents a historical review and analysis of American Indian identity, tribal status, sovereignty, and treaty rights.

**EHS 5715. American Indian Culture and Tradition: Field Project.** (2 cr; SP—5711, 5712, 5713, and 5714; no grad credit; A-F only)  
Utilizes information gained in preceding courses in a professional setting. Students may select a research topic for field study or complete an internship in an American Indian agency.

**EHS 5720. Experiential, Service, and Project Learning: Theories and Practice.** (3 cr [max 9 cr]; SP—No grad credit; A-F only)  
Learning experiential, service, and project learning theories. Understanding relationships between motivation and learning incentives, and the role of adult leadership. Applying theories and understanding to practice.

**EHS 5721. Using Experiential, Service, and Project Learning in Organizations.** (3 cr [max 9 cr]; SP—No grad credit; A-F only)  
Explores how organizations programmatically apply experiential, service and project learning theories. The course uses case studies to analyze organizations, cultures, theoretical development, program application, staff/volunteer/mentor training, incentives, motivation, goals and outcomes according to these theories.

**EHS 5990. Research Project.** (1-12 cr; SP—No grad credit; A-F only)  
Faculty-supervised research project required for M.Ed.

**EHS 7000. Master of Education Professional and Portfolio Development.** (.5-1 cr [max 1 cr]; SP—MEd candidate or #; no grad credit; A-F only)  
Self-examination and reflection of professional ethics and philosophy of education, autobiographical documentation of formal and informal experiences in education, selection of best works, initial planning of M.Ed program and field research project, and critical reflection of M.Ed. goals

**EHS 7001. Educational Innovations and Technology.**

(1-4 cr [max 12 cr]; SP-MEd candidate or #; no grad credit; A-F only)

Exploration of educational innovations using technology applicable to Pre-K-12 classrooms, including accessing UMD/class Web resources, services and assignments/discussion groups, email including listservs and local aliases, electronic portfolios, PowerPoint presentations, spreadsheets, databases, and SPSS for research statistics.

**EHS 7002. Human Diversity and Exceptionality.**

(1-4 cr [max 12 cr]; SP-MEd candidate or #; no grad credit; A-F only)

Evaluation of human diversity and exceptionality theories, strategies, and beliefs including: communication systems, cultural belief structures, traditions and history, special education issues and needs, laws, adaptive technologies and other educational strategies, social/support systems available to students, parents, teachers, and the community.

**EHS 7003. Families and Social Service Systems.**

(1-4 cr [max 12 cr]; SP-MEd candidate or #; no grad credit; A-F only)

Explore diverse family systems, understand complexities of bilingual, single parent, lower/upper SES, transient, families with disabled/terminally ill members. Social services/special programs available to at-risk students, staff and families in crisis/need. Demonstrate parent involvement/mentoring/referral strategies.

**EHS 7004. Educational Action Research and Inquiry.**

(1-4 cr [max 6 cr]; SP-MEd candidate or #; no grad credit; A-F only)

Examination of practice, theory and process of qualitative and quantitative educational research and inquiry. Culminates in approved MEd research project proposal, human subject research form completion and submission, and significant progress in literature review, creation of research tools, and methodology.

**EHS 7005. Teaching and Learning Systems.**

(1-4 cr [max 12 cr]; SP-MEd candidate or #; no grad credit; A-F only)

Evaluation of teaching and learning theories, strategies, and beliefs, including Transformational Learning, Motivation Strategies, Leadership Strategies, Cooperative and Collaborative techniques, multiple intelligences, discussion techniques, electronic portfolios, assessment rubric creation/implementation, service-based and experiential learning theories/applications, and others

**EHS 7006. Professional Practice and Leadership Seminar I: Professional Ethics and Education Philosophy.**

(1-4 cr [max 12 cr]; SP-MEd candidate or #; no grad credit; A-F only)

Exploration of professional ethics and philosophy of education/districts to develop a theoretical and philosophical knowledge base. Identification and elucidation of common ethical issues and dilemmas in education. Identification and assessment of master teachers' professional competencies, national standards and international benchmarks.

**EHS 7007. Professional Practice and Leadership Seminar 2: Professional Focus and Process.**

(1-4 cr [max 12 cr]; SP-MEd candidate or #; no grad credit; A-F only)

Exploration of professional focus and practice including grant writing, formal budget requests, conference presentations, conflict resolution, resource systems identification and management, special needs, and school reform.

**EHS 7008. Professional Practice and Leadership Seminar 3: Curriculum Design.**

(1-4 cr [max 12 cr]; SP-MEd candidate or #; no grad credit; A-F only)

Explore workshop, computer lab, classroom, learning environment design; curriculum design; leadership models in various settings including educational, community, cultural and global; participatory leadership theories; analysis of educational models; design, implement, and evaluate program/curriculum.

**EHS 7009. Professional Practice and Leadership Seminar 4: Assessment, Educational Reform, and System Issues.**

(1-4 cr [max 12 cr]; SP-MEd candidate or #; no grad credit; A-F only)

Develop effective assessment designs based on research, field observations in innovative schools, experiencing new curriculum delivery, and pilot studies. Explore educational change and reform through dialogue, readings, the Internet. Examine and apply system issues/theories to practice.

## Education, Secondary (EdSe)

### College of Education and Human Service Professions

**EdSe 3204. General Instructional Methods.**

(4 cr; SP-Admission to EdSe program; A-F only)

Effective teaching, teaching for diversity, teaching through multiple intelligences, Minnesota graduation rules, writing objectives and lesson plans, using instructional media and technology, various teaching strategies, methods of assessing student learning, classroom management.

**EdSe 3205. Apprenticeship: Middle School.**

(2 cr; SP-Admission to EdSe program, #3204; A-F only)

Thirty hours of experience in a middle school, including observing, teaching, tutoring, working with individual students and small groups. Focuses on classroom management, multicultural education, and students with special needs. Weekly seminar.

**EdSe 3206. Apprenticeship: Secondary School.**

(2 cr; SP-Admission to EdSe program, #3204; A-F only)

Thirty hours of experience in a high school, including observing, teaching, tutoring, working with individual students and small groups. Focuses on classroom management, multicultural education, and students with special needs. Weekly seminar.

**EdSe 4100. Human Relations in Classrooms.**

(2 cr; SP-Admission to EdSe program; A-F only)

Examination of cultural differences; planning instruction to accommodate individual differences in race, gender, ethnic background, cultural background, and physical and mental development; needs of persons with disabilities; humanizing classroom and classroom management procedures.

**EdSe 4222. Teaching Mathematics: Grades 5-12.**

(4 cr; SP-Admission to EdSe program, 3204 or #; no grad credit; A-F only)

Standards for secondary mathematics as they apply to learning, teaching, curriculum, and integration of technologies in mathematics grades 5-12; emphasis on use of problematic approach to mathematical sense-making.

## Course Descriptions

**EdSe 4244. Teaching Social Studies: Grades 5-12.** (3 cr; SP–Admission to EdSe program, 3204 or #; no grad credit; A-F only)  
History and philosophy of social studies education; social studies objectives; curriculum design; instructional planning and use of resources; evaluation procedures.

**EdSe 4255. Teaching Science: Grades 5-12.** (3 cr; SP–Admission to EdSe program, 3204 or #; no grad credit; A-F only)  
Historical development of science education. Goals and purposes of science education in secondary schools; methods and materials; evaluation procedures; current trends.

**EdSe 4400. Professional Development Seminar for Secondary Education Majors.** (1 cr; SP–Admission to EdSe program; no grad credit; A-F only)  
Professional development for Secondary Education Majors through documentation, reflection, synthesis of learning as related to standards. Development of process and product portfolios. Presentation of and dialogue about emergent learning.

**EdSe 4501. Educational Psychology.** (3 cr; SP–Admission to EdSe program; no grad credit; A-F only)  
Principles of psychology applied to teaching; examination of adolescent growth and development; classroom management.

**EdSe 4600. Student Teaching.** (6-12 cr [max 12 cr]; SP–4501,5100, appropriate methods course, Δ; no grad credit; S-N only)  
Supervised practicum in secondary or middle school under direction of licensed teacher. Demonstration of subject matter, teaching competence, and potential for future improvement.

**EdSe 4601. Student Teaching Seminar.** (1 cr; SP–¶4600; no grad credit; A-F only)  
Discussion of current practice as experienced during student teaching/professional semester. Relationship between theory and practice.

**EdSe 4991. Independent Study.** (1-6 cr [max 6 cr]; SP–#; no grad credit; A-F only)  
Directed independent study, readings, or projects of interest to education students.

**EdSe 4993. Special Area Project.** (1-4 cr; SP–#; no grad credit; A-F only)  
Independent project for advanced students to substantially further their theoretical knowledge base or professional competencies.

**EdSe 5100. Human Relations in Classrooms.** (2 cr; SP–Admission to EdSe program; A-F only)  
Examination of cultural differences; planning instruction to accommodate individual differences in race, gender, ethnic background, cultural background, and physical and mental development; needs of persons with disabilities; humanizing classroom and classroom management procedures.

**EdSe 5111. Secondary Curriculum and Administration.** (2 cr; SP–#; A-F only)  
Supervised study and field work to acquire understanding of organization and administration of secondary school curriculum, current practices, and current issues.

**EdSe 5120. Philosophy and Organization of the Middle School.** (2 cr; SP–120 cr or #; A-F only)  
Philosophies and organization and structure of middle schools. Assessment of benefits, drawbacks, and rationale.

**EdSe 5215. Teaching Reading and Literature: Grades 5-12.** (5 cr; SP–9 cr ed; A-F only)  
Teaching procedures, objectives, and materials; emphasis on teaching of reading in various subject-matter fields, practicum experience.

**EdSe 5991. Independent Study.** (.5-6 cr [max 6 cr]; SP–#; no grad credit; A-F only)  
Directed independent study, readings, and/or projects of interest to education students or practicing teachers.

**EdSe 5993. Special Area Project.** (.5-4 cr [max 4 cr]; SP–No grad credit; A-F only)  
Independent project for advanced students to substantially further their theoretical knowledge base or professional competencies.

## Educational Administration (EdAd)

### College of Education and Human Service Professions

**EdAd 5910. Professional Competency Assessment.** (2 cr; SP–No grad credit; EdAd lic progr or #; A-F only)  
Explores various required competencies of educational administration professionals seeking licensure or advanced educational degrees. Examines competency areas of diversity, creativity, technology, leadership, resource management, and assessment/regulations. Professional portfolios will be used to illustrate competencies.

**EdAd 5911. Leadership and Personal Growth.** (4 cr; SP–No grad credit; EdAd lic progr or #; A-F only)  
K-12 administrative competencies: school leadership, judgment skills, oral and nonverbal communications, written expression, philosophical and cultural value. Superintendent competencies: Leadership and district culture, and values and ethics of leadership.

**EdAd 5912. Supervision of Teachers and School Staff.** (4 cr; SP–no grad credit; EdAd lic progr or #; A-F only)  
K-12 administrative competencies: delegation of authority, staff development, motivation, and sensitivity. Superintendent competencies: human resource management.

**EdAd 5913. Communication and Community Relations in Education.** (4 cr; SP–No grad credit; EdAd progr or #; A-F only)  
K-12 administrative competencies: policy and political influences, media and public relations. Superintendent competencies: communication and community relations.

**EdAd 5914. Creation/Implementation and Interpretation of Rules and Regulations.** (4 cr; SP–No grad credit; EdAd lic progr or #; A-F only)  
K-12 administrative competencies: legal and regulatory applications. Superintendent competencies: policy and governance.

**EdAd 5915. Resource Management in Education.** (4 cr; SP–No grad credit; EdAd lic progr or #; A-F only)  
K-12 administrative competencies: information collection, problem analysis, organizational oversight, implementation skills, and human, fiscal and time resource allocation. Superintendent competencies: organizational management and human resource management.

**EdAd 5916. Instructional Design, Management and Assessment of Learning.** (4 cr; SP—No grad credit; EdAd lic progr or #; A-F only)

K-12 administrative competencies: instruction and the learning environment, curriculum design, student guidance and development, and measurement and evaluation. Superintendent competencies: curriculum planning and development and instructional management.

**EdAd 6991. Independent Study.** (1-4 cr [max 6 cr]; SP—#; A-F only)

Directed independent study, readings, and/or projects of interest to students who want to learn about educational administration.

**EdAd 6997. Internship in Educational Administration.** (1-4 cr [max 6 cr]; SP—#; A-F only)

For persons preparing for licensure as an elementary, middle school, or secondary school principal; preparing for licensure as a superintendent; or exploring an interest in educational administration.

## Electrical and Computer Engineering (ECE)

### College of Science and Engineering

*(Note: The CpE program was changed to ECE in 1994. Students wanting to use CpE courses as prerequisites should check with the ECE department for ECE equivalencies.)*

**ECE 1001. Introduction to Electrical and Computer Engineering.** (2 cr; SP—Pre-engr, ChE, CS, ECE, IE majors only; A-F only)

Definition and description of electrical and computer engineering. Digital and analog systems. Electrical and computer engineering lab equipment and software. Selected specialties. (2 hrs lect)

**ECE 1315. Digital System Design.** (4 cr; SP—Pre-engr, ChE, ECE, IE majors only; A-F only)

Binary number system and digital coding techniques. Boolean algebra, combinational logic circuits, and minimization techniques. Synchronous sequential circuits and state reduction techniques. Medium Scale Integration (MSI) combinational components. (3 hrs lect, 3 hrs lab)

**ECE 2006. Electrical Circuit Analysis.** (4 cr; QP—¶Math 3380, Phys 1109 or Phys 1109H; SP—¶Math 3280, Phys 1201, ¶1204; A-F only)

Basic circuit analysis: resistive circuits, voltage and current sources— independent and dependent. Nodal and mesh analysis. Network theorems. Energy storage elements. RC, RL, and RLC transient and steady state analysis, phasors. SPICE analysis. (3 hrs lect, 3 hrs lab)

**ECE 2111. Linear Systems and Signal Analysis.** (4 cr; SP—2006; A-F only)

Signal and system modeling concepts, system analysis in time domain, Fourier series and Fourier transform. Discrete time domain signals and systems, Z transform, analysis and design of digital filters, discrete Fourier transform, FFT applications. (3 hrs lect, 3 hrs lab)

**ECE 2212. Electronics I.** (4 cr; QP—3006 or CpE 3005; SP—2006; A-F only)

Diodes, BJTs, FETs, ideal operational amplifiers, DC analysis, small signal models, and analysis; single-stage circuits design; power amplifiers. (3 hrs lect, 3 hrs lab)

**ECE 2325. Microcomputer System Design.** (4 cr; QP—1315 or CpE 3015; SP—1315; A-F only)

Microcomputer components. Instruction set, machine and assembly language programming. Addressing modes. Signed/unsigned arithmetic. Stack uses. Assembly-level translation of high-level language constructions. Input/Output interfacing. Interrupt programming. Microcomputer system hardware. (3 hrs lect, 3 hrs lab)

**ECE 3151. Control Systems.** (3 cr; QP—3011 or CpE 3011; SP—2111; A-F only)

System mathematical modeling: differential equations, Laplace transform, block diagrams, signal flow graphs. System performance characteristics: time response, sensitivity, steady-state error. Stability analysis: Routh-Hurwitz, root locus and Nyquist. State variables. Compensation design, software tools. (3 hrs lect)

**ECE 3235. Electronics II.** (4 cr; QP—3021 or CpE 3021; SP—2212; A-F only)

Multistage circuits, frequency analysis, non-ideal operational amplifiers, feedback and stability, oscillators, filters. (3 hrs lect, 3 hrs lab)

**ECE 3341. Digital Computer Circuits.** (4 cr; QP—3325 or CpE 3025; SP—2325; A-F only)

Digital logic family characteristics. Medium Scale Integration (MSI) components and applications. Programmable Logic Devices (PLDs). Alternative clocking techniques. Computer arithmetic circuits and memory design. Fundamental mode asynchronous finite-state machine design. (3 hrs lect, 3 hrs lab)

**ECE 3445. Electromagnetic Fields.** (3 cr; QP—Math 3350, Math 3380, Phys 1109 or Phys 1109H; SP—Math 3280, Math 3298, Phys 1201, Phys 1204; A-F only)

Fundamentals of electromagnetic analysis. Electrostatic and magnetostatic fields. Introductory numerical analysis of electromagnetic fields. Time-varying fields and potentials. Maxwell's equations and their applications. (3 hrs lect)

**ECE 3611. Introduction to Solid-State Semiconductors.** (3 cr; QP—Phys 1109; SP—Phys 1204; A-F only)

Fundamentals of solid-state semiconductors and devices. Quantum mechanical concepts and atomic states, solid-state structure, band structure, semiconductor statistics, and transport. (3 hrs lect)

**ECE 4151. Digital Control System Design.** (3 cr; QP—3012 or CpE 3012; SP—3151, 3341; A-F only)

Digital control system characteristics: transient and steady-state responses, frequency response, stability; design by transform techniques; controllability and observability; design using state-space methods. (3 hrs lect)

**ECE 4246. Advanced Analog Circuits.** (3 cr; QP—3055 or CpE 3055; SP—3235; A-F only)

Application of linear integrated circuits to data acquisition problems; transducer interfacing, linear and non-linear preprocessing, phase-locked loops, and high performance quantization and recovery (A/D, D/A conversion). (3 hrs lect)

## Course Descriptions

**ECE 4305. Computer Architecture.** (4 cr; QP-3340 or CpE 3070; SP-3341; A-F only)

Advanced assembly language programming techniques. Memory design principles. Virtual memory. Cache memory. Processor design. Pipelined and Reduced Instruction Set Computers (RISC). Advanced microprocessor features. (3 hrs lect, 3 hrs lab)

**ECE 4311. Design of Very Large-Scale Integrated Circuits.** (3 cr; QP-3340 or CpE 3070, 3035 or CpE 3035 or #; SP-3235, 3341 or #; A-F only)

Philosophy of and techniques for designing VLSI circuits in CMOS technology. Full- and semi-custom design techniques. Digital, analog, and hybrid CMOS circuits and systems. Substantial design project required. (3 hrs lect)

**ECE 4315. Multiprocessor-Based System Design.** (3 cr; QP-3325, ¶CS 5520; SP-4305, ¶CS 5631; A-F only)

Parallelism, interconnection networks, shared memory architecture, principles of scalable performance, vector computers, multiprocessors, multicomputers, dataflow architectures, and supercomputers. (3 hrs lect)

**ECE 4321. Computer Networks.** (3 cr; QP-5305 or CpE 3510, Stat 3562; SP-3341, Stat 3611; A-F only)

Network classification and services. Protocol and communication architectures. Hardware components: multiplexers, concentrators, bridges, routers, access servers. (3 hrs lect)

**ECE 4477. Antennas and Transmission Lines.** (3 cr; SP-3445; A-F only)

Introduction to free space and guided electromagnetic wave propagation; analysis and design of antennas and transmission lines. (3 hrs lect)

**ECE 4501. Power Systems.** (4 cr; QP-3006 or CpE 3005; SP-2006; no grad credit; A-F only)

Fundamentals of rotating machines: DC, synchronous, and induction machines. Transformers. Power system representation. Transmission lines. Power system analysis: stability and dynamic performance. Balanced and unbalanced faults. Power system protection. (3 hrs lect, 3 hrs lab)

**ECE 4741. Digital Signal Processing.** (3 cr; QP-3012 or CpE 3012; SP-2111; A-F only)

Discrete signal processing, digital filtering, A/D conversion, two-dimensional signal processing restoration, enhancement, and reconstruction. (3 hrs lect)

**ECE 4765. Modern Communication.** (4 cr; QP-3011 or CpE 3011, 3035 or CpE 3035; SP-2111, 3235)

Design and analysis of modern communication systems; evaluation of analog and digital modulation techniques. (3 hrs lect, 3 hrs lab)

**ECE 4781. Telecommunications.** (3 cr; QP-3445 or CpE 3045, 3520 or CpE 3520, 3530 or CpE 3530; SP-3445; no grad credit; A-F only)

Switching theory, transmission, networking, traffic engineering, and associated engineering problems and solutions.

**ECE 4801. Introduction to Artificial Neural Networks.** (3 cr; QP-CS 1622, Math 3380, Stat 3562 or #; SP-CS 1521, Math 3280, Stat 3611 or #; A-F only)

Definitions and models of neural networks. Perceptron-based networks. Multi-layered networks with supervised learning. Recurrent networks. Associative memories. Unsupervised learning. (3 hrs lect)

**ECE 4813. Tools and Methods of Design Automation.**

(3 cr; QP-3340 or CpE 3070 or CS 5510; SP-3341; A-F only) Methods and techniques for designing electronic systems based on top-down strategy. High-level synthesis techniques and tools. Automated design of large, digital electronic systems. Design project using electronic design automation tools available in department. (3 hrs lect)

**ECE 4831. Fuzzy Set Theory and Its Application.** (3 cr; QP-CS 1623, Math 3320; SP-CS 1521, Math 3280; A-F only)

Concepts and techniques for dealing with complex phenomena that do not lend themselves to analysis by classical methods, based on probability theory and bivalent logic. (3 hrs lect)

**ECE 4899. Senior Project I.** (1 cr; QP-3340 or CpE 3040; SP-\$4951, 3341, BSECE candidate, #; no grad credit; A-F only)

Selection and completion of project approved and supervised by faculty.

**ECE 4951. Design Workshop.** (4 cr; QP-Comp 3130; SP-\$4899, \$4999; Comp 3130, BSECE candidate, 100 cr or #; no grad credit; A-F only)

Study of a selected topic; its application to a design project, completed individually or in a small group. Focuses on a different method each semester offered. Completion satisfies requirement for a senior design project.

**ECE 4991. Independent Study.** (1-3 cr; SP-#; does not qualify as ECE technical elective; no grad credit; A-F only)

Special projects not available in regular curriculum. Independent investigation, research studies, or survey of selected projects or problems.

**ECE 4995. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 3 cr]; SP-#; A-F only)

Current problems and research. Discussions, selected reading, and/or invited speakers.

**ECE 4999. Senior Project II.** (3 cr; QP-3970 or CpE 3970; SP-\$4951, 4899, BSECE candidate, #; no grad credit; A-F only)

Students present senior project results in formal report after making refinements. Complete documentation of results in professional manner required. ECE 4899 and ECE 4999 must be completed within one year for credit.

## Elementary Education (EIEd)

### College of Education and Human Service Professions

**EIEd 1010. Introduction to Elementary Education.** (3 cr; A-F only)

The elementary teaching profession; personal goals, teaching-learning environment, learner sensitive model, and career opportunities. Experiences which help students gain accurate knowledge of their field.

**EIEd 3113. Learning Environments and Diverse Learning Communities.** (4 cr; SP-¶3325, ¶3331, ¶3355, Educ 3412, Hlth 5161, PE 3126, EIEd candidate; A-F only)

Teaching and learning models as a basis for structuring learning environments for children. Curriculum and instructional strategies; action research; parent involvement. Sociocultural and historical backgrounds, issues, unique learner needs of students, with emphasis on American Indian students.

**EIEd 3325. Language and Literacy.** (4 cr; SP-¶3113, ¶3331, ¶3355, Educ 3412, Hlth 5161, PE 3126, EIEd or ECh candidate; A-F only)

Development and instruction in children's literature-based reading, writing, and oral language in elementary schools. Methods, materials, and research findings related to teaching of integrated language arts.

**EIEd 3331. Children's Literature and Integrated Creative Arts.** (4 cr; SP-¶3113, ¶3325, ¶3355, Educ 3412, Hlth 5161, PE 3126, EIEd or ECh candidate; A-F only)

Purposes of reading; bases for selecting and evaluating reading materials; integrated creative arts: literature, music, drama, and visual arts for elementary classrooms, including those with special needs students.

**EIEd 3355. Critical Thinking: Elementary Mathematics.** (4 cr; SP-¶3113, ¶3325, ¶3331, Educ 3412, Hlth 5161, PE 3126, EIEd candidate; A-F only)

Concepts learned through discovery, induction, critical reasoning, problem solving. Standards for elementary mathematics, use of a problematic approach to mathematical sense making.

**EIEd 3425. Collateral Fields: Field Experiences.** (1-3 cr [max 6 cr]; SP-#; A-F only)

Experience working with kindergarten, elementary, or middle school teacher and children. Work supervised by education adviser and/or faculty member from academic department or collateral field, in cooperation with elementary or middle school principal.

**EIEd 4344. Teaching Science and Environmental Education.** (4 cr; SP-3113, ¶4345, ¶4366, ¶SpEd 5310, EIEd candidate or #; no grad credit; A-F only)

Curriculum standards and research-based pedagogy. Includes field experience.

**EIEd 4345. Instructional Strategies, Assessment, and Management.** (4 cr; SP-3113, ¶4344, ¶4366, ¶SpEd 5310, EIEd candidate or #; no grad credit; A-F only)

Formal and informal assessment strategies to ensure and evaluate continuous intellectual, social, and physical development of students while managing and supporting a positive classroom environment. Includes field experience.

**EIEd 4366. Teaching Social Studies and Environmental Education.** (4 cr; SP-3113, kindergarten EIEd candidate, ¶4344, ¶4345, ¶SpEd 5310; no grad credit; A-F only)

Content and organization of social studies; planning instruction for diverse students; understanding and improving the learning situation; effective use of materials in environmental education.

**EIEd 4400. Professional Development Seminar for Elementary Education Majors.** (1 cr; SP-Acceptance into EIEd program; no grad credit; A-F only)

Professional development for Elementary Education Majors through documentation, reflection, synthesis of learning as related to standards. Development of process and product portfolios. Presentation of and dialogue about emergent learning.

**EIEd 4600. Student Teaching.** (6-12 cr; SP-Sr, EIEd candidate, Δ; no grad credit; S-N only)

Planning, implementing, and evaluating an elementary curriculum. Assessing learning needs and collaborating with specialists to individualize methods and materials.

**EIEd 4601. Student Teaching Seminar.** (1 cr; SP-¶4600; no grad credit; A-F only)

Discussion of current practice as experienced during student teaching/professional semester. Relationship between theory and practice.

**EIEd 4650. Student Teaching in Individual Subjects: K-8.** (1-6 cr [max 7 cr]; SP-Δ; no grad credit; S-N only)

Student teaching in, e.g., art, music, physical education, science. Demonstrating subject matter competence, instructional strategies, and management skills; self-evaluation.

**EIEd 4991. Independent Study.** (1-6 cr [max 6 cr]; SP-Δ; no grad credit; A-F only)

Directed independent study, reading, and/or projects in elementary or middle school education of interest to student.

**EIEd 4993. Special Area Project.** (1-4 cr; SP-#; no grad credit; A-F only)

Independent project for advanced students to substantially further their theoretical knowledge base or professional competencies.

**EIEd 5401. Elementary School Curriculum.** (2 cr; SP-#; no grad credit; A-F only)

Curriculum practices, issues, and trends in elementary schools; survey of research studies related to all areas of instruction; approaches to school reform; analysis of representative programs.

**EIEd 5595. Professional Teaching Experience in a Kindergarten Classroom.** (4 cr; SP-Sr, kindergarten EIEd candidate, Δ; no grad credit; S-N only)

Planning, implementing, and evaluating a kindergarten curriculum. Assessing learning needs and collaborating with specialists to individualize methods and materials.

**EIEd 5993. Special Area Project.** (1-4 cr; SP-#; no grad credit; A-F only)

Independent project for advanced students to substantially further their theoretical knowledge base or professional competencies.

## Engineering (Engr)

### College of Science and Engineering

**Engr 2015. Statics.** (3 cr; QP-¶Math 1297; Phys 1107; SP-Math 1297, Phys 1201)

Vector algebra. Applications of equations of equilibrium to analysis of simple engineering structures and machines. Nature and influence of friction. Elementary theory of static determinate framed structures. Deformation of structures with axially loaded elements.

**Engr 2016. Mechanics of Materials.** (3 cr; QP-3015, ¶Math 3380; SP-2015, ¶Math 3280)

Introductory treatment of stress and strain at a point. Stress-strain relation in two dimensions. Axial loading, torsion, shear and bending moment diagrams, bending stresses, deflection of determinate and indeterminate beams, instability.

**Engr 2026. Dynamics.** (3 cr; QP-3015, ¶Math 3380; SP-2015, ¶Math 3280)

Review of particle dynamics. Mechanical systems and rigid-body model. Kinematics and dynamics of plane systems.

**Engr 3201. Electrical Power.** (3 cr; QP-Phys 1109, Math 3380 or equivalent; SP-¶Math 3280, Phys 1201)

Fundamentals of electric circuit analysis. Single-phase and three-phase AC. Rotating electric machines. Power distribution systems.

# Engineering Management (EMgt)

## College of Science and Engineering

### EMgt 5110. Management of Engineers and Technology.

(3 cr; SP-EMgt student or Δ; A-F only)  
Managing the synergism of people and technology. Overview of management functions, tools, methods. Planning, organization, leadership, motivation, control, quality, human resources, effective decision making.

### EMgt 5120. Advanced Project Management.

(3 cr; SP-EMgt student or Δ; A-F only)  
Project justification and finance. Development and management of project plans and resources. Working with contractors and union personnel. Covers the life cycle of projects. Applications to current practice.

### EMgt 5130. Operations Modeling and Analysis.

(3 cr; SP-EMgt student or Δ; A-F only)  
Modeling and analysis of manufacturing and service systems. Linear programming, network analysis, queuing theory, Markov chains, and non-linear optimization.

### EMgt 5160. Total Quality Management.

(3 cr; SP-EMgt student or Δ; A-F only)  
Global competitiveness, organizational culture, management role responsibilities, concepts for customer value, strategic management, measurement of customer value, organizing to improve systems, employee involvement, culture change, and organizational learning. ISO 9000, quality awards.

### EMgt 5210. Information Technology for Management.

(3 cr; SP-EMgt student or Δ; A-F only)  
Brings students up to date in the field of information technology (IT) and prepares them to manage those technologies in the workplace. Current management and technical topics.

### EMgt 5220. Environmental Issues in Engineering.

(3 cr; SP-EMgt or Δ; A-F only)  
A historical perspective on society's environmental concerns, discussion of federal environmental statutes, regulatory system, approaches to preventing and mitigating environmental problems, and the elements of an effective environmental management system.

### EMgt 5230. Technical Forecasting.

(3 cr; SP-EMgt student or Δ; A-F only)  
Statistical review, data sources, choosing a forecasting technique, moving averages, smoothing, regression analysis, time series analysis, the Box-Jenkins (ARIMA) methodology.

### EMgt 5240. Advanced Operations Management.

(3 cr; SP-EMgt student or MBA student or Δ; A-F only)  
Quantitative methods for designing and analyzing manufacturing and service operations, simulation, and recent paradigms in manufacturing including just-in-time production, synchronous manufacturing, and agile manufacturing. Current competitiveness-enhancing techniques like continuous improvement, benchmarking, and business process re-engineering.

### EMgt 5250. Legal and Ethical Issues in Engineering.

(3 cr; SP-EMgt student or Δ; A-F only)  
Overview of the legal and ethical issues of concern to the engineering manager. Basic law, contracts, intellectual property, product liability. Ethics case studies.

**EMgt 5995. Special Topics: (Various Titles to be Assigned).** (1-3 cr; SP-EMgt student or Δ; A-F only)  
Selected current topics in engineering management. (Various titles to be assigned).

### EMgt 8310. Project Methodology and Practice.

(3 cr; SP-5110, 5120, 5130, 5160; A-F only)  
Research and analysis of a topic or situation of current interest to industry. Probe depth and breadth of the topic and related issues. Analysis to include engineering and management considerations like technical and economic feasibility, life cycle cost analysis, organizational impact, quality impact, environmental and legal implications, and marketability. Formal report and oral presentation.

**EMgt 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser and DGS consent)

# English (Engl)

## College of Liberal Arts

### Engl 1001. Great American Authors.

(3 cr; A-F only; LE 9)  
Introduction to American authors important for their artistic mastery and/or significant role in American literary history.

**Engl 1101. Literature Appreciation.** (3 cr; QP-\$1906 or 1907; primarily for nonmajors but also for potential majors and creative writers; SP-\$1907; primarily for nonmajors but also for potential majors and creative writers; A-F only; LE 9)  
Developing critical reading skills in fiction, poetry, and drama.

### Engl 1507. Time and Place.

(3 cr; A-F only; LE 9)  
Close reading of selected works about experience of time and place.

### Engl 1535. King Arthur in History, Literature, and Art.

(3 cr; A-F only; LE 9)  
Survey of historical accounts, and literary and artistic treatments of King Arthur in Latin, French, and German sources of the Middle Ages and in selected works in modern Arthurian literature.

### Engl 1575. 20th-Century Literature.

(3 cr; SP-Primarily for nonmajors; A-F only; LE 9)  
Readings primarily in American, British, and Irish literature.

### Engl 1582. Introduction to World Literatures.

(3 cr; A-F only; LEIP 9)  
Sampling of literary works mainly from Middle East, Africa, Far East, and South America.

### Engl 1585. Australian and New Zealand Literature and Culture.

(3 cr; A-F only; LEIP 9)  
Introduces students to the literature and cultures of Australia and New Zealand, focusing on the formation of national identity, both countries' relationship to Great Britain and the US, conventions like "mateship," and the cultural politics of aboriginal peoples.

### Engl 1666. Tales of Terror.

(3 cr; A-F only; LE 9)  
Gothic masterpieces chiefly from English and American literature, with emphasis on sociological and psychological implications of the genre.

### Engl 1801. Freshman Seminar: American Gothic.

(3 cr; SP-Freshman, fewer than 30 cr; A-F only; LE 9)  
Exploration of the Gothic tradition in American literature from colonial days to the present, with special attention

to psychological and cultural implications. Some attention, also, to visual arts, film, and theories of terror, horror, the uncanny, and the grotesque.

**Engl 1802. Freshman Seminar: Asian Culture.** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 7)  
Exploration of Chinese and Japanese cultures with attention to Confucianism, Taoism, Buddhism, Shinto and arts such as calligraphy, painting, poetry, garden design, and music. Some attention also to political history.

**Engl 1803. Freshman Seminar: Unseen Reality.** (3 cr; SP–Freshman, fewer than 30 cr; A-F only; LE 9)  
Concepts of “the ideal” and “the real” as developed by writers with differing perspectives, in various literary forms (e.g., fiction, non-fiction, poetry).

**Engl 1907. Introduction to Literature.** (3 cr; QP–\$1906; primarily for nonmajors; SP–Primarily for nonmajors; A-F only; LE 9)  
Literary modes and methods of literary study and interpretation.

**Engl 2571. Contemporary Literature.** (3 cr; A-F only; LE 9)  
Readings in American and British literature since 1945. Emphases, authors, and titles vary.

**Engl 2581. Women Writers.** (3 cr; QP–45 cr or #; SP–30 cr or #; A-F only; LECD 9)  
Feminist reading of selected plays, poetry, prose (including critical works) written by women writers.

**Engl 3115. Writing Fiction.** (4 cr [max 8 cr]; QP–Comp 1110 or Comp 1120 or #; SP–Comp 1120 or #; A-F only)  
Writing of original fiction, with emphasis on the short story; structure and techniques learned from critical reading and classroom analysis.

**Engl 3121. Writing Poetry.** (4 cr; A-F only)  
Writing of poetry, with emphasis on techniques learned through critical reading and classroom analysis.

**Engl 3223. Shakespeare.** (3 cr; A-F only; LE 9)  
Introduction to Shakespeare. Selected plays from the histories, comedies, tragedies, and dramatic romances. Aspects of drama, such as structure, language, characterization, theme, and dramatic conventions examined in study of individual plays.

**Engl 3411. The Modern Short Story.** (4 cr; A-F only)  
Study of the genre, emphasizing close reading and interpretation of the elements of short fiction in selected works.

**Engl 3501. British Literature I.** (4 cr; SP–Engl major or minor; A-F only)  
Chronological study of English literature from beginnings to late-18th century, emphasizing major works, authors, and important literary forms, styles, themes, and movements.

**Engl 3502. British Literature II.** (4 cr; SP–Engl major or minor; A-F only)  
Chronological study of English literature from late-18th to late-20th century, emphasizing major works, authors, and important literary forms, styles, themes, and movements.

**Engl 3511. European and Russian Literature.** (4 cr)  
Reading of European and/or Russian literature in translation. Period, topic, and nationality vary with instructor.

**Engl 3563. American Literature I.** (4 cr; A-F only)  
Historical survey of important authors, movements, conventions, genres, and themes: origins to Civil War.

**Engl 3564. American Literature II.** (4 cr; A-F only)  
Historical survey of important authors, movements, conventions, genres, and themes: Civil War to present.

**Engl 3906. Methods of Literary Study.** (4 cr; QP–\$1906; Comp 1120, Engl major or #; SP–Comp 1120, Engl major or #; A-F only)  
Introduction to interpretive and scholarly methods.

**Engl 4292. Literature into Film.** (4 cr; SP–30 cr or #; A-F only)  
Comparative study of novels and their film adaptations.

**Engl 4375. Drama.** (4 cr; A-F only)  
Selected playwrights, plays, types, traditions, or periods; relevant theoretical and critical writings. Authors and topics vary.

**Engl 4909. Senior Portfolio.** (1 cr; SP–Engl major, sr; A-F only)  
Required portfolio and research project undertaken for senior seminar.

**Engl 4931. Practicum in Teaching Literature.** (4 cr; SP–3906, sr, 4 upper div lit courses, #; no grad credit; A-F only)  
Assist in teaching a 1-, 2-, or 3-level literature course; prepare course materials; advise students in course; learn about the grading process; lecture and lead discussions; conferences with professor about teaching issues.

**Engl 5116. Advanced Writing of Fiction.** (4 cr [max 8 cr]; QP–#; SP–#; A-F only)  
Writing of original fiction beyond the beginning stages; some experience required.

**Engl 5122. Advanced Writing of Poetry.** (4 cr [max 8 cr]; QP–3121 or #; SP–3121 or #; A-F only)  
Study of poetics and poetry, with emphasis on student poems.

**Engl 5222. Shakespeare.** (4 cr; SP–6 cr literature; A-F only)  
Concentrated study of selected plays, with attention to Shakespearean criticism and scholarship. Recommended as the second course in Shakespeare.

**Engl 5312. Chaucer.** (4 cr; SP–6 cr literature; A-F only)  
Introduction to Middle English. Reading and analysis of Chaucer’s works, primarily *Canterbury Tales* and *Troilus and Criseyde*.

**Engl 5331. Milton.** (4 cr; QP–8 cr literature; SP–6 cr literature; A-F only)  
Minor poems, *Areopagitica*, *Paradise Lost*, and *Samson Agonistes*.

**Engl 5375. Modern Poetry.** (4 cr; QP–8 cr literature; SP–6 cr literature; A-F only)  
Study of modern poetry written in English.

**Engl 5471. The Novella.** (4 cr; SP–6 cr literature; A-F only)  
In-depth study of selected masterworks of the form.

**Engl 5533. Studies in English Literature Before 1800.** (4 cr; SP–6 cr literature; A-F only)  
Intensive study of a theme, literary school or circle, literary genre in historical and cultural context. Topics vary.

**Engl 5541. Restoration and 18th Century Literature.** (4 cr; SP–6 cr literature; A-F only)  
Study of controversies and cultural change evident in English literature, 1660-1800. Such authors as Dryden, Behn, Pope, Fielding, Johnson

## Course Descriptions

**Engl 5561. English Romanticism.** (4 cr; QP-8 cr literature; SP-6 cr literature; A-F only)

The Romantic movement in England as reflected in the works of such writers as Wordsworth, Coleridge, Mary Shelley, Keats, Percy Shelley, and Anne Radcliffe.

**Engl 5562. Victorian Literature.** (4 cr; QP-8 cr literature; SP-6 cr literature; A-F only)

Cultural and social concerns of Victorian England as reflected in the works of such writers as Tennyson, Arnold, Christina and D.G. Rossetti, Robert and Elizabeth Barrett Browning, and Samuel Butler.

**Engl 5566. Irish Literary Revival.** (4 cr; QP-8 cr literature; SP-6 cr literature; A-F only)

Anglo-Irish literature in its sociohistorical context. Such authors as Yeats, Synge, Gregory, Joyce, and O'Casey.

**Engl 5571. Colonial and Revolutionary American Authors.** (4 cr; SP-6 cr literature; A-F only)

Major authors of 17th and 18th centuries representing not only the literary artistry of those periods but also the religious and political prose that shaped the emerging republic.

**Engl 5572. American Renaissance.** (4 cr; SP-6 cr literature; A-F only)

American Romanticism and the flowering of American literature from early 19th century to the Civil War (authors and topics vary; e.g., Thoreau, Fuller, Hawthorne, Dickinson, Whitman).

**Engl 5573. American Realism, Naturalism.** (4 cr; SP-6 cr literature; A-F only)

Literary realism and its outgrowths in America (naturalism, impressionism, regionalism) from the Civil War through the early 20th century (authors and topics vary; e.g. Twain, Howells, Chopin, James, Wharton).

**Engl 5577. Major American Authors.** (4 cr [max 8 cr]; SP-6 cr literature; A-F only)

Concentrated study in one to three authors, who are announced before course is offered.

**Engl 5581. American Novel I.** (4 cr; SP-6 cr literature or #; A-F only)

The American novel, origins through 1920; cultural, intellectual, and aesthetic contexts. Authors and topics vary.

**Engl 5582. American Novel II.** (4 cr; SP-6 cr literature; A-F only)

The American novel, 1920 to present; cultural, intellectual, and aesthetic contexts. Authors and topics vary.

**Engl 5583. British Novel.** (4 cr; A-F only)

The British novel in its social, aesthetic, and intellectual contexts.

**Engl 5591. Independent Study.** (1-5 cr [max 8 cr]; QP-Max 6 cr toward grad program; SP-#; max 6 cr toward grad program; A-F only)

Students choose projects in consultation with their instructor.

**Engl 5595. Special Topics: (Various Titles to be Assigned).** (1-5 cr [max 10 cr]; QP-Primarily for majors, minors, grads; SP-Primarily for majors, minors, grads; A-F only)

Topics not included in regular English curriculum. Topic and credits announced before course offered.

**Engl 5661. Publishing the Middle Ages.** (4 cr; SP-Jr or sr or grad student or #; A-F only)

Study of the ways in which the middle ages were defined and canonized in print culture. Instruction on the processes of medieval manuscript production and editing, followed by analysis of rhetorical framework within which "medievalism" was constructed in the 19th century.

**Engl 5662. The Making of a Major Author: The Scholarly Edition in 17th-and-18th-Century England.** (4 cr; SP-Jr or sr or grad student or #; A-F only)

Study of the ways in which writers such as Shakespeare and Milton were transformed into "major authors" and "national poets" through the publication of scholarly editions of their works subsequent to their deaths. Textual analysis of the editions is combined with study of their publication histories, including the roles of editors and publishers who produced them.

**Engl 5663. Readers and the History of Books.** (4 cr; SP-Jr or sr or grad student or #; A-F only)

History of reading, primarily in the United States and England. Study of factors affecting literacy in late 18th through early 20th centuries, including technological advances, educational reform and changes in authorship and literature.

**Engl 5664. Small Presses, Little Magazines, and Modernism.** (4 cr; SP-Jr or sr or grad student or #; A-F only)

The founding and promotion of the modernist movement in little magazines and small presses. Publishing careers of significant modernists (e.g. Ford, Pound, Yeats, H.D. Eliot, Joyce).

**Engl 5811. Introduction to Modern English.** (4 cr; A-F only)

Modern theories of English grammar.

**Engl 5821. History of the English Language.** (4 cr; A-F only)

History of sounds, word stock, and structures of English language from earliest records to present.

**Engl 5902. Teaching Language, Cognition, and Writing.**

(4 cr; QP-Admission to BAA program or #; SP-Admission to BAA program or #; A-F only)

Theory and practice of teaching composition; for prospective teachers grade five to community college level.

**Engl 5922. Teaching Literature and Communication.**

(4 cr; QP-\$3912; SP-5902; S-N only)

Theory and applications in teaching reading, writing, speaking, listening, and media, grades 5-12.

**Engl 8171. Seminar in Pre-1800 British Literature.** (4 cr;

SP-Grad student; A-F only)

Selected topics in the study of British literature written prior to 1800.

**Engl 8181. Seminar in British Literature, Late 18th-20th.**

(4 cr; SP-Grad student; A-F only)

Graduate seminar on selected topics in the study of British literature written from the late 18th century through the 20th century.

**Engl 8191. Seminar: American Literature.** (4 cr; A-F only)

Intensive study of selected authors and topics announced ahead of time; historical, cultural, and literary contexts; methodology; relevant scholarship and criticism.

