

**Course Descriptions**

**This is the Course Descriptions  
section of the 1999-2001 University  
of Minnesota, Duluth Catalog**



# 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. They are designated with the following statement in parentheses after the course number and title: “cannot apply cr toward degree.” The courses carry credit and students must pay normal tuition for them. 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. *Students should 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 1002—Euclidean Geometry, Math 1004—Intermediate Algebra, and SSP 1003—Basic Mathematics and Introductory Algebra.

## Course Numbers

Semester courses have four-digit numbers as follows:

**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.

## 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

§...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.

# 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 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 students minoring in Acct; A-F only) 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; 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 students minoring in Acct 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 students minoring in Acct 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 SBE students minoring in Acct 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 students minoring in Acct 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; S-N 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-3102, BAc candidate or Δ; max 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.

**Acct 3201. Cost Accounting I.** (3 cr; QP-3102, SBE candidate or Acct minor or ☐; SP-3110, SBE candidate or non-SBE students minoring in Acct 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 3261. Auditing.** (3 cr; QP-3503, SBE candidate with 120 cr or Acct minor with 90 cr or ☐; SP-3102, SBE candidate or ☐; A-F only) Theory and procedures in audit process.

**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 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.

**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. Seminar in Accounting Theory.** (3 cr; QP-3503, SBE candidate or Acct minor with 120 cr or grad student or ☐; SP-3102, SBE candidate with 80 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 1101. The 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.

**Air 1102. The 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.

**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 2101. The Evolution of 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.

**Air 2102. The Evolution of 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.

**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 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.

**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.

**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 cross-functional 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.** (3 cr; SP-Cannot apply cr to Graduate School program; A-F only)

Advanced leadership development; national security processes, regional studies, doctrine, the military as a profession, civilian control of the military.

**Air 4102. Preparation for Active Duty.** (3 cr; SP-Cannot apply cr to Graduate School program; A-F only)

Advanced leadership development; advanced leadership ethics, doctrine, the military as a profession, officership, military justice.

## American Indian Studies (AmIn)

### College of Liberal Arts

**AmIn 1103. Beginning Chippewa I.** (3 cr; A-F only)

Speaking and comprehension of basic Chippewa speech patterns. Development of rudimentary reading knowledge.

**AmIn 1104. Beginning Chippewa II.** (3 cr; SP-1103 or #: A-F only)

Speaking and comprehension of basic Chippewa speech patterns. Development of rudimentary reading knowledge.

**AmIn 1106. American Indian Prose, Poetry, and Oratory.** (3 cr; A-F only)

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.

**AmIn 1120. American Indians in the 20th Century.** (3 cr; A-F only)

Topical review of Indian-white contacts, antiquity to present. Historical analysis of the people and their cultures.

**AmIn 2105. Survey of American Indian Arts.** (3 cr; A-F only)

Traditional arts of American Indians and the cultures that produced them; techniques, motifs, and aesthetics of Indian textiles and utilitarian and ceremonial arts.

**AmIn 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.

**AmIn 2203. Intermediate Chippewa I.** (3 cr; SP-1104 or #: A-F only)

Speaking basic Chippewa sentences and paragraphs at fluent level so listener can understand speaking pattern context. Ability to write and read Chippewa language proficiently.

**AmIn 2204. Intermediate Chippewa II.** (3 cr; SP-2203 or #: A-F only)

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)

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; 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 #; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; 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 may be applied to Graduate School 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—1120, upper div soc sci course or #)

Federal Indian policy as a by-product of treaty rights, sovereignty, and self-determination. Emphasis on federal policy impact on Indian family life, education, child welfare, and religious freedom. Selected case studies.

**Amln 5910. Topics in American Indian Studies: (Various Titles to be Assigned).** (3 cr [max 12 cr]; SP—Intro soc sci course or 1120 or #; max 6 cr may be applied to Graduate School 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 1031. Landscapes, Environments, and U.S. Culture.** (3 cr; A-F only)

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.

**AmS 1041. Frontier Heritage in Canada and the United States.** (4 cr; A-F only)

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.

**AmS 1061. American Immigrant Heritage.** (3 cr; A-F only)  
Immigrant and ethnic experiences in the 20th century as depicted in prose, poetry, and the arts; patterns of contemporary prestige and status.

**AmS 5091. Directed Study.** (1-4 cr; A-F only)  
Supervised independent study on selected 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 5521. Human 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 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. Human Neuroanatomy.** (4 cr; SP-#; A-F only)  
Structure of central nervous system, with correlation of structure, function, and clinical relevance. Consideration of special senses.

**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.

**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 in Anthropology: (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.

# Anthropology (Anth)

## College of Liberal Arts

**Anth 1602. Prehistoric Cultures.** (4 cr; A-F only)  
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)  
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)  
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 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 and Method.** (4 cr; QP-1604, 70 cr or grad student or #; SP-1604, 90 cr or grad student or #; cannot apply cr to Graduate School program; A-F only)

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

**Anth 4653. Senior Seminar.** (3 cr; SP-1604, 90 cr or grad student or #; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; A-F only)

Directed reading and research leading to presentation of paper.

**Anth 4695. Special Topics in Anthropology: (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, #; cannot apply cr to Graduate School program; A-F only)

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

**Anth 4699. Honors Project.** (1 cr; QP-5626, Soc 1500, Soc 3500, Soc 3520, 120 cr; approval by dept honors program director; SP-1604, 60 cr or #; cannot apply cr to Graduate School program; A-F only)

Advanced individual project in any area of anthropology; must demonstrate sound theoretical and research foundations; written report.

## Art (Art)

### School of Fine Arts

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

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-Not for art majors except those in art history; A-F only)

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

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-¶1002 or art or art ed major or #; 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; SP-1002 or art or art ed major or #; A-F only)

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

**Art 1012. 3-D Design.** (3 cr; SP-1002 or art or art ed major or #; A-F only)

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

**Art 1013. 2-D Digital Design.** (3 cr; SP-1002 or art or art ed major or #; A-F only)

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

**Art 1014. 3-D Digital Design.** (3 cr; SP-1013 or #; A-F only)

Introduction to concepts and materials of three-dimensional form and space using digital visualization.

**Art 1100. Painting I.** (3 cr; QP-[1002 or art or art ed major, 1010 or 1011 or 1013] or #; SP-1002 or 1009 or 1010 or #; A-F only)

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

## Course Descriptions

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

Theory and practice focusing on dynamics of visual communication. Interpretation and analysis of symbols, formal structures, and 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–1002 or art or art ed major, 1010, 1012 or #; SP–1002 or art or art ed major, 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–1002 or art or art ed major, 1010, 1011 or #; SP–1002 or 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: Litho, Screen.** (3 cr [max 6 cr]; QP–1002 or art or art ed major, 1010, 1011 or #; SP–1002 or 1011 or #; A-F only)

Introduction to methods and materials used in lithographic printmaking from stones and plates and water-based screenprinting. Technical, aesthetic, and contextual considerations encountered in production of meaningful artwork. 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–1002 or art or art ed major, 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)

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–1002 or 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–1002 or 1011 or 1013 or #; A-F only)

Contemporary weaving and fibers.

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

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

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

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

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

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. Graphic Techniques I.** (3 cr; QP–1011 or 1013 or #; SP–1011 or 1013 or #; A-F only)

Fundamentals of graphic reproduction; application of digital programs used in preparing work for reproduction.

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

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

**Art 3016. 2-D Digital Studio I.** (3 cr [max 6 cr]; QP–1002 or art or art ed major, 1013 or #; SP–1002 or art or art ed major, 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 or 1014 or #; A-F only)

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

**Art 3095. Topics in Art: (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–Art 1100 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 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 #; 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 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 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 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; 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 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 admission to elem ed program or #; SP-1002 or art or art ed major or admission to elem ed program 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 or 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 minor or #; SP-Art or art ed major or minor 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 major or minor, #; SP-Art major or minor, #; 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 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 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 4100. Painting III.** (3 cr [max 6 cr]; QP-5150 or #; SP-3100 or #; cannot apply cr to Graduate School program; 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, #; cannot apply cr to Graduate School program; 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 or #; cannot apply cr to Graduate School program; 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, D; SP-2 sem sculpture, #; cannot apply cr to Graduate School program; A-F only)

**Art 4300. Printmaking III.** (3 cr [max 6 cr]; QP-3301, 3302, 5350 or #; SP-1300 or 1301 or #; A-F only)  
Further exploration of print processes. Emphasis on refinement of technical skills as well as development of concepts and imagery. Experimentation in nontraditional, collaborative, and cross-disciplinary approaches. Increased experience in editing and alternative formats combined with a comprehensive critical review.

**Art 4391. Individual Study in Printmaking.** (1-3 cr [max 8 cr]; QP-4 qtrs printmaking, Δ; SP-2 sem printmaking, 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 or #; cannot apply cr to Graduate School program; 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 or #; cannot apply cr to Graduate School program; 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, #; cannot apply cr to Graduate School program; A-F only)

Fibers and weaving.

**Art 4600. Photography III.** (3 cr [max 9 cr]; QP-5650 or #; SP-3600 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 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-#; cannot apply cr to Graduate School program; SP-#; cannot apply cr to Graduate School program; A-F only)

Directed, but largely independent, creative inquiry for students of exceptional ability.