**Engl 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser and DGS consent)

**Engl 8444. FTE: Doctoral.** (1 cr; SP-Doctoral student, adviser and DGS consent)

**Engl 8666. Doctoral Pre-Thesis Credits.** (1-18 cr [max 60 cr]; SP—Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

**Engl 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; SP—Max 18 cr per semester or summer; 24 cr required)

**Engl 8906. Introduction to Critical Theory.** (4 cr; A-F only)  
Core course required for all English M.A. (Plan B) students. Seminar in critical theory and methods of literary research.

**Engl 8931. Practicum in Teaching Literature.** (4 cr; QP-8 cr literature; SP-8 cr grad-level literature or #, Δ; A-F only)  
Teaching in sophomore literature courses; experience preparing supplementary materials, consulting with students, and assisting instructors in grading student work.

## Environmental Studies (ES)

### College of Liberal Arts

**ES 1001. Introductory Seminar.** (2 cr; A-F only)  
Introduction to the complexities of multidisciplinary environmental issues through research and literature review with emphasis on development of critical thinking skills.

**ES 2001. Ecosystems I.** (3 cr; SP—Environ studies major; A-F only)  
Contains a theoretical description of the fundamental physical, chemical and biological components comprising ecosystems, how these components interact to determine ecosystem structure and function, and the response of these components, hence ecosystems, to anthropogenic stress.

**ES 2002. Ecosystems II.** (3 cr; SP-2001; A-F only)  
Builds upon the theoretical information provided in ES 2001 by providing students a hands-on approach to understanding ecosystem dynamics. Students will learn hypothesis testing, experimental techniques, and methods for analyzing data that indicates ecosystems' response to anthropogenic stress.

**ES 3001. Outdoor Experience.** (1 cr; SP-1001, 60 cr, ES major/minor or #; A-F Only)  
Lecture and field-based course incorporating outdoor recreational programs, environmental education, and field-based research in science into a comprehensive understanding of multidisciplinary nature of environmental issues.

**ES 3050. Special Topics: (Various Titles to be Assigned).** (2-4 cr [max 8 cr]; SP-60 cr, ES major or #)  
In depth examination of a particular problem, topic, or group thereof, in the field of interdisciplinary environmental studies.

**ES 4001. Independent Study.** (1-3 cr [max 6 cr]; SP-60 cr or #, no grad credit; A-F only; LE 2)  
Directed readings and projects for students who wish to do independent advanced study or work on topics not normally covered in other courses.

**ES 5001. Environmental Studies Seminar .** (4 cr; QP-ES major, 90 cr; no grad credit; SP-ES major, 90 cr; no grad credit; A-F only)  
Critical discussion, research, and literature review of multidisciplinary environmental issues.

**ES 5050. Environmental Studies Internship.** (2-4 cr; SP—No grad credit; S-N only)  
Practical experience in some field of environmental work, under direction of a faculty adviser and a work-site adviser.

## Family Medicine (FMed)

### School of Medicine

**FMed 5591. Independent Study.** (1-8 cr [max 12 cr]; QP-Δ; SP-Δ)

Intensive, independent study project of student's interest in medical research, interdisciplinary fellowship, preceptorship in rural health care delivery, or another medical area approved by Department of Family Medicine.

**FMed 6101. Family Medicine.** (2 cr; SP-Regis med student; P-N only)

Lectures and seminars on computers in medicine, alternative medicine, preventive medicine, and ethnic diversity.

**FMed 6105. Physical Diagnosis.**

See Med 6505.

**FMed 6121. Preceptorship I.** (1 cr; SP-Regis med student; P-N only)

Students spend periods with area physician in family medicine observing problems encountered in this type of practice and methods by which health care is delivered.

**FMed 6122. Preceptorship II.** (2 cr; SP-Regis med student; P-N only)

Students spend periods with area physician in family medicine observing problems encountered in this type of practice and methods by which health care is delivered.

**FMed 6441. Clinical Rounds and Clerkship I.** (2 cr; SP-Regis med student; P-N only)

Clinical practicum, hospital based, covering core material in family practice, internal medicine, obstetrics, pediatrics, surgery. Patient work-ups with discussion by preceptor.

**FMed 6442. Clinical Rounds and Clerkship II.** (2 cr; SP-Regis med student; P-N only)

Clinical practicum, hospital based, covering core material in family practice, internal medicine, obstetrics, pediatrics, surgery. Patient work-ups with discussion by preceptor.

**FMed 6461. Preceptorship III.** (1 cr; SP-Regis med student; P-N only)

Students spend periods of time with a physician in family practice in rural/small communities of Minnesota and Wisconsin observing methods by which health care is delivered.

**FMed 6462. Preceptorship IV.** (2 cr; SP-Regis med student; P-N only)

Students spend periods of time with a physician in family practice in rural/small communities of Minnesota and Wisconsin observing methods by which health care is delivered.

**FMed 6501. Clinical Pathology Conferences I.** (1 cr; SP-Regis med student; P-N only)

Applying knowledge gained in pathology and laboratory medicine to an unknown clinical case in order to work through a differential diagnosis.

## Course Descriptions

**FMed 6502. Clinical Pathology Conferences II.** (1 cr; SP–Regis med student; P–N only)  
Applying knowledge gained in pathology and laboratory medicine to an unknown clinical case in order to work through a differential diagnosis.

**FMed 7100. Clinical Family Medicine.** (13 cr [max 117 cr]; SP–A, no grad credit; P–N only)  
Supervised care of patients of all ages emphasizing continuous, primary, preventive, acute, and chronic care in all general diagnostic categories.

# Finance and Management Information Sciences (FMIS)

## School of Business and Economics

**FMIS 1201. Introduction to Business Information Systems.** (3 cr; A–F only)  
Business information systems and applications. Computer concepts; use of command-driven and graphics-user interface operating systems; graphics; word processing, spreadsheet, WWW publishing, and database management applications.

**FMIS 1601. Consumer Finance.** (3 cr; A–F only; LE 8)  
Introduction to consumer decision-making principles and concepts. Examination and analysis of financial planning situations, problems, and concerns in the context of personal values, individual and family goals, economic conditions, and the social environment.

**FMIS 3141. Business Communications.** (3 cr; QP–SBE candidate or Econ major or □; SP–SBE candidate or Econ major or □; A–F only)  
Principles of business communication and their application to oral, written, and nonverbal communication.

**FMIS 3201. Management Information Systems.** (3 cr; SP–SBE candidate or approved non-SBE Bus Adm or MIS minor or CS or Engr major or □; A–F only)  
Conceptual foundations, structure, development, and implementation of information systems for social organizations. Emphasis on computer-based systems and their behavioral and societal implications for management.

**FMIS 3212. Structured Programming Techniques.** (3 cr; SP–3201, CS 1121 or CS 1511, SBE candidate or approved non-SBE student minoring in MIS or □; A–F only)  
Introduction to programming for business applications using structured problem-solving techniques and programming methodologies. Focus on sequential file processing, data validation, internal table manipulation, and sorting.

**FMIS 3222. Systems Analysis and Design.** (3 cr; SP–3201, 3421 or CS 4611, SBE candidate or approved non-SBE student minoring in MIS or □; A–F only)  
Analysis phase of systems development life cycle. Emphasizes feasibility study, requirements analysis, and system specification. Detailed study of current physical and logical systems models and specification.

**FMIS 3224. Telecommunications.** (3 cr; SP–3201, CS 1121 or CS 1511, SBE candidate or approved non-SBE student minoring in MIS or □; A–F only)  
Management of telecommunications networks from a business problem solving perspective. Survey of telecommunications technologies, network architectures, management issues, and evolving business environments.

**FMIS 3226. Expert Systems.** (3 cr; SP–3201, CS 1121 or CS 1511, SBE candidate or approved non-SBE student minoring in MIS or □; A–F only)  
In-depth examination of the design and use of expert systems in a business environment. Topics include applications, architectures, knowledge representation, inferencing strategies, and development tools and techniques.

**FMIS 3228. Electronic Commerce.** (3 cr; SP–3201, CS 1121 or CS 1511, SBE candidate or approved non-SBE student minoring in MIS or □; A–F only)  
Overview of the impact of Electronic Commerce (EC) on business, principles and practices of Internet-based Electronic Commerce, business and IT strategies, and future developments. Survey of EC applications, business models and information technologies underlying these applications.

**FMIS 3301. Production and Operations Management.** (3 cr; SP–SBE candidate or approved non-SBE Bus Adm minor or □; A–F only)  
Introductory survey of production and operations as a functional area of management, including operations strategy, process design, forecasting, resource allocation, inventory management, scheduling, quality management, and project management. Computer applications of quantitative techniques to support operations decision making.

**FMIS 3397. SBE Internship.** (3 cr; SP–Admitted to SBE candidacy, consent of internship director; S–N only)  
Work-integrated learning program providing practical experiences within students' majors. Students participate in an approved program within cooperating businesses, government agencies, or civic organizations. Requires minimum 300 hours work experience, assigned written reports, and performance evaluations.

**FMIS 3411. Distributed Computing Principles.** (3 cr; SP–3201, CS 1121 or CS 1511, SBE candidate or approved non-SBE student minoring in MIS or □; A–F only)  
Structured techniques concerning data communication principles, networks, distributed databases, associated hardware and software, typical applications, and management considerations.

**FMIS 3421. Database Management and Design.** (3 cr; SP–3201, CS 1121 or CS 1511, SBE candidate or approved non-SBE student minoring in MIS or □; A–F only)  
Concepts and structures relating to design, implementation, and administration of database management systems. Emphasis on relational databases and development of integrated applications.

**FMIS 3601. Corporation Finance.** (3 cr; SP–SBE candidate or approved non-SBE Bus Adm or finance minor or □)  
Fundamental concepts of managerial financial decision making. Time value of money, valuation, risk and return, financial statement analysis, short-run financial management, capital budgeting, cost of capital, long-term financing, and corporate taxation.

**FMIS 3612. Managerial Finance.** (3 cr; QP-3611, SBE candidate or Acct or Bus Adm minor with 90 cr; SP-3601, SBE candidate or approved non-SBE finance minor or □; A-F only)

Intermediate conceptual and analytical applications in capital budgeting, funds flow, cost of capital, debt management, equity financing, mergers and acquisitions, business reorganizations, international financial management.

**FMIS 3641. Entrepreneurial Finance.** (3 cr [max 8 cr]; SP-3601, SBE candidate or approved non-SBE student minoring in finance or □; A-F only)

Introduce the practice of finance in entrepreneurial settings and enhance understanding of relationships between the investment, financing, and organizational decisions confronting managers.

**FMIS 3644. Investment Fundamentals.** (3 cr; QP-3611, SBE candidate or Acct or Bus Adm minor with 90 cr or □; SP-3601, SBE candidate or approved non-SBE finance minor or □; A-F only)

Comprehensive introduction to nature, problems, and process of evaluating particular securities and portfolio construction. Survey of basic principles of security analysis, analytical techniques, and investment policy for individual and institutional investors. Introduction to computer-assisted investment analysis.

**FMIS 3647. Financial Markets and Institutions.** (3 cr; QP-3611, SBE candidate or Acct or Bus Adm minor with 90 cr; SP-3601, SBE candidate or approved non-SBE finance minor or □; A-F only)

Analysis of money and capital markets, savings-investment process, and financial institutions. Role of Federal Reserve and Treasury in finance market development; supply and demand for loanable funds; level and structure of interest rates. Asset/liability management.

**FMIS 3649. International Finance.** (3 cr; QP-3611, SBE candidate or Econ major or Acct or Bus Adm or Econ minor with 90 cr or □; SP-3601, SBE candidate or approved non-SBE finance minor or □; A-F only)

Comprehensive framework and analysis for financial management of international firm. International financial markets, exchange rates and international firms, elements of international investments, financing decisions, and strategy formulation.

**FMIS 3651. Working Capital Management.** (3 cr; SP-3601, SBE candidate, non-SBE accounting or finance minor, or □; A-F only)

Addresses how current assets are financed and how current assets and liabilities are managed so that the proper amounts of cash, inventories, and accounts receivable can be determined and maintained.

**FMIS 3980. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 8 cr]; QP-SBE candidate or Acct or Bus Adm or Econ minor or □; SP-SBE candidate or □; A-F only)

Specific finance or information systems problems, issues, and approaches.

**FMIS 3991. Independent Study.** (3 cr; QP-S3971, Δ; SP-Δ; A-F only)

For students wishing to do special work in finance or information sciences that extends beyond, or in greater depth than, regular course offerings.

**FMIS 4222. Trends and Issues in Information Systems.**

(3 cr; SP-3201, CS 1121 or CS 1511, MIS major with 90 cr; no grad credit; A-F only)

Exploration of new and emergent technologies, assessment of industrial opportunities for and impacts of the technologies, management of the enterprise's information system function, ethical issues, and other IS-related issues and trends.

**FMIS 4225. Advanced Applications Development.** (3 cr; QP-SBE candidate with 120 cr or grad student or □; SP-3222, CS 2121, MIS major or □; A-F only)

Development of advanced microcomputer-based applications using modern development environments (languages). Emphasis on systems development and integration, interface design, and data access strategies.

**FMIS 4611. Portfolio Analysis.** (3 cr; QP-3644 or ¶3644, SBE candidate with 120 cr or grad student or □; SP-3644 or ¶3644, SBE candidate or grad student or □; A-F only)

Principles for investment selection under conditions of uncertainty, along Markowitz-Tobin-Sharpe lines; implications of model for capital markets and price behavior in efficient markets; empirical evidence on capital market performance; computer-assisted techniques for portfolio analysis.

**FMIS 4613. Corporate Financial Strategies.** (3 cr; QP-3612 or ¶3612, SBE candidate with 120 cr or grad student or □; SP-3612 or ¶3612, SBE candidate and grad student or □; offered alt yrs; A-F only)

Application of financial theory and analytical techniques to financial problem solving using case study methods.

**FMIS 4615. Futures and Options.** (3 cr; QP-3644 or ¶3644, SBE candidate with 120 cr or grad student or □; SP-3644 or §3644, SBE candidate with 60 cr or grad student or □; A-F only)

Nature and functions of derivative security markets such as options, futures, options on futures, swaps, and financial engineering. Emphasizes their use as tools for risk reduction, portfolio management, and speculative medium for aggressive investor.

**FMIS 4616. Security Analysis.** (4 cr; SP-3644, Acct 3101; Δ; credit cannot be applied to a Graduate School program; A-F only)

Introduction to theory, concepts, and practices of security analysis and investment practices. Common stock, fixed income securities, derivative securities, and mutual funds will be analyzed. Other topics include sector analysis, financial statement analysis, ratio analysis, diversification, and hedging.

**FMIS 4617. Management of Financial Institutions.** (3 cr; QP-3647 or ¶3647, SBE candidate with 120 cr or grad student or □; offered alt yrs; SP-3647 or §3647, SBE candidate or grad student or □; offered alt yrs; A-F only)

Techniques for managing commercial banks and other financial institutions through asset/liability management.

**FMIS 4618. Financial Markets Practicum.** (1 cr; SP-4616, Δ; no grad credit; S-N only)

Supervised observation of and participation in work activities of financial institutions.

**FMIS 4619. Analysis of Financial Statements.** (3 cr; QP-3611, SBE candidate with 120 cr or grad student or □; SP-3601, SBE candidate or grad student or □; A-F only)

Analysis and interpretation of financial statements. Presentation of analytical techniques, including trend, comparative, and ratio analysis. Use of computer-assisted analysis.

## Course Descriptions

**FMIS 4620. Portfolio Theory and Analysis.** (4 cr; SP-4616, Δ, \$4611; no grad credit; A-F only)

Portfolio management in a modern portfolio theory (MPT) framework. Risk measurements, risk-return relationships, and portfolio models are developed. Topics include Markowitz portfolio theory, risk-return models, bond portfolio management, evaluating portfolio performance, and outperforming the market.

**FMIS 4651. Risk Management and Insurance.** (3 cr; QP-3611, SBE candidate with 90 cr or grad student; SP-3601, SBE candidate or grad student; offered alt yrs; A-F only) Introduction to risk analysis and management from perspective of individuals and firms in society. Applied use of risk transfer and control techniques, insurance contract construction, and determination of premiums.

**FMIS 4995. Special Topics: (Various Titles to be Assigned).** (3 cr; QP-SBE candidate or Acct or Bus Adm or Econ minor with 90 cr or □; SP-SBE candidate or grad student or □; A-F only) Specific contemporary finance and information science problems, issues, and approaches.

## Fine Arts (FA)

### School of Fine Arts

**FA 1100. Freshman Seminar: Producing/Presenting Art.** (3 cr; SP-Less than 30 cr; A-F only; LE 9)

This course considers the settings in which art is produced or exhibited. Through direct experience and discourse, students will study the multiple venues in which art is presented, exhibited, perceived. Issues in aesthetic philosophy and arts criticism will be addressed.

**FA 1101. Freshman Seminar: Creating Art.** (3 cr; SP-Freshman, fewer than 30 cr; A-F only; LE 9) Discussion/direct experience of settings/ways in which art (including aesthetic philosophy and other creative work) arises.

**FA 1300. Creating Across Disciplines.** (3 cr) Investigation of interdisciplinary creative possibilities offered by artists working with computers, sound, visual arts, theatre, dance, and music, culminating in individual or collaborative public performance.

**FA 2100. Museums and Society.** (3 cr; A-F only) Study of museum audiences, including identification and fulfillment of their needs.

**FA 2510. History of American Architecture: 1600 to Present.** (3 cr; QP-Musm 1010; SP-2100 or #) Architecture from colonial period to present, emphasizing cultural, art historical, and social aspects.

**FA 2595. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 9 cr]) Selected studies with interdisciplinary or multidisciplinary focus.

**FA 3100. Management and Operation of Cultural Properties.** (3 cr; QP-Musm 1001; SP-2100 or #; A-F only) Study of day-to-day management and operation of cultural properties, focusing on administrative, financial, and service aspects; philosophical and technical problems associated with exhibition, care, and interpretation of museum collections.

**FA 3700. English Architecture.** (1-3 cr; A-F only) Architecture and building seen in their art historical, cultural, and social contexts.

**FA 3710. Shakespeare's Dramatic Art.** (1-3 cr; A-F only) Social, intellectual, and dramatic context of Shakespeare's plays and his handling of comedy, history, tragedy, and romance.

**FA 5300. Creating Across Disciplines.** (3 cr [max 9 cr]; QP-Max 6 cr to MA or MEd program; SP-No grad credit) Advanced work in interdisciplinary and interactive or collaborative projects, performances, or installations, drawing upon concepts and processes from various arts disciplines.

## Foreign Studies (FSt)

### College of Liberal Arts

**FSt 1xxx-4xxx. Special Topics.** (1-12 cr; SP-Admission to an approved study abroad program) Subject used to designate study abroad programs.

## French (Fr)

### College of Liberal Arts

**Fr 1101. Beginning French I.** (4 cr; A-F only; LE 3) Conversation and communicative course for students with little or no previous study of French. Emphasis on oral and aural skills; some grammar. Taught in French and English.

**Fr 1102. Beginning French II.** (4 cr; QP-1301 or equiv or #; SP-1-2 yrs high school Fr or 1101 or #; A-F only; LE 3) Conversation and communicative course for students with previous study of French. Emphasis on oral and aural skills; some grammar. Taught in French and English.

**Fr 1201. Intermediate French I.** (4 cr; QP-1301 or equiv or #; SP-3-4 yrs high school Fr or 1102 or #; A-F only; LE 3) Consolidation and enrichment of previously acquired abilities speaking and understanding French, set within introduction to written French and survey of contemporary culture of French-speaking societies. Emphasis on oral, aural, and reading skills; vocabulary building; some writing. Taught in French.

**Fr 1202. Intermediate French II.** (4 cr; QP-1502 or equiv or #; SP-4 yrs high school Fr or 1201 or #; A-F only; LEIP 3) Consolidation and enrichment of previously acquired abilities speaking and understanding French, set within introduction to written French and survey of contemporary culture of French-speaking societies. Emphasis on oral, aural, and reading skills; vocabulary building; some writing. Taught in French.

**Fr 2301. Advanced French.** (4 cr; QP-1503 or equiv or #; SP-5 yrs high school Fr or 1202 or #; A-F only; LE 3) Development of French literacy within a culturally authentic contemporary context. Emphasis on practical writing and formal oral and aural communication skills; vocabulary building; enhancement of reading skills; review of key grammar. Taught in French.

**Fr 2315. French Cinema.** (4 cr; A-F only; LE 9) Images of human diversity in French cinema. Films with English subtitles; class discussion in English.

**Fr 3591. Independent Study.** (1–4 cr [max 8 cr]; QP–3001 or equiv, C or better in adv Fr language sequence or #; SP–2301 with C or better, #; A-F only)  
Students develop and carry out reading and research programs in consultation with the instructor.

**Fr 4422. 20th-Century Novel.** (4 cr; QP–3001 or equiv, C or better in adv Fr language sequence or #; SP–2301 or equiv with C or better or #; no grad credit; A-F only)  
Study of representative novels.

**Fr 4472. French Classical Literature.** (4 cr; QP–3001 or equiv, C or better in adv Fr language sequence or #; SP–2301 or equiv with C or better or #; no grad credit; A-F only)  
Representative works of 17th-century French prose, poetry, and theatre.

**Fr 4482. Voltaire and Rousseau in English.** (4 cr; QP–3001 or equiv, C or better in adv Fr language sequence or #; SP–2301 or equiv with C or better or #; no grad credit; A-F only)  
Representative works.

**Fr 4492. 19th-Century Novel.** (4 cr; QP–3001 or equiv, C or better in adv Fr language sequence or #; SP–2301 with C or better or #; no grad credit; A-F only)  
Study of several novels by major 19th-century writers (e.g., Hugo, Balzac, Stendhal, Flaubert, Zola, Maupassant).

## Geography (Geog)

### College of Liberal Arts

**Geog 1202. World Regional Geography.** (3 cr; A-F only; LEIP 8)  
Geography of human groups in diverse settings. Emphasis on cultural diversity, regional development, and human and environmental forces shaping regional patterns and processes. Geographic analysis of selected regions and countries.

**Geog 1304. Human Geography.** (3 cr; A-F only; LECD 6)  
Ecological basis of human existence. Human population patterns and cultural diffusion. Agricultural geography. Political geography. Geography of language, religion, and ethnic groups. Effects of urbanization; economic geography.

**Geog 1414. Physical Geography.** (4 cr; A-F only; LE 4)  
Earth-sun relations, maps and globes, and major factors of the natural environment, including water resources, landforms, weather and climate, natural vegetation, and soils. (3 hrs lect, 2 hrs lab)

**Geog 2306. Environmental Conservation.** (3 cr; A-F only; LE 8)  
Integrated study of physical, economic, social, and political aspects of natural resource management. Emphasis on identifying environmental problems and evaluating alternatives for resolution, including planning, regulation, market incentives, and mitigation activities.

**Geog 2313. Economic Geography.** (3 cr; A-F only; LE 6)  
Contemporary geographic pattern analysis of production, distribution, and consumption of goods and services. Development of geographic theories and models that attempt to explain spatial variations of economic activities such as agriculture, manufacturing, and trades and services.

**Geog 2552. Introduction to Maps and Cartographic Methods.** (3 cr; A-F only; LE 2)  
Defines maps and map-like images. Maps as communication tools. Scale, projections, cartographic generalization and symbolization. Compares spatial data models and types of spatial (geographic) data. How classification and symbolization methods determine representation of spatial data.

**Geog 3334. Urban Geography and Planning.** (3 cr; SP–25 cr incl 3 cr Geog or #; A-F only)  
Urbanization as a geographic process. Perspectives on economic, political and cultural foundations of cities; cities as life spaces; environmental aspects of urbanization; principles and history of urban planning; practice and politics of local government planning.

**Geog 3342. Geography of Transportation.** (4 cr; QP–8 cr Geog incl 1312, 40 cr or #; SP–6 cr Geog incl 2313, 25 cr or #; A-F only)  
Distribution and pattern of various transportation models; geographic aspects of transport systems at empirical and theoretical levels.

**Geog 3362. Geographic Aspects of Outdoor Recreation.** (3 cr; QP–4 cr Geog, 40 cr or #; SP–4 cr Geog, 25 cr or #; A-F only)  
Geographic survey of U.S. outdoor recreation sites; theories relating to location; outdoor recreation as a cultural expression of land use. Local and regional case studies of northern Minnesota.

**Geog 3401. Weather and Climate.** (3 cr; QP–1403 or 1413, 40 cr or #; SP–1414, 25 cr or #; A-F only)  
Atmospheric composition, structure, and motion; precipitation processes, air masses, fronts, cyclonic storms, and general weather patterns. Global distribution and classification of climates.

**Geog 3422. Natural Hazards.** (4 cr; QP–1403 or 1413, 40 cr or #; SP–1414, 25 cr or #; A-F only)  
Geography of natural hazards. Human-physical environment interrelationships under extreme geophysical conditions; causes, characteristics, and consequences of natural hazards such as earthquakes, tornadoes, hurricanes, floods, and drought; human adjustment to these events.

**Geog 3461. Geography of Global Resources.** (3 cr; QP–40 cr or #; SP–25 cr or #; A-F only)  
Spatial distribution and uses of global natural resources addressed through models of resource management, focusing on energy, non-fuel minerals, population, food, and technology. Theoretical approach and political perspective applied to trade, international economic development, and environmental issues.

**Geog 3481. Urban Habitat: The Physical Geography of the City.** (3 cr; A-F only)  
Effects of urbanization on aquatic and terrestrial habitats; planning and community involvement as solutions to environmental challenges facing cities; case studies of particular North American urban ecosystems. (3 hrs lect)

**Geog 3532. Map Design and Graphic Methods.** (4 cr; QP–1551, CS 1010, 40 cr or #; Stat 1565 recommended; SP–2552, CS 1011, 25 cr or #; Stat 1411 recommended; A-F only)  
Thematic mapping of qualitative and quantitative data. Data measurement levels and their relationships to geographic phenomena and map symbols. Appropriate treatment (both statistical and representational) of map data. Designing and creating maps using computers. (2 hrs lect, 4 hrs lab)

## Course Descriptions

**Geog 3702. Geography of the United States and Canada.** (3 cr; QP-40 cr incl 8 cr Geog or #; SP-25 cr incl 6 cr Geog or #; A-F only)

Topical presentation of geographic patterns in the United States and Canada. Emphasis on contemporary social issues, including patterns of regional development and underdevelopment, environmental issues, regionalism, nationalism, cultural patterns and conflict, and social inequality.

**Geog 3707. Geography of Minnesota.** (2 cr; QP-40 cr incl 3 cr Geog or #; SP-25 cr incl 6 cr Geog or #; A-F only)  
Physical survey followed by study of human activities.

**Geog 3712. Geography of Latin America.** (4 cr; QP-40 cr incl 8 cr Geog or #; SP-25 cr incl 6 cr Geog or #; A-F only)  
Survey of cultural and physical diversities of Latin America. Physical resources, historical development, population characteristics, and economic activities.

**Geog 3715. Field Geography in Mexico.** (4 cr; A-F only)  
Experience another culture and learn about the geography of the Yucatan peninsula (or Guanajuato). Live with a Mexican family for three weeks. Geography classes held daily and excursions to sites, museums, and landscapes of geographic interest.

**Geog 3732. Geography of China and Japan.** (4 cr; QP-40 cr incl 8 cr Geog or #; SP-25 cr incl 6 cr Geog or #; A-F only)  
Physical and cultural geography of China and Japan. Contemporary agriculture, resource use, trade, transport, industrialization, population, and urbanization.

**Geog 3991. Independent Study in Geography.** (1-4 cr [max 6 cr]; QP-#; SP-#; A-F only)  
For students interested in doing advanced work in selected fields of geography.

**Geog 3995. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 8 cr]; QP-#; SP-#; A-F only)  
Topics in geography of current and special interest to students that are not offered in regular department curriculum. Topics may involve specialties of staff or visiting faculty.

**Geog 3997. Internship in Geography.** (1-6 cr [max 8 cr]; SP-Geog major, 60 cr or #)  
Scheduled assignments with direct supervision in public agencies or relevant private firms.

**Geog 4393. Political Geography.** (3 cr; QP-40 cr incl 8 cr Geog or #; SP-80 cr incl 6 cr Geog or #; A-F only)  
Survey of political geography past and present. Environmental-political theories, German geopolitics, territoriality, nation-states and nationalism, boundaries and frontiers, jurisdictional organization and reorganization, locational conflicts, electoral geography, locality studies, and urban politics.

**Geog 4394. Feminist Geographies.** (4 cr; SP-80 cr incl 6 cr Geog or #; A-F only)  
Gender differences in experiences of space and place; relationship between gender politics and geographies of cities, regions, nation-states, and other social institutions; gender differences in "making place" and interacting with environments; emphasis on possibility of feminist alternatives.

**Geog 4451. The Geography of Soils.** (4 cr; SP-1414 or Geol 1110 or Chem 1113 or Chem 1151 or grad student or #; A-F only)  
Examines soil formation and processes in varied environments, with emphasis on soil as a dynamic

system, integral to all terrestrial ecosystems. Human impact and use of soils is examined with regard to land degradation and soil erosion.

**Geog 4563. Introduction to Geographic Information Science.** (3 cr; SP-3532, 14564, 60 cr incl 16 cr Geog or #; A-F only)

Theory of design, operation, and application of geographic information science (GIS); theoretical application of GIS to environmental, physical, and socioeconomic problems; from data gathering and coding through spatial analysis and interpretation.

**Geog 4564. Laboratory in Geographic Information Science.** (2 cr; SP-60 cr, 14563 or #; A-F only)

Application of geographic information science (GIS) to environmental, physical, and socioeconomic problems; from planning and creating a spatial database to spatial analysis of database to explore contemporary spatial problems.

**Geog 4580. Introduction to Remote Sensing and Image Interpretation.** (4 cr; SP-2552, 4563, 4564, recommended course in comp programming, intro stat be taken; A-F only)  
Introduces basic concepts of remote sensing of the environment. Intended to provide the background information necessary to successfully use remotely sensed imagery in conjunction with GIS technology to answer questions about the world in which we live.

**Geog 5446. Water Processes and Management.** (4 cr; SP-1414 or grad student; A-F only)

Introduction to the components of surface water processes and water resources management, including precipitation, runoff generation, channel processes, spatial and temporal variations in water distribution, aspects of water quantity and quality, and basin management problems.

**Geog 5541. Environmental Application of GIS.** (4 cr; SP-4563 or #; A-F only)

Introduction to ArcView GIS and its applications to the environmental issues such as natural hazards, forest management, contaminated sites, soil erosion, habitat assessment, and regional planning.

**Geog 5543. Advanced Cartographic Methods.** (4 cr; QP-3531, Stat 1565, 90 cr incl 16 cr Geog or grad student or #; SP-3532, Stat 1411, 60 cr incl 12 cr Geog or grad student or #; A-F only)

Alternative map representations, such as multimedia representations, map animations, and maps for physically challenged individuals. Focuses on cognitive issues concerning map design, such as color perception and symbolization, that enhance map reading and understanding. (2 hrs lect, 4 hrs lab)

**Geog 5571. Advanced Geographic Information Science.** (4 cr; QP-3531, CS 1500 or CS 1501, Stat 1565, 90 cr incl 16 cr Geog, 5563/5564 or grad student or #; SP-#; A-F only)  
Coordinate systems, geocoding, vector/raster data structures, temporal data structures, surface modeling, error modeling and data uncertainty, visualization, GIS application areas, decision making in a GIS context, system planning, and implementation. (2 hrs lect, 4 hrs lab)

**Geog 5612. Field Techniques.** (4 cr; QP-90 cr incl 16 cr Geog or grad student or #; SP-60 cr incl 12 cr Geog or grad student or #; A-F only)

Geographic survey of physical and cultural aspects of selected urban and rural landscapes, including basic methods of observation, measurement, recording, analysis, and presentation of field data. Chiefly field training.

**Geol 5803. Geographic Thought.** (3 cr; QP-45 cr incl 16 cr Geog or grad student or #; SP-30 cr incl 12 cr Geog or grad student or #; A-F only)

Development and significance of geographic concepts and thought. History and intellectual roots of contemporary geography, geographers, and geographic institutions.

**Geol 5991. Independent Study in Geography.** (1-4 cr [max 6 cr]; QP-#; max 6 cr toward grad program; SP-#; max 4 cr toward grad program; A-F only)

Independent problems for postbaccalaureate students interested in doing additional work in selected fields in geography.

**Geol 5995. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 6 cr]; QP-#; Max 6 cr toward grad program; SP-Grad student or #; max 8 cr toward grad program; A-F only)

Topics of current and special interest to students that are not offered in regular curriculum. Topics may involve specialties of staff or visiting faculty.

**Geol 5999. Senior Project in Geography.** (3-4 cr; SP-#; Max 3 cr toward grad program; A-F only)

Student-initiated field, lab, and/or library research topic. Formal written and oral presentation.

## Geological Sciences (Geol)

### College of Science and Engineering

**Geol 1040. Freshman Seminar: Topics: (Various Titles to be Assigned).** (3 cr; SP-Fewer than 30 cr; A-F only; LE 5)

Topics of general interest in the geosciences. Topic announced before course is offered.

**Geol 1110. Introductory Geology.** (4 cr; A-F only; LE 4)

Comprehensive survey of Earth's composition, structure, and dynamics to develop an understanding of internal processes, plate tectonics, and surface processes as a framework for geological history and development of life.

**Geol 1120. Life and Death of the Dinosaurs.** (3 cr; A-F only; LE 5)

Survey of dinosaurs, who dominated large-animal life on Earth for 150 million years; theories of dinosaur origins and extinction; habitat of dinosaurs on worldwide Mesozoic coastal plains; dinosaur fossilization and modern excavation.

**Geol 1130. Introduction to Environmental Science.** (3 cr; A-F only; LEIP 4)

Earth's physical and biological systems and human interaction with the environment. Climate, soils, ecosystems, human population, food supply, air and water pollution, global climate change, ozone depletion, environmental policy. (2 hrs lect, 2 hrs lab)

**Geol 2110. Earth History.** (3-4 cr; SP-1110 or 1130 or 2610 or Ast 1040 or #; A-F only)

The historical development of the science of geology, nature of the geologic record, fossils, the geologic time scale, and tectonic evolution of continents and ocean basins. Concepts presented are developed within the framework of the theory of plate tectonics. (4 credit option if lab is taken)

**Geol 2120. The Earth's Dynamic Interior.** (3 cr; SP-1110 or 2110; A-F only)

Treatment of the origin, structure and internal composition of the Earth, synthesizing geological, chemical and physical knowledge bearing on the Earth's inaccessible interior. Emphasis is placed on dynamic processes at all depths in the Earth.

**Geol 2300. Basic Mineralogy and Petrology.** (4 cr; QP-\$3324, 1110 or 1110H, 1 yr high school chem or 1 qtr of college chem, 30 cr or #; SP-1 yr high school chem or 1 sem of college chem or #,\$2311, 1110, not for Geol BS majors; A-F only)

Introduction to study of minerals and rocks; survey of the most common and economically important minerals and rock types, including their composition, identification, and origin. (2 hrs lect, 4 hrs lab, field trip)

**Geol 2311. Mineralogy and Petrology I.** (4 cr; QP-\$3324, 1110 or 1110H, 1 qtr college chem; SP-\$2300, 1110, 1 sem college chem or #; A-F only)

Common and important minerals; introduction to optical mineralogy; igneous rocks, including their composition, classification, identification, origin, and interpretation. (2 hrs lect, 4 hrs lab, 2 field trips)

**Geol 2312. Mineralogy and Petrology II.** (4 cr; QP-3324; SP-2311; A-F only)

Common and important sedimentary and metamorphic rocks, including their mineralogy, composition, classification, description, origin, and interpretation. (2 hrs lect, 4 hrs lab, field trips)

**Geol 2350. Earth's Resources.** (3 cr; SP-25 sem cr or #; A-F only; LEIP 5)

Distribution of Earth's resources through space and time, including metals, minerals, fossil fuels, building materials, water, and soil. Relationships between population growth and Earth's finite resources. (field trip)

**Geol 2610. Oceanography.** (3 cr; A-F only; LE 5)

Origin and history of ocean basins, sea floor morphology, chemistry of sea water, currents, waves, tides, life in the sea, primary productivity, nutrient dynamics, human impact.

**Geol 3091. Independent Study.** (1-2 cr [max 4 cr]; QP-#; SP-#) Directed readings and projects on topics not normally covered in other courses.

**Geol 3110. Environmental Geology.** (3 cr; QP-1110 or #; SP-1110 or #; A-F only)

Human and planet Earth interactions; human impacts on geological environment; constraints and influences on human activities imposed by geological processes and history; hazards of living on a dynamic planet; role environmental scientists play in dealing with these problems. Case studies. Group projects. (3 hrs lec, field trip)

**Geol 3210. Geomorphology.** (3 cr; SP-1110, Math 1250 or #, \$2210; A-F only)

Study of Earth surface processes emphasizing the origin and evolution of landforms; response of the physical environment to climatic change and tectonic events, and application of physical, chemical, and mathematical principles to the study and interpretation of landforms.

**Geol 3520. Structural Geology.** (4 cr; QP-3326; SP-2312; A-F only)

Introduction to brittle and ductile deformation, including joints, faults, shear zones, and folds; elementary stress and strain theory; deformation mechanisms; introduction

## Course Descriptions

to plate tectonics. Labs emphasize geologic map interpretation and structural analysis. (2 hrs lec, 4 hrs lab, field trip)

**Geol 3540. Geologic Field Methods.** (1 cr; SP-3520 or #; A-F only)

Introduction to basic methods in geologic mapping and creation of geologic maps. All work done in the field during the first 6 weeks of fall semester.

**Geol 3710. Introduction to Geochemistry.** (3 cr; QP-Math 1296 or equiv, Chem 1112; SP-Math 1296 or equiv, Chem 1152, #; A-F only)

Understanding chemical reactions occurring in geological processes on scales ranging from atomic to global. Geochemistry of the Earth; chemical reactions and stability of minerals; applications of geochemistry to understanding global processes and environmental problems. (3 hrs lect)

**Geol 4110. Advanced Earth Science for Teachers.** (2 cr; QP-Teaching earth sci sr or grad student or #; SP-Teaching earth and space sciences sr or grad student or #; A-F only) Investigative approach to secondary school teaching of modern earth science curricula, including aspects of astronomy, meteorology, oceanography, and geology, the latter with an emphasis on plate tectonics. (2 hrs lect)

**Geol 4300. Optical Mineralogy.** (2 cr; SP-12311 or #; A-F only)

Fundamentals of optical mineralogy: the basis and practice of study and identification of minerals using the polarizing microscope and rock thin sections.

**Geol 4500. Field Geology.** (6 cr; QP-3100, 3326, Δ; students must have health insurance; SP-3520, 3530, Δ; held at Wasatch-Uinta Field Camp, Park City, Utah, for 6 wks; A-F only)

Geological mapping of sedimentary, igneous, and metamorphic terranes and of Quaternary deposits and landforms; topographic maps and aerial photographs, including preparation of geologic maps and cross sections, and map unit descriptions.

**Geol 5091. Geologic Problems.** (1-2 cr [max 4 cr]; QP-Grad student or #; SP-Grad student or #)

Individual research in lab or field problems.

**Geol 5095. Special Topics: (Various Titles to be Assigned).** (1-2 cr [max 4 cr]; QP-#; SP-#; A-F only)

Topics not covered in regular curriculum. Topic announced before course offered.

**Geol 5100. Seminar.** (1-2 cr [max 4 cr]; QP-#; SP-#)

Oral and written presentation on topics of current significance to geoscientists. Participation by department staff.

**Geol 5210. Glacial and Quaternary Geology.** (3 cr; QP-3200 or #; SP-2210 or #; A-F only)

Physics of glacier flow, processes of erosion and deposition, survey of glacial landforms, history and chronology of glaciation. Survey of geological and biological responses to changing environment resulting from climatic fluctuations during last three million years of Earth history. Field studies on the glacial deposits of Minnesota. (2 hrs lect, 2 hrs field lab)

**Geol 5220. Global Climate Change.** (3 cr; QP-#; SP-#; A-F only)

Analysis of past global change from climate proxy records in glacial ice, tree rings, ocean and lake sediments, ocean corals. Impact of ocean and

atmospheric circulation on global climate; climate cycles; El Niño; human impact on global climate. Offered alternate years.

**Geol 5240. Physical Hydrogeology.** (3 cr; SP-2110, Math 1296 or Math 1290, Phys 1201 or #; A-F only)

Introduction to concepts of fluid movement in Earth's crust and the interaction of rocks and water. Introduction to the hydrologic cycle, theory of flow through porous media, crustal-scale flow systems, role of fluids in the plate tectonic cycle.

**Geol 5310. Advanced Petrology.** (3 cr; QP-3326 or #; SP-2312; A-F only)

Physico-chemical principles applied to origin of igneous and metamorphic rocks. Phase equilibria in important mineral systems. Lab study and interpretation of igneous and metamorphic rocks using petrographic microscope. (2 hrs lect, 2 hrs lab)

**Geol 5320. Precambrian Geology.** (3 cr; QP-3520 or #; SP-2312; A-F only)

Nature, distribution, origin, correlation, and special problems of the Precambrian, emphasizing Lake Superior region. Term paper. 3 hrs. lect, field trips; offered alternate years.

**Geol 5335. Physical Volcanology.** (3 cr; QP-3326; SP-2312 or #; A-F only)

Morphology and development of volcanic formations and deposits, and criteria for their recognition in ancient rock terranes. Types of eruptions and deposits, tectonic environments of volcanism, evolution of volcanoes, physical processes and controls of volcanism, and volcanic hazards. Offered alternate years.

**Geol 5350. Economic Geology.** (3 cr; QP-3326, 3150 or #; SP-2312, 2315, #; A-F only)

Geologic description, distribution, and genesis of economic mineral deposits; processes leading to their formation; relationship to plate tectonics; exploration techniques and criteria for finding new deposits.

**Geol 5410. Petrology of Sedimentary Rocks.** (3 cr; QP-3325, 5305 or #; SP-2312 or #; A-F only)

Provenance, associations, and classifications of sedimentary rocks, including sandstones, carbonates, muddy rocks, and others. Microscopic study of thin sections and grain mounts; statistical techniques. Interpretation of rock suites. Term paper. (2 hrs lect, 2 hrs lab)

**Geol 5430. Stratigraphy and Basin Analysis.** (3 cr; SP-2110, Math 1296, Phys 1201 or #; A-F only)

An integrated study of sedimentary basins as dynamical systems. Analysis of how tectonic and climatic processes drive sedimentation in basins, how these processes are preserved in the basin fill, and how stratigraphers interpret the rock record. Offered alternate years.

**Geol 5710. Aqueous Geochemistry/Chemical Hydrogeology.** (3 cr; QP-Chem 1112 or #; SP-Math 1290 or Math 1297 and Chem 1152 or #; A-F only)

Principles of solution chemistry, with application to chemical weathering, acid deposition, rivers, lakes, and oceans. Use of chemical equilibrium software to examine complex real world problems.

**Geol 5810. Exploration Geophysics.** (3 cr; QP-1110, Math 1297 or #; SP-1110, Math 1297 or #; A-F only)

Review of primary geophysical techniques used in exploration industry. Emphasizes application of these techniques for solving near-surface-related problems.

**Geol 5820. Global Geophysics.** (3 cr; SP-2120, Math 1290 or 1296 or Phy 1201, 1202, #; A-F only)

Build upon material presented in 2120, The Dynamic Earth, exploring the contribution of geophysics to our understanding of the Earth and the processes that control its appearance and behavior. Offered alternate years.

**Geol 8094. Geologic Research.** (1-6 cr; QP-#; SP-#; A-F only)

Individual research.

**Geol 8100. Seminar.** (1-2 cr [max 6 cr]; QP-Grad geol major or #; SP-Grad geol major or #; S-N only)

Oral and written presentations on topics of current significance to geoscientists.

**Geol 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser and DGS consent)

**Geol 8444. FTE: Doctoral.** (1 cr; QP-Doctoral student, adviser and DGS consent; SP-Doctoral student, adviser and DGS consent)

**Geol 8666. Doctoral Pre-Thesis Credits.** (1-18 cr [max 60 cr]; SP-[max 18 cr per semester or summer]; doctoral student who has not passed prelim oral)

**Geol 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; SP-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Geol 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; SP-[max 18 cr per semester or summer]; 24 cr required)

## German Studies (Ger)

### College of Liberal Arts

**Ger 1101. Beginning German I.** (4 cr; A-F only; LE 3)

Conversation and communicative course for students with little or no previous study of German. Emphasis on oral and aural skills; some grammar. Taught in German and English.

**Ger 1102. Beginning German II.** (4 cr; QP-1301 or equiv or #; SP-1-2 yrs high school Ger or 1101 or #; A-F only; LE 3)

Conversation and communicative course for students with previous study of German. Emphasis on oral and aural skills; some grammar. Taught in German and English.

**Ger 1201. Intermediate German I.** (4 cr; QP-Lang 1103 or equiv or #; SP-3-4 yrs high school Ger or 1102 or #; A-F only; LE 3)

Consolidation and enrichment of previously acquired abilities speaking and understanding German, set within introduction to written German and survey of contemporary culture of German-speaking societies. Emphasis on oral, aural, and reading skills; vocabulary building; some writing. Taught in German.

**Ger 1202. Intermediate German II.** (4 cr; QP-1502 or equiv or #; SP-4 yrs high school Ger or 1201 or #; A-F only; LEIP 3)

Consolidation and enrichment of previously acquired abilities speaking and understanding German, set within introduction to written German and survey of contemporary culture of German-speaking societies. Emphasis on oral, aural, and reading skills; vocabulary building; some writing. Taught in German.

**Ger 2301. Advanced German.** (4 cr; QP-1503 or equiv or #; SP-5 yrs high school Ger or 1202 or #; A-F only; LE 3)

Development of German literacy within a culturally authentic contemporary context. Emphasis on practical

writing and formal oral and aural communication skills; vocabulary building; enhancement of reading skills; review of key grammar. Taught in German.

**Ger 2402. Germany Today.** (3 cr; SP-Does not count toward Ger major or minor; A-F only; LEIP 8)

Survey of culture, politics, and society of Germany and German-speaking countries, beginning with post-World War II era and emphasizing the European Union's emergence and Germany's role in contemporary Eastern Europe.

**Ger 3401. Introduction to Literary Studies.** (4 cr; QP-3001 or ¶13001; SP-2301 or ¶12301 or #; A-F only)

Techniques and tools for understanding and writing about German poetry, fiction, and drama both as literary texts and as cultural testimony. Emphasis on class discussion and writing critical essays in German.

**Ger 3403. German Poetry and Theater.** (4 cr; QP-3002 or equiv, C or better in last adv Ger language class taken or #; SP-2301 or #; A-F only)

Survey of major German poets since the Middle Ages (first five weeks) and modern German dramatists (remainder of semester). Emphasis on class discussion and interpretive reading in German, with two critical essays in German.

**Ger 3591. Independent Study.** (1-4 cr [max 8 cr]; QP-3002 or equiv, C or better in last adv Ger language class taken or #; SP-2301 or equiv or #; A-F only)

Students develop and carry out reading and research programs in consultation with the instructor.

**Ger 4202. The German Novelle.** (4 cr; QP-3001 of adv Ger language sequence with C or better or #; SP-2301 or equiv or #; no grad cr; A-F only)

Reading and analysis of short fiction created in German-speaking countries from late 1700s to modern era, with emphasis on texts as social commentary. Class discussion and term paper in German.

**Ger 4404. Contemporary Germany.** (4 cr; QP-1503; SP-2301 or equiv or #; no grad cr; A-F only)

Civilization, culture, and politics of Germany and German-speaking countries since 1945. Research term paper in German.

## Health (Hlth)

### College of Education and Human Service Professions

**Hlth 1100. Health and Wellness Strategies for Life.** (3 cr; SP-§1000; A-F only; LE 8)

A lecture series introducing students to health and wellness encompassing nutritional, physical, emotional and spiritual aspects of health and well-being with emphasis on behavioral, environmental and social influences on developing a satisfying and productive lifestyle in our society.

**Hlth 1104. Health Science Terminology.** (1-3 cr [max 3 cr]; A-F only)

Terms commonly used in health sciences and medical professions; emphasis on word structure.

**Hlth 1470. Human Nutrition.** (3 cr; A-F only; LE 5)

Emphasis on chemical nature of dietary nutrients, physiological and metabolic aspects of human nutrition, effects of diet on human health, and global issues in health and nutrition.

## Course Descriptions

### **Hlth 1600. Basic First Aid.** (2 cr; A-F only)

Basic skills and knowledge to respond correctly in first aid emergencies. Leads to American Red Cross Certification.

### **Hlth 1650. Cardiopulmonary Resuscitation.** (1 cr; A-F only)

Techniques of cardiopulmonary resuscitation involving one and two rescuers. American Red Cross certification for infant/child/adult CPR.

### **Hlth 1700. Advanced First Aid.** (3 cr; SP-1650 or current infant/child/adult community CPR certification; A-F only)

Principles of advanced first aid and accident prevention in the home and community; leads to Advanced First Aid Certification.

### **Hlth 2030. Applied Human Anatomy.** (4 cr; SP-5Biol 1761; hlth ed or PE or exer sci or rec major; A-F only)

Introduction to human gross anatomy. Skeletal, muscular, nervous, circulatory, respiratory, and excretory systems. Applications in health and physical education. Demonstrations with predissected specimens.

### **Hlth 2040. Principles of Human Physiology.** (3 cr; SP-1 sem each of college biol, chem, anat recommended; A-F only)

Physiological mechanisms of cells, organs, and organ systems; function, control, and coordination of body systems.

### **Hlth 2042. Human Physiology Laboratory.** (1 cr; SP-#; A-F only)

Non-invasive lab procedures in human physiology; emphasis on metabolic, muscular, cardiovascular, respiratory, and electro-physiology. (2 hrs lab)

### **Hlth 3050. Teaching Cardiopulmonary Resuscitation.** (3 cr; QP-1701 or #; SP-1650 or #; A-F only)

Instructor training for those presently holding current CPR certification. This course may lead to instructor certification.

### **Hlth 3101. Community Health.** (3 cr; A-F only)

Health promotion and disease prevention at local, state, and national levels. Comparison between health problems of individuals and those of groups. Analysis of functions and roles of voluntary and official agencies. Exploration of community-based programs.

### **Hlth 3115. Consumer Health Education.** (3 cr; A-F only)

Overview of concepts of marketing, analysis, selection, and decision making regarding health care, products, services, and providers.

### **Hlth 3117. Principles of Sex Education.** (3 cr; SP-Hlth ed candidate or #; A-F only)

Planning and implementing comprehensive sex education programs in various settings. Sexual physiology, sociocultural aspects of sexuality, birth control, prevention of STDs/HIV, teen pregnancy, and other current topics. How community and family values affect sex education.

### **Hlth 3118. Women's Health Issues.** (3 cr; A-F only)

Survey of American women's health issues. Role of women as patients and as health care providers. Language, politics, and economics of women's health care. Comparison of American women's health status to that of women around the world.

**Hlth 3202. Drug Education.** (2 cr; SP-45 cr, for students seeking and admitted to the STEP (secondary teaching ed program), candidates in health ed, PE, exercise science and communication sciences and disorders or #; A-F only) Physiological and psychological effects of alcohol, tobacco, and other drugs. Survey of societal causes and

effects of drug use and abuse. Reasons and pressures for drug use by students. Appraisal and assessment of teacher's role in education, intervention, and treatment of drug abuse.

### **Hlth 3301. Foundations of Health Education.** (3 cr; SP-1100, hlth ed candidate or #; A-F only)

History, philosophy, and theories of health education; professional associations; basic functions of school and community health education programs; program planning.

### **Hlth 3302. Health Education Methods and Materials.** (3 cr; SP-3301, hlth ed candidate or #; A-F only)

Health education methods, strategies, and materials for use in diverse settings. Determining health needs and interest, selecting content, stating objectives, developing learning opportunities, and evaluating programs. Responsibilities and competencies for entry-level health educator in program planning, implementation, and evaluation.

### **Hlth 3450. Health Promotion Programming.** (3 cr; SP-Hlth ed candidate or #; A-F only)

Basic constructs of health promotion and program planning for entry level health professionals using experiential learning. Resource and program development, community assessment and mobilization, promotional design and delivery, and evaluation applied to various community settings.

### **Hlth 3500. Environmental Health.** (3 cr; SP-Hlth ed candidate or #; A-F only)

Biological, ecological, and physiological aspects of the environment; concurrent effects on health of the community; and possible solutions to environmental problems.

### **Hlth 3620. Wilderness First Response.** (3 cr)

Emergency procedures to care for ill or injured persons in wilderness settings. Planning, equipment, and evacuation procedures used in nontechnical rescues. American Red Cross First Aid and CPR certification to first responder level.

### **Hlth 3990. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; SP-#; A-F only)

Current health-related problems. Emphasis on promoting health/preventing disease in various populations.

### **Hlth 3991. Independent Study.** (1-6 cr [max 6 cr]; SP-#; A-F only)

Opportunity for upper-division students to undertake an independent project that would serve to further their knowledge base and/or professional competencies.

### **Hlth 3992. Readings in Health.** (1-4 cr; SP-#; A-F only)

Special complementary work and investigation in undergraduate student's field of interest; survey of literature and resources available to health educators.

### **Hlth 3997. Practicum: Peer Education.** (1-4 cr [max 4 cr]; SP-Δ; A-F only)

Development of personal and group skills for promoting healthy lifestyles through peer education program affiliated with Student Health and Counseling Center. Students plan and implement health education and health promotion programs for the student community.

### **Hlth 4996. Internship in Health Education.** (1-15 cr; SP-Hlth ed major, #; no grad cr; S-N only)

Supervised entry-level health education practical experience in hospital, worksite, voluntary, or official agencies. Number of settings is limited to two.

**Hlth 5161. School Health Programs: Early Childhood Through Middle School.** (2 cr; SP–Eled or Hlth Ed or ECh Ed candidate or #; A-F only)

Survey of school health programs with in-depth study of selected health education curricula and topic areas, including alcohol, tobacco, drugs, communicable disease, and nutrition. Development of strategies and methods for teaching controversial areas.

**Hlth 5166. Teaching “Growing Healthy” Curriculum.**

(1-6 cr [max 6 cr]; SP–120 cr or special student or #; A-F only) Trains teachers to use “Growing Healthy” curriculum in elementary grades. Teaching techniques. Explains and demonstrates materials. Stations, activities, and worksheets.

**Hlth 5341. Death Education.** (3 cr; SP–No grad cr; A-F only)

Grief, loss, death, dying, and bereavement in our society as understood by children, adolescents, and adults. Review of research and current literature; education program planning strategies for individuals associated with schools, agencies, organizations, or worksites.

**Hlth 5990. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; SP–#; A-F only)

Opportunity for upper-division and graduate students to explore current issues. Various health-related problem areas; emphasis on facilitating positive attitudinal and behavioral changes within students/clients.

**Hlth 5991. Independent Study.** (1-6 cr [max 6 cr]; SP–Adult spec or grad student, #; max 6 cr toward degree; A-F only)

Directed independent study, readings, research, or projects in a particular area of interest. Degree program plan and project proposal should be approved before course is taken by graduate students.

**Hlth 5992. Readings in Health.** (1-4 cr [max 4 cr]; SP–#; A-F only)

Special complementary readings and discussion in advanced or graduate student’s field of interest in health and health education.

## Health, Physical Education, and Recreation (HPER)

### College of Education and Human Service Professions

**HPER 3000. Organization and Administration of Health, Physical Education, and Recreation.** (3 cr; SP–Hlth ed or PE or exer sci candidate or #; A-F only)

Theoretical and practical basis of administrative process and organizational structure of HPER programs.

**HPER 3100. Risk Management.** (2 cr; SP–Exer sci or rec major or #; A-F only)

Proactive approach to managing risks associated with conducting health, physical education, and recreation programs. Emphasis on planning for a safe environment.

**HPER 3200. Research and Evaluation in Health Science.** (3 cr; SP–Hlth, Rec or PE candidate or #; A-F only)

Exploration of the principles of investigation and evaluation in the health and human service professions with emphasis on methods, data analysis and

presentation, and evaluation reports. Basic background information for scientific inquiry and use of evaluative data in health and human service programs.

**HPER 4999. Senior Project.** (6 12 cr; SP–Hlth ed or PE or rec or exer sci candidate with 90 cr, #; no grad cr; S-N only) Selection and completion of a project approved and supervised by faculty.

## History (Hist)

### College of Liberal Arts

**Hist 1207. Dawn of Modern Europe.** (3 cr; A-F only; LE 7)

Early history of the modern era: Renaissance, Reformation, Age of Reason, French Revolution and its impact, Napoleonic era.

**Hist 1208. Europe in the Modern Age.** (3 cr; A-F only; LE 7)

Making of modern Europe; analysis of economic and technological revolution, collision of ideologies, imperialist expansion, revolutions, and wars.

**Hist 1304. US History Part I: 1607-1877.** (3 cr; A-F only; LE 7)

Evolution of the United States from colonial origins into a modern nation. Frontier and agrarian heritage, constitutional development, emergence of modern U.S. political system, expansion of democracy, and cultural diversity. Colonial period to 1877.

**Hist 1305. US History Part II: 1865-Present.** (3 cr; A-F only; LE 7)

Historical roots of major challenges facing Americans today: global responsibility as a world power; the quest for political, economic, and social justice; and community and family changes in modern society; 1877 to present.

**Hist 2244. The History of Science: Ancients to Newton.** (3 cr; A-F only)

The intellectual and cultural history of science from the Greeks (6th c. BC) to the work of Isaac Newton (17th c).

**Hist 2245. Science and Society: 1500 to Present.** (3 cr; A-F only; LE 7)

Explores a series of creative moments in development of science and scientific methods within their broader social and cultural contexts.

**Hist 2265. Russia in the 20th Century.** (3 cr; A-F only; LEIP 7)

Revolutions of 1917, the Soviet period, collapse of the Soviet Union and evolution of Soviet successor states; 1917 to present.

**Hist 2353. American Youth Culture.** (3 cr; A-F only)

Traces the emergence of youth culture through historical analysis of the experience of youth in the twentieth century and will examine what unified an encompassing “American youth culture,” and what fragmented, divided, and reformulated it over time.

**Hist 2355. United States Military History.** (3 cr; A-F only; LE 7)

Explore the history of the United States military from the colonial era to the present in the context of broader patterns of American history.

**Hist 2357. Women in American History.** (3 cr; A-F only; LECD 7)

Roles and contributions of women in American life from colonial period to present.

## Course Descriptions

### **Hist 2515. Precolonial Africa.** (3 cr; A-F only; LECD 7)

Political, cultural, and socioeconomic developments in precolonial Africa to 1800. Emphasis on slave trade, Islamic revolution, and European commercial penetration.

### **Hist 3091. Directed Readings in History.** (1-4 cr [max 16 cr]; QP-#; SP-#; A-F only)

By arrangement in the department: individual study of material below the research level or formal study of history at an accredited institution abroad.

### **Hist 3095. Special Topics: (Various Titles to be Assigned).** (3 cr; A-F only)

Special topics in history.

### **Hist 3097. Internship in History.** (1-3 cr [max 6 cr]; QP-Jr, #; SP-Jr, #; A-F only)

Supervised opportunity to pursue local or regional history under auspices of local museums, historical societies, commemorative commissions. Written and oral presentation of completed project.

### **Hist 3239. Europe in the Age of Renaissance and Reformation: 1348-1648.** (3 cr; A-F only)

Social, economic, political, and cultural development of Europe from the Black Death to the Thirty Years' War. Central themes include Renaissance humanism and art, Columbus and European expansion, the Protestant and Catholic Reformations, and the era of religious wars.

### **Hist 3240. Early Modern England: 1485-1689.** (3 cr; A-F only)

Early Modern English society and culture from the 15th to the 17th centuries.

### **Hist 3241. Europe in Revolution: 1789-1848.** (3 cr; A-F only)

European Enlightenment, Ancient Regime, French Revolution and Napoleon, rise of nationalism, liberalism, beginnings of socialism.

### **Hist 3242. Europe in Ascendance: 1848-1914.** (3 cr; A-F only)

The 1848 Revolution; nation building and nationalist movements; political and social reform; socialist movements; intellectual trends; the new imperialism and international politics.

### **Hist 3243. Europe in Crisis in the 20th Century.** (3 cr; A-F only)

Causes, conduct, and consequences of World Wars I and II from European perspective. Offered during day school and in Individualized Learning Program.

### **Hist 3256. The Making of Modern Britain.** (3 cr; A-F only)

Whig construction and shaping of modern British government, imperial expansion overseas, impact of American and French Revolutions, economic revolution, Victorian reforms and democracy, Irish problem, zenith of the Empire, Britain in two world wars, social transformations, Labour, and the welfare state.

### **Hist 3257. Modern France.** (3 cr; A-F only)

History of France from 1789 to present.

### **Hist 3263. History of Russia I.** (3 cr; A-F only)

Focus on Kievan Russia, Mongol Period, and rise of northern centers culminating in dominance of Moscow; covers Imperial period through reign of Peter I.

### **Hist 3264. History of Russia II.** (3 cr; A-F only)

Peter I to end of reign of Alexander III.

### **Hist 3275. Russian Culture.** (3 cr; A-F only)

Russian film, literature, and popular culture in the 20th century.

### **Hist 3316. U.S. Social History, 1800-1916.** (3 cr; A-F only)

Explores the social history of the United States during the long nineteenth century, focusing on the development of specific regional communities within the larger nation as examples of the richness and complexity of the American experience.

### **Hist 3317. American Expansion, 1800-1900.** (3 cr; A-F only)

Follows the geographic and economic development of the United States from a rural strip bordering the Atlantic Ocean, through civil war to emerge as an industrialized, continent-spanning global power.

### **Hist 3361. The American City.** (3 cr; A-F only)

American urbanization from colonial town to modern metropolis, emphasizing social and cultural problems peculiar to cities and impact of the city on American civilization.

### **Hist 3365. American Society and Culture.** (3 cr; A-F only)

Social trends from the colonial period to the present. Interrelationships among reform movements, race, ethnicity, business and labor, family, intellectual concepts, and popular culture. Interdisciplinary analysis of the American character.

### **Hist 3367. Civil Rights Movements, Recent America.** (3 cr; A-F only)

Survey of struggles by ethnic minorities to secure equal human rights in the United States since World War II, with emphasis on African American activities in the South.

### **Hist 3384. American Foreign Relations I.** (3 cr; A-F only)

Revolution to 1953.

### **Hist 3385. American Foreign Relations II.** (3 cr; A-F only)

From 1953 to present.

### **Hist 3462. History of Modern Japan.** (3 cr; A-F only)

History of Japan since 1800: Commodore Perry's mission to Japan, Meiji Revolution, Japan's expansion in Asia, World War II, developments in the postwar era.

### **Hist 3463. History of Modern China.** (3 cr; A-F only)

China's history from the Opium War to the Great Proletarian Cultural Revolution and Deng Xiaoping's capitalist reform.

### **Hist 3491. History of Modern Asia.** (3 cr; A-F only)

Comparative history of nations in East Asia and Southeast Asia since the 17th century. Ancient cultures in Asia challenged and enriched by Western influences in different ways. Offered in Individualized Learning Program.

### **Hist 3505. Colloquium for Majors.** (1-2 cr; QP-Δ, major or minor in Hist or Teaching Soc Studies-Hist; attendance at 5 dept-approved lectures/discussions over 1-yr period, regis only during qtr of 5th lect; 1 cr for attendance, 2 cr for attendance, presentation; SP-Δ, major or minor in Hist or Teaching Soc Studies-Hist; attendance at 5 dept-approved lectures/discussions over 1-yr period, regis only during semester of 5th lect; 1 cr for attendance, 2 cr for attendance, presentation; S-N only)

Lecture and discussion groups on a variety of topics.

### **Hist 3515. Modern Africa.** (3 cr; A-F only)

Africa, 1800 to present. Colonial conquest and domination, African resistance, nationalism, and problems of independence.

**Hist 3516. Society and Culture in 20th-Century Africa.** (3 cr; A-F only)

Generational, class, and gender conflicts in the wake of European occupation, impact of colonial and neocolonial domination, and African responses to that occupation and to the world economy in the 20th century; selected films and literary sources.

**Hist 3591. History of the Cold War.** (3 cr; A-F only)

Main progress of the Cold War; its impact on relations between East and West, between industrial nations and the Third World; its impact on domestic politics and social developments of various nations. Offered in Individualized Learning Program.

**Hist 3601. Colonial Latin America from Columbus to Bolívar: 1492-1830.** (3 cr; A-F only)

Brief overview of pre-Columbian civilizations in the Americas; social, cultural, economic, and political development of Latin America from first European contacts in 1492 through end of the South American revolutions against Spain in 1830.

**Hist 3603. Modern Latin America.** (3 cr; A-F only)

Thematic survey of Latin American history in the nineteenth and twentieth centuries.

**Hist 5094. Directed Research.** (4 cr [max 12 cr]; QP-#; max 4 cr toward grad program; SP-#; max 4 cr toward grad program; A-F only)**Hist 5095. Special Topics: (Various Titles to be Assigned).** (3-4 cr [max 12 cr]; SP-#; A-F only)

To treat historical subjects not included in the regular curriculum.

**Hist 5905. History Seminar.** (4 cr [max 8 cr]; QP-#; SP-#; A-F only)

Advanced study and individual research on a selected historical topic or theme; senior capstone course for history majors. (2.5 hrs lect, 1 hr student/faculty consultation)

# Humanities and Classics (HmCI)

## College of Liberal Arts

**HmCI 1004. From Classical Antiquity to Medieval Culture.** (4 cr; A-F only; LE 7)

Ancient Greek and Roman world. Historical and cultural contexts. Reorganization of late Roman world from Diocletian to 13th century A.D. Emergence of feudalism and medieval experience. Idea of "Classicism" which the Renaissance discovered and promoted.

**HmCI 1005. Freshman Seminar: From Renaissance to Revolutions.** (4 cr; SP-§1007; Freshman, fewer than 30 cr; A-F only; LE 9)

Major ideas of European Renaissance; how they continue to inform and inspire the modern world. How these "perennial" notions are affected by changes in arts and humanities produced by political, scientific, social, and industrial revolutions.

**HmCI 1021. Classical Mythology.** (3 cr; A-F only; LE 9)

Readings in Greek and Roman myths, especially in those that have influenced Western culture.

**HmCI 1022. The Bible as Literature.** (3 cr; A-F only; LE 9)

The Hebrew Bible, the New Testament, and the Apocrypha examined as literary works of their time.

**HmCI 1023. Folklore.** (3 cr; A-F only; LEIP 9)

Contemporary definitions of folklore and folk life studies; introduction to current interpretive approaches to verbal and nonverbal traditional cultures. Readings in folktales, myths, narrative poetry, and cultivated arts based on folk materials. Field research project required.

**HmCI 3007. The Late Roman and Medieval Worlds.** (3 cr; SP-30 cr or #; A-F only)

Reorganization of late Roman world from Diocletian to 9th century A.D. Origins of feudalism and the medieval experience.

**HmCI 3021. The Age of the Heroes: Homer and His World.** (3 cr; SP-30 cr or #; A-F only)

Organization and development of the Greek world from the fourth millennium B.C. to 700 B.C. Descriptive study of Minoan and Mycenaean worlds emphasizing critical evaluation of archaeological, mythological, and artistic significance of Homer.

**HmCI 3022. Historical Jesus.** (3 cr; QP-40 cr or #; SP-30 cr or #; A-F only)

Survey of work done by the Jesus Seminar, most notably its detailed commentary on the canonical gospels and its work on the historical Jesus by John Dominic Crossan and other biblical scholars. Readings and videotapes.

**HmCI 3028. Gender and Culture in the Classical World.** (4 cr; QP-40 cr or #; SP-30 cr or #; A-F only)

Lives, social roles, statuses, and literary/mythical depictions of women and men in the classical world, from Bronze Age Greece through imperial Rome.

**HmCI 3031. The Roman Republic.** (3 cr; SP-30 cr or #; A-F only)

Republican Rome from origins through collapse in 44 B.C., with emphasis on cultural and political attributes, leading figures, and causes of its demise.

**HmCI 3033. Medieval Literature in Its Cultural Context.** (4 cr; SP-30 cr or #; A-F only)

Forms of life, thought, and art from earliest texts in English, French, German, and Italian to 15th century; appropriate selections in English translation; relationship of literature to its social backgrounds and major aesthetic movements, especially in visual arts.

**HmCI 3041. The Roman Empire.** (3 cr; SP-30 cr or #; A-F only)

Imperial Rome from Age of the Caesars through 550 A.D., with emphasis on politics of pax Romana, rise and spread of Christianity, and Roman legacy to the modern world.

**HmCI 3055. The Ancient Near East.** (3 cr; SP-30 cr or #; A-F only)

History of Ancient Near East from birth of civilization in Egypt and Mesopotamia (c. 3100 B.C.) to arrival of Alexander (330 B.C.). Review of the ancient cultures of Egypt, Babylonia, Assyria, the Hittites, Persia, Syria, and Palestine.

**HmCI 3095. Special Topics: (Various Titles to be Assigned).** (1-5 cr [max 10 cr]; QP-40 cr or #; SP-30 cr or #; A-F only)

Various topics to be assigned.

## Course Descriptions

**HmCI 3099. Project in the Humanities.** (2 cr; SP-30 cr or #; A-F only)

Original paper or project under guidance of humanities and classics minor adviser. Primarily for humanities and classics minors.

**HmCI 3151. Ancient Egyptian Culture.** (3 cr; SP-30 cr or #; A-F only)

History, culture, and arts of ancient Egypt as known through the archaeological record.

**HmCI 3161. Egyptian Literature and Language.** (3 cr; QP-3150 or #; SP-3151 or #; A-F only)

Ancient Egyptian civilization explored through primary texts in religious, historical, secular, and technical literature. Elementary Egyptian vocabulary; opportunities to learn to read and write hieroglyphic.

**HmCI 3292. From Fiction to Film.** (3 cr; QP-40 cr or #; SP-30 cr or #; A-F only)

Comparative study of novels and their film adaptations.

**HmCI 3333. From Homer to Alexander: Archaic and Classical Greece.** (3 cr; SP-30 cr or #; A-F only)

Early history of Greek world from Heroic Age to death of Alexander the Great, 850-323 B.C.

**HmCI 3335. From Alexander to Mohammad.** (3 cr; SP-30 cr or #; A-F only)

Social and cultural analysis of the impact Alexander the Great had on eastern Mediterranean development between 323 B.C. and 631 A.D. Alexander and his world, the formation of its three great religions, and the Alexandrian legacy of his achievement.

**HmCI 3591. Independent Study.** (1-4 cr [max 8 cr]; QP-#; SP-#; A-F only)

Topics studied in a tutorial setting.

**HmCI 5033. Medieval Literature in Its Cultural Context.** (4 cr; QP-90 cr or #; SP-90 cr or #; A-F only)

Forms of life, thought, and art from earliest texts in English, French, German, and Italian to 15th century; appropriate selections in English translation; relationship of literature to its social backgrounds and major aesthetic movements, especially in visual arts.

**HmCI 5095. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 8 cr]; QP-90 cr or grad or #; SP-90 cr or grad or #; A-F only)

Topics announced in *Class Schedule*.

**HmCI 5591. Independent Study.** (1-4 cr [max 8 cr]; QP-#; SP-#; A-F only)

Students devise reading and research programs in consultation with the instructor.

# Industrial Engineering (IE)

## College of Science and Engineering

**IE 1225. Introduction to Design and Manufacturing Engineering.** (4 cr; SP-Math 1296 or #, §1105, §1205; A-F only)

Introduction to methods used to design and manufacture high quality products. Through the use of a CAD system the student will learn design techniques relative to a product. Students, working in teams, will produce their design using appropriate manufacturing methods.

**IE 2105. Introduction to Material Science for Engineers.**

(3 cr; QP-Chem 1140 or #; SP-Chem 1151 or Δ; A-F only) Structures and properties of engineering materials, emphasizing metals, composites, polymers, and ceramics.

**IE 3105. Human Factors.** (4 cr; QP-Stat 3562, BIE candidate; SP-BSIE candidate; A-F only)

Design and analysis of the workplace using ergonomic principles; safety concerns; environmental considerations. Testing and performance measures in worker-machine environment.

**IE 3115. Operations Research.** (4 cr; QP-Math 3320, Stat 3562; SP-Math 3280, Stat 3611, BSIE candidate; A-F only) Optimization. Linear programming, network analysis, Markov chains, and queuing theory.

**IE 3125. Engineering Economic Analysis.** (3 cr; QP-Math 3298, BChE or BIE candidate; SP-Stat 3611, BSIE candidate or #; A-F only)

Data analysis and methods for engineering decision making under risk; using time and value of money concepts; using expectation principles for project selection; and using forecasts.

**IE 3135. Materials Processing.** (4 cr; QP-3005 or Chem 3010, Engr 3016, Phys 1109, Stat 3562, BIE candidate; SP-2105, Stat 3611, BSIE candidate or #; A-F only)

Thermal and mechanical processing techniques for metals, plastics, and composites using special and general purpose machines and tools.

**IE 3245. Machining and Machine Tools.** (4 cr; QP-Engr 3016, Engr 3036, Phys 1109, BIE candidate; SP-1205, Engr 2016, BSIE candidate; A-F only)

Material removal processing techniques for metallic and non-metallic materials using special and general purpose machines and tools.

**IE 3255. Statistical Quality Control.** (3 cr; QP-Stat 3562, BIE candidate; SP-Stat 3611, BSIE candidate; A-F only)

Statistical quality control in manufacturing; modeling, process quality, control charts, process capability, acceptance sampling methods, reliability.

**IE 3265. Production and Operations Management.** (4 cr; QP-3021, 3070, BIE candidate; SP-3115, 3125, BSIE candidate; A-F only)

Production system design and analysis based on inventory policies, production flow concepts, scheduling policies, material handling, and cost analysis. Plant location factors and Total Quality Management.

**IE 4115. Facility Planning and Simulation.** (4 cr; QP-3061, 3070, BIE candidate; SP-3265, BSIE candidate; A-F only) Facility and process design and analysis using flow rates, design relationships, graphical aids, and computer simulation.

**IE 4135. Automation and Robotics.** (3 cr; QP-Math 3380, BIE or BCompE or BECE candidate; SP-Math 3280; BSIE candidate or #; A-F only)

Automation using robots, material handling devices, jigs, and fixtures. Robot position and motion theory; introduction to system control; modularity and flexibility in automated work cells.

**IE 4145. CAD/CAM.** (4 cr; QP-Engr 1025, Math 3380; SP-BSIE candidate; A-F only)

Use of CAD/CAM systems for design, analysis, and manufacturing as applied to parts, tooling, and fixtures. Use of system software.

**IE 4155. Project Management and Senior Design I.** (3 cr; QP-3061, BIE candidate; SP-3125, BSIE candidate, no grad cr; A-F only)

Development and management of plans for resources needed in industrial projects. Team dynamics and project documentation. Student teams begin a major design project emphasizing problem definition, root cause analysis, and baseline performance. Enrollement in IE 4255 in subsequent semester required.

**IE 4175. Machine Design.** (3 cr; SP-BSIE candidate or #; A-F only)

Analysis of mechanical components as used in mechanical devices. Theories of material failures, lubrication, and corrosion. Design of machinery considering performance, safety, packaging, wear, and recycling.

**IE 4196. Cooperative Education.** (2 cr [max 4 cr]; QP-BIE candidate; SP-BSIE candidate; no grad cr; S-N only)

Practical work experience with employer closely associated with student's academic area; arranged by mutual agreement among student, department, and employer. Biweekly status reports and final written report must be submitted to department.

**IE 4235. Manufacturing Systems Integration.** (4 cr; SP-4135, BSIE candidate; A-F only)

Design and use of hardware and software to integrate computer control and decision making into product development and manufacturing systems.

**IE 4255. Senior Design.** (3 cr; QP-IE sr; SP-3205, BSIE candidate; no grad cr; A-F only)

Student teams use design and analysis methods learned in previous courses to design or improve an industrial system, which generally will be a real system from industries in local region.

**IE 4491. Independent Study.** (1-4 cr [max 4 cr]; QP-#; SP-BSIE candidate, #; A-F only)

Directed individual study arranged with instructor and department head before registration.

**IE 4495. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 8 cr]; QP-#; SP-#)

Topics not available in regular department curriculum. May involve specialties of department or visiting faculty.

**IE 4801. International Engineering Report.** (1 cr [max 2 cr]; SP-BSIE candidate, no grad cr; S-N only)

Directed self-examination of engineering study abroad in Sweden. Required for each semester abroad.

**IE 4803. Simulation of Swedish Manufacturing.** (3 cr; SP-BSIE candidate, Δ, no grad cr; A-F only)

Facility and process design and analysis using glow rates, design relationships, graphical aids, and computer simulation. (MPR 003 at Luleå University of Technology)

**IE 4812. Computer Integrated Manufacturing.** (4 cr; SP-BSIE candidate, Δ, no grad cr; A-F only)

Computers and computer systems in industrial settings, networks, CAD communication standards (IGES, STEP, etc.) CAM, e-business, development of CIM strategies, future trends. (MPR 012 at Luleå University of Technology)

**IE 4823. Project Management and Swedish Industrial Design Project.** (6 cr; SP-BSIE candidate, Δ, no grad cr; A-F only)

Design or improve a product or system with a Swedish company and/or team. Define problem, assess baseline, develop alternatives, prioritize recommendations. Project management, team dynamics, reports and documentation. (MPR 023 at Luleå University of Technology)

**IE 4827. Manufacturing Systems Project.** (8 cr; SP-BSIE candidate, Δ, no grad cr; A-F only)

Manufacturing equipment, processes, information control, budget, safety, maintenance of integrated production systems. Major project requires design, manufacture, handling of a project, and design, modeling construction, and control of an automated projection system. (MPR 027 at Luleå University of Technology)

**IE 4870. Advanced Manufacturing Processes.** (4 cr [max 8 cr]; SP-BSIE candidate, Δ, no grad cr; A-F only)

Advanced topics in material processes. Traditional and advanced materials. New processes like laser or waterjet cutting. (MPM, MPB, or MPP at Luleå University of Technology)

## Interdisciplinary Studies (IS)

### College of Liberal Arts

**IS 3001. Interdisciplinary Methods Seminar.** (2 cr; QP-IS major or #; SP-IS major or #; A-F only)

Definitions, history, and philosophy of interdisciplinary research, writing, learning, and teaching. Readings in major types of interdisciplinary work; preliminary methods for interdisciplinary projects.

**IS 3095. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 12 cr]; SP-15 cr or #; A-F only)

Special topics in interdisciplinary studies.

**IS 3099. Senior Project.** (1-10 cr; SP-IS major or #; A-F only)

An agreement that specifies nature of the project, amount of work, and number of credits must be approved by two advisers and filed with director of interdisciplinary studies.

**IS 5111. The Classical Heritage in the Modern World.** (3 cr; SP-60 cr or grad student or #; A-F only)

Ancient Greek and Roman contributions to the modern world explored through readings, lectures, and visual presentations. Historical and cultural contexts. Classicism.

**IS 5121. The Renaissance Legacy in the Modern World.** (3 cr; SP-60 cr or grad student or #; A-F only)

Major ideas of European Renaissance such as the "Renaissance man"; the classical revival and humanism; how these ideas have continued to inform and inspire people of the modern world.

**IS 5131. Technology, Revolution, and the Humanities.** (3 cr; SP-60 cr or grad student or #; A-F only)

Sweeping changes in the arts and humanities brought about by technology and scientific, social, and industrial revolutions. Focuses on challenges to positivism, nationalism, and colonialism by technological relativism and cultural pluralism.

**IS 5195. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 8 cr]; QP-90 cr or grad student or Δ; SP-60 cr or grad student or #; A-F only)

Various titles to be assigned.

**IS 8001. Introduction to Liberal Studies.** (1-4 cr [max 8 cr]; QP-Grad student or #; SP-MLS candidate or Δ; S-N only)

Introduction to methods of interdisciplinary liberal studies. Minimum of 4 credits required of M.L.S. candidates.

## Course Descriptions

**IS 8250. Ecological Economics.** (4 cr; SP-Econ 1003 or 1023 or Biol 2803, grad student or #; A-F only)

An introduction to the emerging new discipline of ecological economics, which situates traditional economic models with an ecological framework. Ecological economics views the notion of endless economic growth as not merely socially undesirable but actually ecologically impossible.

**IS 8501. Seminar: Ethics and the Human Condition.** (4 cr; QP-Δ; SP-MLS candidate or Δ; A-F only)

Explores applications of values and ethical considerations from humanistic study to problems of modern world.

**IS 8502. Ecology, Economics, and Ethics.** (4 cr; SP-8250, grad student or #; A-F only)

Explores the nature of the *good society* with respect to its economic, political, and moral dimensions. It considers alternative conceptions of the *good* and issues of distributive justice, including the distribution of economic wealth and its consequences.

**IS 8591. Directed Study.** (1-8 cr [max 8 cr]; QP-MLS candidate or Δ; SP-MLS candidate or Δ; A-F only)

Individualized study under supervision of the director of the liberal studies program.

## International Business (IntB)

### School of Business and Economics

**IntB 3201. International Business.** (3 cr; QP-SBE candidate or □ SP-SBE candidate or □ A-F only)

Identification of position of United States in world trade; impact of international trade on national businesses and policies; business and employment opportunities in international business.

## International Studies (IntS)

### College of Liberal Arts

**IntS 1066. An Introduction to Britain.** (3 cr; A-F only; LEIP 8)  
Interdisciplinary survey of British Isles: major geographic, historical, social, and cultural features of region.

**IntS 1070. An Introduction to Scandinavia.** (3 cr; A-F only; LEIP 8)

Interdisciplinary survey of Scandinavia and its people: major historical, social, political, and cultural features of region.

**IntS 1095. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 8 cr]; QP-May be repeated simultaneously or sequentially; A-F only)

Special topic identified at time course offered.

**IntS 3166. Study in England Evaluation.** (1 cr; QP-#; SP-#; S-N only)

Self-examination of study abroad experience in Britain.

**IntS 3167. Study in Sweden Evaluation.** (1 cr; QP-#; SP-#; S-N only)

Self-examination of study abroad experience in Sweden.

**IntS 3168. Study in France Evaluation.** (1 cr; QP-#; SP-#; S-N only)

Self-examination of study abroad experience in France.

**IntS 3195. Special Topics: (Various Titles to be Assigned).**

(1-3 cr [max 8 cr]; QP-May be repeated simultaneously or sequentially; A-F only)

Special topic identified at time course offered.

**IntS 3197. International Internship.** (1-6 cr [max 8 cr];

QP-70 cr, Δ; max 4 cr toward IntS major; SP-50 cr, Δ; max 4 cr toward IntS major; S-N only)

Supervised work experience involving international interaction.

**IntS 3295. Special Topics: (Various Titles to be Assigned).**

(1-3 cr [max 8 cr]; QP-May be repeated simultaneously or sequentially; A-F only)

Special topic identified at time course offered.

**IntS 4100. Seminar in International Studies.** (4 cr; QP-Pol

1050, 90 cr incl 12 upper div cr approved IntS courses or #; SP-Pol 1050, 60 cr incl 8 upper div cr approved IntS courses or #; A-F only)

Analysis of and supervised research and writing on selected topics.

**IntS 4891. Independent Study.** (1-5 cr [max 10 cr]; QP-12 cr IntS, #; SP-8 cr IntS, #; A-F only)

Advanced study and research under faculty member supervision.

**IntS 4995. Special Topics: (Various Titles to be Assigned).**

(1-5 cr [max 10 cr]; QP-70 cr incl 12 cr IntS or #; SP-50 cr incl 8 cr in IntS or #; A-F only)

Detailed examination of contemporary international studies topics.

## Journalism (Jour)

### College of Liberal Arts

**Jour 2001. Reporting and Writing I.** (3 cr; SP-Comp 1120; A-F only)

Basic course in reporting and writing on which much of the student's work for the Journalism minor is built. Information gathering, writing of basic news stories; news style, structure and readability; news sources and interviewing techniques.

**Jour 2501. History of American Journalism.** (3 cr; A-F only)

Examines the cultural and social history of journalism in the United States, from Colonial times to the present, using a variety of both secondary and contemporary samples of journalistic work. Students will explore the values, practices and social roles that encompass the institution of journalism.

**Jour 3001. Reporting and Writing II.** (3 cr; SP-2001, Comp 1120; A-F only)

Emphasizes magazine-style feature writing. Students will develop interviewing skills and learn advanced reporting techniques, including searching public records and using the Freedom of Information Act.

**Jour 3101. News Editing.** (3 cr; SP-2001, Comp 1120; A-F only)

Mechanics of copy and picture editing, selection of stories, news judgment, the writer-reporter relationship, headline writing, basic page layout and design, and use of graphics, and basic legal issues.

**Jour 3401. Broadcast News Writing.** (3 cr; SP-2001, Comp 1120; A-F only)

Students will learn to research and write broadcast news reports and features. They will edit quarter inch tape and be introduced to digital editing techniques. They will prepare a weekly public affairs news program for broadcast on KUMD.

**Jour 3700. Media Law and Ethics.** (3 cr; SP-Comp 1120; A-F only)

Laws regarding news gathering and dissemination. First Amendment principles of press freedom, libel, invasion of privacy, prior restraint, access to information, and electronic media content regulation issues.

**Jour 4001. Specialized Reporting and Writing.** (3 cr; SP-2001, 3101, Comp 1120; no grad cr; A-F only)

Students will study basic concepts of investigative reporting, opinion writing, science reporting and feature writing, then choose any two of the above as the basis for long articles and write short pieces in the remaining two areas.

**Jour 4021. Sports Journalism.** (3 cr; SP-2001, Comp 1120; no grad cr; A-F only)

Covers the basics of sports journalism as it pertains to newspapers, magazine and television. Explores the psychology, sociology, business and ethics of sports

**Jour 4500. Special Topics: (Various Titles to be Assigned).** (3 cr; SP-2001, 3101, Comp 1120; no grad cr; A-F only)

Selected themes and issues involving student publications such as staff organization, policies, finance, law, photography, design, and the role of the student press.

**Jour 5102. Advanced Editing.** (3 cr; SP-2001, 3101 or grad student or #; A-F only)

Advanced theory and practice in news selection, preparation, and display for newspaper, magazine, broadcast and photojournalism media; emphasis on the ethical and professional responsibility of the journalist.

**Jour 5197. Journalism Internship.** (3 cr; SP-2001, 3700, 60 cr or grad student or #; A-F only)

Supervised professional experience as a working staff member with a newspaper, magazine, broadcast station or other communications organization.

**Lang 1201. Intermediate Foreign Language I.** (4 cr; QP-1103 or equiv or #; SP-1102 or #; LE 3)

For students studying intermediate language under the auspices of another college or university or by individual arrangement with prior approval by the Department of Foreign Languages and Literatures; or students studying a less frequently taught language at UMD.

**Lang 1202. Intermediate Foreign Language II.** (4 cr; SP-1201 or #; A-F only; LEIP 3)

For students studying intermediate language under the auspices of another college or university or by individual arrangement with prior approval by the Department of Foreign Languages and Literatures; or students studying a less frequently taught language at UMD.

**Lang 1301. English as a Second Language.** (3 cr [max 6 cr]; A-F only)

Integrated study of reading, listening, writing, and speaking skills for students who are not native speakers, with an emphasis on academic and scholarly American English. Content is individualized to each student's needs.

**Lang 3091. Directed Study.** (1-3 cr [max 6 cr]; QP-#, Δ; SP-#, Δ; A-F only)

**Lang 3095. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 8 cr]; QP-Fr 3002 or Ger 1503 or Span 3002 or #; offered in study abroad programs)

Selected topics, not currently offered, that deal with genres, periods, specific authors, or cultural movements of Germanic, Hispanic, Francophone, or other foreign worlds.

**Lang 4044. Language Teaching Methods.** (4 cr; QP-24 cr of a foreign language or #; SP-Fr 2301 or Ger 2301 or Span 2301 or equiv; A-F only)

Theory and practice of teaching a second language. Survey and application of current methods used to teach skills and cultural concepts of world languages.

**Lang 5198. Workshop: (Various Titles to be Assigned).**

(1-4 cr [max 8 cr]; QP-Tchg credentials in a foreign language or #; SP-Tchg credentials in a second lang or #; A-F only) Service course for prospective and in-service teachers provides postgraduate study of any matters related to teaching of a foreign language.

## Language (Lang)

### College of Liberal Arts

**Lang 1101. Beginning Foreign Language I.** (4 cr; A-F only; LE 3)

For students studying beginning language where that language is spoken, under the auspices of another college or university or by individual arrangement with prior approval by the Department of Foreign Languages and Literatures; or students studying a less frequently taught language at UMD.

**Lang 1102. Beginning Foreign Language II.** (4 cr; QP-1101 or equiv or #; SP-1101 or #; A-F only; LE 3)

For students studying beginning language where that language is spoken, under the auspices of another college or university or by individual arrangement with prior approval by the Department of Foreign Languages and Literatures; or students studying a less frequently taught language at UMD.

## Limnology (Lim)

### College of Science and Engineering

**Lim 5001. Physical and Chemical Limnology.** (3 cr; SP-Math 1296; Phys 1002 or 1202; Chem 1152 or 1162; A-F only) Heat budgets, thermal structure of lakes, circulation dynamics, waves, inorganic chemistry of natural waters - major and minor ions, pH-Eh relationships, carbon and nutrient cycles in the water column.