## Course Descriptions

**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 #; cannot apply cr to Graduate School program; SP-Sr or #; cannot apply cr to Graduate School program; 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-#; cannot apply cr to Graduate School program; SP-#; cannot apply cr to Graduate School program; 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; may apply up to 6 cr to Graduate School program; sr standing advisable; SP-Δ; cannot apply cr to Graduate School program; 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.

**Art 4897. Arts Internship Experience.** (1-9 cr [max 9 cr]; QP-#; SP-#; 1 cr for each 45 hrs of fieldwork, cannot apply cr to Graduate School program; 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 Exhibit.** (1 cr; SP-Sr art major or #; cannot apply cr to Graduate School program; A-F only)  
Senior art majors, singly or in pairs, plan, prepare, and present, under guidance of faculty and museum staff, an exhibition of their best undergraduate work in the Tweed Museum of Art.

**Art 4901. Honors Graphic Design.** (3 cr [max 6 cr]; QP-#; SP-#; A-F only)  
Directed, but primarily independent, creative research for outstanding students.

**Art 4904. Technical Topics.** (1-3 cr [max 3 cr]; QP-3040 or #; SP-1011 or 1013, 2905 or #; A-F only)  
Concentrates on graphic design and printing topics.

**Art 4905. Graphic Techniques II.** (3 cr; QP-3041 or #; SP-2905 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 4915. Papers and Printing.** (1 cr [max 2 cr]; QP-3059 or #; SP-3922 or #; A-F only)  
Aesthetic and technical consideration of paper in graphic design and printing. Role of paper as a design element.

**Art 4972. Graphic Design Services.** (3 cr [max 6 cr]; QP-1[3020, 3040, 3059, 3062, 5041 or #], sr graphic design major or #; SP-3933, sr graphic design major or #; A-F only)  
Graphic design for campus and non-profit clients.

**Art 4976. Publication Services.** (3 cr; QP-3059, 3062 or #; SP-3933, 5926 or #; A-F only)  
Graphic design for campus and/or student-generated publications.

**Art 4997. Graphic Design Internship.** (3 cr; QP-Sr graphic design major or #; SP-Sr graphic design major, #; A-F only)

**Art 4999. Senior Project in Graphic Design.** (1 cr [max 3 cr]; SP-Sr graphic design major or #; A-F only)  
Preparation of senior show/project.

**Art 5016. 2-D Digital Studio II.** (3 cr [max 6 cr]; QP-3016 or #; SP-3016 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 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 or FA 1200 or FA 5200 or #; SP-1014 or 3016 or #; cannot apply cr to Graduate School program; 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 5901 or grad student or #; A-F only)  
Introductory course.

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

**Art 5908. Motion Graphics II.** (3 cr; QP-3054; SP-5907 or #; A-F only)  
Continuation of aesthetics, mechanics, and meaning of motion graphics.

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

**Art 5916. Type Lab.** (1 cr [max 3 cr]; QP-3053 or #; SP-3922 or #; A-F only)  
Type as an artistic medium. Introduction to letterpress printing.

**Art 5926. Publications Design.** (3 cr; QP-3059, 3062 or #; SP-3933 or #; A-F only)  
Design and structure of publications for print, especially magazines. Typographic structures: grids and proportion systems.

**Art 5991. Independent Study in Graphic Design.** (1-3 cr [max 8 cr]; QP-4 qtrs graphic design, D; SP-2 sem graphic design, D; A-F only)

**Art 5997. Art Museum Internship.** (3 cr [max 6 cr]; SP-1001, 6 cr art hist; 1 cr for each 45 hrs of work; A-F only)  
Supervised practicum in art museum operation.

**Art 5999. Special Projects in Design.** (1 cr [max 3 cr]; QP-3059, 3062 or #; SP-3933 or #; A-F only)  
Topics in graphic design practice.

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

**Art 8901. Graduate Seminar.** (3 cr [max 12 cr]; SP-1[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 tchg asst or #; A-F only)

Theory of and experience in teaching college-level art.

**Art 8980. Graduate Studio.** (3 cr [max 12 cr]; SP–¶8901; A-F only)

Graphic design studio work based on directed problems and topics for critique in concurrent graduate seminar.

**Art 8990. M.F.A. Creative Thesis.** (3 cr [max 6 cr]; SP–#; A-F only)

In consultation with adviser, 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)

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

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

Development of world art and architecture from Renaissance to present.

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

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

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

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

**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. Topics in Art History: (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.** (1-3 cr [max 9 cr]; SP–Grad student or #; max 6 cr for undergrads; 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–3370 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 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)

Survey of present knowledge of solar system, interstellar space, stars, galaxies, and universe. Historical development of astronomy as a science. (3 hrs lect)

**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. (3 hrs lect)

## Behavioral Science (BhSc)

### *School of Medicine*

**BhSc 5491. Problems in Medical Behavioral Sciences.** (1-6 cr; SP–Med or upper div or grad student, #; can apply max 6 cr to Graduate School 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)

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

## Biochemistry and Molecular Biology (MdBc)

### School of Medicine

**MdBc 5501. Neurobiochemistry.** (2 cr; QP–Chem 3311 or Chem 5337; SP–Chem 3322 or Chem 4342 or #: A-F 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 #: S-N only) Current topics in biochemistry.

**MdBc 8294. Current Research Techniques.** (1-3 cr [max 4 cr]; SP–Biochem or Chem grad student or #: S-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; 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; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

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

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 procaryotic 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)

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

**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 3990. Topics in Biology.** (1-5 cr [max 5 cr]; SP–1012 or #) Topic announced before course offered.

**Biol 3993. Laboratory Teaching Experience.** (1-2 cr [max 2 cr]; SP–Biol or cell biol major, 90 cr incl 25 cr Biol, #: max 2 cr may be applied toward biol or cell 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, #: max 4 cr may be applied toward biol or cell biol major or biol minor as upper div elective; S-N only) Advanced independent work in special fields.

## Biology (Biol)

### College of Science and Engineering

**Biol 1001. Biology and Society.** (4 cr; A-F only) Contemporary issues in biology. For nonmajors. (3 hrs lect, 2 hrs lab)

**Biol 1011. General Biology I.** (5 cr; SP–1 yr high school chem or 1 sem college chem; A-F only) 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 procaryotes, protists, fungi, animals, and plants; behavior; population, community, and ecosystem ecology. (4 hrs lect, 2.5 hrs lab)

**Biol 1097. Freshman Seminar: Topics (Various Titles to be Assigned).** (3 cr; SP–Fewer than 30 cr; A-F only) Fundamental concepts of a specific area within the biological sciences.

**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

**Biol 3996. Internship in Biology.** (1-2 cr [max 2 cr];

SP-1012, #, Δ: max 1 cr may be applied toward biol or cell biology 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.** (0.5 cr; SP-Jr or #; S-N only)

Students attend and evaluate department seminars.

(1.5 hrs seminar)

**Biol 3998. Seminar II.** (0.5 cr; SP-3997, Jr or sr or #; S-N only)

Experience in oral presentation of student-initiated field, lab, or library research findings.

**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-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-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, Chem 3322 or Chem 4341 or #; A-F only)

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 plant molecular biology. (1 hr lect, 9 hrs lab)

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

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

## Course Descriptions

**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-5601 or ¶5601; 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). (3 hrs lect, 3 hrs lab)

**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. (2 hrs lect)

**Biol 5802. Microbial Ecology Laboratory.** (2 cr; SP-5801 or ¶5801 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. (4 hrs lab)

**Biol 5803. Water Pollution Biology.** (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 5807. Mathematical Ecology.** (3 cr; SP-2801, Math 1290 or Math 1297; A-F only)

Development and use of mathematical models to describe ecological patterns and processes. (2 hrs lect, 2 hrs lab)

**Biol 5811. Plant Autecology.** (3 cr; SP-2801; A-F only)

Survey of environmental factors and responses to these by an individual plant; ecological life histories; biotic interactions; intraspecific variation; use of instrumentation; emphasis on seed plants. (2 hrs lect, 2 hrs lab)

**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)

**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 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; SP-5861 or ¶5861; 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)

**Biol 5864. Ecosystems Ecology Laboratory.** (1 cr; SP-5863 or ¶5863, 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 5990. Topics in Biology.** (1-5 cr [max 10 cr]; SP-1012, #; A-F only)

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 literature.

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

**Biol 8777. Thesis Credits: Master's.** (1-18 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)

Introduction to U.S. legal system and its impact on modern business operations. Ethical, economic, social, and political perspectives of the 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, personal property and bailments, forms of business organizations, and 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)

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 2001. Introduction to Environmental Engineering.** (3 cr; QP-High school chem, high school algebra; SP-High school chem, high school algebra; A-F only)

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-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.** (2 cr; QP-3210; SP-3111; A-F only)

Experiments illustrating physicochemical, fluids mechanics, and heat transfer principles. Technical report writing.

**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; cannot apply cr to Graduate School program; 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.** (2 cr; QP-3230, grade of C or better in 3411, BChE candidate or #; SP-3211; cannot apply cr to Graduate School program; A-F only)

Experiments illustrating mass transfer, simultaneous mass and heat transfer, and other separation principles. Technical report writing.