**Lim 5002. Geological Limnology.** (3 cr; A-F only)

Lake basin morphology, geophysical mapping, sediment composition, sediment transport by waves and currents, sediment geochronology, pore-water chemistry, bioturbation, paleolimnology.

**Lim 5004. Field Limnology.** (2 cr; SP- 5002, 5003, Biol 5861 or #; A-F only)

Field measurements on local lakes, streams; research cruise aboard R/V Blue Heron on Lake Superior; laboratory exercises in biological, chemical, geological and physical limnology.

## Linguistics (Ling)

### College of Liberal Arts

**Ling 1811. Introduction to Language.** (3 cr; A-F only; LE 2) Theoretical and practical study of the nature of language, including survey of linguistic science (grammar, vocabulary, first language acquisition, second language learning, regional and social dialects, how the brain processes language, and how language works in interpersonal communication).

**Ling 3101. Introduction to Phonology.** (3 cr; SP-1811 or #; A-F only) Survey of the fundamentals of phonology and its place in linguistic science, with emphasis on descriptive analysis.

**Ling 3102. Introduction to Syntax.** (3 cr; SP-1811 or #; A-F only) Survey of the fundamentals of syntax, with emphasis on systems for describing, analyzing, and creating natural languages, studied within the development of linguistic science.

**Ling 3195. Special Topics: (Various Titles to be Assigned).** (3 cr [max 12 cr]; SP-1811 or #; A-F only) Selected topics, not currently offered, that deal with subdisciplines within linguistics, such as pragmatics, semantics, regional and social language variation, sociolinguistics, childhood language acquisition, second language learning, language change and linguistic reconstruction, and history of linguistic inquiry.

**Ling 3591. Independent Study in Linguistics.** (1-3 cr [max 6 cr]; QP-#, coordinator consent; SP-1811 or #, Δ; A-F only) Directed reading and/or research.

**Ling 5195. Special Topics: (Various Titles to be Assigned).** (3 cr; QP-1811 or #; A-F only) Subdisciplines such as pragmatics, semantics, regional and social language variation, sociolinguistics, childhood language acquisition, second language learning, language change and linguistic reconstructions, and history of linguistic inquiry.

**Ling 5802. Applied Linguistics.** (4 cr; QP-3101 or Engl 5811 or #; SP-1811 or #; A-F only) Application of linguistic theory to reading and writing instruction, with emphasis on preparation of secondary school teachers in English and communication.

**Ling 5852. Practicum in Teaching Linguistics.** (3 cr; QP-8 cr of ling, Δ; SP-1811, 3101, 3102 or #; A-F only) Supervised teaching in introductory linguistics courses. Experience in preparation for and in conduct of classes, in consultations with students, and in testing.

**Ling 8591. Independent Study in Linguistics.** (1-3 cr [max 6 cr]; QP-#, coordinator consent; SP-Δ; A-F only) Directed reading and/or research.

## Management Studies (MgtS)

### School of Business and Economics

**MgtS 3397. SBE Internship.** (3 cr; SP-SBE candidate, consent of internship director; S-N only) Work-integrated learning program providing practical experiences within students' majors. Students participate in approved program within cooperating businesses, governmental agencies, or civic organizations. Requires minimum of 300 hours work experience, assigned written reports, and performance evaluations.

**MgtS 3401. Organizational Behavior and Management.** (3 cr; SP-SBE candidate or approved non-SBE Bus Adm or human resource or Mgmt minor or □ A-F only) Introduction to organizations, management process, and understanding human behavior at work. Effects of structure, technology, leadership, job design, teams, and reward systems on employee attitudes, motivation, and work-related behaviors.

**MgtS 3491. Independent Study.** (1-3 cr; SP-Δ; A-F only) For students wishing to do special work in strategic, organizational, human resource, or marketing management that extends beyond, or in greater depth than, regular course offerings.

**MgtS 3701. Principles of Marketing.** (3 cr; SP-SBE candidate or approved non-SBE Bus Adm or Mkt minor or □ A-F only) Marketing as a process of exchange management. Emphasis on conceptual tools necessary to deal with both strategic marketing management issues and tactical management of product, price, promotion, and distribution.

**MgtS 3711. Marketing Research.** (3 cr; SP-3701, SBE candidate or non-SBE Mkt minor or □ A-F only) Emphasis on improving skills of conducting secondary research, designing a primary research study, and analyzing and reporting results of a research study.

**MgtS 3741. Fundamentals of Selling.** (3 cr; SP-SBE candidate or approved non-SBE Mkt minor or □ A-F only) Theory and practice of personal selling as used by organizations to develop long-term partnerships with customers. Emphasis on marketing, planning, communication, and presentation skills.

**MgtS 3781. International Marketing.** (3 cr; SP-3701, SBE candidate or approved non-SBE Mkt minor or □ A-F only) Marketing across national boundaries; effects of foreign economic, legal/political, and sociocultural environments on multinational marketing strategies.

**MgtS 3801. Human Resource Management.** (3 cr; SP-SBE candidate or approved non-SBE Bus Adm or human resource or org mgmt minor or □ A-F only) Introduction to theory and practice of human resource management in private and public organizations. Organizational, legal, and ethical influences on major personnel functions, including planning, staffing, training, performance appraisal, compensation, and labor-management relations.

**MgtS 3997. Management of Community Projects.** (1-3 cr; SP-3401, 3801, SBE candidate or #; S-N only)

Requires design and administration of community-related project involving volunteers. Interns identify project, contact appropriate persons, obtain approval, and submit written proposal. Requires completion of minimum of 100-300 hours, maintenance of weekly journal, oral presentation, and written analysis.

**MgtS 4411. Organizational Studies.** (3 cr; SP-3401, SBE candidate or approved non-SBE Mgmt minor or  A-F only)  
Survey of organization theories and their application to organizational structuring, coordination, control, job design, organizational decision making, leadership, and organizational development.

**MgtS 4421. Managing Change.** (3 cr; SP-3401, 3801 or equiv, SBE candidate with 90 cr or grad student or  A-F only)

Causes, goals, programs, and results of organizational change and employee responses to it. Assumptions, values, contingency factors, ethical considerations, models, and intervention strategies for organizational development. Role of managers as change agents.

**MgtS 4431. Leadership.** (3 cr; SP-SBE candidate or approved non-SBE Mgmt minor or  A-F only)  
Nature and character of effective leadership; importance of leadership in organizations; traditional and contemporary views of leadership.

**MgtS 4441. Managerial Decision Making.** (3 cr; SP-3401, 3801, SBE candidate or  A-F only)  
Decision-making models, styles, and strategies with goal of improving quality of decision making.

**MgtS 4451. Management Inquiry.** (3 cr [max 3 cr]; SP-3401, 3801, SBE candidate or  A-F only)  
Methods employed by organizational specialists in conducting applied inquiry (research) to assist organizational decision making. Preparation and written/oral presentation of research findings from student-conducted field, laboratory, or library research projects focused on contemporary management issues.

**MgtS 4461. Business and Society.** (3 cr; SP-SBE candidate or approved non-SBE Mgmt minor or  A-F only)  
Business as part of larger system—economic, political, social. Emphasis on external environment—economics, culture, government, technology, international relations, labor—within which business operates. Business ethics and social responsibility.

**MgtS 4471. Interpersonal Relations.** (3 cr; SP-3401, SBE candidate or approved non-SBE Mgmt minor or  A-F only)  
Issues and application of concepts affecting employer-employee and peer relationships at work. Topics may include conflict, counseling, feedback, group decision making, influence strategies, organizational politics, stress management.

**MgtS 4472. Entrepreneurship.** (3 cr; SP-SBE candidate or  A-F only)  
Seminar on nature of entrepreneurship; the entrepreneurial character; situations and experiences encountered by entrepreneurs.

**MgtS 4480. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 9 cr]; SP-SBE candidate, previous course work in topics subject area or  A-F only)  
Contemporary management problems in functional areas of strategic, organizational, human resource, or marketing management.

**MgtS 4481. Strategic Management.** (3 cr; SP-3401, 3701, FMIS 3301, FMIS 3601, 90 cr, SBE candidate or  no grad cr; A-F only)

Integration of basic functions of marketing, finance, production, and behavioral sciences. Emphasis on organizational environments and development and implementation of competitive strategies that respond to social, political, and economic conditions from perspective of top management.

**MgtS 4496. Management of Field Studies.** (3 cr; SP-90 cr, SBE candidate,  $\Delta$ , no grad cr; A-F only)  
Teams of two to four students provide hands-on management assistance, analysis, and other consulting to existing small businesses or economic development agencies.

**MgtS 4711. Business-to-Business Marketing.** (3 cr; SP-3701, SBE candidate or approved non-SBE Mkt minor or  A-F only)

Marketing goods and services to organizations. Emphasis on differences between marketing to organizations and consumers. Derived demand, long-term trade relationships, contact, negotiations, channels, promotion, physical distribution, product development, markets.

**MgtS 4721. Advertising and Marketing Communications.** (3 cr; SP-3701, SBE candidate or  A-F only)  
Promotional planning. Emphasis on planning for advertising, sales promotion, public relations/publicity, direct marketing, and personal selling. Importance of integrated marketing communications to organizations.

**MgtS 4731. Consumer Behavior.** (3 cr; SP-3701, SBE candidate or approved non-SBE Mkt minor or  A-F only)  
Buyer behavior and implications for marketing strategy. Emphasis on information processing concepts, influences on behavior, and decision-making processes from both conceptual and pragmatic perspectives. Students requiring graduate credit must complete additional coursework.

**MgtS 4781. Marketing Management and Strategy.** (3 cr; SP-3701, 3711, one other marketing course, 90 cr, SBE candidate or  A-F only)

Planning, directing, and controlling an organization's marketing activity, including formulating marketing objectives, strategy, and tactics. Interpretation of information in decision making and strategy formulation. Case analysis used to develop marketing problem-solving, communication, and organization skills.

**MgtS 4821. Staffing Work Organizations.** (3 cr; SP-3801, SBE candidate or approved non-SBE human resource minor or  A-F only)

Theory and practice of staffing work organizations. Emphasis on design and implementation of staffing systems, legal requirements, and career planning.

**MgtS 4831. Compensation Systems.** (3 cr; SP-3801, SBE candidate with 90 cr or approved non-SBE human resource minor or

Theory, design, and practice of employee compensation systems. Impacts of compensation, economic and institutional forces influencing employer compensation policies and practices, supplemental forms of compensation and administrative practices.

## Course Descriptions

**MgtS 4841. Training and Development.** (3 cr; SP-3801, SBE candidate, approved non-SBE human resource minor or □)

Design, implement, and evaluate human resource development systems. Elements of program planning and delivery: learning theory, needs analysis, objectives, training methods and coaching, presentational skills and techniques, assessment processes, and transfer strategies.

**MgtS 4851. Unions and Collective Bargaining.** (3 cr; SP-3801, SBE candidate with 90 cr or approved non-SBE Human Resource minor or □)

Nature of and basis for contractual relationships between employers and unions. Emphasis on background of labor movement, union organizing, bargaining relationships, labor law, and contemporary trends in private and public sector labor relations.

**MgtS 4881. Human Resource Issues and Trends.** (3 cr; SP-3801, SBE candidate or □)

Integrative, problem-solving approaches to contemporary human resource challenges.

# Master of Business Administration (MBA)

## School of Business and Economics

**MBA 8111. Business, Government, and Society.** (2 cr; SP-MBA student or □ A-F only)

How cultural, political, global, legal, and economic factors impact business activities. Issues of business ethics and social responsibility.

**MBA 8211. Data Analysis and Statistics for Managers.**

(2 cr; SP-Econ 2020 or equiv, grad student or □ A-F only) Concepts/principles of business statistics, data analysis, and presentation of results. Research process and design, secondary and primary data collection, measurement concepts, sampling design, use and interpretation of statistical techniques, research ethics, reporting, and evaluating research findings.

**MBA 8311. Operations Management.** (3 cr; QP-FMIS 3305 or equiv, grad student or □ SP-FMIS 3301 or equiv, grad student or □ A-F only)

Operations management strategies for the organization. Computer-implemented decision support models introduced in contexts such as project management, resource allocation, forecasting, quality management, inventory management, and simulation.

**MBA 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser and DGS consent.)

**MBA 8411. Policy Formulation and Implementation.**

(3 cr; SP-8311, 8611, 8711, 8811, grad student or □ A-F only) Formulation and implementation of organizational strategy and policy that results in a sustainable competitive advantage. Develop skills in integrating all functional areas of business as well as identifying industry and competitive trends to determine organizational strategy.

**MBA 8501. Management Accounting.** (3 cr; QP-Acct 5501 or equiv, grad student; SP-Acct 2005 or equiv, grad student or □ A-F only)

Interpreting and using accounting reports and supplementary information for management planning, coordination, and control; emphasis on using accounting

information for decision making in problems of product mix, cost-volume-profit analysis, and other profit planning and control areas.

**MBA 8512. Managerial Economics.** (2 cr; QP-[Econ 1004, Econ 1005 or equiv], grad student or □ SP-[Econ 1022, Econ 1023 or equiv], grad student or □ A-F only)

Application of economic theory and economic methodology to managerial decision making. Supply and demand, production, consumer behavior, business and economic forecasting, pricing and marketing strategies under differing competitive conditions, government's role, and the global market.

**MBA 8611. Financial Management.** (3 cr; SP-FMIS 3601 or equiv, grad student or □ A-F only)

Corporate financial policy. Application of financial theory and decision-making tools.

**MBA 8711. Marketing Management.** (3 cr; SP-MgtS 3701 or equiv, grad student or □ A-F only)

Planning, implementation, evaluation, and control of organizational marketing activities. This process includes environmental market analysis in order to achieve competitive advantage and effective resource allocation.

**MBA 8801. Organization Behavior and Human Performance.** (3 cr; SP-MgtS 3401 or equiv, grad student or □ A-F only)

Theoretical models and empirical literature focused on understanding the effects (e.g., performance, motivation, and work-related attitudes—satisfactions and commitment) that organizations have upon their members through environmental factors such as job/work design, technology, and reward systems.

**MBA 8811. Human Resource Challenges.** (3 cr; SP-MgtS 3801 or equiv, grad student or □ A-F only)

Overview of contemporary human resource issues, human resource systems, procedures, and decisions that guide effective, efficient, and equitable management of people in organizations.

**MBA 8991. Independent Study.** (1-3 cr [max 6 cr]; SP-□ A-F only)

Special study in areas useful to individual programs and objectives in accounting, economics, finance, information systems, management, human resource management, marketing, and other areas of business administration that extend beyond, or in greater depth than, regular courses.

**MBA 8994. Directed Research.** (1-6 cr [max 6 cr]; SP-MBA student; A-F only)

**MBA 8995. Special Topics in Business: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; SP-MBA or grad student, □ A-F only)

Special topics on or integrative, interdisciplinary study of problems in accounting, economics, and business administration.

**MBA 8998. Workshop in Business: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; SP-MBA or grad student, □ A-F only)

Workshops provide an opportunity for integrative, interdisciplinary study of problems in accounting, economics, and business administration.

**MBA 8999. Projects in Business.** (1-3 cr [max 6 cr]; SP-MBA or grad student, □ A-F only)

Community or campus-based projects involving analysis of an issue or problem in an organization and proposal of a solution. Provides an opportunity for integrative, interdisciplinary study of problems in accounting, economics, and business administration.

# Mathematics (Math)

## College of Science and Engineering

**Math 0102. Euclidean Geometry.** (QP-1001 or equiv; SP-High school algebra; cannot apply cr toward degree; A-F only)

Plane and solid geometry. Brief introduction to analytic geometry. Intended for students who have not taken high school geometry or who need additional background in geometry.

**Math 1005. College Algebra.** (3 cr; SP-Math placement or  $\Delta$ ; A-F only)

Basic concepts of solving equation and inequalities. Introduction to function concept and graphing. Polynomial, rational, logarithmic, and exponential functions.

**Math 1024. Introduction to Contemporary Mathematics.** (3 cr; SP-1005 or math placement; A-F only; LE 2)

Increases awareness and appreciation of uses, richness, and power of mathematics. Sample topics: graph theory for management science, scheduling, linear programming, statistical sampling and inference, coding information, decision making, voting theory, game theory, geometric growth, symmetry, and patterns.

**Math 1141. Mathematics for Elementary Education.** (4 cr; QP-1002, 1003; SP-[1005, Pre-elem ed major] or  $\Delta$ ; A-F only)

Subject matter for effective elementary school teaching. Problem solving, structure of number systems, and properties of geometric figures. Use of microcomputers in mathematics.

**Math 1155. Trigonometry.** (2 cr; QP-1002, 1003; SP-0102; A-F only)

Introduction to trigonometric functions and their inverses, identities, triangle trigonometry, and applications.

**Math 1160. Finite Mathematics and Introduction to Calculus.** (5 cr; QP-1002, 1003; SP-\$1290, \$1296, 1005; A-F only; LE 2)

Counting theorems, elementary probability, conditional probability, Bayes' theorem, matrices, determinants, graphical and algebraic methods for solving systems of linear equations and inequalities, introduction to linear programming, and abbreviated treatment of calculus with emphasis on business and social science applications.

**Math 1234. Freshman Seminar: Topics: (Various Titles to be Assigned).** (3 cr; SP-Freshman, fewer than 30 cr; A-F only; LE 2)

Concepts from mathematics/statistics and their areas of use. See *Class Schedule* for topics.

**Math 1250. Precalculus Analysis.** (4 cr; QP-1002, 1003; SP-1005 or math placement; A-F only; LE 2)

Inequalities, analytical geometry; relations, functions, and graphs; exponential, logarithmic, and trigonometric functions; complex numbers and De Moivre's Theorem; permutations, combinations, binomial theorem, and mathematical induction.

**Math 1290. Calculus for the Natural Sciences.** (5 cr; SP-\$1296, 1250 or math placement; A-F only; LE 2)

Differential and integral calculus needed for modeling in earth and life sciences. Computational software. Not intended for students in mathematics, engineering, or physical sciences.

**Math 1296. Calculus I.** (5 cr; QP-1250, 1296; SP-\$1290, 3 1/2 yrs high school algebra or trig or geometry or college precalc course; A-F only; LE 2)

First part of a standard introduction to calculus of functions of a single variable. Limits, continuity, derivatives, integrals, and their applications.

**Math 1297. Calculus II.** (5 cr; QP-1296, 1297; SP-1290 or 1296; A-F only)

Second part of a standard introduction to calculus. Vectors, applications of integrals, transcendental functions, series, and multivariable functions and partial derivatives.

**Math 3091. Independent Study.** (1-3 cr [max 8 cr]; QP- $\Delta$ ; SP- $\Delta$ ; A-F only)

Directed reading and/or research in mathematics. Must be arranged with instructor and department head before registration.

**Math 3097. Internship.** (1-3 cr; QP-Math major, 90 cr,  $\Delta$ ; SP-Math major,  $\Delta$ ; S-N only)

Practical, independent project in commercial, government, or industrial setting. Department approval required before beginning project.

**Math 3110. Foundations of Mathematics and Geometry.** (5 cr; QP-3298, 3320; SP-1297; A-F only)

Introduction to foundations of mathematics. Non-Euclidean geometries, postulational systems, and models. History of mathematics. Importance and use of mathematics in modern society.

**Math 3120. Mathematics Tutorial Project.** (1-2 cr [max 4 cr]; QP-1297,  $\Delta$ ; SP-1296, #; S-N only)

Primarily for 1xxx mathematics courses, under supervision of mathematics department member.

**Math 3280. Differential Equations with Linear Algebra.** (4 cr; QP-3298; SP-1297; A-F only)

First, second, and higher order equations; series methods; Laplace transforms; systems; software; modeling applications; introduction to vectors; matrix algebra, eigenvalues.

**Math 3298. Calculus III.** (4 cr; QP-3298; SP-1297; A-F only)

Third part of a standard introduction to calculus. Conic sections, vectors and vector-valued functions, partial derivatives and multiple integrals, vector fields, Green's and Stokes' theorems.

**Math 3299. Intermediate Analysis.** (3 cr; QP-3298; SP-1297; A-F only)

In-depth study of fundamental notions such as limit, convergence, continuity, differentiability, and integrability on which all reflective study of calculus must rest.

**Math 3355. Discrete Mathematics.** (4 cr; QP-3320, CS 1502 or CS 1621; SP-[1296, CS 1511, 1297 or CS 1521] or #; A-F only)

Introduction to mathematical logic, predicates and quantifiers, sets, proof techniques, recursion and mathematical induction, recursive algorithms, analysis of algorithms, assertions and loop invariants, complexity measures of algorithms, combinatorial counting techniques, relations, graph theory.

**Math 3941. Undergraduate Colloquium.** (1 cr; QP-Math major,  $\Delta$ ; must regis during qtr of 16th point; SP-Math major or minor,  $\Delta$ ; must regis during sem of 16th point; S-N only) Exposure to UMD mathematics-related colloquia. Sixteen points required: one for attending a colloquium;

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one for writing an acceptable report on a colloquium (at least four must be earned through writing); up to eight for giving a colloquium.

**Math 3995. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; QP-Δ; SP-Δ; A-F only)  
Topics not available in standard curriculum.

**Math 4230. Applied Mathematics: Complex Variables.** (3 cr; QP-3350, 3699; SP-3280; A-F only)  
Complex numbers and analytic functions; complex integration; complex power series, Taylor series, and Laurent series; theory of residues; conformal mapping.

**Math 4240. Applied Mathematics: Operational Methods.** (3 cr; QP-3380; SP-3280; A-F only)  
Laplace transform; Fourier series, integrals, and transforms; Sturm-Liouville operator- and boundary-value problems; orthogonal functions; operator solutions of partial differential equations.

**Math 4326. Linear Algebra.** (3 cr; SP-6 cr Math/Stat above 3120, no grad cr; A-F only)  
Systems of linear equations, matrix algebra, determinants, vector spaces, subspaces, linear independence, span, basis, coordinates, linear transformations, matrix representations of linear transformations, eigenvalues and eigenvectors, diagonalization, Gram-Schmidt orthogonalization, orthogonal projection and least squares.

**Math 4820. Applied Mathematics: Numerical Methods.** (3 cr; QP-1297, 3320, proficiency in FORTRAN or Pascal; SP-3280 or 4326, proficiency in FORTRAN or C or C++)  
Computer representation of numbers; sources of error; introduction to interpolation, approximation, numerical integration, solution of linear and nonlinear systems, initial-value problem approximation; use of computer software.

**Math 5201. Real Variables.** (4 cr; QP-3699; SP-3299; A-F only)  
Limits, sequence and series of real numbers, tests for convergence, rearrangements, summability, and the class  $[1][2]$ . Metric spaces; continuous functions, connectedness, completeness, compactness. Banach fixed-point theorem and Piccard existence theorem for differential equations.

**Math 5220. Optimization and Control.** (3 cr; SP-3280; A-F only)  
Introduction to control theory of linear systems. Controllability, stabilizability, linear quadratic regulator problem. (offered alt yrs)

**Math 5260. Dynamical Systems.** (3 cr; QP-3380 or 3381; SP-3280)  
Fundamentals of differential equations (existence, uniqueness, continuation of solutions); linear systems, autonomous systems, and Poincare-Bendixson theory; periodic systems; discrete dynamical systems; bifurcation theory; chaos. (offered alt yrs)

**Math 5270. Modeling with Dynamical Systems.** (3 cr; QP-3380 or 3381, 3699; SP-3280)  
Application and analysis of continuous and discrete dynamical systems. Model construction, simulation, and interpretation. (offered alt yrs)

**Math 5280. Partial Differential Equations.** (3 cr; QP-3380, 5380; SP-3280; A-F only)  
Introduction, emphasizing use of Fourier series, Green's functions, and other classical techniques.

**Math 5327. Advanced Linear Algebra.** (3 cr; QP-5326; SP-Grad student or #; A-F only)  
Vector spaces over fields, subspaces, linear transformations, matrix representations, change of basis, inner-product spaces, singular value decomposition, eigenspaces, diagonalizability, annihilating polynomials, Jordan form.

**Math 5330. Theory of Numbers.** (3 cr; QP-3320 or 3555; SP-3355 or #; A-F only)  
Properties of integers, primes, divisibility, congruences, and quadratic reciprocity. Computational aspects include factoring algorithms and RSA cryptosystem. (offered alt yrs)

**Math 5365. Graph Theory.** (3 cr; QP-3320; SP-3355 or #; A-F only)  
Finite graphs, including trees, connectivity, traversability, planarity, colorability, labeling, and matchings.

**Math 5366. Enumerative Combinatorics.** (3 cr; QP-3555; SP-3355; A-F only)  
Permutations, combinations, binomial coefficients, inclusion-exclusion, recurrence relations, ordinary and exponential generating functions, Catalan numbers, selected topics from designs, finite geometries, Polya's enumeration formula.

**Math 5371. Abstract Algebra I.** (3 cr; QP-3320; SP-3355 or 4326 or #; A-F only)  
Introduction to groups and rings and their applications.

**Math 5372. Abstract Algebra II.** (3 cr; QP-3320, 5670; SP-3355 or #; A-F only)  
Polynomial rings, divisibility in integral domains, field extensions, finite fields, special topic, and applications.

**Math 5384. Algebraic Coding Theory.** (3 cr; QP-3320; SP-3355 or #; A-F only)  
Introduction to linear error-correcting codes using binary vector spaces and finite fields. Hamming codes, Golay codes, linear codes in general, cyclic codes, BCH codes, and their encoding/decoding. (offered alt yrs)

**Math 5810. Linear Programming.** (3 cr; QP-5IE 3070, 3320; SP-3280 or 4326; A-F only)  
Motivation problems, modeling, theory of simplex method, duality and sensitivity analysis, large-scale problems, complexity, and Karmarkar algorithm. (offered alt yrs)

**Math 5830. Numerical Analysis: Approximation and Quadrature.** (4 cr; QP-3380 or 3381, 5326, CS 1501; SP-3280 or 4326, proficiency in FORTRAN or C or C++)  
Error analysis, interpolation and approximation, numerical integration, solution of nonlinear systems. (offered alt yrs)

**Math 5840. Numerical Analysis: Systems and Optimization.** (4 cr; QP-3380 or 3381, 5326, CS 1501; SP-3280 or 4326, proficiency in FORTRAN or C or C++)  
Solution of systems of linear equations; elimination and factorization methods; iterative methods; error analysis; eigenvalue/eigenvector approximation; unconstrained optimization; nonlinear least squares. (offered alt yrs)

**Math 5850. Numerical Differential Equations.** (4 cr; QP-3380, 5380; SP-3280, proficiency in FORTRAN or C or C++; A-F only)  
Computational differencing techniques as applied to initial- and boundary-value problems. Introduction to variational formulations of differential equations and general technique of weighed residuals.

**Math 5900. Team Modeling Project.** (3 cr; SP–Sr, #, no grad cr)

Team-based, model-design project. Applications and methods vary. (offered alt yrs)

**Math 5991. Independent Study.** (1–4 cr [max 8 cr]; QP–Δ; SP–Δ; max 6 cr toward grad program; A-F only)

Directed individual reading and/or research in mathematics; must be arranged with instructor and department head before registration.

**Math 5995. Special Topics: (Various Titles to be Assigned).** (1–3 cr [max 6 cr]; QP–Δ; SP–Δ; A-F only)  
Topics not available in standard curriculum.

**Math 8201. Real Analysis.** (3 cr; QP–5701, 5702; SP–5201; A-F only)

Rigorous development of abstract measure spaces, measurable functions, and corresponding theory of integration. Lebesgue measure and Lebesgue integral developed as a particular model. (offered alt yrs)

**Math 8333. FTE: Master's.** (1 cr; SP–Master's student, adviser and DGS consent)

**Math 8777. Thesis Credits: Master's.** (1–18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Math 8811. Mathematics Seminar.** (3 cr; SP–8980, no grad cr; S-N only)

Applications of mathematical and computational modeling methods; high-performance computation, visualization, and modeling techniques. Case-study analyses of models from areas such as the sciences, medicine, engineering, and industry.

**Math 8870. Scientific Computation: Vector Processing.** (3 cr; QP–5534, CS 5510; SP–5840 or #; prev exper with comp arch, FORTRAN programming desirable)

Vector architecture; performance measures and modeling; benchmarking procedures; vector algorithms; code-optimization techniques; survey of applications. (offered alt yrs)

**Math 8880. Scientific Computation: Parallel Processing.**

(3 cr; QP–5534, CS 5510; SP–5840 or #, FORTRAN or C programming)  
Parallel architectures; heterogeneous network computing; parallel algorithms; workload allocation and load balancing; message-passing libraries; applications. (offered alt yrs)

**Math 8980. Graduate Seminar.** (1 cr; QP–#; SP–#; A-F only)

Survey of applications of discrete, continuous, and stochastic modeling techniques. For first-year graduate students in applied and computational mathematics.

**Math 8994. Directed Research.** (1–4 cr [max 12 cr]; QP–#; SP–#; A-F only)

**Math 8995. Special Topics: (Various Topics to be Assigned).** (1–3 cr [max 6 cr]; QP–#; SP–#; A-F only)  
Topics in mathematics and statistics not available in standard curriculum. (offered when feasible)

# Medical and Molecular Physiology (Phsl)

## School of Medicine

**Phsl 3011. General Physiology.** (4 cr; QP–Biol 1012, Chem 1101 or #; SP–Biol 1761, Chem 1102 or #; A-F only)

Lab and/or lecture demonstrations illustrate key aspects of function and mechanisms of action of major organ systems. Primarily for students preparing for nursing, dental hygiene, pre-professional programs, communication disorders, life science teaching, majors in natural sciences.

**Phsl 5211. Literature Seminar.** (1–2 cr; QP–5927 or #; no grad cr; S-N only)

Oral presentation of written literature review and research data reflecting student's research interests and thesis research results.

**Phsl 5292. Readings in Physiology.** (1–3 cr; SP–#)

Topics in physiology selected for each student; written reviews prepared and discussed.

**Phsl 5294. Research in Physiology.** (1–15 cr; SP–#)

Introduction and use of lab techniques and equipment used for research in various subspecialties of physiology, including neurophysiology, cardiovascular physiology, endocrinology, respiratory and transport process, electrophysiology, and renal physiology.

**Phsl 5601. Physiology of Organ Systems I.** (4 cr; QP–[Biol 3154, Biol 3245],[Chem 3311 or Chem 5336] or #; SP–3011 or Biol 2201 or Biol 2101 or Chem 3322 or Chem 4341 or #; A-F only)

Survey of physiologic functions and interrelationships of organ systems in mammals (musculoskeletal, cardiovascular, renal, respiratory, nervous, endocrine, and reproductive). Framework for understanding physiological processes, allowing students to integrate knowledge gained at molecular level with functions of whole organism.

**Phsl 5602. Physiology of Organ Systems II.** (2 cr; QP–5601 or #; SP–5601 or #; A-F only)

Advanced study of organ system functions in context of interaction of organism with environment.

**Phsl 8333. FTE: Master's.** (1 cr; SP–Master's student, adviser, and DGS consent)

**Phsl 8401. Physiology of Aging.** (2 cr; SP–5601, #)

In-depth study of several theories concerning physiological processes that appear to set the limits of maximum human life span.

**Phsl 8405. Muscle Physiology.** (2 cr; SP–5601, #; A-F only)

In-depth review and discussion of physiological processes involved in muscle contraction from subcellular events to neural-controlled function of whole muscle (skeletal, cardiac, and smooth muscle).

**Phsl 8415. Topics in Endocrinology.** (2 cr; SP–5601, #)

Selected topics of current endocrine research interest examined in depth; historical background, questions posed by current research, and implications of current research for future development in the area.

**Phsl 8441. Transport Processes.** (2 cr; SP–5601, #)

In-depth, quantitative approach to transport processes in biological systems.

**Phsl 8444. FTE: Doctoral.** (1 cr; SP–Doctoral student, adviser and DGS consent)

**Phsl 8666. Doctoral Pre-Thesis Credits.** (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

**Phsl 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Phsl 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

# Medical Microbiology and Immunology (MicB)

## School of Medicine

**MicB 5545. Immunobiology.** (3 cr; QP–Biol 3245 or #; SP–#; A-F only)

The immune system and the cells and molecules which work in concert to keep us free from disease and aberrations resulting in immune disorders.

**MicB 5591. Problems in Medical Microbiology and Immunology.** (1-4 cr [max 8 cr]; SP–Open to med students or qualified upper div and grad students with #) Independent study on tutorial basis. Emphasis on basic and clinical microbiology problems under study at UMD School of Medicine, including immunology. Investigative work and appropriate reading arranged with tutorials consistent with interests and capabilities of individual students.

**MicB 8333. FTE: Master's.** (1 cr; SP–Master's student, adviser and DGS consent)

**MicB 8444. FTE: Doctoral.** (1 cr; SP–Doctoral student, adviser and DGS consent)

**MicB 8554. Advanced Immunology and Immunobiology.** (2 cr; SP–5545 or #; A-F only) Detailed study of mechanisms involved in immunologic defense. Emphasis on concepts and current literature.

**MicB 8666. Doctoral Pre-Thesis Credits.** (1-18 cr [max 60 cr]; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

**MicB 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**MicB 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; SP–Max 18 cr per semester or summer; 24 cr required)

# Medicine (Med)

## School of Medicine

**Med 0601. Basic Science I.** (0 cr; SP–Regis med student; P-N only)

For selected medical students working toward an M.D. who are doing continuing work in their first year. Students must be recommended by the Scholastic Standing Committee or associate dean for student affairs. May be repeated.

**Med 0602. Basic Science II.** (0 cr; SP–Regis med student; P-N only)

For selected students working towards an M.D. who are doing continuing work in their second year. Students must be recommended by the Scholastic Standing Committee or associate dean for student affairs. May be repeated.

**Med 0691. Independent Study.** (0 cr; SP–Regis med student; P-N only)

For selected medical students working toward an M.D. who are pursuing independent study (e.g., remedial coursework, repeating a course, medical leave). Students must be recommended by the Scholastic Standing Committee or associate dean for student affairs.

**Med 0693. Directed Study.** (0 cr; SP–Regis med student; P-N only)

For selected medical students working toward an M.D. who are in a supervised program preparing for the National Boards Exam. Students must be recommended by the Scholastic Standing Committee or associate dean for student affairs.

**Med 0694. Research.** (0 cr; SP–Regis med student; P-N only)

For selected medical students working toward an M.D. who are doing research over an extended period of time. Students must be recommended by the Scholastic Standing Committee or associate dean for student affairs. May be repeated.

**Med 3998. Human Biology and Behavior Topics.** (1-10 cr [max 12 cr]; SP–#; A-F only)

Advanced undergraduate or graduate students can study in depth normal human biology and behavior. During the academic year, students may elect to enroll in one or several subtopics. No basic science clinical correlation.

**Med 6023. Seminars in Indian Health.** (1-2 cr [max 3 cr]; SP–Regis med student; A-F only)

Current issues impacting health of Indian people. Causes of morbidity and mortality, including social, cultural, and economic issues. Discussion focuses on solutions to problems in context of Indian communities.

**Med 6505. Applied Anatomy.** (11 cr; SP–Regis med student; O-N only)

Regional dissection of the human body supplemented with body imaging techniques, clinical correlation conferences, and a strong emphasis on functional and clinical applications; combined with the physical diagnosis of the region this course provides an understanding of human structure along with techniques of the physical exam.

**Med 6510. Histopathology.** (6 cr; SP–Regis med student; O-N only)

Integrated course correlating normal structure and function of cells, tissues, and organs of the body with examples of pathological changes that take place within these cells, tissues, and organs during disease processes.

**Med 6520. Principles of Basic Medical Science.** (9 cr;

SP–Regis med student; A-F only)

Introduction to cellular homeostatic principles and mechanisms associated with normal and abnormal structure and function. Basic science principles of integrative medical sciences. Interdisciplinary sessions emphasize fundamental concepts of biochemistry, molecular biology, anatomy, microbiology, physiology, and pharmacology.

**Med 6541. Hematopoiesis and Host Defenses.** (9 cr;

SP–Regis med student; A-F only)

Introduction to principles of human immunology and hematology. Basic science principles, including pharmacology and pathology together with clinical aspects of innate and acquired immunity within context of hemato-lympho-reticular system.

**Med 6566. Cardiovascular System.** (7 cr; SP–Regis med

student; A-F only)

Integrated comprehensive overview of cardiovascular system. Anatomical, biochemical, physiological, pathological, and pharmacologic aspects of heart, blood vessels, and blood, including histology, embryology, anatomy, gross and microscopic pathology, as well as clinical features, diagnosis, and pharmacological therapy.

**Med 6573. Nervous System.** (13 cr; SP–Regis med student;

A-F only)

Interdisciplinary study of human nervous system, including consideration of eye and ear. Basic sciences of anatomy, behavioral science, biochemistry, microbiology, pathology, pharmacology, and physiology correlated with clinical material.

**Med 6724. Gastrointestinal Hepatobiliary System.** (6 cr;

SP–Regis med student; A-F only)

Interdisciplinary integrative course discusses fundamental concepts of anatomy, physiology, nutrition, pathology, clinical medicine, and microbiology as they relate to issues of gastrointestinal and hepatobiliary system.

**Med 6728. Respiratory System.** (5 cr; SP–Regis med

student; A-F only)

Maintenance and regulation of human internal environment by the respiratory system. Histology of upper airways and lungs; respiratory gas exchange; introduction to respiratory component of acid-base balance. Integrative lab covering cardiovascular-respiratory adjustments to exercise.

**Med 6746. Fluids and Electrolytes.** (4 cr; SP–Regis med

student; A-F only)

Introduction to principles and mechanisms associated with human renal and genitourinary function in health and disease. Integrates anatomical, physiological, pharmacological, pathological, immunological, and basic clinical aspects of renal and genitourinary systems in context of fluid and electrolyte homeostasis.

**Med 6762. Endocrine and Reproductive System.** (10 cr;

SP–Regis med student; A-F only)

Structure and function of endocrine and reproductive systems. Essential background for understanding findings of clinical medicine related to endocrine regulation of reproduction and homeostasis.

**Med 6773. Integrated Clinical Medicine.** (6 cr; SP–Regis

med student; O-N only)

Integration of basic, clinical, and behavioral science principles to understand the human body and its integrative function and psychosocial responses,

especially in multisystem conditions. Emphasizing evidence-based medicine principles, health issues are explored over the life cycle from pediatrics to geriatrics.

**Med 6788. Dermatology and Musculoskeletal System.**

(4 cr; SP–Regis med student; O-N only)

Interdisciplinary study of integument and musculoskeletal system. Basic sciences of anatomy, microbiology, pathology, pharmacology, and physiology correlated with clinical material.

## Music (Mu)

### School of Fine Arts

**Mu 0100. Recital Hour.** (0 cr; SP–¶[applied instruction];

S-N only)

Attendance at scheduled musical events.

**Mu 1001. Introduction to Music.** (3 cr; QP–Not for music

majors or minors unless specified by adviser; SP–Not for music majors or minors; LEIP 9)

Various historical style periods; listening to develop understanding and enjoyment of music.

**Mu 1003. Beethoven to the Beatles.** (3 cr; LE 9)

Survey of 19th- and 20th-century classical, jazz, rock, pop, and ethnic music genres.

**Mu 1005. Jazz Studies.** (3 cr; LECD 9)

Evolution of jazz; social problems in America that fostered its origin and continues to shape its development.

**Mu 1101. Music Theory I.** (3 cr; QP–¶1424 or equiv or

passed piano proficiency; SP–¶1421 or equiv or passed piano proficiency; A-F only)

Study of basic diatonic material and structure with introduction to chromatic material. Analysis of vocal and instrumental scores; creative writing coordinated with ear training, sight singing, and elementary keyboard harmony.

**Mu 1102. Music Theory II.** (3 cr; QP–¶1424 or equiv or

passed piano proficiency; SP–¶1421 or equiv or passed piano proficiency; A-F only)

Continued study of basic diatonic material and structure with an introduction to chromatic material. Analysis of vocal and instrumental scores; creative writing coordinated with ear training, sight singing, and elementary keyboard harmony.

**Mu 1311. Voice.** (1-3 cr [max 18 cr]; QP–Music major fee-

waiver student, Δ; SP–Music major, Δ; A-F only)

Individual and one-hour group lesson weekly.

**Mu 1312. Voice.** (1 cr; QP–Students who do not qualify for

fee waiver; SP–Non-music major or music major sec instr; may be repeated; A-F only)

Individual lesson: one-half hour weekly.

**Mu 1321. Piano.** (1-3 cr [max 18 cr]; QP–Music major fee-

waiver student, Δ; SP–Music major, Δ; A-F only)

Individual and one-hour group lesson weekly.

**Mu 1322. Piano.** (1 cr; QP–Students who do not qualify for

fee waiver; SP–Non-music major or music major sec instr; may be repeated; A-F only)

Individual lesson: one-half hour weekly.

**Mu 1325. Jazz Piano.** (1-3 cr [max 18 cr]; QP–Music major

fee-waiver student, Δ; SP–Music major, Δ; A-F only)

Individual and one-hour group lesson weekly.

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**Mu 1326. Jazz Piano.** (1 cr; QP—Students who do not qualify for fee waiver; SP—Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson: one-half hour weekly.

**Mu 1331. Organ.** (1-3 cr [max 18 cr]; QP—Music major fee-waiver student, Δ; SP—Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 1332. Organ.** (1 cr; QP—Students who do not qualify for fee waiver; SP—Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson: one-half hour weekly.

**Mu 1351. Strings.** (1-3 cr [max 18 cr]; QP—Music major fee-waiver student, Δ; SP—Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 1352. Strings.** (1 cr; QP—Students who do not qualify for fee waiver; SP—Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson: one-half hour weekly.

**Mu 1357. Harp.** (1-3 cr [max 18 cr]; QP—Music major fee-waiver student, Δ; SP—Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 1358. Harp.** (1 cr; QP—Students who do not qualify for fee waiver; SP—Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson: one-half hour weekly.

**Mu 1361. Woodwinds.** (1-3 cr [max 18 cr]; QP—Music major fee-waiver student, Δ; SP—Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 1362. Woodwinds.** (1 cr; QP—Students who do not qualify for fee waiver; SP—Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson: one-half hour weekly.

**Mu 1371. Brass.** (1-3 cr [max 18 cr]; QP—Music major fee-waiver student, Δ; SP—Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 1372. Brass.** (1 cr; QP—Students who do not qualify for fee waiver; SP—Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson: one-half hour weekly.

**Mu 1381. Percussion.** (1-3 cr [max 18 cr]; QP—Music major fee-waiver student, Δ; SP—Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 1382. Percussion.** (1 cr; QP—Students who do not qualify for fee waiver; SP—Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson: one-half hour weekly.

**Mu 1391. Classical Guitar.** (1-3 cr [max 18 cr]; QP—Music major fee-waiver student, Δ; SP—Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 1392. Classical Guitar.** (1 cr; QP—Students who do not qualify for fee waiver; SP—Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson: one-half hour weekly.

**Mu 1395. Jazz Guitar.** (1-3 cr [max 18 cr]; QP—Music major fee-waiver student, Δ; SP—Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 1396. Jazz Guitar.** (1 cr; QP—Students who do not qualify for fee waiver; SP—Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson: one-half hour weekly.

**Mu 1398. Pop Styles Guitar.** (1 cr; QP—Students who do not qualify for fee waiver; may be repeated; SP—Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson, one half hour weekly.

**Mu 1411. Diction: Italian and English.** (1 cr; QP—Voice major or #; SP—Principal instr voice or #; A-F only)  
Proper enunciation of English and Italian as applied to vocal literature.

**Mu 1412. Diction: German.** (1 cr; QP—Voice major or #; SP—1411 or #; A-F only)  
Proper enunciation of German as applied to vocal literature.

**Mu 1413. Diction: French.** (1 cr; QP—Music major or #; SP—1411 or #; A-F only)  
Proper enunciation of French as applied to vocal literature.

**Mu 1421. Piano Class I.** (1 cr [max 4 cr]; QP—Music major or #; repeatable for 6 cr max; SP—Music major or #; A-F only)  
Basic piano technique; sight reading, harmonizing melodies, improvisation for music major working toward department piano proficiency requirement.

**Mu 1440. Survey of Instrumental Techniques.** (1 cr; SP—Music major or #; A-F only)  
Pedagogical, technical and acoustical principles of percussion, brass, woodwinds, and strings; direct practical experience with each instrument group.

**Mu 1441. Vocal Techniques.** (1 cr; QP—Music major; SP—Music major or #)  
Beginning group instruction in voice and vocal pedagogy; principles of vocal acoustics.

**Mu 1442. Percussion Techniques.** (1 cr; QP—Music major or #; SP—Music major or #; A-F only)  
Beginning group instruction and pedagogy on instruments in the percussion family; principles of percussion acoustics.

**Mu 1491. Group Instruction in Applied Music.** (1 cr [max 4 cr]; QP—Non-music major at beginning and intermediate levels; repeatable for 6 cr max; SP—Non-music major at beginning and intermediate levels; A-F only)  
Development of individual's musical performance skills through group instruction.

**Mu 1501. Concert Band.** (1 cr; QP—Instructor determines placement, repeatable for 12 cr max; SP—Instructor determines placement, may be repeated; LE 10)  
Study and performance of transcribed and original concert literature.

**Mu 1502. Symphonic Wind Ensemble.** (1 cr; QP—Instructor determines placement, repeatable for 6 cr max; SP—Instructor determines placement, may be repeated; LEIP 10)  
Study and performance of symphonic wind ensemble and contemporary band literature by a select group.

**Mu 1503. Symphony Orchestra.** (1 cr; QP—High school performance experience in strings or brass or woodwind or percussion; instructor determines placement, repeatable for 12 cr max; SP—Instructor determines placement, may be repeated; LEIP 10)  
Rehearsal and performance of representative musical literature for symphony orchestra.

**Mu 1504. Chamber Orchestra.** (1 cr; QP—#; may be repeated; SP—Instructor determines placement; may be repeated; LE 10)  
Rehearsal and performance of chamber orchestra literature.

**Mu 1505. Jazz Ensemble.** (1 cr; QP—Instructor determines placement, repeatable for 12 cr max; SP—Instructor determines placement, may be repeated; LECD 10) Study and performance of large jazz ensemble literature.

**Mu 1510. Concert Choral.** (1 cr; QP—Instructor determines placement, repeatable for 12 cr max; SP—Instructor determines placement, may be repeated; LE 10) Rehearsal and performance of representative choral literature from a variety of periods and cultures.

**Mu 1511. University Singers.** (1 cr; QP—Instructor determines placement, repeatable for 12 cr max; SP—Instructor determines placement, may be repeated; LEIP 10) A select group for study and performance of distinctive choral literature from diverse historical periods, cultures, and languages. Regional tour usually taken during spring semester. Extended domestic or international tours when possible.

**Mu 1512. Chamber Singers.** (1 cr; QP—Instructor determines placement, repeatable for 12 cr max; SP—1511 or 4511; instructor determines placement, may be repeated; LE 10) Study and performance of vocal chamber music.

**Mu 1513. Vocal Jazz Ensemble.** (1 cr; QP—Instructor determines placement, repeatable for 12 cr max; SP—Instructor determines placement, may be repeated; LECD 10) Study and performance of music for vocal jazz ensemble.

**Mu 1541. Chamber Music.** (.5-1 cr; QP—#; may be repeated; SP—Instructor determines placement; may be repeated; A-F only) Study and performance of chamber music literature, classical and/or jazz.

**Mu 1601. Music Fundamentals.** (1 cr; QP—For non-music major; SP—For pre-elem ed major; A-F only) Functional music skills for classroom teachers; singing and playing classroom and accompanying instruments; introduction to music notation and elements of music.

**Mu 1901. Music Technology I.** (1 cr; QP—3151, 3152; SP—Music major or #; A-F only) Introduction to music notation software and ear-training software.

**Mu 1902. Music Technology II.** (1 cr; QP—3151, 3152; SP—1901 or #; A-F only) Theoretical and applied study in use of elements of musical instrument digital interface.

**Mu 2001. Ethnic and Folk Music of the World.** (3 cr; LEIP 9) Survey of music of selected world cultures.

**Mu 2003. Survey of American Music.** (3 cr; LE 9) American folk, popular, and art music from colonial times to present.

**Mu 2005. African Roots of American Music.** (3 cr; LECD 9) Traditional African music and culture and their influence on American musical styles.

**Mu 2007. The Power of Music.** (3 cr; LE 9) Effects of music upon our physical, mental, and spiritual health.

**Mu 2101. Music Theory III.** (3 cr; QP—1116, 1424 or equiv or passed piano proficiency; SP—1102; A-F only) Basic chromatic material and structure. Analysis of vocal and instrumental scores; creative writing coordinated with ear training, sight singing, and elementary keyboard harmony.

**Mu 2102. Music Theory IV.** (3 cr; QP—1124, ¶1424 or equiv or passed piano proficiency; SP—2101; A-F only) Advanced study of chromatic material and structure. Analysis of vocal and instrumental scores; creative writing coordinated with ear training, sight singing, and elementary keyboard harmony.

**Mu 2105. Composition I.** (1-2 cr [max 4 cr]; QP—1116; repeatable for 6 cr max; SP—1102; A-F only) Beginning music composition technique leading to creation of original works.

**Mu 2421. Piano Class II.** (1 cr [max 2 cr]; QP—Music major or #; repeatable for 6 cr max; SP—1421, #) Continued development of piano skills for music major working toward department piano proficiency requirement. Sight reading, harmonizing melodies, and improvisation; grades two- and three-level piano literature.

**Mu 2443. Woodwind Techniques I.** (1 cr; QP—1442 or #; SP—Music major or #; A-F only) Beginning group instruction and pedagogy on single reed instruments; principles of woodwind acoustics.

**Mu 2444. Woodwind Techniques II.** (1 cr; QP—1442, music major or #; SP—Music major or #; A-F only) Beginning group instruction and pedagogy on double reed instruments; principles of double reed acoustics.

**Mu 2445. String Techniques I.** (1 cr; QP—1443 or #, music major; SP—Music major or #; A-F only) Beginning group instruction and pedagogy on high string instruments; acoustic principles for strings.

**Mu 2446. String Techniques II.** (1 cr; QP—Music major, 1442 or #; SP—Music major or #; A-F only) Beginning group instruction and pedagogy on low string instruments; acoustic principles for strings.

**Mu 2447. Brass Techniques I.** (1 cr; QP—Music major, 1441 or #; SP—Music major or #; A-F only) Beginning group instruction and pedagogy on high brass instruments; acoustic principles for brass instruments.

**Mu 2448. Brass Techniques II.** (1 cr; QP—1441 or #; SP—Music major or #; A-F only) Beginning group instruction and pedagogy on low brass instruments; acoustic principles for brass instruments.

**Mu 2605. Introduction to Music Education.** (1 cr; SP—Music ed majors; A-F only) Introduction to the music education profession; includes career options, history of the profession, professional writings, current research.

**Mu 2701. Fundamentals of Conducting.** (1 cr; QP—1115, 1424 or equiv or passed piano proficiency, music major or #; SP—1102, music major or #; A-F only) Beginning instruction in leading musical ensembles: meter patterns, conventional gestures, instrumental transposition, choral techniques.

**Mu 2801. Improvisation.** (1 cr; SP—1102; A-F only) Introduction to basic principles and techniques.

**Mu 2802. Jazz Improvisation I.** (1 cr; QP—1114 or #; SP—2801; A-F only) Beginning techniques and concepts.

**Mu 2803. Jazz Improvisation II.** (1 cr; SP—2101, 2801 or #; A-F only) Study and development of improvisational facility as used in the jazz idiom.

## Course Descriptions

### **Mu 3101. Form and Analysis.** (2 cr; SP–2102; A-F only)

Overview of form in music; structure from Renaissance through 20th-century.

### **Mu 3105. Composition II.** (1–2 cr [max 4 cr]; QP–1127 or #; repeatable for 6 cr max; SP–2105; A-F only)

Continued study of musical composition techniques leading to creation of original works.

### **Mu 3201. Music History I.** (4 cr; QP–1202, 60 cr or #; SP–2202 or #; A-F only)

Study of Medieval, Renaissance, Baroque, and Classical eras of Western musical development, emphasizing works of Josquin, Palestrina, J.S. Bach, Handel, Haydn, Mozart, and Beethoven.

### **Mu 3202. Music History II.** (4 cr; QP–1202, 60 cr or #; SP–3201 or #; A-F only)

Styles in 19th- and 20th-century Western music from romanticism through impressionism, atonality, primitivism, serialism, neo-classicism, to avant-garde and contemporary composers; non-Western musics.

### **Mu 3211. Art Song Literature.** (2 cr; QP–1116, music major or #; SP–1102, music major or #; A-F only)

Survey of art song, emphasizing German, French, and English compositions and composers.

### **Mu 3212. Opera Literature.** (2 cr; QP–1116, 40 cr, music major or #; SP–1102, music major or #; A-F only)

Survey of opera solo and ensemble literature from Italian, German, French, English, and American traditions.

### **Mu 3300. Recital.** (1–3 cr; QP–Δ; repeatable for 3 cr max; SP–Δ; may be repeated; A-F only)

Preparation and presentation of a solo performance.

### **Mu 3510. Opera Studio.** (1 cr; QP–#; SP–#; may be repeated; A-F only)

Production techniques and performances of solo and ensemble opera literature.

### **Mu 3511. Performance Practicum.** (1–2 cr [max 2 cr]; QP–#; repeatable for 3 cr max; SP–Music major, #; A-F only)

Performance of significant role in a musical production.

### **Mu 3601. Elementary School Music Teaching.** (2 cr; QP–1002 or 1202 or 1260 or 1270, 1611, 80 cr, elem ed major or #; SP–1601, 1001 or 1005 or 2001 or 2003 or 2005, 60 cr or #; A-F only)

Methods and materials for teaching music in elementary school classroom. Philosophy of music education, curriculum design, lesson planning, implementation, evaluation, integrated arts experiences.

### **Mu 3603. Music for Early Childhood.** (1 cr; QP–Educ 1000, Ech 1025 or # [except for piano pedagogy majors]; SP–#; A-F only)

Methods and materials for teaching music in a pre-school setting. Principles of children's musical development ages birth to five years.

### **Mu 3605. Teaching Classroom Music.** (4 cr; QP–80 cr, music major or #; SP–60 cr, music major or #; A-F only)

Philosophy, theory, techniques of instruction for general classroom music, grades K–12.

### **Mu 3607. Instrumental Music Methods.** (3 cr; QP–80 cr, music major or Δ; SP–60 cr, music major or #; A-F only)

Methods and materials for teaching instrumental students in the secondary setting; role and extent of instrumental music in the school curriculum, philosophies and current trends in instrumental music education, recruiting, scheduling, administrative tasks, literature, organizing and training athletic bands.

### **Mu 3627. Art of Accompanying: Vocal Music.** (2 cr; SP–#; A-F only)

Vocal accompanying (art song, recitative and aria, choral music, and functional skills (e.g. score reading, keyboard harmony). Vocal coaching techniques, listening to standard vocal repertoire, performance.

### **Mu 3628. Art of Accompanying: Instrumental Music.** (2 cr; SP–#; A-F only)

Instrumental accompanying (strings, brass, and woodwinds) and functional skills (e.g. score reading, keyboard harmony). Rehearsal techniques, listening to standard instrumental repertoire, performance.

### **Mu 3701. Choral Conducting and Methods I.** (3 cr; QP–1116, 1124, 1791, 3792, 40 cr, music major or #; SP–2701 or #; A-F only)

Conducting, vocal pedagogy, and methods and materials related to choral rehearsal, emphasizing elementary and middle/junior high.

### **Mu 3702. Choral Conducting and Methods II.** (3 cr; QP–1116, 1791, 1125, 3793, 40 cr, music major or #; SP–3701 or #; A-F only)

Continued conducting instruction, with methods and materials related to high school choral ensembles.

### **Mu 3705. Instrumental Conducting I.** (1 cr; QP–1791, 80 cr incl 6 from major ensembles, music major or #; SP–2701 or #; A-F only)

Intermediate techniques, reading, and interpretation of full and condensed orchestral, band, and vocal scores; lab practice in rehearsal procedures.

### **Mu 3706. Instrumental Conducting II.** (1 cr; QP–3798, 80 cr, music major or #; SP–3705 or #; A-F only)

Advanced techniques, reading, and interpretation of full and condensed orchestral, band, and vocal scores; lab practice in rehearsal procedures.

### **Mu 3801. Jazz Improvisation III.** (1 cr; QP–1108 or #; SP–2802 or #; A-F only)

Study and development of improvisational facility as used in jazz idiom.

### **Mu 3802. Jazz Improvisation IV.** (1 cr; QP–1108 or #; SP–3801 or #; A-F only)

Study and development of improvisational facility as used in jazz idiom.

### **Mu 3805. Jazz Writing I.** (2 cr; QP–1126 or #; SP–2102 or #; A-F only)

Transpositions, voicings, and arranging concepts for large jazz ensemble; development of composition in jazz idiom.

### **Mu 3806. Jazz Writing II.** (2 cr; QP–1126, 3102 or #; SP–2102, 3805 or #; A-F only)

Continuation of arranging concepts for large jazz ensemble; further development of composition in jazz idiom.

### **Mu 3841. Jazz Rhythm Section.** (2 cr; SP–#)

Theoretical and applied methods for jazz rhythm instruments.

### **Mu 3991. Independent Study.** (1–3 cr [max 6 cr]; QP–#; repeatable for 6 cr max; SP–#; A-F only)

Directed study in area of student interest arranged with instructor before registration.

### **Mu 3995. Special Topics: (Various Titles to be Assigned).** (1–3 cr [max 9 cr]; QP–#; repeatable for 12 cr max; SP–#; A-F only)

Selected topics defined by type, period, or composer.

**Mu 3997. Field Study in Music.** (1-4 cr [max 4 cr]; QP-#; repeatable for 6 cr max; SP-Δ; A-F only)  
Off-campus travel, research, and creative activities in specialized area. Credit allowed depends on nature and scope of study. Requires advance planning with faculty sponsor and permission of department.

**Mu 4101. Instrumental Arranging.** (3 cr; QP-3143 or #; SP-1902, 3101 or #; A-F only)  
Idiomatic scoring for instruments; individual assignments in problems and possibilities of various instrument combinations.

**Mu 4103. Contrapuntal Techniques.** (2 cr; QP-1126; SP-2102 or #; A-F only)  
Study of, and practice in, use of linear devices in Western art music.

**Mu 4105. Composition III.** (1-2 cr [max 4 cr]; QP-3127; SP-3105; A-F only)  
Advanced creative composition; individual assignments in various contexts.

**Mu 4201. Piano Literature.** (3 cr; QP-#; SP-Music major or #; A-F only)  
Study of representative piano literature from various periods of music history.

**Mu 4311. Voice.** (1-3 cr [max 12 cr]; QP-Music major fee-waiver student, Δ; SP-Music major or fee-waiver student, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 4312. Voice.** (1 cr; QP-Students who do not qualify for fee waiver; SP-Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson: one-half hour weekly.

**Mu 4321. Piano.** (1-3 cr [max 12 cr]; QP-Music major fee-waiver student, Δ; SP-Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 4322. Piano.** (1 cr; QP-Students who do not qualify for fee waiver; SP-Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson: one-half hour weekly.

**Mu 4325. Jazz Piano.** (1-3 cr; SP-Music major, Δ)  
Individual and one-hour group lesson weekly.

**Mu 4331. Organ.** (1-3 cr [max 12 cr]; QP-Music major fee-waiver student, Δ; SP-Music major, Δ)  
Individual and one-hour group lesson weekly.

**Mu 4332. Organ.** (1 cr; QP-Students who do not qualify for fee waiver; SP-Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson; one-half hour weekly.

**Mu 4351. Strings.** (1-3 cr [max 12 cr]; QP-Music major fee-waiver student, Δ; SP-Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 4352. Strings.** (1 cr; QP-Students who do not qualify for fee waiver; SP-Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson; one-half hour weekly.

**Mu 4357. Harp.** (1-3 cr [max 12 cr]; QP-Music major fee-waiver student, Δ; SP-Music major, Δ)  
Individual and one-hour group lesson weekly.

**Mu 4358. Harp.** (1 cr; QP-Students who do not qualify for fee waiver; SP-Non-music major or music major sec instr; may be repeated)  
Individual lesson; one-half hour weekly.

**Mu 4361. Woodwinds.** (1-3 cr [max 12 cr]; QP-Music major fee-waiver student, Δ; SP-Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 4362. Woodwinds.** (1 cr; QP-Students who do not qualify for fee waiver; SP-Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson; one-half hour weekly.

**Mu 4371. Brass.** (1-3 cr [max 12 cr]; QP-Music major fee-waiver student, Δ; SP-Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 4372. Brass.** (1 cr; QP-Students who do not qualify for fee waiver; SP-Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson; one-half hour weekly.

**Mu 4381. Percussion.** (1-3 cr [max 12 cr]; QP-Music major fee-waiver student, Δ; SP-Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 4382. Percussion.** (1 cr; QP-Students who do not qualify for fee waiver; SP-Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson; one-half hour weekly.

**Mu 4391. Classical Guitar.** (1-3 cr [max 12 cr]; QP-Music major fee-waiver student, Δ; SP-Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 4392. Classical Guitar.** (1 cr; QP-Students who do not qualify for fee waiver; SP-Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson; one-half hour weekly.

**Mu 4395. Jazz Guitar.** (1-3 cr [max 12 cr]; QP-Music major fee-waiver student, Δ; SP-Music major, Δ; A-F only)  
Individual and one-hour group lesson weekly.

**Mu 4396. Jazz Guitar.** (1 cr; QP-Students who do not qualify for fee waiver; SP-Non-music major or music major sec instr; may be repeated; A-F only)  
Individual lesson; one-half hour weekly.

**Mu 4501. Concert Band.** (1 cr; QP-Instructor determines placement; SP-Instructor determines placement; A-F only)  
Study and performance of transcribed and original concert literature.

**Mu 4502. Symphonic Wind Ensemble.** (1 cr; QP-Instructor determines placement; SP-Instructor determines placement; A-F only)  
Study and performance of symphonic wind ensemble and contemporary band literature by a select group.

**Mu 4503. Symphony Orchestra.** (1 cr; SP-Instructor determines placement; A-F only)  
Rehearsal and performance of representative literature for symphony orchestra.

**Mu 4504. Chamber Orchestra.** (1 cr; QP-Instructor determines placement, repeatable for 12 cr max; SP-Instructor determines placement; A-F only)  
Study and performance of chamber orchestra literature.

**Mu 4505. Jazz Ensemble.** (1-4 cr; QP-Instructor determines placement, repeatable for 12 cr max; SP-Instructor determines placement; A-F only)  
Study and performance of large jazz ensemble literature.

**Mu 4510. Concert Chorale.** (1-4 cr; QP-Instructor determines placement, repeatable for 12 cr max; SP-Instructor determines placement; A-F only)  
Study and performance of representative choral literature from various style periods and cultures.

## Course Descriptions

**Mu 4511. University Singers.** (1 cr; QP—Instructor determines placement; SP—Instructor determines placement; A-F only)

A select group for study and performance of distinctive choral literature from diverse historical periods, cultures, and languages. Regional tour usually taken during spring semester. Extended domestic or international tours when possible.

**Mu 4512. Chamber Singers.** (1 cr; QP—instructor determines placement; SP—¶1511 or ¶4511; instructor determines placement; A-F only)

Study and performance of vocal chamber music.

**Mu 4513. Vocal Jazz Ensemble.** (1 cr; QP—Instructor determines placement, repeatable for 12 cr max; SP—Instructor determines placement; A-F only)

Study and performance of music for vocal jazz ensemble.

**Mu 4541. Chamber Music.** (.5-1 cr; QP—#; may be repeated; SP—#; may be repeated; A-F only)

Study and performance of chamber music literature, classical and/or jazz.

**Mu 4601. Applied Music Teaching.** (1 cr; QP—#; repeatable once for cr; SP—#; A-F only)

Procedures and materials for class and individual instruction in approved fields of applied music; evaluation of solo literature; discussion of approved and experimental pedagogical practice; lesson observation; and supervised student teaching.

**Mu 4605. Kodaly, Orff, and Dalcroze: Classroom Applications.** (1 cr; Music ed majors, #; no grad cr; A-F only)

Study and application of the philosophies and instructional approaches of Zoltan Kodaly, Carl Orff, and Emile Jaques-Dalcroze to American music education.

**Mu 4621. Piano Pedagogy and Practicum I.** (3 cr;

QP—1321 or #; SP—1321 or 1322 or #; A-F only)

Principles and materials for teaching elementary piano students; supervised practice teaching.

**Mu 4622. Piano Pedagogy and Practicum II.** (3 cr;

QP—1321 or #; SP—4621 or #; A-F only)

Principles and materials for teaching intermediate piano students; supervised practice teaching.

**Mu 4623. Special Topics: (Various Titles to be Assigned).**

(3 cr; QP—5627 or #; SP—1321 or #; A-F only)

Technical and stylistic considerations for teaching and performing advanced piano literature.

**Mu 4801. Evolution and Analysis of Jazz Styles.** (1-2 cr;

QP—1126 or #; SP—2102; A-F only)

Study and analysis of various jazz styles and idioms.

**Mu 4803. Jazz Literature and Pedagogy.** (3 cr; QP—1503,

1125 or #; SP—2102; A-F only)

Techniques and materials necessary to organize and develop a jazz band in junior and senior high school.

**Mu 4807. Music Industry.** (2 cr; QP—#; SP—#; A-F only)

Study of developing commercial applications and trends in the music industry, including basic concepts of business and marketing.

**Mu 4997. Internship in Music.** (1-2 cr [max 4 cr]; QP—Δ;

repeatable for 6 cr max; SP—Δ; A-F only)

Participation in music tutoring or recognized campus/community activity related to student's musical program and career objectives.

**Mu 5005. African Roots of American Music.** (3 cr;

QP—3810, 80 cr or #; SP—60 cr or #; A-F only)

Traditional African music and culture and their influences on American musical styles.

**Mu 5201. Advanced Music History.** (2 cr; QP—3200, 3201,

3202; SP—3201, 3202 or #; A-F only)

Specialized study of selected composers and/or genres.

**Mu 5203. Advanced Choral Literature.** (3 cr; QP—3794 or #;

SP—3706 or #; A-F only)

Study of representative choral literature from various periods of music history.

**Mu 5204. Instrumental Ensemble Literature.** (2 cr;

SP—Grad student or #; A-F only)

Study of major works for large wind and orchestral ensembles.

**Mu 5207. Instrumental Chamber Music.** (1 cr; SP—Grad

student or #; A-F only)

Study of chamber music literature with emphasis on student's major applied area.

**Mu 5510. Opera Studio.** (1 cr [max 6 cr]; SP—3510 or equiv,

grad student or #; A-F only)

Opera production techniques; performance of solo and ensemble opera literature.

**Mu 5603. Computer Applications for Music Educators.**

(2 cr; QP—90 cr or #; SP—60 cr or #; A-F only)

Training in use of microcomputer for music educators. Software applications such as spreadsheets, databases, music CAI, and music printing programs. Software for Macintosh and IBM-PC.

**Mu 5695. Special Topics: (Various Titles to be Assigned).**

(1-3 cr [max 9 cr]; QP—#; max 6 cr to grad program; SP—#; max 6 cr to grad program; A-F only)

Selected topics of interest to music educators concerning philosophy, history, and teaching/learning theory and practice.

**Mu 5701. Advanced Conducting.** (3 cr; QP—#; SP—3702 or #;

A-F only)

Score reading, analysis, styles, and conducting and rehearsal techniques related to performance.

**Mu 5991. Independent Study.** (1-3 cr [max 9 cr]; QP—Jr or

sr or grad student or #; repeatable for 8 cr max; SP—Jr or sr or grad student or #; can apply no more than 6 cr to a Graduate School program; A-F only)

Directed study in areas of student interest arranged with instructor before registration.

**Mu 5995. Topics in Music: (Various Titles to be**

**Assigned).** (1-3 cr [max 6 cr]; SP—#; A-F only)

Selected studies in topics defined by type, period, or composer.

**Mu 8101. Graduate Music Theory.** (2 cr; SP—Grad student or #; A-F only)

Advanced analytical studies of representative historical musical compositions. Students will utilize multiple analytical processes and compose model pieces.

**Mu 8222. Music Bibliography and Research.** (3 cr;

SP—Grad student or #; A-F only)

Research methods in music; preparation for writing plan B project.

**Mu 8300. Graduate Recital.** (1 cr [max 2 cr]; SP—Grad

student, #; A-F only)

Preparation and presentation of a solo musical performance.

**Mu 8301. Graduate Applied Music: Major Instrument.** (1-2 cr [max 2 cr]; SP-Advanced proficiency, grad student, #; A-F only)  
Studio lesson on major instrument or voice; one-half hour per week per credit.

**Mu 8302. Graduate Applied Music: Secondary Instrument.** (1 cr; SP-Intermediate proficiency, grad student, #; may be repeated; A-F only)  
Half-hour weekly studio lesson; instrument or voice.

**Mu 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser, and DGS consent)

**Mu 8401. Graduate Music Pedagogy.** (1 cr; SP-Grad student or #; A-F only)  
Principles and techniques of music pedagogy with emphasis on the student's applied field of study.

**Mu 8600. Seminar in Music Education.** (2 cr [max 6 cr]; SP-Grad student or #; A-F only)  
Survey and analysis of current issues in music education research and/or practice.

**Mu 8601. Foundations of Music Education.** (3 cr; SP-Grad student or #; A-F only)  
Philosophical, psychological, and historical foundations; principles of school music teaching and learning.

**Mu 8605. Leadership in Music Education.** (3 cr; SP-Grad student or #; A-F only)  
Techniques, theories, and models of music and arts leadership; considerations for supervising music personnel, facilities, budgets, curricular programs, and policies.

**Mu 8701. Graduate Applied Conducting.** (1-2 cr [max 12 cr]; SP-3702, 3706 or equivalent; grad student or #; A-F only)  
Studio lessons in conducting; one half-hour per week per credit.

**Mu 8899. Directed Project in Music Education.** (1-12 cr [max 12 cr]; QP-Major adviser consent for Plan B project; SP-#; A-F only)  
Directed project, Plan B. Research project on selected theoretical or practical issue/topic in Music Education.

**Mu 8900. Seminar in Music.** (2 cr [max 6 cr]; SP-Grad student, #; A-F only)  
Survey and analysis of current issues and problems in music research, performance, and pedagogy.

**Mu 8991. Independent Study.** (1-2 cr [max 6 cr]; SP-Grad student, #; A-F only)  
Directed study in areas of student interest arranged with instructor before registration; written report required.

## Pharmacology (Phcl)

### School of Medicine

**Phcl 4001. Introduction to Pharmacology.** (2 cr; QP-Biol 1111, Chem 1110-1111-1112, Chem 3512-3513 or #; SP-Biol 1011, Chem 1151-1152, Chem 2521-2522 or #; A-F only)  
Elementary course in pharmacology. Actions and use of drugs in selected health conditions.

**Phcl 4094. Directed Research in Pharmacology I.** (1-10 cr [max 10 cr]; QP-Upper div sci major, #; SP-Upper div sci major, #; A-F only)

**Phcl 5094. Directed Research in Pharmacology II.** (1-10 cr [max 10 cr]; QP-Grad student, #; SP-Grad student, #)

**Phcl 5201. Pharmacology I.** (6 cr; QP-Chem 5336, Chem 5337, Phsl 5601 or #; SP-Chem 4341-4342 or Phsl 5601 or #; A-F only)

Analysis of effects of pharmacologic agents on living systems; major classes of drugs; concepts of chemotherapy; characteristic pharmacologic agents, their reactions and therapeutic applications.

**Phcl 5202. Pharmacology II.** (5 cr; QP-5101 or #; SP-5201 or #; A-F only)

Analysis of effects of pharmacologic agents on living systems; major classes of drugs; concepts of chemotherapy; characteristic pharmacologic agents, their reactions and therapeutic applications.

**Phcl 5204. Pharmacology Seminar.** (1 cr [max 4 cr]; QP-Grad student, #; SP-Grad student, #; A-F only)  
Presentation of selected research problems and current journal articles.

**Phcl 5410. Advanced Pharmacology.** (1 cr; QP-Phcl grad student or #; SP-Phcl grad student or #; A-F only)  
Comprehensive lectures and discussion of principles of drug disposition; drug receptor interactions; mechanism of action of selected drugs emphasizing current advances and methodologies.

**Phcl 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser and DGS consent)

**Phcl 8444. FTE: Doctoral.** (1 cr; SP-Doctoral student, adviser and DGS consent)

**Phcl 8666. Doctoral Pre-Thesis Credits.** (1-18 cr [max 60 cr]; SP-Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

**Phcl 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; SP-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Phcl 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; SP-Max 18 cr per semester or summer; 24 cr required)

## Philosophy (Phil)

### College of Liberal Arts

**Phil 1001. Problems of Philosophy.** (3 cr; A-F only; LE 2)  
Introduction to philosophy through examination of several classic philosophical problems: existence of God, nature of knowledge, free will versus determinism, relation of mind and body, character of moral responsibility, organization of society, and adoption of a world view.

**Phil 1003. Ethics and Society.** (3 cr; A-F only; LEIP 7)  
Classic theories addressing questions of whether morality is subjective or objective, cultural relativism versus universal rules, how right and wrong should be determined. Moral issues such as euthanasia, the environment, population and birth control, nuclear deterrence, alternative life styles, and capital punishment in their international dimension.

**Phil 1007. Philosophy and World Religions.** (3 cr; A-F only; LEIP 7)

Comparative philosophical examination of teachings and practices of several major world religions selected from ancient polytheism, Christianity, Judaism, Islam, Taoism, Buddhism, Hinduism, and various Native American and African religions.

## Course Descriptions

**Phil 1008. Critical Thinking.** (3 cr; A-F only; LE 2)

Patterns of reasoning encountered in everyday life, including advertising, editorials, and politics. Use of language in formulating arguments; differences between deductive and inductive arguments; how to detect and avoid mistakes in reasoning.

**Phil 1018. Logic.** (4 cr; A-F only; LE 2)

Introduction to symbolic logic. Nature of language, species of arguments, informal versus formal arguments, techniques of translation, methods of sentential logic, and methods of predicate logic.

**Phil 2001. Existential Literature.** (3 cr; QP-Comp 1120, 40 cr or #; SP-Comp 1120, 30 cr or #; A-F only)

Themes of love, death, boredom, and alienation through plays and novels of such 19th- and 20th-century authors as Kafka, Dostoyevsky, Barth, Sartre, Camus, Murdoch, and Fowles.

**Phil 2011. Philosophy of Language.** (3 cr; SP-Course in logic or literary analysis or human communication or CS or Math or #; A-F only; LE 3)

Introduction to theories of meaning and truth and the structure of language. Relation of language to thought and the world; semantics and syntax; speech acts and performative utterances; descriptions and reference; and structuralism and the possibility of objective knowledge.

**Phil 2021. Science and Pseudo-Science: Thinking About Weird Things.** (3 cr; A-F only; LE 8)

A critical introduction to the nature of knowledge and belief by focusing on contemporary issues, such as UFOs, ESP, mysticism, creationism and evolution, and near-death experiences, which explains the differences between rational beliefs and articles of faith and between science and pseudo-science.

**Phil 2250. Feminist Issues in Philosophy.** (3 cr; QP-1001 or #; SP-15 cr or #; A-F only; LECD 8)

Feminist perspectives in philosophy including gender issues in everyday life and in theories of human nature, relation of gender and morality, effects of patriarchal thinking on social and political theory, prospects for philosophy of human liberation.

**Phil 3118. Selected Topics: (Various Titles to be Assigned).** (3-9 cr [max 9 cr]; QP-1001 or #; SP-1001 or #; A-F only)

In-depth examination of a particular philosopher or problem in philosophy. Specific course announced in *Class Schedule*.

**Phil 3222. Medical Ethics.** (4 cr; A-F only)

Values underlying the health care professions and ethical dilemmas in medical contexts. Patients' rights and autonomy, medical paternalism, confidentiality, truth-telling, euthanasia.

**Phil 3231. Law and Punishment.** (4 cr; SP-1001 or Soc 1301; A-F only)

Nature of law, natural law theory, and legal positivism and their relationship to traditional and contemporary theories of punishment; deterrence, reform, retribution, rehabilitation, social defense, restitution.

**Phil 3242. Values and Technology.** (3 cr; QP-90 cr or #; SP-60 cr or #; A-F only; LE 8)

Problems related to science and technology. Application of moral theory to issues raised by technology, such as distribution of power, effects on environment, labor and social life, privacy, intellectual property rights, product liability, and professional codes of ethics.

**Phil 3281. Ethical Theory.** (4 cr; QP-1001 or 1003 or #; SP-1001 or 1003 or #; A-F only)

Characteristics and criteria of value statements; justification of moral standards; some 20th-century ethical theories.

**Phil 3291. Current Social Political Philosophy.** (4 cr; QP-1001 or 1003 or #; SP-1001 or 1003 or #; A-F only)

Detailed philosophical analysis of recent writings about social and political concepts such as freedom, democracy, socialism, communism, fascism, and anarchy.

**Phil 3301. Greek Philosophy.** (4 cr; QP-30 cr or #; SP-30 cr or #; A-F only)

Greek philosophy from the pre-Socratic era through Socrates, Plato, and Aristotle to Neoplatonism and the rediscovery of Aristotle. Philosophy of nature, theories of persons, possibility of human knowledge, happiness, and the good life.

**Phil 3303. The Birth of Modern Philosophy.** (4 cr; QP-40 cr or #; SP-30 cr, course in phil or hist or pol sci or lit or #; A-F only)

Impact of science and secularity on the rationalism of Descartes, Spinoza, Leibniz and the empiricism of Locke, Berkeley, and Hume.

**Phil 3305. 19th- and 20th-Century Philosophy.** (4 cr; SP-3303 or #; A-F only)

Survey of main issues and philosophers, with emphasis on the analytic tradition.

**Phil 3325. Environmental Ethics.** (4 cr; QP-45 cr or #; SP-30 cr or #; A-F only)

Moral dimension of relationship between humans and earth's natural environment. Pollution, energy policy, economics, law, and environment; endangered species; rights of nonhumans; preservation and conservation; obligations toward future generations; ethical theory and environment.

**Phil 3421. Oriental Philosophies.** (4 cr; QP-5 cr Phil or #; SP-45 cr, 6 cr Phil or Asian hist or #; A-F only)

Overview of Hinduism, Buddhism, Confucianism, and Taoism. Analysis of basic concepts of Indian and Chinese civilizations.

**Phil 3651. Advanced Logic.** (4 cr; QP-1018 or Math 1296 or #; SP-1018 or Math 1296 or #; A-F only)

Dimensions of language; relation of logic to ordinary language and to mathematics; calculus of propositions, classes, and relations; properties of formal deductive systems.

**Phil 3900. Colloquium for Majors.** (1 cr; QP-Δ, phil major/minor; attendance at 12 dept-approved lectures/ discussions over 4-year period, regis only during qtr of 10th lect; SP-Δ, phil major/minor; attendance at 12 dept-approved lectures/discussions over 4-yr period, regis only during semester of 10th lect; 5-N only)

Lectures and discussion groups on variety of philosophical topics; required reading; places and topics to be announced.

**Phil 4000. Major Philosophers.** (2-4 cr; SP-3301, 3303; A-F only)

In depth study of one or two important philosophers. Appropriate examples: Aristotle, Hegel, Wittgenstein, Russell, Hume, Hobbes, Nietzsche, Aquinas, Descartes, Mill, Dewey, etc. See department (or departmental website) for details of a particular semester offering.

**Phil 4655. Theory of Knowledge.** (4 cr; QP–8 cr Phil; SP–1001, 1008 or 1018 or #, no grad cr; A-F only)  
Introduction to theory of knowledge interpreted broadly to encompass perceptual, deductive, inductive, and other modes of knowledge. Beginning with standard conception of knowledge as warranted true belief, explores strengths and weaknesses of alternative accounts.

**Phil 4900. Seminar in Philosophy.** (4 cr [max 12 cr]; QP–12 cr Phil or #; max 6 cr toward grad program; SP–12 cr Phil or #, no grad cr; A-F only)  
Detailed examination of major topics or philosophical works. See department for details.

**Phil 5245. Aesthetics.** (3 cr; SP–60 cr; A-F only)  
Possibility of definition of art or of the aesthetic experience examined through survey of classic aestheticians; philosophy of art criticism. Research paper required of graduate students.

**Phil 5570. Philosophy of Psychology.** (4 cr; QP–1001 or Psy 1003, 90 cr; SP–1001 or Psy 1003, 60 cr or #, no grad cr; A-F only)  
Current philosophical issues surrounding psychology: behaviorism, dualism, mind/brain identity theories, computer models of cognition, and functionalism.

**Phil 5991. Independent Study.** (1-3 cr [max 10 cr]; QP–#; cannot be used to satisfy requirements for phil major or minor; SP–#; cannot be used to satisfy requirements for phil major or minor; A-F only)  
Work in problems of special interest to student arranged with instructor before registration. Written work required. May be taken in conjunction with another philosophy course.

**Phil 5997. Intern Teaching Assistantship.** (2 cr [max 4 cr]; QP–#; SP–#; A-F only)  
Practical experience in assisting teaching of philosophy. Application deadline one week before beginning of registration for the following semester.

## Physical Education (PE)

### College of Education and Human Service Professions

**PE 1199. Special Topics in Physical Education Skills.** (1-4 cr [max 4 cr])  
Contemporary topics.

**PE 1200. Beginning Swimming.** (1 cr)  
Development of fundamental aquatic skills and techniques for personal participation. Understanding of the principles of safety in or on the water.

**PE 1220. Intermediate Swimming.** (1 cr)  
Development of intermediate aquatic skills and techniques for personal participation. Intermediate principles of safety in and on the water.

**PE 1300. Ballroom Dance.** (1 cr)  
Development of the basic steps and patterns for ballroom dance. Development of technical and choreographic skill for personal expressive communication through movement.

**PE 1302. Folk Dance.** (1 cr)  
Development of the basic steps and patterns of folk dance. Development of technical and choreographic skill for personal expressive communication through movement.

**PE 1304. Square Dance.** (1 cr)  
Development of the basic steps and patterns of square dance. Development of technical and choreographic skill for personal expressive communication through movement.

**PE 1400. Badminton.** (1 cr)  
Development of personal sport skills and understanding for participation in badminton.

**PE 1402. Tennis.** (1 cr)  
Development of personal skills in tennis. Understanding of strategies and concepts for participation in the game.

**PE 1410. Golf.** (1 cr)  
Development of personal golf skills and understandings for participation in the sport.

**PE 1414. Bowling.** (1 cr)  
Development of personal skills in bowling. Understanding of concepts and strategies for participation in the game.

**PE 1500. Cross-Country Skiing.** (1 cr)  
Development of personal skills in cross country skiing. Understanding of the techniques and concepts for participation in the sport.

**PE 1502. Alpine Skiing.** (1 cr; A-F only)  
Development of personal skills in alpine skiing. Understanding of the techniques and concepts for participation in the sport.

**PE 1504. Ice Skating.** (1 cr)  
Development of personal skills in ice skating. Understanding of techniques and concepts for participation in the sport.

**PE 1506. Sailing.** (1 cr)  
Development of personal skills in sailing. Understanding of the techniques and concepts for participation in the activity. Understanding of the principles of safety on the water.

**PE 1507. Flatwater Kayaking.** (1 cr)  
Flatwater kayaking techniques. History, safety, kayak design, basic braces, paddle strokes, and maneuvering in flatwater conditions.

**PE 1508. Flatwater Canoeing.** (1 cr)  
Basic skills and terminology relevant for safe canoeing on flatwater and slow-stream conditions.

**PE 1510. Whitewater Kayaking.** (1 cr; SP–1507 or #)  
Rescue techniques, bracing, paddle strokes, maneuvering skills, examination of water hydraulics for use in whitewater conditions. Practical experience on local rivers and lakes. Successful completion results in certification from the American Canoe Association.

**PE 1511. Sea Kayaking.** (1 cr; SP–#; A-F only)  
Sea kayaking techniques; history, safety, kayak design, basic braces, paddle strokes, and maneuvering in large water conditions.

**PE 1512. Fishing Skills.** (1 cr)  
Development of personal skills in fishing. Acquisition of understanding, techniques, and patterns for participation in the activity.

**PE 1530. Rock Climbing.** (1 cr)  
History, techniques and safety, equipment, knots, basic belay systems, route finding, face and crack climbing, identification of environmental hazards.

## Course Descriptions

**PE 1531. Intermediate Rock Climbing.** (1 cr; SP-1530 or #)  
Intermediate rock climbing skills and knowledge including use of and placement of anchor systems, top rope set-up, introductory lead climbing and climb site risk management. This course builds upon basic rock climbing skills and techniques which are prerequisite for this course.

**PE 1600. Physical Fitness.** (1 cr)  
Development of personal skills related to physical fitness. Understanding and application of factors and participation patterns contributing to enhanced physical fitness.

**PE 1601. Aerobics.** (1 cr)  
Knowledge of cardiovascular fitness, including aerobic exercise and hydro-aerobics. Physical development through cardiovascular training, muscle strengthening, and stretching.

**PE 1612. Karate.** (1 cr)  
Development of personal skills in karate. Understanding history, cultural background, patterns, and strategies for participation in karate.

**PE 1613. Karate: Advanced Belts.** (1-4 cr [max 4 cr]; SP-1612 or equiv or #; A-F only)  
An advanced course for the experienced student who has achieved the basic competencies in karate.

**PE 1614. Self Defense.** (1 cr)  
Development of personal skills related to self defense. Understanding of concepts, strategies, and skills for developing a personal system of self defense.

**PE 1616. Weight Training.** (1 cr)  
Development of personal skills related to weight training. Understanding of principles, concepts, and conditioning regimens for participation in weight training.

**PE 1620. Aikido.** (1 cr)  
Development of personal skills in aikido. Understanding of the history, cultural background, patterns, and strategies for participation in aikido.

**PE 1702. Soccer.** (1 cr)  
Development of personal skills in soccer. Understanding of strategies, concepts, and skills for participation in the sport of soccer.

**PE 1706. Volleyball.** (1 cr)  
Development of personal skills in volleyball. Understanding of strategies, concepts, and skills for participation in volleyball.

**PE 1708. Basketball.** (1 cr)  
Development of personal skills in basketball. Understanding of strategies, concepts, and skills for participation in the sport.

**PE 1710. Softball.** (1 cr)  
Development of personal skills in softball. Understanding of strategies, concepts, and skills for participation in softball.

**PE 1901. Varsity Football.** (1 cr [max 4 cr]; SP-#; S-N only)  
Participation in intercollegiate football competition.

**PE 1903. Varsity Soccer.** (1 cr [max 4 cr]; SP-#; S-N only)  
Participation in intercollegiate soccer competition.

**PE 1905. Varsity Basketball.** (1 cr [max 4 cr]; SP-#; S-N only)  
Participation in intercollegiate basketball competition.

**PE 1907. Varsity Ice Hockey.** (1 cr [max 4 cr]; SP-#; S-N only)  
Participation in intercollegiate ice hockey competition.

**PE 1913. Varsity Cross Country.** (1 cr [max 4 cr]; SP-#; S-N only)  
Participation in intercollegiate cross country competition.

**PE 1917. Varsity Volleyball.** (1 cr [max 4 cr]; SP-#; S-N only)  
Participation in intercollegiate volleyball competition.

**PE 1919. Varsity Track.** (1 cr [max 4 cr]; SP-#; S-N only)  
Participation in intercollegiate track competition.

**PE 1921. Varsity Tennis.** (1 cr [max 4 cr]; SP-#; S-N only)  
Participation in intercollegiate tennis competition.

**PE 1925. Varsity Baseball.** (1 cr [max 4 cr]; SP-#; S-N only)  
Participation in intercollegiate baseball competition.

**PE 1927. Varsity Softball.** (1 cr [max 4 cr]; SP-#; S-N only)  
Participation in intercollegiate softball competition.

**PE 2001. Sport Ethics and Society.** (3 cr; A-F only; LE 7)  
Explores ethical issues in sport to develop moral reasoning skills for a successful life.

**PE 2240. Lifeguarding Today.** (1 cr; SP-Ability to swim 500 yards, #)  
Provides knowledge and skills necessary to qualify as a non-surf lifeguard. Meets current American Red Cross standards. Includes CPR and first aid instruction.

**PE 2244. Water Safety Instructor.** (2 cr; SP-1240, 17 yrs old, knowledge and skill based on Emergency Water Safety Standard; A-F only)  
Knowledge, skills, and strategies to teach American Red Cross swimming and water safety courses.

**PE 3126. Elementary School Physical Education.** (2 cr; SP-EIEd major or #; A-F only)  
Teaching physical education for elementary education majors; need for physical education for elementary school children, planning and teaching age appropriate developmental movement experiences.

**PE 3750. Movement Experience for the Young Child.** (1 cr; SP-ECh major; A-F only)  
Movement patterns, planning, and instruction in early childhood education.

**PE 5470. Sports Nutrition.** (3 cr; SP-3470, Hlth 1470, exer sci or grad student or #, no grad cr; A-F only)  
Relationship between nutrients and special demands of physically active people. Body composition assessment. Caloric and fluid needs determination. Training, pre- and post-event meal planning. Focus on practical application of nutrition principles for specific populations (e.g., children, diabetics, elderly, elite athletes).