**ChE 4301. Chemical Reaction Engineering.** (3 cr; QP-3110, Chem 5622, Math 3380, BChE candidate; SP-3112; cannot apply cr to Graduate School program; 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.

## Course Descriptions

**ChE 4401. Process Control.** (3 cr; QP–3110, 3230, Math 3380, BCHE candidate; SP–2121, 3112, 4301, Math 3280; cannot apply cr to Graduate School program; 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; cannot apply cr to Graduate School program; 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; cannot apply cr to Graduate School program; 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 5895. Special Topics: (Various Titles to be Assigned).** (1-4 cr [max 10 cr]; QP–#; SP–#; cr cannot be applied to a Graduate School program) 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 1102. Aspects of Chemistry.** (3-4 cr; SP–\$1113, \$1151, \$1161, \$2172; A-F only) 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, or 1161; 4 credit option with lab.

**Chem 1113. Introduction to General, Organic, and Biological Chemistry I.** (5 cr; SP–\$1151, \$1161, \$2172; for students terminating study of chem with a max of 10 cr; 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 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) Fundamental principles exemplified by study of elements, compounds, and their reactions.

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

**Chem 2222. Quantitative Analysis.** (4 cr; QP–1112 or 1132H; SP–1152 or 1162; A-F only) Theory and practice in analytical techniques; introduces gravimetric, volumetric, and spectrophotometric methods.

**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 6 cr];

QP-Δ; SP-Δ; 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 ¶3322; A-F only)

Identification and analysis of biological molecules with emphasis on macro-molecules, polysaccharides, proteins, and nucleic acids (RNA, DNA).

**Chem 4242. Instrumental Analysis.** (2-4 cr; QP-3210, 5611

or 5622; SP-2222, 4632 or 4642; BS chem majors should take for 4 cr with lab; A-F only)

Theory and applications of instrumental methods of chemical analysis, including electrochemistry, spectroscopy, and separations.

**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,

5337; SP-2222, 4342 or ¶4342 with #; A-F only)

Applications of biochemistry and molecular biology techniques.

**Chem 4364. Molecular Biology Laboratory.** (2 cr;

QP-5338, 5361 or #; SP-4342, 4363; A-F only)

Applications of biochemistry and molecular biology techniques.

**Chem 4434. Inorganic Chemistry.** (4-5 cr; QP-5610 or

5620; SP-4632 or 4641; BS chem majors must take for 5 cr with lab; 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 4632. Physical Chemistry.** (4-5 cr; QP-3513 or #,

Math 1297, Phys 1109 or 11109H; SP-2522 or #, Math 1297, Phys 1204; 5 cr includes lab; A-F only)

Properties of gases, liquids, and solutions; thermodynamics and equilibria; electrochemistry; chemical kinetics; quantum mechanics; spectroscopy.

**Chem 4641. Physical Chemistry I.** (4 cr; QP-2 yrs chem,

Math 3298, Math 3320, Phys 1109 or Phys 1109H; SP-2 yrs

chem, Math 3280, Phys 1204; A-F only)

Quantitative treatment of physical principles and theories in chemistry, including topics in quantum mechanics, spectroscopy, and thermodynamics.

**Chem 4642. Physical Chemistry II.** (4 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 thermodynamics, equilibrium, and kinetics.

**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 #; SP-4242 or #; A-F only)

Augmentation to basic coursework in wet and instrumental analytical chemistry, including 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.

## Course Descriptions

**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.

**Chem 8666. Doctoral Pre-Thesis Credits.** (1–18 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; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Chem 8888. Thesis Credits: Doctoral.** (1–18 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 or #; not open to PE majors; A-F only)  
Applied musculoskeletal anatomy and linear, angular, and curvilinear physics as bases for enhanced athletic performance.

**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–15 cr in coaching minor; SP–15 cr in coaching minor, #; S-N only)  
Supervised coaching experience in a school or agency setting.

## Communication (Comm)

### *College of Liberal Arts*

**Comm 1000. Human Communication Theory.** (3 cr; A-F only)  
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)  
Application of the theoretical bases of rhetoric to the public speaking situation.

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

**Comm 1500. Media and Society.** (3 cr; A-F only)  
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)

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 2621. 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; A-F only)  
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-1000 or 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 3300. Teaching Assistantship in Communication.** (1-3 cr [max 6 cr]; SP-60 cr, comm major or minor, #; max 3 cr may be applied to 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 in Communication: (Various Titles to be Assigned).** (3 cr [max 6 cr]; A-F only)  
Topics not included in regular curriculum. Topic announced before course offered.

**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.** (1 cr; SP-Sr comm major; cannot apply cr to Graduate School program; 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 may be applied to Graduate School program; A-F only)

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

**Comm 4391. Independent Study.** (1-3 cr [max 6 cr]; SP-60 cr, 3.30 GPA in comm major or minor, #; max 3 cr may be applied to comm major or minor; A-F only)

Directed readings and projects in communication, communication media, or communication education. Application deadline is one week before beginning of registration for following semester.

**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 may be applied to comm major or minor; cannot apply cr to Graduate School program; 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 4500. History of Rhetoric.** (3 cr; SP-1112 or #; cannot apply cr to Graduate School program; A-F only)

Development of rhetorical thought as expressed by representative writers.

**Comm 4505. Media Theory and Research.** (4 cr; SP-1500 or 2101, 60 cr or #; cannot apply cr to Graduate School program; 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 5095. Special Graduate Topics in Communication.** (3 cr [max 36 cr]; SP–Grad student, #; A-F only)  
Theory and research on various topics in communication.

**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 6 cr]; SP–Jr or sr or #; S-N only)  
Intensive study of various aspects of communication.

# Communication Sciences and Disorders (CSD)

*College of Education and Human Service Professions*

**CSD 1100. Phonetics.** (2 cr)  
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)  
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 #)  
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.** (4 cr)  
Receptive and expressive human communication disorders. Importance of communication to human behavior; influence that communication disorders exert on broad spectrum of human activities. Professional roles and responsibilities of speech-language pathologists and audiologists. Observation.

**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 major 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 major 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 major, C grade or better in 3230, 25 hrs clinical observation; A-F only)  
Introductory experience of 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 week)

**CSD 4197. Clinical Practicum in Communication Disorders.** (3 cr [max 6 cr]; QP–CSD major, C grade or better in 3906, 25 hours clinical observation; SP–3230, CSD major, C grade or better in 3230, 25 hours clinical observation or #; A-F only)  
Beginning experience of 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 week)

**CSD 4200. Introduction to Fluency Disorders.** (2 cr; QP–3111, 3211; SP–2230, 3100, CSD major 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 major 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 #; cannot apply cr to Graduate School program)  
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 #; cannot apply cr to Graduate School program)  
Advanced-level study of grammatical and linguistic features of ASL; understanding deaf culture and fluency in expressive and receptive skills.

**CSD 5091. Independent Study.** (1-3 cr [max 6 cr]; QP-Sr or grad student in CSD or SpEd, Δ; SP-Sr or grad student in CSD or SpEd, Δ)

Directed study, readings, and/or projects of student interest in communication disorders.

**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 4 cr]; QP-25 hrs clinical observation, CSD grad student or #; SP-25 hrs supervised clinical observation, CSD grad student or #; 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 week)

**CSD 8099. Projects in Communication Disorders.** (2 cr; QP-CSD grad student or #; SP-CSD grad student 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 #; SP-25 hrs supervised clinical observation, CSD grad student or #; 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 laryngeal 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 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.

**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 #; cannot apply more than 2 cr to Graduate School program; S-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 #)

Study and discussion of current trends in rehabilitation of hard-of-hearing individuals through directed readings.

## Composition (Comp)

### College of Liberal Arts

**Comp 1100. Word Processing for Writing.** (0.5 cr;

QP-cannot apply credit to Engl major or minor; S-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)

Instruction and practice in writing argumentative prose for academic situations with integrated word processing lab.

## Course Descriptions

**Comp 3100. Advanced Writing: Language and Literature.** (3 cr; QP-1120, 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-1120, 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-§3120; 1120, 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-1110 or 1120, 90 cr, upper div papers filed; SP-1120, 60 cr; A-F only)  
Writing practice.

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

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

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

**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-§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 may be applied to Graduate School program; SP-1120, 60 cr; max 3 cr may be applied to Graduate School 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 5591. Independent Study.** (1-3 cr [max 6 cr]; QP-#: max 6 cr may be applied to Graduate School program; SP-#: max 3 cr may be applied to Graduate School 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-#: 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; 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)

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 1111. Introduction to Programming in Pascal.** (3 cr; QP-1 yr high school algebra or #: SP-§1511, §1581; 1 yr high school algebra or #: A-F only)

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)

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)

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)

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-§1521; 3 yrs high school math, 1 sem college programming or #; A-F only)  
For programmers experienced in another programming language.

**CS 1311. Fundamentals of Information Systems.** (4 cr; 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 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)  
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)  
Same as CS 1511, but in greater depth and with more challenging assignments. For high-ability students.