## Physical Education Professional (PEP)

### College of Education and Human Service Professions

**PEP 1000. Teaching Elementary Games and Rhythms.** (1 cr; SP-PE or exer sci or rec major or #; A-F only)  
Basic skills, teaching strategies, practice, drills, and skill analysis for teaching elementary games and rhythms.

**PEP 1002. Teaching Stunts: Tumbling and Apparatus.** (1 cr; SP-PE or exer sci or rec major or #; A-F only)  
Basic skills, teaching strategies, practice, drills, and skill analysis for teaching stunts, tumbling, and gymnastic apparatus.

**PEP 1300. Teaching Ballroom Dancing.** (1 cr; SP–PE or exer sci or rec major or #; A-F only)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching ballroom dancing.

**PEP 1302. Teaching Folk Dance.** (1 cr; SP–PE or exer sci or rec major or #; A-F only)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching folk dance.

**PEP 1304. Teaching Square Dance.** (1 cr; SP–PE or exer sci or rec major; A-F only)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching square dance.

**PEP 1400. Teaching Tennis and Golf.** (1 cr; SP–PE or exer sci or rec major; A-F only)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching tennis and golf.

**PEP 1500. Teaching Cross-Country Skiing.** (1 cr; SP–PE or exer sci or rec major or #; A-F only)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching cross-country skiing.

**PEP 1504. Teaching Skating.** (1 cr; SP–PE or exer sci or rec major or #)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching skating.

**PEP 1505. Teaching Whitewater Kayaking.** (1 cr; SP–PE 1510 or #)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching whitewater kayaking. Successful completion results in American Canoe Association instructor certification.

**PEP 1506. Teaching Sea Kayaking.** (1 cr; SP–PE 1507 or #)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching sea kayaking. Successful completion results in American Canoe Association instructor certification.

**PEP 1507. Teaching Outdoor Skills.** (2 cr; SP–PE 1201, PE 1202 or PE 1203, PE 1204 or #)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching outdoor recreation skills; includes navigation, camp craft, backpacking, back country travel, and safety.

**PEP 1508. Teaching Rock Climbing.** (1 cr; SP–PE 1530 or #)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching rock climbing.

**PEP 1509. Teaching Canoeing.** (1 cr; SP–PE 1508 or #)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching canoeing. Successful completion results in American Canoe Association instructor certification.

**PEP 1520. Alpine Ski Instructor's Course.** (1 cr; A-F only)

Instructor training for alpine skiing. Provides a basis of training for professional development as a skiing instructor.

**PEP 1600. Teaching Fitness and Weight Training.** (1 cr; SP–PE or exer sci or rec major or #; A-F only)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching physical fitness, weight training, and aerobics.

**PEP 1700. Teaching Soccer and Softball.** (1 cr; SP–PE or exer sci or rec major or #; A-F only)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching soccer and softball.

**PEP 1710. Teaching Volleyball and Basketball.** (1 cr;

SP–PE or exer sci or rec major or #; A-F only)  
Basic skills, teaching strategies, practice, drills, and skill analysis for teaching volleyball and basketball.

**PEP 2000. Foundations of Physical Education.** (3 cr; SP–Exer sci or PE major or #; A-F only)

Historical, philosophical, sociological, and scientific foundations within physical education and its subdisciplines.

**PEP 2070. Elementary Physical Education Methods and Development.** (4 cr; SP–1000, PE major or #; A-F only)

Analysis of philosophy, objectives, program, methods, evaluation, and developmental motor patterns for elementary school physical education.

**PEP 2071. Clinical Experience: Elementary.** (1 cr; SP–¶2070, PE major or #; A-F only)

Supervised clinical teaching experience with responsibilities that include planning, managing, and implementing instructional experiences for elementary school children.

**PEP 2610. Introduction to Athletic Training.** (2 cr; SP–Exer sci major or #; A-F only)

Historical, organizational, and legal aspects of athletic training; focuses on the athletic trainer as a member of the sports medicine team.

**PEP 2620. Essentials of Athletic Training and Emergency Care.** (2 cr; SP–Exer sci major, Anat, Phsl or #; A-F only)

Basic concepts of athletic training, including pre-participation screening, physiology of tissue repair, topographical anatomy, evaluation and assessment of illness and injuries, emergency care undergraduate major.

**PEP 3010. Adapted Physical Education.** (2 cr; SP–Exer sci or PE major or #; A-F only)

Developmental/adapted physical education for children with disabilities.

**PEP 3020. Motor Learning.** (2 cr; SP–Exer sci or PE candidate or Δ; A-F only)

Factors affecting motor learning; theories of learning and their application to the learning of physical skills; motor learning at beginning through advanced skill levels.

**PEP 3021. Exercise Adherence.** (2 cr; SP–Psy 1003, exer sci or PE major; A-F only)

Fundamental concepts of exercise psychology. Exercise behavior, exercise adherence, psychology of injured athlete.

**PEP 3030. Human Biomechanics.** (4 cr; QP–\$PE 3118; [Hlth 1901 or Hlth 1903], [Hlth 1905 or Phsl 1043], [3-5 cr from Math 1156-1297 or #]; SP–PE, exer sci or rec majors, #; A-F only)

Application of physical laws to human movement. Laws of mechanics and tissue biomechanics concepts are applied to human motor function. (3 hrs lect, 1 hr lab)

**PEP 3040. Exercise Physiology.** (4 cr; SP–Hlth 2040, PE or exer sci candidate or #; A-F only)

Physiological responses and adaptations to acute and chronic exercise. (3 hrs lect, 1.25 hrs lab)

**PEP 3400. Exercise Testing and Prescription.** (3 cr; SP–3040, ex sci major or #; A-F only)

Physical fitness programming for adults; principles of exercise testing and prescription. (2 hr lect, 1.25 hrs lab)

## Course Descriptions

### PEP 3402. Principles of Strength and Conditioning

**Programs.** (3 cr; SP-3020, 3030, 3040, exer sci major; A-F only)

Theory and practice of developing and implementing strength training and conditioning programs; emphasis on technique analysis and instructional methods (2 hrs lect, 1.25 hrs lab)

### PEP 3404. Clinical Exercise Physiology.

(2 cr; SP-3040, 3400; A-F only)

Examination of the use of physiological principles and relationships in clinical situations where exercise is used for prevention or alleviation of disease.

### PEP 3470. Sports Nutrition.

(3 cr; SP-3040, Hlth 2040, \$PE 3470, exer sci or hlth ed or PE or rec major or #; A-F only)

Principles of sports nutrition; emphasis on effects of diet on body composition, metabolic processes, physiological function, and physical performance.

### PEP 3500. Facilities Management.

(3 cr; SP-Exer sci or rec major or #; A-F only)

Theory and practice of managing sports facilities.

### PEP 3600. Techniques of Athletic Training I.

(3 cr; SP-\$CC 3116; PE candidate or Δ; A-F only)

Assessment and management of sport-related trauma; injuries to axial region and lower and upper extremities; use of therapeutic modalities; legal considerations.

### PEP 3610. Therapeutic Exercise.

(3 cr; SP-3010, PE or exer sci candidate or #; A-F only)

Principles of therapeutic exercise for rehabilitation of acute and chronic injuries.

### PEP 3620. Techniques of Athletic Training II.

(4 cr; SP-2610, 2620, 3600, exer sci candidate; A-F only)

Athletic trainer's role in diagnosis and treatment of musculoskeletal, cardiorespiratory, nervous system, gastrointestinal, and genitourinary injuries.

### PEP 3630. Administrative Aspects of Athletic Training.

(2 cr; SP-2610, 2620, 3600, exer sci candidate; A-F only)

Lecture and lab in use of taping, bandaging, orthotics, and protective equipment in injury prevention.

### PEP 3632. Advanced Athletic Training Techniques.

(2 cr; SP-3630, exer sci candidate; A-F only)

Lecture and lab in use of advanced techniques for taping, bandaging, orthotics, and protective equipment in injury prevention.

### PEP 3640. Principles of Therapeutic Modalities.

(3 cr; SP-3630, 3632, 3640 or #, exer sci candidate; A-F only)

Lecture and lab in use of therapeutic modalities by athletic trainers.

### PEP 3650. Administration of Athletic Training.

(3 cr; SP-2620; A-F only)

Examination of how managerial and organizational knowledge and skills can and should be applied by athletic trainers in the administration of athletic training programs.

### PEP 3700. Measurement and Evaluation in Physical Education.

(3 cr; SP-PE majors, #; A-F only)

Methods and techniques for measuring and evaluating physical performance, knowledge, and attitudes; procedures for evaluating tests and their results; analysis and interpretation of test data.

### PEP 3730. Secondary Physical Education Methods and Curriculum.

(4 cr; SP-PE major or #; A-F only)

Analysis of philosophy, objectives, program, methods, and curriculum for secondary school physical education.

### PEP 3731. Clinical Experience: Secondary.

(1 cr; SP-#3730, PE major or #; A-F only)

Supervised clinical teaching experience with responsibilities that include planning, managing, and implementing instructional experiences for secondary school children.

### PEP 3970. Supervised Teaching: College.

(1 cr; SP-[3720 or PE 3122], [3730 or PE 3123], BAS PE candidate or #; A-F only)

Supervised teaching experience in a college setting.

### PEP 3997. Athletic Training Practicum.

(3 cr [max 9 cr]; SP-3630, 3632, 3640, #, exer sci candidate; S-N only)

Practical experience in athletic training under direct supervision of a National Athletic Trainers Association certified trainer at an on- or off-campus location.

### PEP 4991. Independent Study.

(1-4 cr [max 8 cr]; SP-PE or exer sci major and #, no grad cr; A-F only)

Research or study in selected noncurricular area of exercise science or physical education.

### PEP 4992. Directed Readings.

(1-3 cr [max 6 cr]; SP-PE or exer sci candidate with 90 cr or #; no grad cr; A-F only)

### PEP 4996. Internship.

(3-12 cr [max 12 cr]; SP-3040, 3400, PE candidate, #, no grad cr; S-N only)

Supervised field internship experience in hospital, fitness facility, or agency setting.

### PEP 4997. Practicum.

(1-5 cr [max 4 cr]; SP-PE or exer sci major, no grad cr; A-F only)

Supervised practical experience related to physical education teaching or exercise science professional experiences.

### PEP 5041. Applied and Experimental Exercise

**Physiology.** (4 cr; SP-3040 or Δ, exer sci candidate with 90 cr or quick enroll or grad student; A-F only)

Advanced study and research in exercise physiology; methods of quantifying exercise responses and adaptations; basic research design.

### PEP 5290. Research in Motor Learning.

(2 cr; SP-3020 or #; A-F only)

Directed research.

### PEP 5301. Techniques and Research in Computerized Videography.

(4 cr; SP-3030 or #; A-F only)

Analysis and research in sport, dance, and aquatics through use of high-speed computerized videography.

### PEP 5600. Seminar in Athletic Training.

(2 cr; SP-3600; A-F only)

Recognition, principles, and responsibilities related to athletic injuries in secondary and collegiate programs; demonstration and practice in training techniques.

### PEP 5700. Research in Exercise Science.

(3 cr; SP-Exer sci major, 75 cr, #; A-F only)

Interpretation of statistical procedures and research design in exercise science. Prepares students to conduct research projects in the exercise physiology, biomechanics, motor learning, and the psychological factors that influence exercise.

### PEP 5991. Independent Study.

(1-4 cr [max 8 cr]; SP-Quick enroll or grad student and #; A-F only)

Directed research and study in selected area of physical education or exercise science.

### PEP 5992. Directed Readings.

(1-3 cr [max 6 cr]; SP-Quick enroll or grad student or #; A-F only)

Directed readings.

# Physics (Phys)

## College of Science and Engineering

**Phys 1001. Introduction to Physics I.** (5 cr; SP–Algebra, trig; A-F only; LE 4)

Noncalculus general physics course primarily for certain preprofessional fields. Topics in mechanics, heat, and sound.

**Phys 1002. Introduction to Physics II.** (5 cr; QP–1101; SP–1001; A-F only)

Noncalculus general physics course primarily for certain preprofessional fields. Topics in light, electricity, magnetism, and modern physics.

**Phys 1011. Ideas in Physics.** (3 cr; SP–Will not satisfy major or minor requirements in phys; A-F only; LE 5)

Descriptive, nonmathematical survey of basic concepts in physics from Newton to present. Instructor has considerable latitude regarding content. Primarily for liberal arts students; not for preprofessional preparation.

**Phys 1101. Solving Physics Problems.** (2 cr; QP–§Math 1296; SP–§Math 1296; A-F only)

Applying mathematical and reasoning skills to physics problems.

**Phys 1201. Mechanics.** (4 cr; QP–Math 1296; SP–Math 1290 or Math 1296; A-F only; LE 4)

Calculus-level general physics course in Newtonian mechanics, including fluid mechanics.

**Phys 1202. Heat and Electricity.** (4 cr; QP–1107; SP–1201; §1204; A-F only)

Calculus-level general physics, including DC circuits.

**Phys 1203. Magnetism, Waves, and Optics.** (4 cr; QP–1108, Math 1297; SP–1202, Math 1297; §1204; A-F only)

Calculus-level general physics; also includes AC circuits.

**Phys 1204. Electricity, Magnetism, and Optics.** (5 cr; QP–1107, Math 1297; SP–1201, Math 1297; §1202, 1203; A-F only)

Calculus-level general physics.

**Phys 1205. Waves and Heat.** (3 cr; QP–1107; SP–1204; §1202, 1203; A-F only)

Calculus-level general physics; also includes AC circuits.

**Phys 2001. Oscillations.** (2 cr; QP–1109; SP–1203 or 1205; A-F only)

Waves and vibrations, superposition of periodic motion, free vibrations of physical systems, forced vibrations, resonance phenomena with examples from electricity, optics, and mechanics; progressive waves, boundary effects, interference.

**Phys 2021. Relativity and Quantum Physics.** (4 cr; QP–1109; SP–1202 or 1204; A-F only)

Descriptive course; relativity, quantum mechanics, hydrogen atom, multielectron atoms, molecular structure, quantum statistics, thermal radiation, solid state physics, nuclear physics.

**Phys 2031. Quantum Physics Laboratory.** (1 cr; QP–3500; SP–§2021; A-F only)

Experiments and computer simulations selected to provide experience with both concepts and techniques in modern physics.

**Phys 3061. Instrumentation.** (3 cr; QP–1109, 1 qtr programming; SP–1203 or 1204, 1 sem programming; A-F only)

Introduction to electronics for scientific applications. DC and AC circuits, linear and nonlinear devices, integrated circuits. Analog electronics. Transducers. Digital electronics. Applications of microcomputers to lab data acquisition.

**Phys 3091. Independent Study.** (1–3 cr [max 6 cr]; SP–A; A-F only)

Directed individual study.

**Phys 3094. Physics Research.** (1–6 cr [max 6 cr]; SP–A; S-N only)

Supervised research.

**Phys 3099. Physics Tutoring.** (1–2 cr [max 4 cr]; QP–1109, Δ; SP–1202 or 1204, Δ; may apply only 2 cr toward phys major; S-N only)

Tutoring students in 1xxx-, 2xxx-, and 3xxx-level physics courses.

**Phys 4001. Classical Mechanics.** (4 cr; QP–3010, Math 3380; SP–2001, Math 3280; A-F only)

Theoretical mechanics, including Lagrangian and Hamiltonian functions, symmetries, and conservation laws.

**Phys 4011. Electromagnetic Theory.** (4 cr; QP–1109, Math 3380; SP–1203 or 1205, Math 3280; A-F only)

Electric and magnetic fields, Maxwell's equations and applications, radiation.

**Phys 4021. Quantum Physics II.** (4 cr; QP–3500, Math 3380; SP–2021, Math 3280; A-F only)

Quantum wave mechanics with applications; Schrödinger equation, angular momentum, hydrogen atom, symmetries, identical particles.

**Phys 4031. Thermal and Statistical Physics.** (4 cr; QP–3500; SP–2021; A-F only)

Elements of thermodynamics; principles of statistical physics applied to equilibrium properties of classical and quantum systems.

**Phys 5041. Optics.** (3 cr; QP–3010; SP–2001; A-F only)

Fundamentals of physical optics.

**Phys 5051. Computational Physics.** (4 cr; QP–3500, Math 3380, 1 qtr programming; SP–2021, Math 3280, 1 sem programming; A-F only)

Application of numerical methods to problems in classical and quantum physics, emphasizing ordinary and partial differential equations. Computer modeling of physical systems.

**Phys 5061. Experimental Methods.** (3 cr; QP–3041, 3071; SP–2031, 3061; A-F only)

Instruction and practice in methods of experimental physics; microcomputer-based data acquisition; vacuum techniques.

**Phys 5062. Advanced Laboratory.** (2 cr; SP–§Comp 3150, #; A-F only)

Computational projects and/or experiments in physics or physical limnology.

**Phys 5090. Physics Seminar.** (1 cr [max 2 cr]; SP–Sr or grad student; A-F only)

Preparation and presentation of oral reports on approved physics topics, research projects, and journal articles.

## Course Descriptions

**Phys 5501. Advanced Classical Mechanics.** (3 cr; QP-5124; SP-4001; A-F only)

Hamiltonian and Lagrangian formulations for discrete systems, canonical transformations, nonlinear dynamics, and chaos theory.

**Phys 5511. Electrodynamics.** (3 cr; QP-5125; SP-4011; A-F only)

Maxwell's equations, relativity and electrodynamics, radiation and scattering of electromagnetic waves, relativistic particles in electromagnetic fields, and radiation reaction.

**Phys 5521. Quantum Mechanics I.** (3 cr; QP-5103; SP-4021; A-F only)

Schrödinger equation, operator formulation, angular momentum, symmetries.

**Phys 5522. Quantum Mechanics II.** (3 cr; QP-5177; SP-5521; A-F only)

Identical particles, perturbation theory, scattering, interaction with electromagnetic field.

**Phys 5531. Introduction to Solid State Physics.** (3 cr; QP-5103, 5107; SP-4021, 4031; A-F only)

Solid structure, thermal, and electronic properties of solids and solid surfaces.

**Phys 5541. Fluid Dynamics.** (3 cr; QP-3010, Math 3380; SP-2001, Math 3280; A-F only)

Analytic and numeric treatment of dynamics of fluids. Rotating, stratified fluids, with applications in limnology, oceanography, and meteorology.

**Phys 5551. General Relativity.** (4 cr; QP-5123; SP-4001; A-F only)

Differential geometry, tensors, metrics, curvature, Einstein's equation, Newtonian limit, Killing vectors, cosmology, perfect fluids, Schwarzschild and Kerr solutions, observational tests, black holes.

**Phys 5591. Independent Study.** (1-3 cr [max 6 cr]; SP-Consent of director of graduate studies, #; S-N only)

Special studies, useful in individual graduate programs, not available in regular course offerings.

**Phys 5594. Physics Research.** (1-3 cr [max 6 cr]; SP-#; S-N only)

**Phys 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser, and DGS consent)

**Phys 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; SP-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Pol 1195. Special Topics: (Various Titles to be Assigned).**

(1-4 cr [max 8 cr]; QP-\$1902; 1113 or 1413 or 1513 or 1613 may be repeated for 8 cr max; A-F only)

Contemporary topics in American governmental systems and processes. Specific course announced in *Class Schedule*.

**Pol 1200. Introduction to Public Policy.** (3 cr; A-F only; LE 8)

Public policy consists of political decisions for implementing programs to achieve societal goals such as reducing crime and poverty, improving education, maintaining national security, and preserving the environment. Introduction to how policy is made, implemented, and evaluated.

**Pol 1500. Introduction to Comparative Politics.** (3 cr; A-F only; LEIP 6)

Survey of the politics of countries selected to reflect alternative styles of politics and forms of government; examples of Western liberal democratic, Communist and post-Communist, and Third World systems.

**Pol 1610. Politics and Society.** (3 cr; QP-\$1600, \$3601, \$3635; A-F only; LE 7)

Survey of major contemporary political ideologies: liberalism, conservatism, socialism, Marxism, fascism, feminism, anarchism, ecologism, and liberation ideologies

**Pol 2700. Methodology and Analysis.** (4 cr; QP-\$1700, \$3200; 60 cr or #; A-F only)

Theory and methods of conducting political research: theory construction, concept formulation, survey research and sampling design, basic statistical analysis, and measurement of relationships.

**Pol 3001. American Public Policy.** (3 cr; QP-60 cr incl 1011 or #; SP-40 cr incl 1011 or #; A-F only)

Approaches to policy study, context of policy process, and discussion of policy issues.

**Pol 3020. State Government.** (3 cr; QP-1011, 60 cr or #; SP-1011, 40 cr or #; A-F only)

The states in the American federal system; governmental institutions and processes; intergovernmental relations. Special reference to Minnesota.

**Pol 3040. Women and Politics.** (3 cr; QP-\$3801; 60 cr or #; SP-40 cr or #; A-F only)

Women's political status; implications of women's role in political process; women as political actors; feminist critique and vision of politics.

**Pol 3080. Environment and Politics.** (3 cr; QP-1011, 60 cr or #; SP-1011, 40 cr or #; A-F only)

American natural resource problems with special attention to conservation activities on national, state, and local levels; development of conservation agencies in Minnesota.

**Pol 3097. Government Internship.** (1-12 cr [max 12 cr]; QP-\$3710; jr, #; 4 cr max from 3105, 3114, 3405, 3414, 3505, 3514, 3605, 3614 may be applied toward Pol major requirements; SP-Jr, #; 4 cr max from 3097, 3197, 3297 may be applied toward advanced Pol major requirements; S-N only) Scheduled work assignments with direct supervision in performance of governmental functions; full- or part-time employment.

**Pol 3109. Intern Teaching in Political Science.** (1-2 cr [max 3 cr]; QP-\$3900; sr, Pol major, #; 4 cr max from 3109, 3409, 3509, 3609 may be applied toward gen upper div Pol major requirements; SP-Sr, Pol major, #; 3 cr max may be applied to gen upper div Pol major requirements; S-N only)

# Political Science (Pol)

## College of Liberal Arts

**Pol 1011. American Government and Politics.** (3 cr; QP-\$1010; A-F only; LE 6)

Principles of American national government. Survey of American governmental system, structure, operations, and services; constitutionalism, federalism, civil liberties, parties, pressure groups, and elections.

**Pol 1050. International Relations.** (3 cr; A-F only; LEIP 8)

Introduction to contemporary international politics: levels of analysis; the international system; nation-state behavior; foreign policy decision making; economic and defense policy issues.

Practical experience teaching in Department of Political Science. Application deadline one week before beginning of registration for the following semester. Before interning in a course, students must obtain a grade of at least B+ in the course.

**Pol 3120. Congress and the Presidency.** (4 cr; QP-§3160, §3325, §5160, §5320, §5325; 1011, 60 cr or #; SP-1011, 40 cr or #; A-F only)

Functioning and structure of the United States Congress and Presidency. Members of Congress and the Presidency: their characteristics, their selection, roles they play, how they interact with each other as well as with others in the policy-making process.

**Pol 3130. The Judicial Process.** (3 cr; QP-§3330, §5330; 1011, 60 cr or #; SP-1011, 40 cr or #; offered alt yrs; A-F only)

Structure of the American judiciary; selection of judges; process of litigation; influences on judicial decision; impact of and compliance with decisions.

**Pol 3140. American Political Parties and Elections.** (3 cr; QP-1011, 60 cr or #; SP-1011, 40 cr or #; A-F only)

American two-party system; structures and functions of political parties in America; nominations and elections of government officials.

**Pol 3150. American Constitutional Law I.** (4 cr; QP-§3110, §3111; 1011, 60 cr or #; SP-1011, 40 cr or #; A-F only)

Judicial review; national powers over commerce, taxing, and spending; presidential power; state powers to tax and regulate; regulation of economic and property interests; the Fourteenth Amendment and due process.

**Pol 3151. American Constitutional Law II.** (4 cr; QP-§3110, §3111; 1011, 60 cr or #; SP-1011, 40 cr or #; A-F only)

Rights of the accused; freedom of expression and association. Freedom of religion; equal protection; state action and personal rights; other civil rights; military, war, and foreign affairs powers.

**Pol 3170. Political Interest Groups and Individuals.** (3 cr; QP-§5170; 1011, 60 cr or #; SP-1011, 40 cr or #; A-F only)

Role of interest groups and individuals who lobby government to influence public policy. Internal dynamics of groups; strategies of lobbying and its regulation.

**Pol 3195. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 8 cr]; QP-§3902; 60 cr incl 8 cr soc sci or #; 3113 or 3413 or 3513 or 3613 may be repeated for 8 cr max; SP-40 cr incl 6 cr soc sci or #; A-F only)

Detailed examination of contemporary topics in political science. Specific course announced in *Class Schedule*.

**Pol 3197. Nongovernmental Internship.** (1-12 cr [max 12 cr]; QP-Jr, Pol major, #; 4 cr max from 3105, 3114, 3405, 3414, 3505, 3514, 3605, 3614 may be applied to gen upper div Pol major requirements; SP-Jr, #; 4 cr max from 3097, 3197, 3297 may be applied toward adv Pol major requirements; S-N only)

Supervised, scheduled work assignments in performance of political functions in nongovernmental organizations; full- or part-time employment. Not all outside work is eligible; see department head for requirements.

**Pol 3221. Public Administration and Policy Analysis.** (3 cr; QP-§3220; 1011, 60 cr or #; SP-1011, 40 cr or #; A-F only)

Operations of bureaucratic organizations and their role in government policy making. Capability of modern bureaucracy in meeting its own goal of technical efficiency; impact of bureaucratic forms of organization on democratic society.

**Pol 3297. Public Policy Internship.** (3-12 cr [max 12 cr]; SP-Completion intro courses for policy studies concentration and #; no more than 3 cr may be applied to adv policy conc; no more than 4 cr comb 3097, 3197 and/or 3297 may be applied to adv Pol Sci major, #; S-N only)

Supervised, scheduled work assignments in policy settings related to student's substantive track; full or part-time employment.

**Pol 3310. Public Opinion and Propaganda.** (3 cr; QP-1011, 60 cr or #; SP-40 cr or #; A-F only)

Role of public opinion and propaganda in the political system; acquisition and measurement of opinion; persuasion and use of propaganda techniques by candidates, pressure groups, and others.

**Pol 3400. Contemporary Issues in World Politics.** (4 cr [max 8 cr]; QP-§3450; 1050, 60 cr or #; 4 cr max may be applied toward requirements for dept field concentration; SP-1050, 40 cr or #; 4 cr max may be applied toward Pol major requirements; A-F only)

Detailed examination and analysis of selected contemporary issues in world politics and international relations. Policy recommendations dealing with each issue.

**Pol 3402. American Foreign and Defense Policy.** (3 cr; QP-§3002, §3065; 1011 or 1050, 60 cr or #; SP-1011 or 1050, 40 cr or #; A-F only)

Institutions and processes that determine U.S. foreign and defense policies; major developments; contemporary issues; effects on domestic politics.

**Pol 3426. Politics of International Organization and Law.** (4 cr; QP-1050, 60 cr incl 12 cr soc sci or #; SP-40 cr incl 8 cr soc sci or #; A-F only)

Investigation of development, operations, and significance of international organization and law in contemporary international politics.

**Pol 3451. Theories of International Relations.** (4 cr; QP-§IntS 5200; 1050 or IntS 1010, 60 cr incl 12 cr soc sci or #; SP-40 cr incl 8 cr soc sci or #; A-F only)

Historical and contemporary theories of international relations. Views of contending theorists are analyzed and assessed.

**Pol 3456. International Security: Theory and Policy.** (4 cr; SP-40 cr incl 6 cr soc sci or #; A-F only)

Introduces undergraduates to the principal theories used in international security studies and to the major security issues faced by the United States in the post-Cold War world.

**Pol 3510. Russian and Eastern European Politics.** (4 cr; QP-60 cr incl 12 cr soc sci or #; SP-40 cr incl 8 cr soc sci or #; A-F only)

Reform and revolution in Tsarist Russia; political leadership and Soviet development under Lenin and Stalin; political issues in the post-1953 Stalinist system: conservatives and reformers from Khrushchev to Gorbachev; dissolution of the USSR and its aftermath; recreating the Russian polity.

**Pol 3517. Western European Political Systems.** (4 cr; QP-§3516; 60 cr incl 12 cr soc sci or #; SP-40 cr incl 8 cr soc sci or #; A-F only)

Comparative analysis of development and operation of political-governmental institutions and processes in selected Western European countries; political and ideological patterns and trends; problems of democratic politics; policy issues in advanced industrial societies and the future of the "welfare state."

## Course Descriptions

**Pol 3550. Politics of Contemporary Southern Africa.** (2 cr; QP-60 cr incl 12 cr soc sci or #; SP-40 cr incl 8 cr soc sci or #; A-F only)

Contemporary political, economic, and social trends in Southern Africa.

**Pol 3570. Third World and Development.** (3 cr; QP-1050 or 1500 or 12 cr soc sci, 60 cr or #; SP-1050 or 1500 or 8 cr soc sci, 40 cr or #; A-F only)

Nature of political development; individual and institutional causes and consequences of development; political economy of Third World.

**Pol 3600. Political Concepts.** (4 cr; QP-\$1600; 60 cr or #; SP-40 cr or #; A-F only)

Fundamental political concepts, including but not limited to justice, liberty, equality, power, democracy, political obligation, and community. Perspectives of diverse political philosophies and cultures may be addressed.

**Pol 3610. Political Economy: An Introduction.** (4 cr; QP-60 cr incl 8 cr soc sci or econ or bus or #; SP-40 cr incl 6 cr soc sci or econ or bus or #; A-F only)

Relationship between politics and economics and ways they affect each other, focusing on political and economic values/goals and their role in shaping public policy; policies and policy making in selected national systems; the international economy.

**Pol 3651. History of Western Political Thought I.** (4 cr; QP-\$5653; 60 cr or #; SP-1600 or 1610 or #; A-F only)

Justice and the political community; classical Greek thought and medieval thought, concentrating on Plato, Aristotle, Augustine, Aquinas, Machiavelli, and More.

**Pol 3652. History of Western Political Thought II.** (4 cr; QP-\$5655; 60 cr incl 1600 or 1610 or #; SP-1600 or 1610 or #; A-F only)

Political thought from the Enlightenment to the present. Works of major political philosophers, including Hobbes, Locke, Rousseau, Wollstonecraft, Mill, Marx, and 20th-century philosophers.

**Pol 3690. Left, Right, and Centre: Ideology and Politics.** (1-4 cr; A-F only)

Political argument in Britain at the end of 20th century.

**Pol 3910. Honors Seminar: Landmarks in Political Science.** (4 cr; QP-\$3890; 80 cr, 3.00 GPA in Pol courses, Δ; SP-55 cr, 3.00 GPA in Pol courses, Δ; A-F only)

Selected books and essays published in the last 40 years considered to be outstanding contributions to political science. The works' arguments and contribution to political science.

**Pol 4190. Senior Seminar.** (4 cr; QP-\$5199, \$5399, \$5499, \$5599; 8 cr relevant upper div Pol courses, #; SP-6 cr relevant upper div Pol courses, #; A-F only)

Supervised research and writing in current areas or issues of politics and political science, subject matter varying with instructor.

**Pol 4191. Independent Study.** (1-4 cr [max 6 cr]; QP-\$5704; 12 cr Pol, 8 cr other soc sci, #; 5111 or 5411 or 5511 or 5611 may be repeated for 8 cr max; SP-8 cr Pol, 6 cr other soc sci, #; A-F only)

Advanced study and research under supervision of a staff member; student must consult with instructor before registration.

**Pol 4192. Senior Seminar in Policy Studies.** (4 cr; SP-Completion of core course requirements for public policy concentration or #; A-F only)

Capstone class for the policy studies concentration.

Focuses on economic, political, and societal constraints on the policymaking process, and the ethical values that policies promote.

**Pol 4195. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 6 cr]; SP-45 cr incl 8 cr soc sci or #; A-F only)

Detailed examination of contemporary topics in political science. Specific course announced in *Class Schedule*.

**Pol 4198. Workshop: (Various Titles to be Assigned).** (1-4 cr [max 6 cr]; SP-70 cr incl 12 cr soc sci or #; 5101 or 5401 or 5501 or 5601 may be repeated; max 6 cr toward grad program; SP-50 cr; max 4 cr toward grad program; A-F only)

Intensive study in various aspects of political science.

**Pol 4201. Natural Resource Policy.** (4 cr; SP-50 cr incl 6 cr soc sci or #; A-F only)

Examine historical, political and economic dimensions of natural resource policy in the United States with emphasis on public lands and water. Topics include water, forest management, wilderness, wildlife and biodiversity, mining and ranching.

## Psychology (Psy)

### College of Education and Human Service Professions

**Psy 1003. General Psychology.** (4 cr; A-F only; LE 6)

Scientific study of behavior; current knowledge of biological, social, and cognitive areas of psychology. Assessment, research methods, human development, personality, mental disorders, and therapy.

**Psy 2010. Human Service Seminar: Issues and Ethics in the Field.** (1 cr; SP-Psy major; S-N only)

For psychology majors choosing an applied human service concentration. Academic and career advisement. Introduction to the human service profession.

**Psy 2021. Developmental Psychology.** (4 cr; A-F only; LECD 6)

Major processes in human development, conception through lifespan; biological and cultural influences on physical-motor, cognitive, social, and emotional development; effects of diverse cultural traditions and values; social policy implications.

**Psy 2023. Marriages and Families Worldwide.** (4 cr; A-F only; LEIP 8)

Family functions and structures worldwide; impact of expectations, gender roles, race, culture, and values on partner and parenting; love, sex, communication, power, abuse, stress, and satisfaction; small group experiences with focus on strengthening families.

**Psy 2223. Gender in Society.** (4 cr; A-F only; LECD 8)

Sociocultural, historical, and developmental formations of men's and women's roles and experiences in society. Effects on personality, interpersonal relationships, and life choices.

**Psy 3020. Statistical Methods.** (4 cr; SP-Elem algebra, math placement test; A-F only)

Descriptive statistics; introduction to correlational analysis and regression; sampling techniques and statistical inference; applications of simple and factorial design analysis of variance and other parametric and nonparametric hypothesis-test statistics in the behavioral sciences.

**Psy 3021. Experimental Design and Methodology.** (4 cr; SP-3020; A-F only)

Introduction to problems and methods of experimentation in psychology; logical and scientific basis of experimental psychology; problems and techniques of designing, conducting, and reporting experiments. (3 hrs lect, 1 hr lab)

**Psy 3022. Applied Methods and Measurement.** (4 cr; SP-3020, 3021; A-F only)

Designing, conducting, and reporting experiments; constructing, choosing, and interpreting psychological instruments; experimental procedures and research findings from various areas within psychology. (3 hrs lecture, 1 hr lab)

**Psy 3061. Physiological Psychology.** (4 cr; SP-4 cr Psy or #; A-F only)

Physiological basis of behavior, including central and peripheral nervous systems, sensory processes as they relate to perception, cognition, emotion, motivation, intelligence, and learning.

**Psy 3081. History and Systems of Psychology.** (3 cr; SP-3 cr Psy; A-F only)

Survey of historical development and current status of contemporary systems and theories in psychology.

**Psy 3111. Theories of Personality.** (3 cr; SP-3 cr Psy; A-F only)

Basic concepts, issues, and methods involved in study of human personality; introduction to selected theories on motives, dynamics, development, and description of human nature.

**Psy 3112. Psychology of Religion.** (3 cr; SP-Upper div standing, strong interest in scientific study of religious experience and behavior; A-F only)

Religious beliefs and their functional value in human life. Varieties of religious experience and behavior.

**Psy 3121. Abnormal Psychology.** (4 cr; SP-3 cr Psy; A-F only)

Mental disorders, including DSM-IV classification system, etiology, and treatment.

**Psy 3201. Social Psychology.** (3 cr; SP-3 cr Psy; A-F only)

How thoughts, feelings, and behavior of individuals are affected by others. Social influence and interaction. Attitude measurement and change, conformity, impression formation, attribution theory, aggression, and prosocial behavior.

**Psy 3211. Group Dynamics.** (3 cr; SP-3 cr Psy; A-F only)

Principles and processes of interaction in groups; structure and functioning of groups; leadership, communication, decision making, social influence; aspects of sensitivity training.

**Psy 3215. Special Topics: (Various Titles to be Assigned).** (3 cr; SP-§3216; 3 cr Psy; A-F only)

Biological and psychosocial factors relating to human sexuality, sexual functioning, gender, and related issues. Group discussion of societal factors, values, and attitudes and their impact on behavior.

**Psy 3216. Human Sexuality: A Personal Perspective.** (3 cr; SP-§3215; A-F only)

Independent study course. Students deal with typical topics covered in human sexuality through viewing videotapes, reading text and journal articles, and personal evaluation.

**Psy 3231. Psychology of Drug Use.** (3 cr; SP-3 cr Psy; A-F only)

Basic understanding of drug effects: tolerance and withdrawal; commonality among drugs of abuse; how antischizophrenic, antimanic, antianxiety, and antidepressant drugs are thought to work; reward centers in brain.

**Psy 3371. Child and Adolescent Psychology.** (3 cr; SP-1003; A-F only)

Growth of individual and social forms of human behavior. Interaction of heredity and environment on physical, intellectual, social, and emotional changes from conception to adulthood.

**Psy 3381. Adult Development and Aging.** (3 cr; SP-2021 or #; A-F only)

Change and continuity in physiological, psychological, and sociocultural development in early, middle, and late adulthood; theories and research on effects of demographics, cohort, race, ethnicity, gender, culture, family, friends, work, health, education, housing, public policies; dying, grief, bereavement.

**Psy 3445. Transpersonal Psychology.** (3 cr; SP-1003 or #; A-F only)

Branch of psychology that studies spiritual and transcendental experiences. Concerned with the whole of being, it recognizes potential for a variety of states of consciousness; it acknowledges developmental psychology and draws further insights from the spiritual dimensions of human beings. Lab fee.

**Psy 3450. Dreamwork.** (3 cr; SP-3 cr Psy; A-F only)

Historical perspective and theoretical overview of dreamwork. May include such theorists as Freud, Jung, Perls, Gendlin, and Ullman. Focuses on creative use of dreams as symbolic knowledge.

**Psy 3524. Basic Helping Skills.** (4 cr; A-F only)

Rationale for and practice of basic skills needed for effective interpersonal helping.

**Psy 3527. Psychology and Social Responsibility.** (4 cr; SP-3 cr Psy; A-F only)

How psychological development and psychological problems are influenced by political, social, economic, and other global issues. Designed to increase social and political awareness, broaden perspective of psychology, and promote social responsibility and activism. Includes field trips. Lab fee.

**Psy 3535. Career Awareness and Development.** (3 cr; SP-3 cr Psy; A-F only)

Theoretical base and practical experiences for students to use in their own career development, from awareness through job search and adjustment.

**Psy 3540. Psychology of Food Abuse.** (3 cr; SP-3 cr Psy; A-F only)

Basic understanding of eating disorders: obesity, binge eating, anorexia, bulimia, and social, psychological, and physical influences on normal and abnormal eating. Social evaluation of obesity.

**Psy 3601. Psychology of Personal Development.** (3 cr; SP-3 cr Psy; S-N only)

Focuses on discovery of self and spiritual journey. Examines personal development by exploring ways to change, grow, and achieve creative potential. Individual and group counseling experiences required to increase self-awareness and self-knowledge.

## Course Descriptions

**Psy 3611. Learning and Behavior.** (4 cr; SP-3 cr Psy; A-F only)

Study of basic learning and behavior processes including the evolution of behavior, Pavlovian Conditioning, Instrumental Learning, and elementary cognitive processes.

**Psy 3613. Behavior Modification.** (3 cr; SP-3 cr Psy; A-F only)

Basic psychological methods, techniques, and findings in applications of operant and respondent conditioning to treatment of human behavior problems.

**Psy 3621. Cognition.** (4 cr; SP-3 cr Psy; A-F only)

An overview of cognitive processes, using historical, philosophical, biological and experimental perspectives. Course topics include attention, perception, knowledge representation memory, language, thinking, reasoning, and decision-making.

**Psy 3661. Psychology of Language.** (3 cr; SP-3 cr Psy; A-F only)

Psychological processes underlying comprehension, production, and acquisition of language(s); cognitive, social, biological, and educational perspectives on language and their applications.

**Psy 3691. Sensation and Perception.** (4 cr; A-F only)

Theories, methods, and findings in study of sensory and perceptual processes; psychophysics and psychophysiology of visual, auditory, gustatory, olfactory, cutaneous, kinesthetic, vestibular, and pain senses; analysis of perceptions of constancy, illusion, space, time, motion, and form.

**Psy 3701. Personnel Psychology.** (3 cr; SP-3 cr Psy; A-F only)

Introduction to personnel psychology. Testing, selection, performance appraisal, job analysis, job evaluation, validity issues in organizational settings, discrimination, and affirmative action programs.

**Psy 3707. Organizational Psychology.** (3 cr; SP-3 cr Psy; A-F only)

Overview of organizational topics within industrial/organizational psychology. Leadership, job satisfaction, motivation theories, goal setting, organizational behavior, organizational development, and industrial relations.

**Psy 3896. Seminar: Professional Issues.** (1 cr; SP-Jr or sr or BAS Psy major; A-F only)

Required for students seeking preprofessional field placement experience. Ethics, introduction to human service professions, and related professional issues.

**Psy 3950. Workshop: (Various Titles to be Assigned).** (1-4 cr [max 4 cr]; SP-#; S-N only)

Advanced students concentrate study on common problems and/or applications in psychology.

**Psy 3985. Honors Seminar in Psychology.** (2 cr; SP-3021, Psy major with 60 cr, 3.00 GPA overall, 3.25 GPA in Psy, #; A-F only)

Concentrated study using original writings on major issue or by person with historical or theoretical importance within psychology. Bibliography, individual paper, and group project required.

**Psy 3990. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 3 cr]; SP-3 cr Psy; A-F only)

Developed by psychology faculty in their expertise areas to instruct on selected advanced and current topics.

**Psy 3991. Projects in Psychology.** (1-4 cr [max 4 cr]; SP-Psy major or minor, #; S-N only)

Supervised practical experience in University or community activities to gain experience in application of psychological principles and techniques; written report required.

**Psy 3994. Directed Research in Psychology.** (1-4 cr [max 4 cr]; SP-Psy major or minor, #; S-N only)

Research problem chosen by instructor; written report required.

**Psy 3995. Research in Psychology.** (1-4 cr [max 4 cr]; SP-Psy major or minor, #; A-F only)

Intensive independent empirical research on problem in psychology chosen by student; research report required.

**Psy 3996. Preprofessional Field Placement.** (3-10 cr [max 10 cr]; SP-3896, sr BAS Psy major, #; S-N only)

Supervised experience in human service organization. Contract, log, site evaluation, and written report required. Minimum of three hours approved experience on site per week for each semester credit. One hour weekly group supervision required at UMD (time arranged).

**Psy 3997. Honors Project in Psychology.** (1-3 cr [max 3 cr]; SP-Sr Psy major, #, 3.00 GPA overall, 3.25 GPA in Psy; A-F only)

Advanced individual project demonstrating application of psychological principles based on sound theoretical and research foundations. A psychology faculty adviser, written report, and oral examination required.

**Psy 3998. Honors Research in Psychology.** (1-3 cr [max 3 cr]; SP-Sr Psy major, #, 3.00 GPA overall, 3.25 GPA in Psy; A-F only)

Advanced independent empirical research project proposed and conducted by student with psychology faculty adviser. Project must receive Human Use Committee approval and be reported in American Psychological Association publication style.

**Psy 3999. Directed Instruction.** (1-4 cr [max 4 cr]; SP-#; A-F only)

Students work with department faculty in planning and helping teach an undergraduate course.

**Psy 5001. Transpersonal Development.** (3 cr; QP-Ed psy or soc work grad major or #; SP-Couns psy or soc work grad major or #)

Transpersonal perspectives of counseling, religions, and philosophies, including Sufism, Buddhism, Zen, Taoism, Native American spirituality, and Christianity. Includes experiential activities such as group interaction, meditation journaling, and vision quests.

**Psy 5051. Research Methods and Measurement in Psychology.** (3 cr; QP-Grad student or #; SP-Grad student or #; A-F only)

Research methods and design for the behavioral sciences; principles and practices of needs assessment, program evaluation, and individual assessment techniques; ethical and legal considerations in research and assessment.

**Psy 5052. Advanced Statistical Methods.** (3 cr; QP-3020, 5813 or #; SP-3020, 5051 or #; A-F only)

Advanced parametric and nonparametric statistics; application of variance, covariance, and linear regression analyses to a variety of multilevel and factorial research designs; psychometric statistics; computer-based data management; ethical and legal considerations.

**Psy 5061. Research Problems I.** (1-2 cr; QP-Ed psy grad major or #; SP-Couns psy grad major or #; S-N only) Application of principles and procedures of research methods, needs assessments, and program evaluations; integration of research concepts with counseling problems through guided study and practice; ethical and legal considerations. Partially fulfills Plan B requirement.

**Psy 5062. Research Problems II.** (1-2 cr [max 2 cr]; QP-Ed psy grad major or #; SP-5061 or #; S-N only) Advanced application of principles and procedures of research methods, needs assessment, program evaluation, and statistics; integration of research concepts with counseling problems; analysis, conclusions, and dissemination of research. Written report and oral exam required; completes fulfillment of Plan B requirement.

**Psy 5121. Psychopathology Over the Lifespan.** (3 cr; QP-3121 or grad student or #; SP-3121 or grad student or #; A-F only) Abnormal behavior in childhood, adolescence, and adulthood; development, classification, etiology, methods of assessment, treatment, and prevention; ethical considerations.

**Psy 5123. Psychology of Addictive Behaviors.** (3 cr; QP-Sr or grad student or #; SP-Sr or grad student or #; A-F only) Examination of a wide spectrum of addictive behaviors, including drug addictions and process addictions, such as gambling, compulsive buying, and compulsive eating. Evaluation and treatment approaches.

**Psy 5125. Biological Bases of Behavior, Psychopathology, and Pharmacotherapeutics.** (3 cr; QP-Sr or grad student or #; SP-Sr or grad student or #; A-F only) Biological bases of normal cognition, emotionality, social interactions, and motor control; biological reasons for disturbances; rationale and mode of action of various pharmacotherapeutic compounds for treatment; areas of interest include schizophrenia, depression, psychomotor epilepsy, drug abuse, and addiction.

**Psy 5201. Childhood and Adolescence: Advanced Study.** (3 cr; QP-3331 or 3371, sr or grad student or #; SP-2021 or 3371, sr or grad student or #; A-F only) Current theories and research on physical, cognitive, social, and emotional development of children and adolescents in selected areas worldwide; influences on learning, decision making, academic and career needs, risk, resilience; assessment, advocacy for problem prevention/intervention, counseling, legal, and ethical issues.

**Psy 5251. Parenting.** (3 cr; QP-3331 or 3371 or #, sr or grad student or #; SP-2021 or 3371 or #, sr or grad student; A-F only) Parent-child interaction, roles, and responsibilities throughout the life cycle; analysis of parenting strategies; contemporary variations of family cultures, structures, and lifestyles; sources of education and support.

**Psy 5501. Counseling Theories and Skills.** (4 cr; QP-Ed psy grad major or #; SP-Couns psy grad major or #; A-F only) Theoretical orientations in counseling; application of theories through intensive practice of skills and videotape review; ethical considerations.

**Psy 5502. Group Guidance and Counseling.** (3 cr; QP-5521, 5525, ed psy grad major or #; SP-5501, couns psy grad major or #; A-F only) Group theories, dynamics, leadership, guidance, and counseling; group guidance and counseling skills analyzed and practiced.

**Psy 5601. Lifespan and Career Development: Theories and Counseling.** (3 cr; QP-Ed psy grad major or #; SP-Couns psy grad major or #; A-F only) Major lifespan, personality, and career development theories. Implementing theories in counseling. Nature and needs of all developmental levels; career decision making for life; interrelationships among work, family, and leisure. Assessment of normal personality, interests, abilities, and values. Occupational information sources. Ethical considerations.

**Psy 5603. Cultural and Family Counseling: Theories and Techniques.** (3 cr; QP-Ed psy or soc work grad major or #; SP-Couns psy or soc work grad major or #; A-F only) Theory, practice, and assessment of cultural and family counseling; systems, intergenerational, structural, communication, and strategic theories. Influences of gender, sexuality, race, ethnicity, socioeconomic status, age, physical disability, family patterns, language, intellectual ability, and other micro, macro, and exo-systems. Ethical and legal considerations.

**Psy 5611. Behavior and Cognitive Therapy Approaches.** (3 cr; QP-Grad student or Psy 3611 or #; SP-Grad student or Psy 3611 or #; A-F only) Selected therapeutic applications of learning principles to human behavior, including principles of cognitive therapies and behavior-based counseling techniques. Ethical, legal, and cultural considerations.

**Psy 5651. Psychological Consultation and Supervision.** (2 cr; QP-2nd yr ed psy grad student or #; SP-2nd yr couns psy grad student or #; A-F only) Theories, principles, practices, and procedures in consultation and supervision in human service systems and education; ethical and legal issues.

**Psy 5980. Selected Issues in Psychology and Counseling.** (1-4 cr [max 8 cr]; QP-Sr or grad student or #; SP-Sr or grad student or #; A-F only) Current developments and review of research in selected areas of psychology and/or counseling; analysis of issues based on theoretical frameworks; strategies and applications suitable for counseling and related fields.

**Psy 5990. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 8 cr]; QP-Sr or grad student or #; SP-Sr or grad student or #; A-F only) Analysis of selected advanced topics in psychology and/or counseling.

**Psy 5992. Directed Reading.** (1-4 cr [max 4 cr]; QP-Grad student, #; SP-Grad student, #) Readings in student's area of interest with faculty approval and direction; study to substantially further student's knowledge base of theory, research, and/or professional competencies; written report required.

**Psy 5993. Directed Study: Psychology and Counseling.** (1-4 cr [max 8 cr]; QP-Grad student, #; SP-Grad student, #) Individual in-depth explorations of psychological and/or counseling theories and principles approved and guided by faculty.

**Psy 5994. Directed Research.** (1-4 cr [max 4 cr]; QP-5813 or equiv, #; SP-5051 or equiv, #) Advanced individual research with faculty approval and direction; demonstration of sound theoretical foundations and research skills resulting in written report.

## Course Descriptions

### **Psy 5998. Residency: School Counseling, Grades K-8.**

(2-4 cr [max 4 cr]; QP-8510, 8532, 8541 at elementary school site; SP-8005, 8597 or 8797, 8697 or 8897, ed psy or couns psy MA student, Δ; S-N only)

Supervised school counseling and classroom teaching experience. Fulfills one-half year of full-time post-master's internship required for Minnesota licensure recommendation. Student is responsible for obtaining school site administrative and supervisory approvals before registration.

### **Psy 5999. Residency: School Counseling, Grades 5-12.**

(2-4 cr [max 4 cr]; QP-8510, 8532, 8541 at a secondary school site; SP-8005, 8597 or 8797, 8697 or 8897, ed psy or couns psy MA student, Δ; S-N only)

Supervised school counseling and classroom teaching experience. Fulfills one-half year of full-time post-master's internship required for Minnesota licensure recommendation. Student is responsible for obtaining school site administrative and supervisory approvals before registration.

### **Psy 8001. Ethical and Professional Issues in Community Counseling.** (2 cr; QP-Ed psy grad major or #; SP-Couns psy grad major or #; A-F only)

Foundational and theoretical basis for practice of counseling in community settings. Contextual, ethical, and professional issues.

### **Psy 8003. Ethical and Professional Issues in College Counseling.** (2 cr; QP-Ed psy grad major or #; SP-Couns psy grad major or #; A-F only)

Core knowledge for counseling in college settings; characteristics and needs of college students from a developmental perspective. Ethical issues and professional role development for counselors.

**Psy 8005. Ethical and Professional Issues in School Counseling.** (2 cr; QP-Ed psy grad major or #; SP-Couns psy grad major or #; A-F only)

Ethical and legal considerations in school counseling. History and philosophy of school counseling, current trends, and professional issues. Role and functions of school counselor contrasted with those of other professionals such as school psychologist or social worker. Program planning, management, and evaluation.

**Psy 8101. Practicum: Developmental Outreach and Counseling.** (2 cr; QP-5521, 5523, 5525, 5526, 5712, ed psy grad major or #; SP-5501, 5601, 5603, couns psy grad major or Δ; S-N only)

Practice in individual and group counseling on UMD campus and other sites. Includes weekly one-to-one supervision and group supervision. Videotaping required.

**Psy 8197. Internship I: Group Counseling in the Community.** (3-6 cr; QP-8511, 8531, #; SP-8001, 8101, Δ; S-N only)

Supervised practice of counseling skills with focus on group counseling at a community site. Videotaping required.

**Psy 8297. Internship II: Individual Counseling in the Community.** (3-6 cr; QP-8511, 8541, #; SP-8101, 8197, Δ; S-N only)

Supervised practice of counseling skills with focus on individual counseling at a community site. Videotaping required.

**Psy 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser and DGS consent.)

### **Psy 8397. Internship I: Group Counseling in Colleges.**

(3-6 cr; QP-8511, 8531, #; SP-8003, 8101, Δ; S-N only)

Supervised practice of counseling skills with focus on group counseling at a college site. Videotaping required.

### **Psy 8497. Internship II: Individual Counseling in Colleges.** (3-6 cr; QP-8511, 8531, #; SP-8003, 8397, Δ; S-N only)

Supervised practice of counseling skills with focus on individual counseling at a college site. Videotaping required.

### **Psy 8597. Internship I: Group Counseling in Schools, K-8.**

(3-6 cr; QP-8510, 8531, #; SP-8101, Δ; S-N only)

Supervised practice of counseling skills with focus on group counseling at a school site in grades K-8. Videotaping required.

### **Psy 8697. Internship II: Individual Counseling in Schools, K-8.** (3-6 cr; QP-8510, 8531, 8541, #; SP-8005, 8101, 8597, Δ; S-N only)

Supervised practice of counseling skills with focus on individual counseling at a school site in grades K-8. Videotaping required.

### **Psy 8797. Internship I: Group Counseling in Schools, 5-12.** (3-6 cr; QP-8510, 8531, #; SP-8005, 8101, Δ; S-N only)

Supervised practice of counseling skills with focus on group counseling at a school site in grades 5-12. Videotaping required.

### **Psy 8897. Internship II: Individual Counseling in Schools, 5-12.** (3-6 cr; QP-8510, 8531, 8541; SP-8005, 8101, 8797, Δ; S-N only)

Supervised practice of counseling skills with focus on individual counseling at a school site in grades 5-12. Videotaping required.

## Recreation (Rec)

### *College of Education and Human Service Professions*

#### **Rec 1000. Introduction to Recreation.** (4 cr; A-F only)

Overview of recreation and leisure and its impact on modern society.

#### **Rec 1201. Outdoor Skills I.** (2 cr; A-F only)

Instruction and practice in skills of fall and winter outdoor activities. Camping, hiking, fishing, hunting, and climbing; equipment, shelters, and navigation.

#### **Rec 1202. Outdoor Skills II.** (2 cr; A-F only)

Instruction and practice in skills of winter and spring outdoor activities. Camping, canoeing, and fishing; equipment and navigation.

#### **Rec 1203. Outdoor Skills I.** (2 cr; QP-Rec major or minor or #; SP-Rec major or minor or #; A-F only)

Instruction and practice in skills of fall and winter outdoor activities. Camping, hiking, fishing, hunting, and climbing; equipment, shelters, and navigation.

#### **Rec 1204. Outdoor Skills II.** (2 cr; QP-Rec major or minor or #; SP-Rec major or minor or #; A-F only)

Instruction and practice in skills of winter and spring outdoor activities. Camping, canoeing, and fishing; equipment and navigation.

**Rec 2300. Recreation Programming.** (3 cr; SP-1000 or #; A-F only)

Designing, presenting, and evaluating recreation programs. Components of planning, such as facilities management and equipment procurement. Leadership practices pertaining to outdoor education programs.

**Rec 3310. Recreation Leadership.** (2 cr; QP-3335 or #; SP-3300 or #; A-F only)

Practice, theory, and methods involved in leadership development including a detailed analysis of the qualities and roles of leaders in recreation settings. This course will occur as a 9 day field experience.

**Rec 3320. Recreational Sports.** (3 cr; SP-1000 or #; A-F only)

Organization and administration of intramural and formal sport programs in a recreational sport agency.

**Rec 3327. Life Fitness Programs and Events Management.** (3 cr; SP-3320 or #; A-F only)

Organization and administration of life fitness activities and nonformal instruction in recreational sport programs. Design, implementation, and evaluation of large-scale recreational sports events such as triathlons and tournaments.

**Rec 3330. Outdoor Recreation.** (3 cr; SP-2300 or #; A-F only)

Examination of outdoor recreation as a part of natural resource based agencies as well as in nature centers, commercial operations, and in municipal settings. This course will focus on outdoor recreation uses in Northeastern Minnesota.

**Rec 3331. Organization of Environmental Education Centers.** (2 cr; SP-2300 or #; A-F only)

Philosophy and organization of environmental education centers as non-formal education providers. Both residential and non-residential centers including history, philosophy, management, and educational delivery relative to environmental literacy will be studied. Visits to local environmental learning centers are included.

**Rec 3341. Field Interpretive Techniques I.** (3 cr; SP-1000 or #; A-F only)

Techniques and methods used to interpret natural history of autumn and early winter environments. Emphasizes geomorphology, tree identification, and basic raptor ecology. Primarily field based at sites throughout northeastern Minnesota.

**Rec 3342. Field Interpretive Techniques II.** (3 cr; SP-3341 or #; A-F only)

Techniques and methods used to interpret natural history of winter and spring environments. Ecology of winter, vernal ponds, spring wildflowers, biomes, and migratory birds. Primarily field based at sites throughout northeastern Minnesota.

**Rec 4315. Recreation Management.** (3 cr; SP-3300 or #; no grad cr; A-F only)

Methods and practice of administrative processes of personnel, fiscal, and facility management. Field study and presentation of a management plan.

**Rec 4410. Ropes Course Management.** (3 cr; SP-2300, Psy 3524 or #; no grad cr; A-F only)

Management of a ropes course as a part of an outdoor education facility. Includes ropes course elements, instructional techniques, group debriefing skills, site inspection, safety, rescue and equipment maintenance. This course will follow industry standards such as Project Adventure.

**Rec 4991. Independent Study.** (1-4 cr [max 4 cr]; SP-#, no grad cr; A-F only)

Independent project that would serve to further the student's knowledge base and/or professional competencies.

**Rec 4992. Readings in Recreation.** (1-4 cr [max 4 cr]; SP-#, no grad cr; A-F only)

Complementary readings and discussion in student's area of interest with faculty supervision.

**Rec 4996. Recreation Internship.** (12 cr; SP-Rec major, #; no grad cr; S-N only)

Supervised field experience in recreation agency.

**Rec 4997. Recreation Practicum.** (3 cr; SP-1000, #; no grad cr; S-N only)

Field-based experience through a selected recreation agency.

**Rec 4998. Recreation Seminar.** (1-3 cr; SP-Rec major, #; S-N only)

Facilitated discussions and presentations of contemporary recreation research, curricula, and/or issues.

**Rec 5320. G.I.S. Management for Recreation Professionals.** (3 cr; SP- #; no grad cr)

Using G.I.S. mapping techniques for recreation and outdoor education professionals in resource management decisions. The use of Arcview and Landview software will be used to visualize and analyze landscapes. This course is specific to recreation and/or outdoor education professionals.

## Russian (Russ)

### College of Liberal Arts

**Russ 1101. Beginning Russian I.** (4 cr; A-F only; LE 3)

Grammar, reading, and conversation for students with no previous knowledge of Russian.

**Russ 1102. Beginning Russian II.** (4 cr; QP-1112 or equiv or #; SP-1101 or equiv or #; A-F only; LE 3)

Grammar, reading, and conversation.

## Safety (Safe)

### College of Science and Engineering

**Safe 3001. Safety Education.** (2-3 cr; A-F only)

Comprehensive approach to problems of safety in schools, home, community, and occupational world, emphasizing recognition, evaluation, control, and avoidance.

**Safe 6001. OSHA and Other Regulatory Standards.** (3 cr; SP-MEHS student or Δ; can apply cr to MEHS program only; A-F only)

Overview of federal Occupational Safety and Health Act as well as other safety and health standards, codes, and regulations. Recognition of the more critical health and safety violations and guidelines for correcting workplace hazards.

## Course Descriptions

### **Safe 6011. System Safety and Loss Control Techniques.**

(3 cr; SP–MEHS student or Δ; can apply credit to MEHS program only; A-F only)

Analytical techniques of data collection, data analysis, and risk assessment in designing and implementing proactive system safety processes. Comprehensive approach to cost reduction and containment processes and programs, which minimize financial and accidental losses.

### **Safe 6012. Risk Management and Workers' Compensation.**

(2 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; A-F only)

Comprehensive overview of risk management strategies and insurance system; essential elements of workers' compensation cost reduction and containment programs in industry. Workers' compensation and occupational safety in preventing corporate financial losses.

### **Safe 6021. Physical Hazard Control.**

(3 cr; SP–MEHS student or Δ; can apply credit to MEHS program only; A-F only)

Physical hazards in work environment and methods of control. Recognition of common and high hazard conditions, and design and application of corrective measures.

### **Safe 6051. Construction Safety.**

(2 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; A-F only)

Code of Federal Regulations 1926 and other standards and regulations that affect construction industry.

Recognition, analysis, and corrective action.

### **Safe 6101. Principles of Industrial Hygiene.**

(3 cr; SP–MEHS student or Δ; can apply credit to MEHS program only; A-F only)

Effects of chemical, physical, and biological agents on the body and typical methods of control; lab use of monitoring and corrective devices.

### **Safe 6102. Advanced Industrial Hygiene and Health Physics.**

(2 cr; SP–6101 or Δ; can apply cr to MEHS program only; A-F only)

Recognition, evaluation, and control techniques necessary for prevention of occupationally related diseases.

Introduction to health hazards of radiated energy such as ionizing nuclear radiation and X-rays; nonionizing radiation hazards from microwaves, lasers, and infrared and ultraviolet light.

### **Safe 6111. Industrial Noise and Ventilation Control.**

(3 cr; SP–MEHS student or Δ; can apply credit to MEHS program only; A-F only)

Physics of sound, industrial noise sources, effects of noise on humans, and noise control. Basic principles of ventilation as applied to control of air contaminants; elementary principles of design for exhaust ventilation systems; and fan specifications. Lab applications.

### **Safe 6121. Epidemiology and Industrial Toxicology.**

(2 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; A-F only)

Introduction to principles and practice of toxicology as it relates to chemical hazards in the workplace.

Interpretation and assessment of data and potential risk. Derivation and application of guidelines and regulations concerning toxic chemicals.

### **Safe 6201. Fire Prevention and Emergency Preparedness.**

(2 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; A-F only)

Hazard analysis and risk assessment as related to prevention and control of undesired fires; analytical study

of flammable materials and extinguishing systems found in industrial settings; organization and development of emergency preparedness programs.

### **Safe 6211. Transportation Safety.**

(2 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; A-F only)  
Study of health and safety programs used in rail, road, air, and marine transportation, emphasizing fleet safety programs.

### **Safe 6291. Independent Study in Industrial Safety.**

(1-3 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; S-N only)

Special projects, field studies, or research in industrial hygiene or safety topics

### **Safe 6295. Special Topics: (Various Titles to be Assigned).**

(1-3 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; A-F only)

Selected topics in industrial safety or hygiene. Similar topics may not be repeated for credit.

### **Safe 6301. Occupational Biomechanics and Work Physiology.**

(2 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; A-F only)

Overview to study physical interaction of workers with their tools, machines, and materials so as to enhance workers' performance while minimizing risk of future musculoskeletal disorders.

### **Safe 6302. Occupational Ergonomics and Injury Management.**

(3 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; A-F only)

Overview of occupational ergonomics and related disciplines such as work physiology, biomechanics, human anatomy, engineering design, medical management. Hands-on approach, including ergonomic job analysis, risk factor quantification, and documentation for demanding tasks.

### **Safe 6401. Environmental Safety and Legal Implications.**

(2 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; A-F only)

Federal, state, and local laws and judicial interpretations that have applications to environmental health and safety programs. Corporate responsibility regarding environment, employee, and product.

### **Safe 6402. Environmental Control Operations and Design.**

(2 cr; SP–6401 or Δ, MEHS student; can apply cr to MEHS program only; A-F only)

Focus is on design and use of equipment used to control environmental pollution in industry and municipalities. Takes a multimedia approach looking at applications in air pollution, water/wastewater and solid/hazardous wastes.

### **Safe 6801. Conference Leading and Team Dynamics.**

(2 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; S-N only)

Purposes, advantages, and limitations of team approach. Current theory, research, and application in group dynamics. Development of leadership skills in planning, leading, and evaluating conferences and other interactive situations.

### **Safe 6811. Behavioral Aspects of Safety.**

(2 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; A-F only)

Behavior-based approach to safety. Characterizes employees as mature human beings motivated to work safely through use of behavior-based programs.

**Safe 6821. Organization and Administration of Safety Programs.** (2 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; A-F only)

Current administrative practices. Involvement in design and development of safety programs suitable for an industrial facility.

**Safe 6997. Internship in Industrial Safety.** (3 cr; SP–MEHS student or Δ; can apply cr to MEHS program only; S-N only) Cooperative internship in an industrial, governmental, or other organization that has an established safety program or is in the process of implementing one. Requires a significant Plan B-type project for the firm.

## School of Business and Economics (SBE)

### *School of Business and Economics*

**SBE 0102. Freshman Orientation.** (0 cr; S-N only) Orientation program for SBE students

**SBE 1101. The Business Environment.** (3 cr; A-F only; LE 8) Introduction to context, environment, and operation of business and organizations. Study of foundations and functional areas of business and entrepreneurship. Analysis of technological, ethical, diversity, and global issues from business and organizational perspectives.

## Science (Sci)

### *College of Science and Engineering*

**Sci 3351. Chemistry for High School Teachers I.** (2 cr; QP–Δ; SP–Δ)

Complete participation in Chem 2521—Organic Chemistry I required. Library research paper and special problems assigned. Lab includes experiments of particular importance to high school chemistry. (4 hrs lect, 3 hrs lab; offered summer only)

**Sci 3352. Chemistry for High School Teachers II.** (2 cr; QP–3351; SP–Δ)

Complete participation in Chem 2522—Organic Chemistry II required. Library research paper and special problems assigned. Lab assignments include experiments of particular importance to high school chemistry. (4 hrs lect, 3 hrs lab; offered summer only)

## Social Work (SW)

### *College of Education and Human Service Professions*

**SW 1210. Global Issues.** (3 cr; SP–§1211; A-F only; LEIP 8) Global problems of war, peace, national security; population, food, hunger; environmental concerns, global resources; economic and social development; human rights. Examines issues from a global problem-solving perspective. Value, race, class, gender differences. Offered in day school and as an individualized learning program course on the World Wide Web.

**SW 1211. Freshman Seminar: Global Issues.** (3 cr; SP–Freshman, fewer than 30 cr, §1210; A-F only; LEIP 8) Global problems of war, peace, and national security; population, food, and hunger; environmental concerns and global resources; economic and social development; human rights. Examination of issues from systems, problem solving, and futurist perspectives in seminar format. Consideration of value, race, class, and gender differences.

**SW 1619. Race, Class, and Gender in the United States.** (3 cr; A-F only; LECD 8)

Race, class, and gender as pivotal dimensions in American society. Similarities and differences between groups, dynamics of discrimination, and efforts to meet needs and achieve potential for all groups in America.

**SW 5032. Child Welfare and the Law.** (2 cr; SP–Jr or sr or grad student or #; A-F only) Intensive advanced course in the federal, state, and tribal laws and court processes regulating child welfare practice. Includes laws and procedures and the role of the social worker in legal proceedings.

**SW 5061. Computers in the Human Services.** (1–2 cr; SP–Jr or sr or grad student or #)

Overview of computers in the human services, including word processing, spreadsheets, databases, communication, and internet/World Wide Web. Emphasis on hands-on, practical applications.

**SW 5091. Independent Study.** (1–4 cr [max 8 cr]; SP–#) Directed reading, research, or other experiences leading to presentation of a report.

**SW 5095. Special Topics: (Various Titles to be Assigned).** (1–4 cr [max 12 cr]) Proseminar on contemporary topics of concern to students and faculty. Topics announced in *Class Schedule*.

**SW 5096. Special Project.** (1–4 cr [max 8 cr]; SP–#; S-N only) Approval of faculty sponsor and field coordinator required to do a project in generalist or advanced generalist social work practice. Project may closely coordinate with another course or may be an independent area of interest.

**SW 5098. Workshop: (Various Titles to be Assigned).** (1–4 cr)

Workshop on a topic of special concern to persons in the human services.

**SW 5101. Human Behavior in the Social Environment.**

(3 cr; SP–Jr or sr or grad student or #; A-F only) Overview of social psychological and social systems concepts. Applications of concepts to social work and human service issues. Focus on individuals, human development, families, groups, organizations, communities, and society/culture.

**SW 5104. Dynamics of Discrimination.** (2 cr; SP–Jr or sr or grad student or #; A-F only)

Conditions and processes fostering discrimination on the basis of “race,” ethnicity, socioeconomic status, gender, sexual orientation, national origin, age, physical/mental functioning, and religion. Methods for reducing discrimination, particularly in the human service professions.

## Course Descriptions

**SW 5111. Grant Writing in the Human Services.** (1-2 cr; SP–Jr or sr or grad student or #; A-F only)

Step-by-step development of grant planning and grant writing. Sources of grants: private foundations and public agencies. Needs assessment methodologies, budgeting, and program evaluation.

**SW 5201. Social Welfare Policy.** (3 cr; SP–Jr or sr or grad student or #; A-F only)

Historical development of field of social welfare in the United States and emergence of social work profession. Social policy analysis techniques and ways to influence social policy and vulnerable/minority issues.

**SW 5222. Intervention in Family Violence.** (1-2 cr; SP–Jr or sr or grad student or #; A-F only)

Current theory, research, and practice in field of family violence. Multidisciplinary assessment and intervention skills for working with families with diverse backgrounds.

**SW 5235. American Indians and Social Policy.** (2 cr; SP–5201 or #)

Informs human service providers of policies affecting American Indians, including relationships of tribal governments with the United States and Minnesota governments, the interface between Indian and non-Indian service delivery systems, and Indian culture and politics.

**SW 5271. Women and Social Policy.** (2 cr; SP–Jr or sr or grad student or #; A-F only)

Policies affecting the well-being of women; strategies for better meeting women's needs. Focuses on policies that affect women's roles and statuses within the domestic unit and within larger economic and political spheres.

**SW 8006. Advanced Generalist Seminar.** (2 cr; SP–Advanced standing MSW student or #; A-F only)

Introduction to advanced generalist practice in the social work profession. Review of foundation theory, knowledge, and skills for generalist practice.

**SW 8021. Methods of Clinical Social Work Practice.**

(1-2 cr; SP–8111 or advanced standing MSW student or #; A-F only)

Advanced skill development in clinical assessment and intervention. Through an ecologically based framework, students learn how to address a wide variety of micro-level problems involving many different populations. Social work applications of the DSM-IV.

**SW 8031. Child Welfare.** (2 cr; SP–1SW 8111; A-F only)

Overview of current policy, practice, and research issues in child welfare practice. Emphasis on concerns of oppressed populations, such as the Indian Child Welfare Act and its implementation, gay/lesbian custody issues, kinship care, and culturally competent practice.

**SW 8051. School Social Work.** (1-2 cr; SP–Soc work grad major or #; A-F only)

Overview of social work practice in educational settings, roles and functions of social workers within a complex ecological system, and skills and knowledge needed by social workers in a school setting.

**SW 8101. Introduction to Research.** (2 cr; SP–Soc work grad major or #; A-F only)

Introduction to social science research and its applications to social work and social welfare.

**SW 8102. Advanced Research.** (2 cr; SP–8101 or advanced standing MSW student or #; A-F only)

Application of social science knowledge and skills to evaluate practice and to conduct community-based research and program evaluation projects.

**SW 8103. Project Seminar I.** (1 cr; SP–#8102; S-N only)

Application of research knowledge and skills to beginning stages of students' master's research paper (Plan B). Issues addressed: topic selection, literature reviews, formulation of research questions/hypothesis, data gathering instruments, methods of data analysis, proposal development.

**SW 8104. Project Seminar II.** (1 cr; SP–8103; S-N only)

Application of research knowledge and skills to final stages of master's research project. Data collection and analysis procedures applied to the Plan B paper.

**SW 8111. Generalist Practice: Micro.** (3 cr; SP–SW grad major or #; A-F only)

Overview of generalist social work practice, ethics, ecological perspective, and problem-solving model. Application to individuals, families, and groups and to diverse populations. Development of counseling skills.

**SW 8112. Generalist Practice: Mezzo and Macro.** (3 cr; SP–8111; A-F only)

Problem-solving models of engagement, data collection, assessment, planning, intervention, evaluation, and termination with communities, task-centered groups, and organizations. Introduction to grant writing. Emphasis on community resource development with diverse populations.

**SW 8333. FTE: Master's.** (1 cr; SP–Master's student, adviser and DGS consent)

**SW 8441. Advanced Practice: Individuals, Families, and Small Groups.** (2 cr; SP–8112 or advanced standing MSW student; A-F only)

Examines a range of social work practice theories and their application to practice with individuals, families, and groups. Advanced skills in assessment and intervention in addressing complex problems with a focus on micro practice. Application to diverse populations and settings.

**SW 8442. Advanced Group Work.** (1-2 cr; SP–8441)

Conceptual knowledge and applied experiences needed to lead groups in a variety of social work settings serving diverse populations. Treatment groups and task groups (on both the organizational and community levels). Builds on the advanced generalist framework.

**SW 8551. Advanced Practice: Administration.** (2 cr;

SP–8112 or advanced standing MSW student; A-F only) Mezzo-level (administrative) knowledge and skills for management positions in human services organizations. Organizational theory, management functions, and supervision presented within problem-solving model. Information on vulnerable/minority issues.

**SW 8661. Advanced Practice: Rural and Urban Community Organizing.** (2 cr; SP–8112, advanced standing MSW student; A-F only)

Intensive exposure to specific strategies and tactics for organizing and advocacy at community, regional, and state levels. Rural development, social policy, and social planning within problem-solving and ecological systems models. Attention to macro practice with diverse populations.

**SW 8771. Health in American Indian Communities.** (2 cr; SP-5235 or #; A-F only)

Introduction to historical and contemporary concepts of American Indian health. Policy issues, cultural and sensitivity knowledge, and practice methods with American Indian clients and communities at micro, mezzo, and macro levels of intervention.

**SW 8801. Field Placement I.** (4-8 cr [max 8 cr]; SP-8111 or ¶8111, 8112 or ¶8112, soc work grad major; enrollment required for entire academic yr or summer or #; S-N only) Practicum experience with emphasis on developing knowledge and skill base for “beginning generalist” practice in a community agency. Concurrent seminar assists students in integrating classroom theories and intervention methodologies with field experiences. Application to diverse populations.

**SW 8802. Field Placement II.** (4-8 cr; SP-¶8441, 8551, 8661 or #, soc work grad major; enrollment required for entire academic year or as summer block placement; S-N only) Developing knowledge and skill base for “advanced generalist” practice in a community agency. Concurrent seminar focuses on integrating classroom theories and intervention methodologies with experiences with client systems at micro, mezzo, and macro levels of practice. Attention to vulnerable/minority issues.

**SW 8881. Dynamics of American Indian Families.** (2 cr; SP-5235 or #; A-F only) Introduction to traditional and contemporary concepts relating to American Indian families. Public policy, social problems, cultural strengths, conflicts, and culturally competent social work practice.

**SW 8991. Practice in the American Indian Community.** (2-4 cr; SP-Soc work grad major, 8771 or 8881, #; S-N only) Gives MSW students supervised direct practice experience in the American Indian community. Application of cultural knowledge and culturally competent practice skills.

## Sociology (Soc)

### College of Liberal Arts

**Soc 1095. Freshman Seminar: Topics (Various Titles to be Assigned).** (3-4 cr; SP-Freshman, fewer than 30 cr; A-F only; LE 8) Seminar designed specifically for freshmen.

**Soc 1096. Freshman Seminar: Topics (Various Titles to be Assigned).** (3-4 cr; SP-Freshman, fewer than 30 cr; A-F only; LECD 8) Seminar designed specifically for freshmen.

**Soc 1101. Introduction to Sociology.** (4 cr; A-F only; LECD 6) Introduction to sociological concepts and their application.

**Soc 1201. Sociology of the Family.** (3 cr; A-F only; LECD 8) The family as a basic social institution: similarities and variations in family systems, their interrelationships with other institutions, and patterns of continuity and change.

**Soc 1301. Introduction to Criminology.** (4 cr; A-F only; LE 8) Analysis of social justice with emphasis on criminal justice system in United States. Nature and extent of crime; social factors related to criminal behavior.

**Soc 2001. Sociological Perspective.** (3 cr; SP-1101 or 1301; A-F only)

Sociological approach to explanation. Structural versus individual perspective. Major sociological explanatory concepts. Introduction to research design, sampling, data collection, and data analysis. Relationships between variables and rules of evidence. Differences and similarities between sociological and common-sense explanations.

**Soc 2111. Sociological Theory.** (4 cr; QP-1100 or Anth 1604 or #; SP-1101, 2001 or #; A-F only) Analysis of classical and contemporary sociological theory. Major theorists, including Durkheim, Weber, and Marx; major paradigms and their importance to sociological thought.

**Soc 2311. Criminological Theory.** (4 cr; SP-1101, 2001 or #; A-F only)

Examination of the major theories of crime causation. Specific theories include macro and micro sociological explanations, as well as biological and psychological perspectives. Discussion includes the history, social context, and policy implications of each theory.

**Soc 3151. Research Methods and Analysis.** (3 cr; QP-1100 or 1300 or Anth 1602 or Anth 1604, Soc 1500, Soc 3305 or Soc 3400 or Anth 5626 or Δ, crim major or soc major or minor or crim-soc major or anth major or minor; SP-Crim major or soc major or minor or crim-soc major, 30 cr or #; A-F only)

Logic of social scientific explanation. Research designs and measurement issues. Survey of quantitative and qualitative techniques of data analysis as they relate to theory and research procedures. Basic descriptive and inferential techniques and critical evaluation of published research.

**Soc 3152. Applied Research.** (3 cr; QP-3500 or Δ, crim major or soc major or minor or crim-soc major or anth major or minor; SP-3151 or #, crim major or soc major or minor or crim-soc major, 30 cr or #; A-F only) Continuation of Soc 3151. Emphasis on analysis of quantitative and qualitative data and logic of statistical inference. Application of course material in design and implementation of a research project.

**Soc 3153. Qualitative Research Methods.** (3 cr; SP-3151, crim or soc major or minor or crim-soc major or anth major or minor, 30 cr or #; A-F only)

Application of qualitative research methods to the study of social structures with emphasis on field research techniques and secondary data analysis and interpretation.

**Soc 3306. Deviance.** (3 cr; QP-1100, 1500, 40 cr or #; SP-1301, 2001 or #, S2306; A-F only) Behaviors, beliefs, and physical characteristics defined as deviant; legal and other formal and informal reactions to deviance; subjective and objective effects of being defined as deviant.

**Soc 3322. Law and Society.** (3 cr; QP-1100, 40 cr or #; SP-30 cr or #; A-F only)

Complexities, organization, and elements of legal systems, particularly in the United States. Legal theory used to explain the “working” of the law, historical development of law, current issues in law, and overall interrelationship between law and society.

## Course Descriptions

**Soc 3324. Sociology of Criminal Law.** (3 cr; QP-1100, 1500, 55 cr or #; SP-3322, crim major or soc major or minor or crim-soc major, 30 cr or #; A-F only)  
Nature, goals, and problems in administration of the American criminal judicial process.

**Soc 3328. Delinquency and Juvenile Justice.** (3 cr; QP-1100, 40 cr or #; SP-3322, crim major or soc major or minor or crim-soc major, 30 cr or #; A-F only)  
Delinquency in contemporary American society. Major issues concerning causes, prevention, and treatment of juvenile offenders. Focus on U.S. juvenile justice system.

**Soc 3333. Legal Research.** (3 cr; SP-30 cr or #; A-F only)  
Overview of American legal system, including the courts and legislature; primary and secondary sources of law, judicial reports, citations and digest; annotated law reports; legal periodicals and research procedure. Different areas of law and associated research.

**Soc 3338. Sociology of Gangs.** (3 cr; SP-30 cr or #; A-F only)  
Street and prison gangs in America at the national, state, and local level. Sociological research and theories relative to gang formation and the economics related to street and prison gangs.

**Soc 3342. Law Enforcement Administration.** (3 cr; QP-1100, 40 cr or #; SP-30 cr or #; A-F only)  
Nature, goals, and problems of law enforcement agencies. Defines management as it relates to law enforcement processes.

**Soc 3344. Law Enforcement and Society.** (3 cr; QP-1100, 40 cr or #; SP-30 cr or #; A-F only)  
Role of police and relationship of law enforcement to the community; focuses on crime prevention.

**Soc 3361. Correctional Continuum.** (3 cr; QP-1100, 40 cr or #; SP-1101, 30 cr or #; A-F only)  
Analysis of traditional and nontraditional corrections programs for juveniles and adults. Cross-cultural examination of historical development of prisons and other correctional approaches and social forces involved in creation of penal sanctions.

**Soc 3363. Correctional Agency Administration.** (3 cr; SP-3361, 30 cr or #; A-F only)  
Assumptions, theories, and research related to change, control, and management in correctional systems. Evolution of management theory and effects of law, media, and the community on management of corrections organizations.

**Soc 3365. Legal Issues in Corrections.** (3 cr; SP-30 cr or #; A-F only)  
Legal and constitutional issues and their effect on correctional workers and prisoners; freedom of speech, religion, search and seizure, medical care, and punishment. Analysis of impact of court decisions, and legislative actions on legal liability issues.

**Soc 3367. Community Corrections.** (3 cr; SP-30 cr or #; A-F only)  
Analysis of traditional and nontraditional community corrections programs. Class will visit juvenile and adult treatment programs and will be introduced to new intermediate sanctioning programs such as shock incarceration, "Boot Camp," electronic monitoring, and home confinement.

**Soc 3395. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; QP-1100, 1500, 40 cr or #; SP-Crim major or soc major or minor or crim-soc major, 30 cr or #; A-F only)  
Overview of American legal system, including the courts and legislature; primary and secondary sources of law, judicial reports, citations and digest; annotated law reports; legal periodicals and research procedure. Different areas of law and associated research.

**Soc 3595. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; QP-1100, 1500, 40 cr or #; SP-Crim major or soc major or minor or crim-soc major, 30 cr or #; A-F only)  
Contemporary topics.

**Soc 3701. Social Psychology.** (3 cr; QP-1100, 40 cr or #; SP-2001, 30 cr or #; A-F only)  
Theory and research issues regarding relation of individual to society. Socialization, effects of social organization and disorganization, and interpersonal interaction.

**Soc 3821. Sociology of Community.** (3 cr; QP-3800, 70 cr or #, SP-2111, 30 cr or #; A-F only)  
Theoretical orientations and empirical investigations of community structure, processes, conflict, and change. Community components and types; community development strategies reviewed and applied.

**Soc 3831. Organization and Society.** (3 cr; QP-1100, 40 cr or #; SP-30 cr or #; A-F only)  
Sociological examination of structure and processes of public and private formal organizations and patterns of adaptation to external social environments. Role of voluntary organizations in society.

**Soc 3901. Social Change and Social Policy.** (3 cr; QP-1100, 40 cr or #; SP-2111, 30 cr or #; A-F only)  
Social change and maintenance forces as they affect social life. Emphasis on social theory and research along with formation and implementation of social policy leading to both change and maintenance.

**Soc 3945. Social Stratification.** (3 cr; QP-1100, 40 cr or #; SP-2111, 30 cr or #; A-F only)  
Structural investigation of effect of social class on people's lives. Theories and research on social class; social mobility theory and effects. Intertwinement of social class, gender, and race/ethnicities.

**Soc 4323. Women and Justice.** (3 cr; QP-1100 or 1300 or WS 1100, 40 cr or #; SP-60 cr or #, \$3326, no grad cr; A-F only)

Women's involvement in the civil and criminal justice systems of the United States both historically and currently. Attention given to women as criminal and civil defendants, issues of women's civil rights, and to women practitioners within each system.

**Soc 4340. Minorities, Crime and Justice in the United States.** (3 cr; QP-1100, 1500 Crim major or soc major/minor, 40 cr or #; SP-60 cr or #, \$3326; A-F only)

Examines U.S. criminal justice system in relation to minorities. Attitudes and perceptions of crime and justice from minority perspectives. Differential crime rates among majority-minority groups, police-minority contacts, processing of minorities by the courts, and disproportionate representations of minorities in prison system.

**Soc 4382. Victimology.** (3 cr; QP–1300, 90 cr or #; SP–3322 or 4925 or 4935, 60 cr or grad student or #, no grad cr; A-F only)  
Extent, nature, and forms of criminal victimizations; profiles of crime victims; coping strategies; victims' rights; impact of victimizations on victims and nonvictims; victim attitudes about crime and interactions with justice system; evaluation of victim service programs.

**Soc 4384. Child Abuse and Child Protection in Minnesota.** (3 cr; SP–90 cr or grad student or #; A-F only)  
Examine how our legal system and community discovers and protects neglected or abused children. Provide understanding of juvenile court, the role of forensic science, social workers, police, teachers, nurses physicians, and other professionals mandated to report suspected abuse.

**Soc 4395. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; QP–90 cr or grad student or #; SP–90 cr or grad student or #; A-F only)  
Proseminar on contemporary topics. Course announced in *Class Schedule*.

**Soc 4587. Internship Preparation.** (1 cr; SP–#; no grad credit; A-F only)  
Introduction to internship by learning about internship expectations, developing internship objectives, exploring internship opportunities, and developing an application for an internship.

**Soc 4595. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; QP–90 cr or grad or #; SP–90 cr or grad or #; A-F only)  
Proseminar on contemporary topics.

**Soc 4596. Practicum in Criminology.** (3-14 cr [max 14 cr]; SP–#; S-N only)  
Supervised experience in criminal justice agency and concurrent seminar which focus on identification, application, and evaluation of implementation of concepts, principles, theories and best practices in criminal justice. Law enforcement agencies, juvenile courts, probation and parole departments, correctional institutions, delinquency control programs, and public or voluntary agencies experience.

**Soc 4597. Internship.** (1-14 cr [max 14 cr]; QP–#; SP–#, no grad cr; S-N only)  
Supervised lab experience in a human service agency or project.

**Soc 4598. Workshop: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; QP–90 cr or grad student or #; SP–60 cr or grad student or #; S-N only)  
Topics of current general interest.

**Soc 4735. Social Conflict Management Strategies.** (3 cr; SP–60 cr or #; A-F only)  
Introduction to social conflict as a social process as a basis for understanding conflict management strategies and tactics. Emphasis on interpersonal and organizational based conflicts not regulated by formal structures such as contracts.

**Soc 4860. Environmental Sociology.** (3 cr; QP–120 cr or grad student or #; SP–90 cr or grad student or #; A-F only)  
Introduction to environmental sociology—the relationship between social structure, human social behavior, and the physical environment. Focuses on the “natural” environment, not the “built” environment.

**Soc 4862. Technology and Society.** (3 cr; QP–1100, 1500, 120 cr or #; SP–90 cr or grad student or #; A-F only)  
Applying sociological principles and methods to assessing effects of technology on communities, institutions, organizations, and individuals. Emphasis on topics involving cross-discipline effects.

**Soc 4911. Alcoholism and Other Addictions.** (3 cr; QP–1100, 1500, 90 cr or grad student or #; SP–90 cr or grad student or #; A-F only)  
Addictions considered by way of etiologies, social and behavioral involvement, treatment approaches, helping resources, outcome research, and public policy.

**Soc 4925. Sociology of Rape.** (3 cr; QP–1100 or 1300 or WS 1100, 40 cr or #; SP–1101 or 1301, 60 cr or grad student or #; A-F only)  
Social, moral, and legal definitions and implications of rape.

**Soc 4935. Conflict and Violence.** (3 cr; QP–1300, 3350, 40 cr or #; SP–60 cr or grad student or #; A-F only)  
Historical and contemporary reality and theoretical explanations of conflict and violence in society. Criminal justice and other societal responses to conflict and violence.

**Soc 4947. Sociology of Women.** (3 cr; QP–1100, 40 cr or #; SP–60 cr or grad student or #; A-F only)  
Women's status and role in society and culture from a structural approach. Behavior patterns, assumptions, social realities, and social institutions. Intertwining nature of gender, race, and social class.

**Soc 4949. Race and Ethnic Relations.** (3 cr; SP–60 cr or grad student or #; A-F only)  
Overview of race and ethnic relations in America; conditions of major racial and ethnic minorities; formation of racial/ethnic identities, sources of prejudice, discrimination; intergroup conflict; assimilation, persistence of ethnicity; intergroup diversity; major racial and ethnic groups; the new immigrants.

**Soc 4991. Independent Study in Sociology.** (1-3 cr [max 6 cr]; QP–A; SP–#; A-F only)  
Directed reading, research, or involvement in social action leading to preparation of a paper or other product.