**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-1 yr high school or college computer programming in C or 1211 or 1521 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)  
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 2311. Data, File, and Object Structures.** (4 cr; QP-1421; 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 or #; SP-1521 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.** (4 cr; SP-1311, 2311; 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-1 qtr college programming, jr or #; SP-1 sem college programming, jr 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. Introduction to Interactive Multimedia Technology.** (4 cr; QP-1 qtr college programming, jr or #; SP-1 sem college programming, jr 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. Includes a large-scale project.

**CS 3131. Introduction to Computer Graphics.** (4 cr; QP-1 qtr college programming, jr, Math 1160 or Math 1297 or Math 3320 or #; SP-1 sem college programming, jr, Math 1160 or Math 1297 or Math 3320 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. Introduction to Database Management Systems.** (4 cr; QP-1 qtr college programming, jr or #; SP-1 sem college programming, jr 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-1 sem college programming, jr or #; A-F only)  
Hands-on introduction to operating systems and tools. Operating systems such as UNIX and X Windows and Windows 95. 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-2111, 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.

## Course Descriptions

### CS 4411. Communications and Network Technology.

(4 cr; SP-3011, 3221 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-3710 or #; SP-2511, 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 or #; SP-2511 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 4711. Computer Security. (4 cr; QP-3610, 3710 or #; SP-2511 or #; 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. Subreptitious attacks. Privacy and legality. Intellectual property and ethical issues.

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 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 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-1623, 3610, 3710 or #; SP-2511 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 or #; 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 or #; SP-2511, 2521 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-3610, Math 3320 or #; SP-2511, Math 3320 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 5731. Information and Text Processing. (4 cr; QP-1623, 3710 or #; SP-2511 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 5741. Object-Oriented Design. (4 cr; QP-5529 or #; SP-4531 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-5776, Stat 1565 or Stat 3562 or #; SP-2511, Stat 1411 or Stat 2411 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 5994. Advanced Topics in Computer Science: (Various Titles to be Assigned).** (4 cr; QP-#; SP-#; 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 # or CS grad student; SP-4511 or # or CS grad student)

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.

**CS 8621. Advanced Computer Architecture.** (4 cr; QP-5510 or # or CS grad student; SP-5621 or # or CS grad student; 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 # or CS grad student; SP-5631, 5641 or # or CS grad student; 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 # or CS grad student; SP-5721 or # or CS grad student; 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 # or CS grad student; SP-5731 or # or CS grad student)

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 # or CS grad student; SP-5751 or # or CS grad student; 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 8777. Thesis Credits: Master's.** (1-18 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-# or CS grad student; SP-# or CS grad student; 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*.

## Dance (DN)

### *School of Fine Arts*

**DN 1001. Introduction to the World of Dance.** (3 cr; A-F only)

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)

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; SP-# for spr sem; A-F only)

Beginning work, emphasizing jazz dance as a performing art form. Fall semester enrollment encouraged.

**DN 1121. Tap Dance Technique I.** (2 cr [max 4 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)

Beginning work, emphasizing ballet as a performing art form. Fall semester enrollment encouraged.

**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 12 cr]; QP-#; SP-#; A-F only)

Intermediate work in lyrical and percussive jazz dance techniques.

**DN 3221. Tap Dance Technique II.** (2 cr [max 4 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.

## Course Descriptions

**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 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.

**DN 4116. Musical Theatre Audition Techniques.** (3 cr; QP-#; SP-#; cannot apply cr to Graduate School program; A-F only)

Advanced dance, song, acting, and marketing capstone course for professionally oriented musical theatre student.

**DN 5991. Independent Study in Dance.** (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, cannot apply cr to Graduate School program; 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, can apply max 6 cr to Graduate School program; SP-Δ; 1 cr for each 45 hrs of work, cannot apply cr to Graduate School program; A-F only)  
Internship with a cooperating professional, commercial, or regional dance company.

**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. Practicum.

**ECh 3040. Creative Expression.** (3 cr; A-F only)  
Developing curriculum for creative expression involving aesthetic and physical development.

**ECh 3050. Observing and Guiding Behavior: Birth-Age Eight.** (4 cr; SP-2010, ¶3010, ¶3040, ¶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 #; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; 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 4600. Student Teaching in Early Childhood/Primary.** (3-12 cr; SP-3005, 3007 or #; cannot apply cr to Graduate School program; 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; cannot apply cr to Graduate School program)

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-#; cannot apply cr to Graduate School program; A-F only)  
Individualized reading and research in a special topic.

## 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-¶EIE1 1010)

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 4993. Special Area Project.** (1-4 cr; SP-#: cannot apply cr to Graduate School program; 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. Practicum.

**ECh 5040. Creative Expression.** (3 cr; SP-Cannot apply cr to Graduate School program)  
Developing curriculum for creative expression involving aesthetic and physical development.

**ECh 5050. Observing and Guiding Behavior: Birth-Age Eight.** (4 cr; SP-2010, ¶3010, ¶3040, ¶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 5107. Issues in the Education of Younger Learners.** (6 cr; SP-60 cr, #; cannot apply cr to Graduate School program; 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-Cannot apply cr to Graduate School program)  
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-#: cannot apply cr to Graduate School program; A-F only)  
Directed independent study, readings, and/or projects of student interest.

**ECh 5993. Special Area Project.** (1-4 cr; SP-Cannot apply cr to Graduate School program; 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-Cr not allowed toward econ major or minor or BAc or BBA degree; SP-Cannot apply cr to Econ major or minor or BAc or BBA majors)  
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.** (4 cr; SP-Fewer than 30 cr; A-F only)  
Nature and consequences of income and inequality and poverty globally and within the United States.

**Econ 1022. Principles of Economics: Macro.** (3 cr; A-F only)  
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.

**Econ 1023. Principles of Economics: Micro.** (3 cr; A-F only)  
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.

## Course Descriptions

**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.** (4 cr; SP—Fewer than 30 cr; A-F only)

Development of macroeconomic thought from the historical perspective of the Great Depression, 1929–41. During this time macroeconomic theory went through a profound revolution that laid the economic foundation for contemporary society.

**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)

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)

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, and price analysis.

**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 #; A-F 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.

**Econ 4497. Full-Time Internship.** (6 cr; QP–[Econ major, 3104, 3105] or #; SP–\$4397; [Econ major, 3022, 3023] or #; A-F 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.

**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)

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)  
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)

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)

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-Fewer than 30 cr; A-F only)

Values and their expression in and effects on educational policies and practices. Philosophical, historical, and comparative approaches 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)

Problems and issues facing contemporary children from perspectives of anthropological sociological, legal, educational, and medical knowledge. Cross-cultural variations in experiences and status of children.

**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.** (2 cr; SP-Rec 3342 or #; cannot apply cr to Graduate School program; 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-Cannot apply cr to Graduate School program; 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-Cannot apply cr to Graduate School program; A-F only)

Review of research and current literature; trends and experimental approaches to teaching mathematics; criteria for program development and evaluation.

## Course Descriptions

**Educ 4233. Secondary School Curriculum.** (2 cr; SP—Cannot apply cr to Graduate School program; 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—Cannot apply cr to Graduate School program; 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—Cannot apply cr to Graduate School program) 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; cannot apply cr to Graduate School program; 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.** (3 cr; SP—Admission to Educ or CSD program, sr, Δ; cannot apply cr to Graduate School program; 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—#; cannot apply cr to Graduate School program; offered summer only) 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, #; cannot apply cr to Graduate School program; 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.** (1-3 cr [max 6 cr]; SP—#; cannot apply cr to Graduate School program; A-F only) Directed independent study, readings, and/or projects of interest to education students.

**Educ 4993. Special Area Project.** (1-4 cr; SP—#; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; 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—Cannot apply cr to Graduate School program)

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—Cannot apply cr to Graduate School program; 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—Cannot apply cr to Graduate School program) Effects of technological and social changes on education; the future-conscious educational program.

**Educ 5164. Environmental Education In-Service Training.** (1-10 cr [max 10 cr]; SP—#; cannot apply cr to Graduate School program; 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—#; cannot apply cr to Graduate School program; 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—#; cannot apply cr to Graduate School program; 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—Cannot apply cr to Graduate School program; 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.** (1-3 cr [max 3 cr]; SP—#; cannot apply cr to Graduate School program; 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—#; cannot apply cr to Graduate School program; 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—Cannot apply cr to Graduate School program; 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—Cannot apply cr to Graduate School program; 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.** (1-4 cr [max 6 cr]; SP—Cannot apply cr to Graduate School program; 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, 90 cr or grad or adult spec student 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) Current issues and trends regarding computers, media, and related technologies. Specific themes and/or content varies.

**Educ 5421. Research Methods in Education.** (2 cr; SP—\$5421; admission to MEd or #; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; 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—Cannot apply cr to Graduate School program; 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—#; cannot apply cr to Graduate School program; S-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—Cannot apply cr to Graduate School program; 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—Cannot apply cr to Graduate School program) Using historic sites and related materials to create curriculum materials; implementing and evaluating living history learning experiences in classrooms.

**Educ 5784. Multicultural Literature for Children and Adolescents.** (3 cr; SP—Cannot apply cr to Graduate School program; 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.** (1-4 cr [max 8 cr]; QP—#; SP—#; cannot apply cr to Graduate School program; A-F only) Directed independent study, readings, and/or projects of interest to students in education.