**Soc 4997. Teaching Assistantship in Sociology/ Criminology.** (1-3 cr [max 6 cr]; SP–#, no grad cr; S-N only)  
Practical experience in teaching activities in beginning courses (Introduction to Sociology and Introduction to Criminology) in the department. Students serve as teaching assistants alongside an instructor. Application deadline is one week before beginning of registration for the following semester.

**Soc 4999. Honors Project.** (1-3 cr [max 6 cr]; QP–3520 or 3530, 120 cr, approval by dept honors program director; SP–90 cr, approval by dept honors program director; no grad credit; A-F only)  
Advanced individual project in any area of sociology, demonstrating sound theoretical and research foundations and resulting in a written report.

# Spanish (Span)

## College of Liberal Arts

### Span 1101. Beginning Spanish I. (4 cr; A-F only; LE 3)

Conversation and communicative course for students with little or no previous study of Spanish. Emphasis on oral and aural skills; some grammar. Taught primarily in Spanish, with some English.

### Span 1102. Beginning Spanish II. (4 cr; QP-1301 or equiv or #; SP-1-2 yrs high school Span or 1101 or #; A-F only; LE 3)

Conversation and communicative course for students with previous study of Spanish. Emphasis on oral and aural skills; some grammar. Taught primarily in Spanish, with some English.

### Span 1201. Intermediate Spanish I. (4 cr; QP-Lang 1103 or equiv or #; SP-3-4 yrs high school Span or 1102 or #; A-F only; LE 3)

Consolidation and enrichment of previously acquired abilities speaking and understanding Spanish, set within introduction to written Spanish and survey of contemporary culture of Spanish-speaking societies. Emphasis on oral, aural, and reading skills; vocabulary building; some writing. Taught in Spanish.

### Span 1202. Intermediate Spanish II. (4 cr; QP-1502 or equiv or #; SP-4 yrs high school Span or 1201 or #; A-F only; LEIP 3)

Consolidation and enrichment of previously acquired abilities speaking and understanding Spanish, set within introduction to written Spanish and survey of contemporary culture of Spanish-speaking societies. Emphasis on oral, aural, and reading skills; vocabulary building; some writing. Taught in Spanish.

### Span 1540. Freshman Seminar: Hispanic Realities. (4 cr; SP-Less than 30 cr; A-F only; LE 7)

A survey of literary and artistic works from Spain and Latin America which demonstrate distinctive cultural perspectives of reality. Read, discuss and report on novels, plays, poems, short stories, and art works from the mentioned regions.

### Span 2301. Advanced Spanish. (4 cr; QP-1503 or equiv or #; SP-5 yrs high school Span or 1202 or #; A-F only; LE 3)

Development of Spanish literacy within a culturally authentic contemporary context. Emphasis on practical writing and formal oral and aural communication skills; vocabulary building; enhancement of reading skills; review of key grammar. Taught in Spanish.

### Span 2540. Latino Literatures and Cultures. (3 cr; SP-Offered alt yrs; A-F only; LECD 8)

Literatures and cultures of Latinos in the United States, with attention to their particular issues. Some readings in Spanish for the occasional Spanish major/minor student. Taught in English (unless entire class composed of students of Spanish).

### Span 3042. Hispanic American Civilization and Culture. (4 cr; QP-3002 or equiv, C or better in last adv Span language class taken or #; SP-2301 with C or better or #; offered alt yrs; A-F only)

Survey of important aspects of Hispanic American civilization and culture, pre- and post-Encounter. Taught in Spanish.

**Span 3044. Spanish Civilization and Culture.** (4 cr; QP-3002 or equiv, C or better in last adv Span language class taken or #; SP-2301 with C or better or #; offered alt yrs; A-F only)  
Historical survey. Taught in Spanish.

### Span 3402. Fundamentals of Hispanic Linguistics. (4 cr [max 8 cr]; A-F only)

The basic building blocks of the Spanish language would be introduced, such as phonetics, phonology, morphology, syntax, semantics, pragmatics and/or dialectology. These elements are essential to understanding the structure of the language and the cultural implications.

### Span 4004. Spanish Conversation. (1-4 cr [max 8 cr]; SP-2301; A-F only)

Practice in oral conversation skills.

### Span 4011. Hispanic American Prose. (4 cr; QP-3002 or equiv, C or better in last adv Span language class taken or #; SP-2301 with C or better or #, no grad cr; offered every 3rd yr; A-F only)

Prose fiction with emphasis on 20th and 21st centuries. Attention also to cultural background. Taught in Spanish.

### Span 4013. Hispanic American Poetry and Drama. (4 cr; QP-3002 or equiv, C or better in last adv Span language class taken or #; SP-2301 with C or better or #, no grad cr; offered every 3rd yr; A-F only)

Emphasis on 20th and 21st centuries. Attention also to cultural background. Taught in Spanish.

### Span 4018. Hispanic America From Within. (4 cr; QP-3002 or equiv, C or better in last adv Span language class taken or #; SP-2301 with C or better or #, no grad cr; offered every 3rd yr; A-F only)

Study of selected Hispanic American countries; historical, political, cultural, and other defining moments, and literary expressions of those moments, with goal of seeing the country from within. Taught in Spanish.

### Span 4022. Medieval and Golden Age Spain. (4 cr; QP-3002 or equiv, C or better in last adv Span language class taken or #; SP-2301 with C or better or #, no grad cr; offered every 3rd yr; A-F only)

Survey of representative literary works, with attention to literature and cultural background. Taught in Spanish.

### Span 4025. Cervantes. (4 cr; QP-3002 or equiv, C or better in last adv Span language class taken or #; SP-2301 with C or better or #, no grad cr; offered every 3rd yr; A-F only)

Study of representative short works and his masterpiece *Don Quixote* as literary expressions of the time and with respect to the modern novel. Taught in Spanish.

### Span 4026. 20th-Century Spain and Beyond. (4 cr; QP-3002 or equiv, C or better in last adv Span language class taken or #; SP-2301 with C or better or #, no grad cr; offered every 3rd yr; A-F only)

Poetry, drama, and prose fiction of 20th and 21st centuries, with attention to literary period and genre and to cultural background. Taught in Spanish.

### Span 4090. Aspects of the Hispanic World. (4 cr [max 8 cr]; QP-3002 or equiv, C or better in last adv Span language class taken or #; SP-2301 with C or better or #, no grad cr; A-F only)

Sociopolitical, historical, literary, and cultural events of major importance in Hispanic America, Spain, or among Latinos in the United States. Taught in Spanish.

**Span 4091. Independent Study.** (1-3 cr [max 6 cr]; QP-3002 or equiv, C or better in last adv Span language class taken or #; SP-2301 with C or better or #, no grad cr; A-F only)

Students devise programs of reading and research in consultation with instructor to expand upon a topic related to one studied in regular coursework. Taught in Spanish.

**Span 4095. Special Topics: (Various Titles to be Assigned).** (4 cr [max 8 cr]; QP-3002 or equiv, C or better in last adv Span language class taken or #; SP-2301 with C or better or #, no grad cr; A-F only)

Literature and/or culture of Spanish-speaking populations: Spaniards, Hispanic Americans, or Latinos in the United States. Taught in Spanish.

**Span 4096. Field Study.** (1-4 cr [max 8 cr]; QP-3002 or equiv, C or better in last adv Span language class taken or #; SP-2301 with C or better or #, no grad cr; A-F only) Students work with some aspect of community service for Latinos in Minnesota, as available.

## Special Education (SpEd)

### College of Education and Human Service Professions

**SpEd 1357. Individuals With Disabilities in Society.** (3 cr; A-F only; LECD 8)

Major types of disabilities and giftedness, including definitions, causes, characteristics, and educational implications. Disability perspectives. Social, legal, and educational considerations of disability issues.

**SpEd 3103. Infants and Toddlers With Special Needs.** (4 cr; SP-ECh or SpEd major or #; A-F only)

Causation and development of disabling conditions in infants and toddlers. Effective intervention techniques in a variety of settings involving interagency collaboration and family involvement. Practicum.

**SpEd 3105. Young Children With Special Needs: Ages Three to Eight.** (4 cr; SP-#; A-F only)

Identification, assessment, and classification of young children with special needs. Effective intervention techniques for use in a variety of settings, emphasizing integration and teaming strategies. Practicum.

**SpEd 3205. Assessment in Early Childhood Special Education.** (4 cr; SP-5103, 5105; A-F only)

Measurement theory, assessment practices, familiarization with selected instruments, legal and ethical precautions for assessing preschool and primary age children with disabilities. Practicum.

**SpEd 5052. Children with Special Needs: Kindergarten through Grade Three.** (3 cr; QP-Admission to ECh program or 180 cr; no grad credit; SP-120 cr or #, no grad cr; A-F only)

Adapting instruction for kindergarten and primary-aged children with disabilities in regular education classes. Managing and guiding behavior of children who are challenging in the regular classroom. Working with a team of professionals for assessment, IEP writing, planning and instruction. Identifying and using a variety of resources to assist the classroom teacher will be emphasized.

**SpEd 5103. Infants and Toddlers With Special Needs.**

(4 cr; SP-ECh or SpEd major or #; A-F only) Causation and development of handicapping conditions in infants and toddlers. Effective intervention techniques in a variety of settings involving interagency collaboration and family involvement. Practicum. (3 hrs lect-discussion, 3 hrs lab per wk)

**SpEd 5105. Young Children With Special Needs: Ages Three to Eight.** (4 cr; SP-2103 or #; A-F only)

Identification, assessment, and classification of young children with special needs. Effective intervention techniques for use in a variety of settings, emphasizing integration and teaming strategies. Practicum.

**SpEd 5204. Special Education Assessment: Mild Disabilities.** (4 cr; SP-90 cr, 5433 or #; A-F only)

Theory of assessment of students with mild disabilities; knowledge and practice in selecting and administering standardized tests and informal assessment instruments and in designing and conducting behavioral observations; scoring and interpreting assessment results for eligibility and educational planning decisions. Practicum.

**SpEd 5205. Assessment in Early Childhood Special Education.** (4 cr; SP-5103, 5105)

Measurement theory, assessment practices, familiarization with selected instruments, legal and ethical precautions for assessing preschool and primary age children with disabilities. Practicum.

**SpEd 5300. Special Education Seminar.** (1 cr [max 6 cr]; SP-90 cr or #, no grad cr)

In-depth discussion of practices, trends, issues, and problems related to student's selected area in special education.

**SpEd 5310. Adapting for Diverse Learners in General Education Settings.** (4 cr; SP-EIEd or EdSe major or #; A-F only)

Application of foundational knowledge of special education, Section 504 requirements, and students with disabilities and diverse learning needs to school curricula and environments at all levels. Understanding general educators' responsibilities in the special education process. Skills in making adaptations and accommodations.

**SpEd 5351. Learning Disabilities Characteristics and Interventions.** (4 cr; SP-90 cr, 5433 or #; A-F only)

Characteristics of learning disabilities, emphasizing language and processing deficits and how they interfere with academic achievement and social relationships; assessment and intervention approaches for students with learning disabilities. Practicum.

**SpEd 5381. Behavior Management Strategies.** (4 cr; SP-90 cr, 5433 or #; A-F only)

Models of behavior change for preschool, elementary, and secondary students; identification and assessment of problem behaviors; proactive and reactive strategies for managing disruptive behavior; application of applied behavior analysis to modifying behaviors; legal and ethical issues in behavior change.

**SpEd 5382. Advanced Theory and Practice in Emotional/Behavioral Disorders.** (4 cr; SP-5204, 5381 or #)

Behavioral and emotional disorders of school-aged children and youth; assessment approaches, models of instruction, curricula, advanced application of skills to change behaviors, crisis intervention skills, knowledge of community resources and services. Practicum.

## Course Descriptions

**SpEd 5433. Foundations in Special Education.** (4 cr; SP-90 cr or #)

History, philosophy, theories, and issues of special education. Overview of special education rules and processes. Survey of exceptionalities, including disability perspectives.

**SpEd 5434. Assistive and Computer Technology for Teaching.** (3 cr; SP-Min 90 cr or grad student; A-F only)

Introduction for educators to the legal guidelines and required technology practices governing the use of technology devices and accommodations for individual with disabilities in school settings.

**SpEd 5435. Parent and Professional Communication and Collaboration.** (4 cr; SP-5433 or #)

Group process, problem solving, decision making, collaboration, and teamwork applied to the special education process. Techniques for working with parents, professionals, paraprofessionals, and community agencies when planning and implementing Individualized Educational Plans.

**SpEd 5452. Academic Interventions for Students With Disabilities.** (4 cr; SP-5433, ELed methods or #; A-F only)

Understanding various models for teaching students with reading, writing, or math difficulties; development of intervention plan based on assessment and observation. Practicum.

**SpEd 5455. Instructional Strategies and Transitional Planning.** (4 cr; SP-15433 or #; A-F only)

Overview and instruction in various learning strategies for middle and high school-age students with disabilities. Assessment procedures, planning and instructional methods to help students make the transition from school to postsecondary training, education, and employment. Practicum.

**SpEd 5555. Assessment and Instruction of Culturally and Linguistically Diverse Exceptional Learners.** (3 cr; SP-Min 90 cr or grad student; A-F only)

Participants learn assessment, instructional and collaboration models and approaches to address the educational needs of culturally and linguistically diverse exceptional learners. Core skills and strategies are designed to meet special education standards of effective practice in this field.

**SpEd 5600. Student Teaching.** (1-12 cr [max 12 cr]; SP-#, no grad cr; S-N only)

Observational, evaluative, and instructional experience with students with disabilities in K-12 settings. Seminar included.

**SpEd 5601. Student Teaching Seminar.** (1 cr; SP-15600, no grad cr)

Instruction and application of complete individual education planning process, field debriefing, career planning.

**SpEd 5901. Research in Special Education.** (1-9 cr; SP-Δ)

**SpEd 5991. Independent Study.** (1-6 cr [max 6 cr]; SP-Δ; A-F only)

Directed independent study, readings, or projects of interest to student.

**SpEd 5993. Special Area Project.** (1-4 cr; SP-#, no grad cr; A-F only)

Independent project for advanced students to substantially further their theoretical knowledge base or professional competencies.

**SpEd 5995. Special Topics: (Various Titles to be Assigned).** (1-6 cr [max 12 cr]; A-F only)

Current issues to meet needs and interests of various groups, particularly practicing professionals. Topics vary; specific title and content announced in *Class Schedule*.

**SpEd 5998. Workshop: (Various Titles to be Assigned).** (1-6 cr [max 6 cr]; SP-Tchg exper or #; A-F only)

Topics vary. Specific titles announced in *Class Schedule*.

**SpEd 7710. Practice, Research, and Leadership I.** (3 cr; SP-Med student or #; A-F only)

Analysis of research approaches, preparation standards, leadership skills, and current issues and trends in special education, leading to a professional development plan. Information technology, professional ethics, and reflective change processes.

**SpEd 7720. Practice, Research, and Leadership II.** (3 cr; SP-7710 or #; A-F only)

Synthesis of research methods, special education research in selected areas, and change processes for groups in order to increase one's leadership capacity. Technology-based sources of educational research, leadership models, and strategic planning processes.

**SpEd 7730. Practice, Research, and Leadership III.** (3 cr; SP-7720 or #; A-F only)

Application of research and leadership skills to improve one's practice in special education. Educational organizations and approaches to organizational change. Socialization into leadership roles in special education through presentations, publications, and participation in national discussions.

## Statistics (Stat)

### College of Science and Engineering

**Stat 1411. Introduction to Statistics.** (3 cr; QP-Math 1003; SP-Math 1005 or math placement or Δ; A-F only; LE 2)

Statistical ideas involved in gathering, describing, and analyzing observational and experimental data. Experimental design, descriptive statistics, correlation and regression, probabilistic models, sampling, and statistical inference.

**Stat 2411. Statistical Methods.** (3 cr; QP-Math 1250; SP-Math 1250 or math placement; A-F only; LE 2)

Graphical and numerical descriptions of data, elementary probability, sampling distributions, estimations, confidence intervals, one-sample and two-sample t-test.

**Stat 3611. Introduction to Probability and Statistics.**

(4 cr; QP-Math 1297; SP-Math 1290 or Math 1296; A-F only)

Basic probability, including combinatorial methods, random variables, mathematical expectation. Binomial, normal, and other standard distributions. Moment-generating functions. Basic statistics, including descriptive statistics and sampling distributions. Estimation and statistical hypothesis testing.

**Stat 4021. Actuarial Time Series.** (1 cr; SP-5511, 5531, 5571; A-F only)

Problem-solving techniques in time-series analysis needed in actuarial work. (offered alt yrs)

**Stat 4101. Actuarial Calculus and Probability.** (1 cr;

SP-3611, Math 3298; no cr toward math major or minor, no grad cr; S-N only)

Problem-solving techniques in calculus and probability used in the mathematical foundations of actuarial science.

# Supportive Services Program (SSP)

## Academic Support and Student Life

**Stat 5411. Analysis of Variance.** (3 cr; QP-3062 or 3563, 5561, 5562, Math 3320; SP-2411 or 3611)  
Analysis of variance techniques as applied to scientific experiments and studies. Randomized block designs, factorial designs, nesting. Checking model assumptions. Using statistical computer software.

**Stat 5511. Regression Analysis.** (3 cr; QP-3563, Math 3320; SP-3611, Math 3280 or Math 4326; A-F only)  
Simple, polynomial, and multiple regression. Matrix formulation of estimation, testing, and prediction in linear regression model. Analysis of residuals, model selection, transformations, and use of computer software.

**Stat 5515. Multivariate Statistics.** (3 cr; QP-5561, 5562; SP-5411, Math 3280 or 4326)  
Hotelling T[2], multivariate analysis of variance, canonical correlation, discriminant analysis, principal components. Use of computer software. (offered alt yrs)

**Stat 5531. Probability Models.** (4 cr; QP-3562, 5585 or 5595, Math 3298; SP-3611, Math 1297; A-F only)  
Development of probability models and their applications to science and engineering. Classical models such as binomial, Poisson, and exponential distributions. Random variables, joint distributions, expectation, covariance, independence, conditional probability. Markov processes and their applications. Selected topics in stochastic processes.

**Stat 5571. Probability.** (4 cr; QP-3562, Math 3350; SP-3611, Math 3298; A-F only)  
Axioms of probability. Discrete and continuous random variables and their probability distributions. Joint and conditional distributions. Mathematical expectation, moments, correlation, and conditional expectation. Normal and related distributions. Limit theorems.

**Stat 5572. Statistical Inference.** (4 cr; QP-3563, 5595; SP-5571; A-F only)  
Mathematical statistics; Bayes' and maximum-likelihood estimators, unbiased estimators; confidence intervals; hypothesis testing, including likelihood ratio tests, most powerful tests, and goodness-of-fit tests.

**Stat 8444. FTE: Doctoral.** (1 cr; QP-Doctoral student, adviser, DGS consent; SP-Doctoral student, adviser, DGS consent)

**Stat 8611. Linear Models.** (3 cr; QP-5596, Math 5326; SP-5572; A-F only)  
Developing statistical theory of general linear model. Distribution theory, testing, and estimation. Analysis of variance and regression. (offered alt yrs)

**Stat 8666. Doctoral Pre-Thesis Credits.** (1-18 cr [max 60 cr]; QP-Doctoral student who has not passed preliminary oral examination; SP-[max 18 cr per semester or summer]; doctoral student who has not passed prelim oral; S-N only)

**Stat 8711. Statistics Seminar.** (3 cr; QP-#; SP-5572; S-N only)  
Applications of probabilistic and statistical modeling methods, such as linear and nonlinear regression, generalized linear models, Markov chains, and Poisson processes. Case-study analyses of models from areas such as natural sciences, medicine, engineering, and industry.

**Stat 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; QP-Doctoral candidate; SP-[max 18 cr per semester or summer]; 24 cr required; S-N only)

**SSP 0103. Basic Mathematics and Introductory Algebra.** (SP-#Math 1004; cannot apply cr toward a degree; S-N only)  
Computational math skills and applications, including arithmetic, introductory geometry, and introductory algebra.

**SSP 1000. Introduction to College Learning.** (1-2 cr; A-F only)  
Course to help facilitate the successful transition into college learning and student life at UMD.

**SSP 1052. College Writing Strategies.** (2 cr; SP-#Comp 1120; S-N only)  
Individualized approach to learning skills necessary for argumentative writing process, including development of individual writing process, organization of argumentative paragraph and essay, and beginning research/library skills.

**SSP 1054. College Study Strategies.** (1 cr; S-N only)  
Focuses on the skills necessary to study more efficiently for college. Topics include time management, test taking strategies, note taking, concentration, and library orientation.

**SSP 1101. Personal Development.** (2 cr; A-F only)  
Introduction to some of the components of the human personality and the relationship of the individual to the environment. Focuses on such topics as human relations, values, interpersonal skills and competencies, decision making, and conflict resolution.

**SSP 1802. English as a Second Language: Writing.** (2 cr; S-N only)  
Preparation for Comp 1120 for ESL students.

**SSP 1803. English as a Second Language: Reading.** (2 cr; S-N only)  
Comprehension, speed, and vocabulary; uses university course reading material.

**SSP 1804. English as a Second Language: Practice in Speaking and Understanding.** (2 cr; S-N only)  
Pronunciation, intonation, and listening comprehension.

**SSP 3001. Preparation for SSP Teaching Assistantship.** (1-3 cr; SP-#; S-N only)  
Skills needed to develop and conduct effective small group learning experiences. Communication processes, leadership styles and responsibilities, goal setting, social influences, developmental stages of groups, learning theories, and content as related to appropriate SSP skills course.

**SSP 3002. SSP Teaching Assistantship Practicum.** (1-3 cr [max 6 cr]; SP-#; A-F only)  
Leading structured small groups in designated SSP courses. TA responsibilities outlined in contract with faculty supervisor.

**SSP 3003. Tutor Training: Individualization of Instruction.** (2 cr; SP-#; A-F only)  
Introduction to contemporary learning theory and its application to one-on-one and small group learning situations (tutorials). Emphasis on philosophy, procedures, and practices known to be effective in improving learning.

## Course Descriptions

**SSP 3004. Tutor Practicum.** (1-2 cr [max 3 cr]; SP-3003 or #; A-F only)  
Supervised practicum for students leading one-on-one and small group tutorials. Tutor responsibilities outlined in contract with instructor.

# Theatre (Th)

## School of Fine Arts

**Th 0901. B.F.A. Qualifying Presentation.** (0 cr; QP-A; SP-A; S-N only)  
Presentation of performance audition or technical portfolio for admission to full B.F.A. candidacy.

**Th 1001. Introduction to Theatre Arts.** (3 cr; A-F only; LE 9)  
Appreciation of theatre arts. Developing sensitivity and critical sophistication as articulate, discriminating theatregoers. Play viewing, play reading, critiques, and term projects.

**Th 1051. Introduction to Film.** (3 cr; A-F only; LE 9)  
History and genres of film; how movies are made. Watching and analyzing films and developing an articulate and discerning viewpoint. (2 hrs lect, 2.5 hrs lab)

**Th 1052. Freshman Seminar: Film and Society.** (3 cr; SP-Fewer than 30 cr; A-F only; LE 9)  
Critical analysis of how films influence contemporary moral/cultural life.

**Th 1071. Musical Theatre History.** (3 cr; A-F only; LE 9)  
Musical theatre genre focusing on integration of theatre, music, and dance. Major librettists, composers, directors, choreographers, and performers.

**Th 1099. Production Practicum I.** (1 cr [max 3 cr]; A-F only; LE 10)  
Experience in backstage areas and front-of-house operations of theatrical productions; planning and execution of scenery, properties, costumes, makeup, lighting, sound, stage operation, publicity, box office, theatre management before/during performance runs for UMD Theatre productions. (45 hrs work per sem)

**Th 1111. Acting Fundamentals I.** (3 cr; SP-Not open to BFA Th majors; A-F only; LE 10)  
Developing the ability to respond to imaginative situations with sincerity, individuality, and effectiveness; projects in elementary acting techniques.

**Th 1112. Acting I.** (3 cr; QP-1500, Th major; SP-1801, BFA Th major or #; A-F only)  
Introduction to fundamental skills of acting: objectives, actions, given circumstances, activities. Focus on freeing natural impulses through imagination and improvisation. For BFA theatre majors.

**Th 1114. Musical Theatre: Theory/Sight Singing.** (3 cr; SP-#; A-F only)  
Introduction to sight singing, music reading, written music transposition, and melody-line piano keyboard. For musical theatre student performers.

**Th 1116. Audition Techniques.** (3 cr; SP-#; A-F only)  
Theory, technique, and application of audition skills for the actor.

**Th 1118. Voice and Movement for the Actor.** (3 cr; SP-#; A-F only)  
Introduction to voice and movement techniques designed to liberate, develop, and strengthen actor's body and voice.

**Th 1199. Performance Practicum I.** (1 cr [max 12 cr]; QP-#; by audition only; SP-#; by audition only; A-F only; LE 10)  
Rehearsal and performance of minor role, as determined by instructor, in a play or dance performance before a public audience in UMD Theatre productions.

**Th 1299. Theatre Marketing/Management Practicum.** (2 cr [max 6 cr]; SP-Th major or minor; A-F only)  
Practical experience working in theatre box office, management, marketing, and advertising promotion for UMD theatre productions. (90 hrs work)

**Th 1301. Stagecraft.** (5 cr; QP-1500 or #; SP-1801 or #; A-F only)  
Introduction to methods of planning, constructing, painting, rigging, and shifting stage scenery. Lab work required constructing and painting scenery and properties for theatrical productions.

**Th 1351. Stage Rendering Techniques.** (3 cr; QP-1500 or #; SP-1801 or #; A-F only)  
Practical course in study of different rendering mediums, styles, and techniques for the theatrical designer.

**Th 1399. Scenery/Properties Practicum.** (2 cr [max 6 cr]; SP-Th major or minor; A-F only)  
Practical experience constructing and painting scenery and properties for theatrical productions. (90 hrs work)

**Th 1401. Costume Construction I.** (5 cr; QP-1500 or #; SP-1801 or #; A-F only)  
Introduction to study and practice of methods and materials used in building costumes for theatrical productions. Lab work required.

**Th 1451. Stage Makeup.** (3 cr; QP-1500 or #; SP-1801 or #; A-F only)  
Introduction to principles and materials of stage makeup and their application in developing a character makeup for theatrical productions.

**Th 1499. Costume Practicum.** (2 cr [max 6 cr]; SP-Th major or minor; A-F only)  
Practical experience working on costume construction and costume crafts for theatrical productions. (90 hrs work)

**Th 1501. Stage Lighting I.** (4 cr; QP-1500 or #; SP-1001, 1801 or #; A-F only)  
Principles and practice of stage lighting.

**Th 1551. Sound Design.** (3 cr; QP-1500 or #; SP-1801 or #; A-F only)  
Principles and practice of choosing, editing, and running sound cues for theatrical productions.

**Th 1599. Lighting/Sound Practicum.** (1 cr [max 3 cr]; SP-Th major or minor; A-F only)  
Practical experience working on lighting and sound for theatrical productions. (45 hrs work)

**Th 1601. Stage Management.** (3 cr; A-F only)  
Theory and practice of stage management techniques applicable to a variety of theatre forms and situations.

**Th 1699. Running Crew Practicum.** (2 cr [max 6 cr]; SP-#; A-F only)  
Practical experience working backstage during the run of theatrical productions. (90 hrs work)

**Th 1801. Elements of Theatre.** (3 cr; QP–Th major; SP–Th major; A-F only)

Intensive study in rudimentary theatre vocabulary, research methods, principles of play production, preproduction script analyses, performance criticism, and postproduction assessment. Playviewing, play reading, critiques, and term projects.

**Th 2112. Acting II: American Realism.** (3 cr; SP–#; A-F only)

Continuation of 1112 with a concentration on American realism, characterization, and living truthfully in the moment.

**Th 2113. Acting III: Classical Styles.** (3 cr; QP–#; SP–2112 or #; A-F only)

Acting styles from various classical periods, emphasizes Shakespeare and verse.

**Th 2114. Acting: Musical Theatre.** (3 cr; SP–#; A-F only)

Application of theories and techniques of musical theatre performance.

**Th 2118. Speech for the Actor.** (3 cr; SP–#; A-F only)

Ear training and articulation (in anticipation of dialects); acquisition of nonregional dialect for the stage through use of phonetics and classical texts.

**Th 2119. Stage Dialects.** (3 cr; SP–#; A-F only)

Facilitates actor's acquisition and performance of stage dialects.

**Th 3099. Production Practicum II.** (2 cr [max 4 cr]; A-F only)

Experience in backstage areas and front-of-house operations of theatrical productions; planning/execution of scenery, properties, costumes, makeup, lighting, sound, stage operation, publicity, box office, and theatre management before/during performance runs in UMD Theatre productions. (90 hrs work per sem)

**Th 3111. Acting Fundamentals II.** (3 cr; QP–1110; not open to BFA Th majors; SP–1111, 1112 or #; not open to BFA Th majors; A-F only)

Continuation of 1111. Development of acting skills beyond the fundamental level for non-BFA theatre majors. Project work emphasis on characterization and contemporary scene study.

**Th 3112. Improvisation for the Theatre.** (3 cr; SP–#; A-F only)

Freeing the actor's natural impulses through in-depth, hands-on exploration of improvisational theatre. Emphasis placed on actor's learning to create without fear.

**Th 3151. Stage Combat/Circus.** (3 cr; QP–1950 or #; SP–0901 or #; A-F only)

Intensive study of techniques and principles of stage combat focusing on armed (rapier/dagger/broadsword) and unarmed combat. Physical development through various circus skills: juggling, tumbling, and balancing.

**Th 3171. Acting IV: Character/Masks.** (3 cr; QP–80 cr, BFA Th major, #; SP–60 cr, BFA Th major, #; A-F only)

Using the body to express and develop character through mask work, improvisation, and selected scene work.

**Th 3199. Performance Practicum II.** (2 cr [max 12 cr]; QP–#; by audition only; SP–#; by audition only; A-F only)

Rehearsal and performance of major role, as determined by instructor, in a play or dance before a public audience of UMD Theatre productions.

**Th 3201. Stage Direction .** (3 cr; QP–1112, 80 cr, Th major or minor or #; SP–1112, 60 cr, Th major or minor or #; A-F only)

Comprehensive, portfolio approach focusing on interpretive role of director in contemporary theatre. Major tasks facing director as collaborator; lecture, written assignments, workshops, and projects.

**Th 3331. Scenic Design I.** (3 cr; QP–1330, 1764 or #; SP–1301 or #; A-F only)

Elements of design used in creation of scenery for theatre.

**Th 3351. Theatrical Drafting.** (3 cr; QP–1330, 1764; S P–1301; A-F only)

Principles and practice in techniques of drafting traditional and nontraditional types of stage scenery.

**Th 3355. Computer-Aided Theatrical Design.** (3 cr; QP–1330, 1764 or #; SP–1301 or #; A-F only)

Computer-aided drafting and design with technical applications to scenic design, lighting design, and technical direction.

**Th 3371. Scene Painting.** (3 cr; QP–1330, 1764; SP–1301; A-F only)

Advanced work in use of both traditional and modern methods of painting stage scenery emphasizing practical lab work. (2 hrs lect, 2 hrs lab)

**Th 3381. Theatre Design: Period Styles.** (3 cr; QP–3331, 3444 or #; SP–3331, 3441 or #; A-F only)

Introduction to historical styles: architecture, painting, and dress as they influence theatrical design through the ages.

**Th 3401. Costume Construction II.** (3 cr; QP–1440, 1762 or #; SP–1401 or #; A-F only)

Advanced principles and practices of costume construction techniques emphasizing pattern drafting and draping and a study of advanced craft techniques.

**Th 3441. Costume Design I.** (3 cr; QP–1440, 1762, 1500 or #; SP–1401, 1801 or #; A-F only)

Principles and practice of costume design with emphasis on designing and rendering costumes from various historical periods.

**Th 3699. Production Management.** (2 cr [max 12 cr]; QP–\$1670, \$3670, #; SP–#; A-F only)

Participation in management and leadership in all areas of theatre production. (90 hrs work)

**Th 3801. Drama Titles.** (1 cr; QP–1500 or #; SP–1801 or #; A-F only)

Survey of dramatic literature and theatre texts. Playreading, script analysis, term projects.

**Th 3851. Screenwriting.** (3 cr; A-F only)

Introduction to and practice in fundamentals of screenwriting. Dialogue, character, structure, story development, writing for a visual medium, formatting.

**Th 3871. Playwriting.** (3 cr; A-F only; LE 9)

Instruction and practice in fundamentals of playwriting, including dialogue, character, and scenario development; traditional and experimental formal structures; emphasizes theatre format with peripheral screenplay information.

**Th 3881. New Play Development Workshop.** (3 cr [max 6 cr]; QP–#; SP–1001, 1801 or #; A-F only)

Intensive work in development of new scripts from initial reading to minimally staged performance.

## Course Descriptions

**Th 3991. Independent Study in Theatre.** (1-3 cr [max 6 cr]; QP-#; undergrads may not take more than 6 cr in 3171 and 5171 combined; SP-#; undergrads may not take more than 6 cr in 3991 and 5991 combined; A-F only)  
Directed readings and projects arranged between student and faculty mentor.

**Th 3995. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 9 cr]; QP-#; SP-#; A-F only)  
Intensive study of special topics falling outside usual theatre or dance courses. Topic announced before course offered.

**Th 4151. Acting V: Senior Studio.** (3 cr; QP-#; SP-#, no grad cr; A-F only)  
Capstone course utilizes scene study to access actor's skills, proficiencies, and artistic growth. Variety of styles make up final presentation of scenes and monologues rehearsed throughout semester.

**Th 4171. Acting VI: Acting for the Camera.** (3 cr; QP-#; SP-4151 or #, no grad cr; A-F only)  
Contemporary acting adjustments necessary for film, television, and commercials.

**Th 4331. Scenic Design II.** (3 cr; QP-3331; SP-3331; A-F only)  
Advanced study in creating scenic designs for a variety of theatrical forms, including musical comedy, opera, dance, and legitimate theatre.

**Th 4351. Portfolio Preparation and Presentation.** (3 cr; QP-#; no grad credit; SP-#, no grad cr; A-F only)  
Capstone course utilizes presentation of student's work in technical theatre/design to assess design/technical skills. Analysis of portfolio, job applications, résumé development, and portfolio development techniques.

**Th 4399. Theatre: Special Projects.** (1-2 cr [max 12 cr]; QP-\$5220, \$5336, \$DN 5405, #; max 6 cr toward grad program; SP-#; A-F only)  
Projects in directing, choreography of individual or groups, or designing of costumes, lighting, scenery, or sound.

**Th 4441. Costume Design II.** (3 cr; QP-3444 or #; SP-3441 or #; A-F only)  
Advanced principles and practice of costume design with emphasis on designing and rendering costumes from various historical periods.

**Th 4501. Stage Lighting II.** (3 cr; QP-1337, 1663; SP-1501 or #; no grad credit; A-F only)  
Advanced theories and techniques used in designing lights for traditional and nontraditional theatre works.

**Th 4801. History of the Theatre I.** (4 cr; QP-1500 or #; SP-3801 or #; A-F only)  
Survey of style, theory, performance, and production techniques of world theatre from theoretical origins through early 19th century.

**Th 4802. History of the Theatre II.** (4 cr; QP-5551, 5552; SP-4801 or #; A-F only)  
Survey of style, theory, performance, and production techniques of world theatre from 19th century to present.

**Th 4851. Dramatic and Performance Theory.** (3 cr; QP-60 cr or #; SP-3801 or #; A-F only)  
Survey and analysis of dramatic and performance theory texts, playscripts, and criticism.

**Th 4901. Intern Teaching in Theatre.** (3 cr [max 9 cr]; QP-#; SP-#, no grad cr; A-F only)  
Practical experience teaching beginning courses in department. Students serve as intern teachers, assisting instructor in administration of course.

**Th 5991. Independent Study in Theatre.** (1-3 cr [max 6 cr]; QP-Sr, Δ; undergrads may not take more than 6 cr in 3171 and 5171 combined; SP-Sr, Δ; undergrads may not take more than 6 cr in 3991 and 5991 combined, no grad cr; A-F only)  
Directed, advanced readings and projects arranged between student and faculty mentor.

**Th 5997. Internship in Professional Theatre.** (1-12 cr [max 12 cr]; QP-Δ; 1 cr for each 30 hrs work; max 6 cr toward grad program; SP-Δ; 1 cr for each 45 hrs work, no grad cr; S-N only)  
Internship with a cooperating professional, commercial, or repertory theatre.

## Toxicology (Txcl)

### Graduate School

**Txcl 5011. Principles of Toxicology.** (2 cr; SP-Grad txcl major or #; A-F only)  
Introduction to fundamentals of poisoning in individuals and the environment, assessment of potential health hazards, and application of toxicology in various professional careers.

**Txcl 8012. Advanced Toxicology I.** (3 cr; QP-5214 or PubH 5261; SP-5011, chem 4341 or #; A-F only)  
Absorption, distribution, metabolism, and excretion of xenobiotics; toxicokinetics; mechanisms of toxicity or specific classes of chemical agents.

**Txcl 8013. Advanced Toxicology II.** (3 cr; QP-5214 or PubH 5261; SP-8012, Chem 4342, Phsl 5601 or #; A-F only)  
Kinetic and dynamic determinants of target organ toxicity; pathological alterations in structure/function relationships for major target organ systems; mechanisms of mutagenesis, carcinogenesis, and teratogenesis.

**Txcl 8100. Investigative Toxicology.** (1 cr [max 2 cr]; QP-5214; SP-8013 or #; A-F only)  
Evaluating toxicology research issues and literature.

**Txcl 8333. FTE: Master's.** (1 cr; SP-Master's student, adviser and DGS consent)

**Txcl 8444. FTE: Doctoral.** (1 cr; SP-Doctoral student, adviser and DGS consent)

**Txcl 8666. Doctoral Pre-Thesis Credits.** (1-18 cr [max 60 cr]; SP-Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

**Txcl 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; SP-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Txcl 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; SP-Max 18 cr per semester or summer; 24 cr required)

## Urban and Regional Studies (URS)

### College of Liberal Arts

#### URS 1001. Introduction and Orientation to Urban and Regional Studies. (3 cr; A-F only)

Interdisciplinary introduction to urban and regional issues. Political, historical, socioeconomic, and spatial processes in the United States. Intended for urban and regional studies sophomores and others considering it as a major.

#### URS 3097. Internship in Urban and Regional Studies. (1-6 cr [max 8 cr]; QP-URS major, jr or sr, #; SP-URS major, jr or sr, #; S-N only)

Scheduled assignments with direct supervision in public agencies or relevant private firms.

## Water Resources Science (WRS)

### College of Science and Engineering

#### WRS 5001. Introduction to Field Research in Water Resources. (2 cr; SP-Grad WRS major or #)

Introduction to field research techniques and opportunities during two-week summer excursion to regional sites. Data acquisition in large/small lakes, streams, and wetlands for biota and chemical/physical water quality; surface and groundwater hydrologic measurements and sampling.

#### WRS 5101. Water Resources: Individuals and Institutions. (3 cr; SP-Grad student or #)

Control of water resources by natural system functions, user actions, and influence of social and political institutions. How these controls vary in space and time; complexities of each control and feedbacks among them.

#### WRS 8050. Special Topics in Water Resources Science. (1-3 cr [max 6 cr]; SP-#; A-F only)

#### WRS 8060. Directed Studies in Water Resources Science. (1-3 cr [max 6 cr]; SP-#; A-F only)

**WRS 8095. Plan B Project.** (3 cr; SP-#; S-N only)  
Satisfies Plan B project requirement. May appear on master's program, but does not count toward credit minimum in major. Project topic arranged between student and adviser. Written report required.

#### WRS 8100. Interdisciplinary Seminar in Water Resources. (1-3 cr [max 3 cr])

#### WRS 8333. FTE: Master's. (1 cr; SP-Master's student, adviser and DGS consent)

#### WRS 8444. FTE: Doctoral. (1 cr; SP-Doctoral student, adviser and DGS consent)

#### WRS 8666. Doctoral Pre-Thesis Credits. (1-18 cr [max 60 cr]; SP-Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

#### WRS 8777. Thesis Credits: Master's. (1-18 cr [max 50 cr]; SP-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

#### WRS 8888. Thesis Credits: Doctoral. (1-24 cr [max 100 cr]; SP-Max 18 cr per semester or summer; 24 cr required)

## Women's Studies (WS)

### College of Liberal Arts

#### WS 1000. Introduction to Women's Studies. (3 cr; A-F only; LECD 7)

Women's studies as an interdisciplinary field of study; overview of the many issues related to current and changing role and status of women. International perspectives.

#### WS 2101. Women, Race, and Class. (3 cr; A-F only; LECD 8)

Complex influences of gender, race, and class on women's lives in the United States. Focuses on experiences, views, and cultural expression of contemporary women who are not white or middle class. Cross-cultural perspectives.

#### WS 3000. International Perspectives on Feminism. (3 cr; SP-1000 or #; A-F only)

Movements and perspectives of feminism worldwide; comparison and contrast with feminism in the United States.

#### WS 3001. Third World Women. (3 cr; SP-1000 or #; A-F only)

A critical examination of how major social-economic, political and historical factors such as colonialism and imperialism affected and continue to structure women's lives in postcolonial cultures. Examines and compares how Third World women, and women of color in the U.S., as active and resilient social actors resisted and continue to resist all forms of oppression.

#### WS 3002. Latin American Women: Culture and Politics. (3 cr; A-F only)

Examination of contemporary economic and socio-political issues affecting Latin American women.

#### WS 3100. Feminist Theory. (4 cr; SP-80 cr or #; A-F only)

Historical and conceptual examination and analysis of central ideas and problems within several feminist theories.

#### WS 3150. Women-Identified Culture. (3 cr; SP-1000, #; A-F only)

Chronological survey introducing a relatively new body of knowledge in women's studies about lesbian cultures. Lesbian studies in literature, history, law, sociology, aesthetics, and philosophy; international perspectives.

#### WS 3200. Women's Autobiographies. (3 cr; SP-1000 or #; A-F only)

Women's self-concepts as expressed in autobiographical writings. Meanings women give their lives as women; impact of race and class; choices for artistic, political, intellectual, and/or private lives. Autobiographical techniques and style.

#### WS 3250. Women and Love in Literature, Theory, and Practice. (3 cr; SP-1000 or #; A-F only)

Develop own theories about women and love by examining the ways women in various time periods, cultures, and disciplines have written about their theories and experiences of love.

#### WS 3300. Women, Religion, and Spirituality. (3 cr; SP-1000 or #; A-F only)

Religions and spirituality in relation to women. Historical and contemporary practices and beliefs.

## Course Descriptions

**WS 3350. Women and the Law.** (3 cr; SP-1000 or #; A-F only)

Ways women's lives and gender relationships are influenced by laws and the judicial system; how the system can become more responsive to women's experience.

**WS 3400. Women and Film.** (3 cr; SP-1000 or #; A-F only)  
American and foreign films screened, analyzed, and reviewed from a feminist perspective. Role of women in history, economics, and politics of filmmaking.

**WS 3595. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 9 cr]; SP-1000 or #; A-F only)  
Topics that fall outside current women's studies courses. Topic announced before course offered.

**WS 3600. Ecofeminist Theories and Practices.** (3 cr; SP-1000 or #; A-F only)  
Environmental ethics from a feminist perspective; ecofeminist analysis applied to contemporary ethical, social, and environmental issues.

**WS 3891. Independent Study.** (1-3 cr; SP-53 cr or #; A-F only)  
Directed readings, research, and/or projects on topics of interest to the student.

**WS 3896. International Fieldwork in Women's Studies.** (1-3 cr [max 3 cr]; SP-\$Comp 3133; A-F only)  
Travel abroad with an instructor. Live with local families and learn about local women's lives through field work involving community visits, presentations by grassroots women, community-service work, reading, and follow-up writing and discussion. Repeatable once, in two different geographical areas.

**WS 3897. Internship.** (1-9 cr; SP-WS major, 53 cr or #; S-N only)  
Work in public agency, private organization, or service agency offering practical application of women's studies theories and/or experience not available in classroom. Students must set goals, fulfill requirements for credit earned, and submit written and oral evaluations of experience.

**WS 4000. Seminar.** (4 cr; SP-2000 or approved WS methods course, 6 cr approved WS, sr or #; A-F only)  
Major issues, concepts, and questions addressed by feminist scholarship; context of feminist inquiry.

**WS 5595. Special Topics: (Various Titles to be Assigned).** (3 cr; SP-80 cr or grad student or #; S-N only)  
Advanced study. Topic announced before course offered.

**WS 5991. Independent Study.** (1-3 cr; SP-80 cr or grad student or #; S-N only)  
Readings, research, and/or projects on topics of interest to graduate students concerning women and women's issues.