**Educ 5993. Special Area Project.** (1-4 cr; SP—Cannot apply cr to Graduate School program; A-F only) Independent project for advanced students to substantially further their theoretical knowledge base or professional competencies.

**Educ 5994. Current Issues in Education.** (1-4 cr; SP—Tchg exper or #; cannot apply cr to Graduate School program; A-F only) Issues such as school reform and educational innovations.

**Educ 5995. Topics in Education: (Various Titles to be Assigned).** (1-4 cr [max 4 cr]; SP—Cannot apply cr to Graduate School program; A-F only) Topics selected from education to meet needs and interests of different groups of students. Topics vary. Specific course content announced in *Class Schedule*.

## 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 #; cannot apply cr to Graduate School program; 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—#; cannot apply cr to Graduate School program; 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. Topics in Education and Human Service Professions.** (1-4 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; cannot apply cr to Graduate School program; A-F only) Topics announced in *Class Schedule*.

**EHS 5990. Research Project.** (1-12 cr; SP—Cannot apply cr to Graduate School program; A-F only) Faculty-supervised research project required for M.Ed.

## Education, Secondary (EdSe)

### College of Education and Human Service Professions

**EdSe 3204. General Instructional Methods.** (3 cr; SP—Admission to sec ed 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 sec ed 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.

**EdSe 3206. Apprenticeship: Secondary School.** (2 cr; SP—Admission to sec ed 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.

**EdSe 4100. Human Relations in Classrooms.** (2 cr; SP—Admission to sec ed program; cannot apply cr to Graduate School 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 sec ed program, 3204 or #; cannot apply cr to Graduate School program; 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.

**EdSe 4244. Teaching Social Studies: Grades 5-12.** (3 cr; SP—Admission to sec ed program, 3204 or #; cannot apply cr to Graduate School program; 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 sec ed program, 3204 or #; cannot apply cr to Graduate School program; 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 4501. Educational Psychology.** (3 cr; SP—Admission to sec ed program; cannot apply cr to Graduate School program; 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; cannot apply cr to Graduate School program; 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 4991. Independent Study.** (1-6 cr [max 6 cr]; SP—#; cannot apply cr to Graduate School program; A-F only) Directed independent study, readings, or projects of interest to education students.

**EdSe 4993. Special Area Project.** (1-4 cr; SP—#; cannot apply cr to Graduate School program; A-F only) Independent project for advanced students to substantially further their theoretical knowledge base or professional competencies.

**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 Middle Schools.** (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.** (1-6 cr [max 6 cr]; SP-#; cannot apply cr to Graduate School program; A-F only)

Directed independent study, readings, and/or projects of interest to education students or practicing teachers.

**EdSe 5993. Special Area Project.** (1-4 cr [max 4 cr]; SP—Cannot apply cr to Graduate School program; 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—EdAd lic prog or #; cannot apply cr to Graduate School program; A-F only)

Required competencies of educational administration professionals seeking licensure or advanced educational degrees. Competency areas of diversity, creativity, technology, leadership, resource management, and assessment/regulations. Professional portfolios used to illustrate competencies.

**EdAd 5911. Leadership and Personal Growth.** (4 cr; SP—EdAd lic prog or #; cannot apply cr to Graduate School program; A-F only)

K-12 administrative competencies: school leadership, judgment skills, oral and nonverbal communications, written expression, philosophical and cultural values. Superintendent competencies: leadership and district culture, and values and ethics of leadership.

**EdAd 5912. Supervision of Teachers and School Staff.** (4 cr; SP—EdAd lic prog or #; cannot apply cr to Graduate School program; 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—EdAd lic prog or #; cannot apply cr to Graduate School program; 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—EdAd lic prog or #; cannot apply cr to Graduate School program; 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—EdAd lic prog or #; cannot apply cr to Graduate School program; 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 and Management and Assessment of Learning.** (4 cr; SP—EdAd lic prog or #; cannot apply cr to Graduate School program; 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; 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; 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; 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)

## Course Descriptions

**ECE 2212. Electronics I.** (4 cr; QP-3006; 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; 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; SP-2111; A-F only)

System mathematical modeling: differential equations, Laplace transform, block diagrams, signal flow graphs. System performance characteristics: time response, sensitivity errors. 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; 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; 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; 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 or Phys 1109H; 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; 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; 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)

**ECE 4305. Computer Architecture.** (4 cr; QP-3340; 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-3035 or 3340 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, ¶ICS 5520; SP-4305, ¶ICS 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, 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; SP-2006; cannot apply cr to Graduate School program; 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; 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, 3035 or CpE 3035; SP-2111, 3235; A-F only)

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; SP-3445; cannot apply cr to Graduate School program; A-F only)

Topics in switching theory, transmission, networking, traffic engineering, and associated engineering programs and solutions. (3 hrs lect)

**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; 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; SP-\$4951; 3341, BSECE candidate, #; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; 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; cannot apply cr to Graduate School program; A-F only) Special projects not available in regular curriculum. Independent investigation, research studies, or survey of selected projects or problems.

**ECE 4995. Selected Advanced Topics or Seminar.** (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; SP-\$4951; 4899, BSECE candidate, #; cannot apply cr to Graduate School program; 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. Practicum.

**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 #; cannot apply cr to Graduate School program; A-F only) Curriculum standards and research-based pedagogy. Practicum.

**EIED 4345. Instructional Strategies, Assessment, and Management.** (4 cr; SP-3113, ¶4344, ¶4366, ¶SpEd 5310, EIED candidate or #; 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, EIED candidate, ¶4344, ¶4345, ¶SpEd 5310; cannot apply cr to Graduate School program; 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. Practicum.

**EIED 4600. Student Teaching.** (6-12 cr; SP-Sr, EIED candidate, Δ; cannot apply cr to Graduate School program; S-N only) Planning, implementing, and evaluating an elementary curriculum. Assessing learning needs and collaborating with specialists to individualize methods and materials.

**EIED 4650. Student Teaching in Individual Subjects—K-8.** (1-6 cr [max 7 cr]; SP-Δ; cannot apply cr to Graduate School program; 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; cannot apply cr to Graduate School program; 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-#; cannot apply cr to Graduate School program; 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-#; cannot apply cr to Graduate School program; 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; cannot apply cr to Graduate School program; 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-#; cannot apply cr to Graduate School program; 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.** (2 cr; QP-Math 1297 or ¶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 equiv; SP-Math 3280, Phys 1201)

Fundamentals of electric circuit analysis. Single-phase and three-phase AC. Rotating electric machines. Power distribution systems.

## English (Engl)

### *College of Liberal Arts*

**Engl 1001. Great American Authors.** (3 cr; A-F only)

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, §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)

Developing critical reading skills in fiction, poetry, and drama.

**Engl 1507. Time and Place.** (3 cr; A-F only)

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)

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)

Readings primarily in American, British, and Irish literature.

**Engl 1582. Introduction to World Literatures.** (3 cr; A-F only)

Sampling of literary works mainly from Middle East, Africa, Far East, and South America.

**Engl 1666. Tales of Terror.** (3 cr; A-F only)

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-Fewer than 30 cr; A-F only)

The Gothic tradition in American literature, from colonial days to the present, with special attention to psychological and cultural implications. Visual arts, film, and theories of terror, horror, the uncanny, and the grotesque.

**Engl 1802. Freshman Seminar: Asian Culture.** (3 cr; SP-Fewer than 30 cr; A-F only)

Chinese and Japanese cultures, including Confucianism, Taoism, Buddhism, Shintoism; arts such as calligraphy, printing, poetry, garden design, and music; and some political history.

**Engl 1803. Freshman Seminar: Unseen Reality.** (3 cr; SP-Fewer than 30 cr; A-F only)

Concepts of “the ideal” and “the real” as developed by writers with differing perspectives in a variety of literary forms, including fiction, nonfiction, and poetry.

**Engl 1907. Introduction to Literature.** (3 cr; QP-§1906; primarily for nonmajors; SP-Primarily for nonmajors; A-F only)

Literary modes and methods of literary study and interpretation.

**Engl 2571. Contemporary Literature.** (3 cr; A-F only)

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)

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)

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 #; cannot apply cr to Graduate School program)  
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 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 5523. Middle English Language and Literature.** (4 cr; QP–8 cr literature; SP–6 cr literature; A-F only)  
Introduction to and reading of Middle English; reading, discussion, and criticism of selections from alliterative poetry, metrical romances, saints' legends, the mystics. Langland, Gower, Lydgate, Malory.

**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, or 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)  
Studies of controversies and cultural change evident in English literature, 1660–1800. Such authors as Dryden, Behu, Pope, Fielding, Johnson.

**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.

## Course Descriptions

**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 5585. British Novel I.** (4 cr; SP-6 cr literature; A-F only)  
The British novel in its social, intellectual, and aesthetic contexts, origins to 1872. Authors and topics vary.

**Engl 5586. British Novel II.** (4 cr; QP-8 cr literature; SP-6 cr literature; A-F only)

The British novel in its social, intellectual, and aesthetic contexts, 1872 to present. Authors and topics vary.

**Engl 5591. Independent Study.** (1-5 cr [max 8 cr]; QP-Max 6 cr may be applied to Graduate School program; SP-#; max 6 cr may be applied to Graduate School 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 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 8111. Seminar: Medieval and Renaissance Studies.** (4 cr; A-F only)

Advanced study of literature and literary culture. Historical, cultural, and literary contexts; methodology; relevant scholarship and criticism.

**Engl 8141. Seminar: 19th-Century British Literature.** (4 cr; A-F only)

Advanced study of Romantic and Victorian literature and literary culture. Historical, cultural, and literary contexts; methodology; relevant scholarship and criticism.

**Engl 8175. Seminar: Modernism.** (4 cr; A-F only)

Advanced intensive study of selected modern writers. Historical, cultural, and literary contexts; methodology; relevant scholarship and criticism.

**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; SP-Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

**Engl 8888. Thesis Credits: Doctoral.** (1-18 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 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 in Environmental Studies.** (2-4 cr [max 8 cr]; SP-60 cr, ES major or #)

In-depth examination of one or more problems or topics in this interdisciplinary field.

**ES 4001. Independent Study.** (1-3 cr; SP-60 cr or #; cannot apply cr to Graduate School program)

Directed readings and projects for students who wish to do advanced work on topics not normally covered in other courses.

**ES 5001. Environmental Studies Seminar.** (4 cr; QP-ES major, 90 cr; not for grad cr; SP-ES major, 90 cr; not for grad cr; A-F only)

Critical discussion, research, and literature review of multidisciplinary environmental issues.

**ES 5050. Environmental Studies Internship.** (2-4 cr; SP-Cannot apply cr to Graduate School program; A-F 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]; OP-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 7100. Clinical Family Medicine.** (13 cr [max 117 cr]; SP-Δ; cannot apply cr to Graduate School program; 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 3141. Business Communications.** (3 cr; OP-Comp 1110, SBE candidate or Econ major or Act or Bus Adm minor with 60 cr 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 Engr major or approved non-SBE student minoring in Bus Adm or MIS or CS 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 1521 or ¶CS 1521, SBE candidate 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, CS 1511, 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 1521 or ¶CS 1521, SBE candidate 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 1521 or ¶CS 1521, SBE candidate or □ A-F only)

In-depth examination of design and use of expert systems in a business environment. Applications, architectures, knowledge representation, inferring strategies, and development tools and techniques.

**FMIS 3228. Electronic Commerce.** (3 cr; SP-3201, CS 1511, SBE candidate or approved non-SBE MIS minor or □ A-F only)

Overview of impact of Electronic Commerce (EC) on business, principles and practices of Internet-based EC, 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 student minoring in Bus Adm 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-SBE candidate, 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 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-3222, 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 student minoring in Bus Adm or Finance 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.

## Course Descriptions

**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 student minoring in Finance 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 3644. Investment Fundamentals.** (3 cr; QP-3611, SBE candidate or Acct or Bus Adm minor with 90 credits or □ SP-3601, SBE candidate or approved non-SBE student minoring in Finance 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 student minoring in Finance 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 student minoring in Finance 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 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-§3971; 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 4225. Advanced Applications Development.** (3 cr; QP-SBE candidate with 120 cr or grad student or □ SP-3421, CS 1521 or ¶CS 1521, SBE candidate 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 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 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.

**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-Fewer than 30 cr; A-F only)

Through direct experience and discourse, students study the multiple venues in which art is presented, exhibited, and perceived. Issues in aesthetic philosophy and arts criticism.

**FA 1101. Freshman Seminar: Creating Art.** (3 cr; SP-Fewer than 30 cr; A-F only)

Multiplicity of ways that art is created and the situation in which such work arises, including aesthetic philosophy and creative work.

**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. Topics in Fine Arts: (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–Cannot apply cr to Graduate School program)  
Advanced work in interdisciplinary and interactive or collaborative projects, performances, or installations, drawing upon concepts and processes from various arts disciplines.

## French (Fr)

### *College of Liberal Arts*

**Fr 1101. Beginning French I.** (4 cr; A-F only)  
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)  
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–1303 or equiv or #; SP–3-4 yrs high school Fr or 1102 or #; A-F only)  
Consolidation and enrichment of previously acquired abilities in 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)  
Consolidation and enrichment of previously acquired abilities in 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)  
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)  
Images of human diversity in French cinema. Films with English subtitles; class discussion in English.

**Fr 3006. Language Study Abroad.** (1-5 cr [max 10 cr]; QP–Δ; SP–Δ)  
For students pursuing formal study of French, beyond the beginning and intermediate levels, in a French-speaking country, under the auspices of another college or university or by individual agreement.

**Fr 3400. Culture and Civilization Study Abroad.** (1-10 cr [max 20 cr]; QP–Δ; SP–Δ)  
For students pursuing formal study of French culture and civilization, beyond the beginning and intermediate levels, in a French-speaking country, under the auspices of another college or university or by individual agreement.

**Fr 3591. Independent Study.** (1-4 cr [max 8 cr]; QP–3001 or equiv, C or better in advanced 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 advanced Fr language sequence or #; SP–2301 or equiv with C or better or #; cannot apply cr to Graduate School program; A-F only)  
Representative novels.

**Fr 4472. French Classical Literature.** (4 cr; QP–3001 or equiv, C or better in advanced Fr language sequence or #; SP–2301 or equiv with C or better or #; cannot apply cr to Graduate School program; A-F only)  
Representative works of 17th-century French prose, poetry, and theatre. Taught in French.

**Fr 4482. Voltaire and Rousseau in English.** (4 cr; QP–3001 or equiv, C or better in advanced Fr language sequence or #; SP–2301 or equiv with C or better or #; cannot apply cr to Graduate School program; A-F only)  
Representative works.

**Fr 4492. 19th-Century Novel.** (4 cr; QP–3001 or equiv, C or better in advanced Fr language sequence or #; SP–2301 with C or better or #; cannot apply cr to Graduate School program; A-F only)  
Novels by writers such as Hugo, Balzac, Stendhal, Flaubert, Zola, and Maupassant. Taught in French.

## Geography (Geog)

### *College of Liberal Arts*

**Geog 1202. World Regional Geography.** (3 cr; A-F only)  
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.

## Course Descriptions

### **Geog 1304. Human Geography.** (3 cr; A-F only)

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)

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)

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)

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)

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 3104. Historical Geography: United States.** (4 cr; QP-40 cr incl 4 cr Geog or #; SP-25 cr incl 3 cr Geog or #; A-F only)

Geographic conditions influential in development and settlement of the United States.

### **Geog 3113. Geography of American Indians in the United States and Canada.** (3 cr; QP-40 cr incl 4 cr Geog or #; SP-25 cr incl 3 cr Geog or #; A-F only)

Regional shifts in location and spatial organization of American Indians pre- and post-European contact. Comparative analysis of U.S. and Canadian groups.

### **Geog 3143. Ethnic Geography of American Immigration.** (3 cr; QP-40 cr incl 8 cr Geog or #; SP-25 cr incl 6 cr Geog or #; A-F only)

Geographic survey of origins and distribution of European immigration in the United States; theories relating to migration and location of immigrants; transplanted systems of cultural ecology and the American environment; ethnicity as a geographic expression. Local and regional case studies.

### **Geog 3333. Urban Geography.** (3 cr; QP-40 cr incl 4 cr Geog or #; SP-25 cr incl 3 cr Geog or #; A-F only)

Urbanization as a geographic process. Perspectives on the origins of cities, patterns of urban development, and contemporary urban problems.

### **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)

Analysis of the distribution and pattern of various transportation modes; examination of geographic aspects of transport systems at empirical and theoretical levels.

**Geog 3352. Urban and Regional Planning.** (3 cr; QP-40 cr incl 8 cr Geog or #; SP-25 cr incl 6 cr Geog or #; A-F only)  
Planning principles, process, and practice. History and trends in planning; development of comprehensive plans; implementation process in urban and regional planning.

### **Geog 3362. Geographic Aspects of Outdoor Recreation.** (3 cr; QP-40 cr incl 4 cr Geog or #; SP-25 cr incl 3 cr Geog 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 3382. U.S. and Canadian Public Lands and Public Land Policy.** (3 cr; QP-40 cr incl 4 cr Geog or #; SP-25 cr incl 3 cr Geog or #; A-F only)

Comparison of public land systems in the United States and Canada, including philosophies and attitudes toward public land; patterns of land use; current stresses on public lands.

### **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 3451. The Geography of Soils.** (4 cr; A-F only)

Soil formation processes in various environments, emphasizing soil as a resource that reflects human-environment interaction. (3 hrs lect, 1 hr lab)

### **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.

### **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)

**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 8 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 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 3742. Geography of the Middle East and North Africa.** (3 cr; QP-40 cr incl 8 cr Geog or #; SP-25 cr incl 6 cr Geog or #; A-F only)

Study of one of the world's most strategic regions. Geopolitical significance of this region; physical and cultural themes; role of oil and Arab-Israeli dispute in political geography of the Middle East.

**Geog 3752. Geography of Russia and Other Commonwealth Republics.** (3 cr; QP-40 incl 8 cr Geog or #; SP-25 cr incl 6 cr Geog or #)

Physical and cultural geography of Russia and other republics of the former Soviet Union from an ethnic and geographical perspective.

**Geog 3762. Geography of Europe.** (3 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 countries of Europe considered regionally and through a more detailed discussion of topics dealing with environmental, energy, urban, and industrial issues.

**Geog 3767. Geography of Scandinavia, Finland, and Iceland.** (3 cr; QP-40 cr incl 8 cr Geog or #; SP-25 cr incl 6 cr Geog or #; A-F only)

Cultural and physical geography of Scandinavia, Finland, and Iceland; introduction to their settlements in North America.

**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 in Geography: (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 4563. Introduction to Geographic Information Science.** (3 cr; SP-3532, ¶4564, 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, ¶4563 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 5431. Principles of Geographic Hydrology.** (4 cr; QP-1403 or 1413, 45 cr or #; SP-1414, 30 cr or grad student or #; A-F only)

Geography of water processes: relationships between rivers and landscape. Incorporating theoretical and empirical studies into hydrologic principles, stream channel processes, and fluvial geomorphology: spatial and temporal variations in water distribution, analyses of hydrologic data, flows, sediment, forecasting, hydrographs, and modeling.

**Geog 5441. Water Resource Management.** (3 cr; QP-1403 or 1413, 5430, 45 cr or grad student or #; SP-1414, 30 cr or grad student or #; A-F only)

Geography of water distribution, planning, and management. Application of hydrological information in water management: aspects of water quantity and quality, groundwater availability, water use and treatment, resource development, political and administrative issues, basin management problems, forestry, agriculture, urbanization, floods, drought.

**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,

## Course Descriptions

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 or incl 16 cr Geog or grad student or #; SP-60 or 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.

**Geog 5803. Geographic Thought.** (3 cr; QP-45 or incl 16 cr Geog or grad student or #; SP-30 or 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.

**Geog 5991. Independent Study in Geography.** (1-4 cr [max 6 cr]; QP-#; max 6 cr can be applied to Graduate School program; SP-#; max 4 cr can be applied to Graduate School program; A-F only)

Independent problems for postbaccalaureate students interested in doing additional work in selected fields in geography.

**Geog 5995. Special Topics in Geography: (Various Titles to be Assigned).** (1-4 cr [max 8 cr]; QP-#; max 6 cr can be applied to Graduate School program; SP-Grad student or #; max 8 cr can be applied to Graduate School 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.

**Geog 5999. Senior Project in Geography.** (3-4 cr; SP-#; max 3 cr can be applied to Graduate School 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)

**Geol 1110. Introductory Geology.** (3 cr; A-F only)  
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. (2 hrs lect, 2 hrs lab)

**Geol 1120. Life and Death of the Dinosaurs.** (3 cr; A-F only)  
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. (3 hrs lect)

**Geol 1130. Introduction to Environmental Science.** (3 cr; A-F only)

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 2100. Geological Computer Applications.** (1 cr; QP-1110; SP-1110; A-F only)

Geological use of computer software, including spreadsheets, databases, contouring and drill hole plotting programs, Web page construction, and slide show presentation. (2 hrs lab)

**Geol 2210. Geomorphology.** (3 cr; QP-1110; SP-1110; A-F only)

Geologic processes of Earth's surface environment that produce major elements of the landscape. Aerial photographs and topographic maps as tools for interpreting origin and geological history of landscapes. (2 hrs lect, 2 hrs lab)

**Geol 2300. Basic Mineralogy and Petrology.** (4 cr; QP-§3324; 1110, 1 yr high school chem or 1 qtr of college chem, 30 cr or #; SP-§2311; 1110, sem or college chem or #; not for geol 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, 1 qtr college chem; SP-§2300; 1110, 2 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 2315. Mineral Resource Geology.** (2 cr; QP-3326; SP-2312; A-F only)

Geological origin, extraction, and use of mineral resources; importance of minerals to modern society. (1 hr lect, 2 hrs lab)

**Geol 2350. Earth's Resources.** (3 cr; SP-25 sem cr or #; A-F only)

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. (3 hrs lect, field trip)

**Geol 2410. Geology of North America.** (2 cr; QP-1110; SP-1110; A-F only)

Survey of major physiographic and tectonic provinces of North America, including their geological nature, origin, and history. (2 hrs lect)

**Geol 2610. Oceanography.** (3 cr; A-F only)

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. (3 hrs lect)

**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.** (2 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; strategies for dealing with these problems. (2 hrs lect, field trip)

**Geol 3410. Stratigraphy-Sedimentation.** (3 cr; QP-3300 or 3325 or #; SP-2312; A-F only)

Stratigraphic principles and techniques used to study sedimentary rock and fossil record in order to interpret geologic history. Tectonic settings of basins. Development of life through time. (2 hrs lect, 2 hrs lab)

**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 to plate tectonics. Labs emphasize geologic map interpretation and structural analysis. (2 hrs lect, 4 hrs lab)

**Geol 3530. Field and Computer Methods.** (3 cr; QP-3520 or #; SP-3520 or #; A-F only)

Introduction to basic methods of geologic mapping and preparation of geologic reports. Field projects based on field instrumentation; computer-aided drafting and introduction to GIS. Students expected to use spreadsheets, databases, and word processing. (6 hrs lab)

**Geol 3710. Introduction to Geochemistry.** (3 cr; QP-Math 1296 or equiv, Chem 1112; SP-Math 1296 or equiv, Chem 1152 or #; 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 4211. Applied Hydrogeology.** (3 cr; QP-3200, Math 1296 or #; SP-2210, Math 1296 or #; A-F only)

Introduction to hydrologic cycle, including precipitation, runoff, evapotranspiration, and groundwater recharge. Theory of groundwater flow, groundwater flow to wells, aquifer performance tests, geostatistics, wellhead protection, monitoring well networks, modeling, compilation of hydrogeological investigation reports. (2 hrs lect, 3 hrs lab)

**Geol 4212. Contaminant Hydrogeology.** (3 cr; QP-5210, Math 3298 or #; SP-4211; A-F only)

Introduction to sources and types of groundwater contamination, water balance and leachate quantity analysis, physical and chemical contaminant transport processes, transport equations, analytical and numerical transport modeling, groundwater quality investigations, and remedial actions. (2 hrs lect, 3 hrs lab)

**Geol 4500. Field Geology.** (6 cr; QP-3100, 3326, Δ; SP-3520, 3530, Δ; held at Wasatch-Uinta Field Camp, Park City, Utah, for 6 wks; students must have health insurance; 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 4810. Global Geophysics.** (3 cr; QP-1110 or #; SP-1110 or #; A-F only)

Integrated introduction to seismology, heat flow, gravity, and magnetics. Contribution of these phenomena to our understanding of Earth's evolution and behavior. (3 hrs lect)

**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 in Geology: (Various Titles to be Assigned).** (1-2 cr [max 4 cr]; QP-#; SP-#)

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 glaciers (glaciology), including erosional and depositional activities. 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.** (2 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.

**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.** (2 cr; QP-3520 or #; SP-3520 or #; A-F only)

Nature, distribution, origin, correlation, and special problems of the Precambrian, emphasizing Lake Superior region. Term paper. (2 hrs lect, field trips; offered alt yrs)

**Geol 5350. Economic Geology.** (4 cr; QP-3326, 3150 or #; SP-2312, 3110 or #; 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. (2 hrs lect, 4 hrs lab, field trip; offered alt yrs)

**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. (2 hrs lect, 2 hrs lab; offered alt yrs)

**Geol 5420. Physical Sedimentology.** (3 cr; QP-3325 or #; SP-2312; A-F only)

Mechanics of sediment transport, determining grain size distributions, magnetic granulometry, and introduction to statistical analysis of sediments. Systematic study of

## Course Descriptions

modern environments of deposition. Interpreting environments of deposition of ancient sedimentary rock units. (2 hrs lect, 3 hrs lab; offered alt yrs)

**Geol 5710. Aqueous Geochemistry.** (2 cr; QP-Chem 1112 or #; SP-Chem 1152 or #; A-F only)

Principles of solution chemistry, with application to chemical weathering, acid deposition, rivers, lakes, and oceans. (2 hrs lect)

**Geol 5720. Analytical Methods in Geology.** (2 cr;

QP-3326, Stat 3062 or equiv or #; SP-3710 or #; A-F only) Chemical analysis of geological samples using a range of analytical approaches, including inductively coupled plasma mass spectrometry (ICP-MS). UV-vis spectrophotometry, X-ray diffraction; practical application and data analysis. (1 hr lect, 3 hrs lab; offered alt yrs)

**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. (3 hrs lect; offered alt yrs)

**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-prereq doctoral student, adviser and DGS consent; SP-prereq doctoral student, adviser and DGS consent)

**Geol 8666. Doctoral Pre-Thesis Credits.** (1-18 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; SP-Max 18 cr per semester or summer; 10 cr total required [Plan A only])

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

## German (Ger)

### *College of Liberal Arts*

**Ger 1101. Beginning German I.** (4 cr; A-F only)

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)

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)

Consolidation and enrichment of previously acquired abilities in 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)

Consolidation and enrichment of previously acquired abilities in 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)

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)

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. Taught in English.

**Ger 3006. Language Study Abroad.** (1-5 cr [max 10 cr]; QP-Δ; SP-1202 or equiv, Δ)

For students pursuing formal study of German, beyond the beginning and intermediate levels, in a German-speaking country, under the auspices of another college or university or by individual agreement.

**Ger 3400. Culture and Civilization Study Abroad.** (1-10 cr [max 20 cr]; QP-Δ; SP-1202 or equiv, Δ)

For students pursuing formal study of German culture and civilization, beyond the beginning and intermediate levels, in a German-speaking country, under the auspices of another college or university or by individual agreement.

**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 advanced 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 advanced 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 advanced Ger language sequence with C or better or #; SP-2301 or equiv or #; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; 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 1000. Developing Wellness.** (3 cr; A-F only)  
Individual wellness components, including physiological, psychological, sociological, environmental, and spiritual-moral issues. Emphasis on attaining optimum quality of life through health risk assessment. Personal decision-making concerning health behavior.

**Hlth 1104. Health Science Terminology.** (1-3 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)  
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.

**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 1620. Wilderness Emergency Care.** (3 cr; SP-\$1610; A-F only)  
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 1650. CPR.** (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 CPR certification; A-F only)  
Principles of advanced first aid and accident prevention in the home and community; leads to first responder certification.

**Hlth 2030. Applied Human Anatomy.** (4 cr; SP-\$BIol 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.** (4 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 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, admission to EdSe or BAS PE or BAS hlth ed or BAA exer sci or CSD program 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-1000, 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)  
Health promotion and program planning applied to various work-site settings through the development of program proposals. Practical applications: health assessment, goal setting, program methodology, program evaluation, budgeting, design, and research, through the constraints of a pilot project.

**Hlth 3500. Environmental Health.** (3 cr; SP-Hlth ed candidate or #; A-F only)  
Biological, ecological, and physiological aspects of environmental health; concurrent effects on health of the community; and possible solutions to environmental problems.

**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, #; cannot apply cr to Graduate School program; S-N only)  
Supervised entry-level health education practical experience in hospital, work site, voluntary, or official agencies. Number of settings is limited to two.

**Hlth 5161. School Health Programs: Early Childhood Through Middle School.** (2 cr; SP-ECh or EEd or hlth 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-cannot apply cr to Graduate School program; 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 work sites.

**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 can be applied 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 & 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 and Human Services.** (3 cr; Exer sci or hlth ed or PE or rec major or #; A-F only)  
Principles of investigation and evaluation in health and human service professions with emphasis on methods, data analysis and presentation, and evaluation reports. Basic background information for scientific inquiry; 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, #; cannot apply cr to Graduate School program; 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)  
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)  
Making of modern Europe; analysis of economic and technological revolution, collision of ideologies, imperialist expansion, and revolutions and wars.

**Hist 1304. American Heritage.** (3 cr; A-F only)  
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. American Challenges.** (3 cr; A-F only)  
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 2245. Science and Society: 1500 to Present.** (3 cr; A-F only)  
Explores a series of creative moments in the 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)  
Revolutions of 1917, the Soviet period, collapse of the Soviet Union and evolution of Soviet successor states; 1917 to present.

**Hist 2357. Women in American History.** (3 cr; A-F only)  
Roles and contributions of women in American life from colonial period to present.

**Hist 2515. Precolonial Africa.** (3 cr; A-F only)  
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)  
Upper division classroom course treating historical subjects not included in the regular curriculum.

**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 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. American Genesis.** (3 cr; A-F only)  
The peopling of America, from colonial origins and the evolution of a New World civilization through 19th-century immigration and minority struggles for full membership in the American community.

**Hist 3317. Liberty and Union.** (3 cr; A-F only)  
Study of sectional discord between North and South, secession, Civil War, and Reconstruction, with emphasis on life and legacy of Abraham Lincoln.

**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 5094. Directed Research.** (4 cr [max 12 cr]; QP-#; max 4 cr may be applied to Graduate School program; SP-#; max 4 cr may be applied to Graduate School program; A-F only)

**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)

### HmCI 1023. Folklore.

(3 cr; A-F only)  
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 1025. Zen Buddhism.

(3 cr; A-F only)  
Selected elements of Buddhist history and philosophy from 6th century B.C. India through Ch'an history and philosophy in China and Zen in Japan and America.

### 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 3035. The Music and Lives of the Beatles.

(3 cr; QP-30 cr or #; SP-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.

### 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 3051. Science and Civilization.

(3 cr; QP-30 cr or #; SP-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.

## Humanities and Classics (HmCI)

### College of Liberal Arts

#### HmCI 1004. From Classical Antiquity to Medieval Culture.

(4 cr; A-F only)  
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-Fewer than 30 cr; A-F only)  
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 1007. From Renaissance to Revolutions.

(4 cr; SP-\$1005; A-F only)  
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)  
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)  
The Hebrew Bible, the New Testament, and the Apocrypha examined as literary works of their time.

**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 in Humanities: (Various Titles to be Assigned).** (1-5 cr [max 10 cr]; QP-40 cr or #; SP-30 cr or #; A-F only)

**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 3221. Science Fiction.** (3 cr; SP-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.

**HmCI 3231. Utopian Images.** (3 cr; SP-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.

**HmCI 3241. Women and Men in Popular Culture.** (3 cr;

QP-40 cr or #; SP-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.

**HmCI 3271. Popular Culture in the 1960s.** (3 cr; QP-40 cr or #; SP-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.

**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 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 in Humanities: (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 1105. Introduction to Engineering Design.** (3 cr; A-F only)

Engineering representation and analysis of systems using visualization and sketching; orthographic projection; isometric and oblique pictorials; scales and dimensions; and different coordinate systems. Manufacturing considerations in design and use of CAD for graphic representation.

**IE 1205. Introduction to Manufacturing Engineering.**

(3 cr; QP-1025 or Engr 1025, Math 1296 or #; SP-1105, Math 1296 or #; A-F only)

Methods used to design and manufacture high quality products. Student teams study how manufacturers plan and perform operations to convert raw materials into finished products using acceptable manufacturing methods. Student teams work with cellular manufacturing systems.

**IE 2105. Introduction to Material Science for Engineers.**

(3 cr; QP-Chem 1140 or #; SP-Chem 1151; 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; 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. Manufacturing Processes I.** (4 cr; QP-3005 or

Chem 3010, Engr 3016, Phy 1109, Stat 3562, BIE candidate; SP-2105, Stat 3611, BSIE candidate; A-F only)

Thermal and mechanical processing techniques for metals, plastics, and composites using special and general purpose machines and tools.

**IE 3205. Project Management.** (3 cr; QP-3061, 3110 or

3111, BIE candidate; SP-3125, BSIE candidate; A-F only)

Development and management of plans for resources needed in industrial projects. Life cycle of projects.

## Course Descriptions

**IE 3245. Manufacturing Processes II.** (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; cannot apply cr to Graduate School program; 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; cannot apply cr to Graduate School program; 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; cannot apply cr to Graduate School program; 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 4175. Machine Design.** (3 cr; SP–BSIE candidate or #; cannot apply cr to Graduate School program; 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; cannot apply cr to Graduate School program)

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; cannot apply cr to Graduate School program; 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. Design of Industrial Systems.** (3 cr; QP–IE sr; SP–3205, BSIE candidate; cannot apply cr to Graduate School program; 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, #; cannot apply cr to Graduate School program; 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–#; cannot apply cr to Graduate School program)

Topics not available in regular department curriculum. May involve specialties of department or visiting faculty.

## Interdisciplinary Archaeological Studies (InAr)

### *College of Science and Engineering*

**InAr 5005. Geoarchaeology.** (3 cr; SP–Grad student or #; offered all years; A-F only)

Systematic review of current research on application of geology and geography to solution of archaeological problems.

**InAr 5009. Cultural Resource Management.** (3 cr; SP–Grad student or #; offered all years; A-F only)

Survey of cultural resource management archaeology, including applicable state and federal law, with practical problems.

**InAr 5100. Topics in Archaeology: (Various Titles to be Assigned).** (3 cr [max 9 cr]; SP–Grad student or #; A-F only) Topics vary.

**InAr 5676. Field Research in Archaeology.** (1-10 [max 10 cr]; SP–Anth 1602 or Anth 1612 or #; A-F Only)

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

**InAr 8001. Archaeologic Method and Theory.** (3 cr; SP–Offered all yrs; A-F only)

Contemporary methodological and theoretical issues and approaches in archaeology.

**InAr 8003. Archaeologic Science.** (3 cr; SP–Offered all years; A-F only)

Review and evaluation of application of theory and methodology of natural sciences to solution of archaeological problems.

**InAr 8100. Interdisciplinary Seminar.** (3 cr; SP–Offered all years; A-F only)

Themes in successful applications of interdisciplinary studies in archaeology. Interdisciplinary project.

**InAr 8200. Directed Readings.** (1-4 cr [max 8 cr]; SP–#; A-F only)

Under direction of IAS staff.

**InAr 8300. Directed Research.** (1-4 cr [max 8 cr]; SP–#; A-F only)

Under direction of IAS staff.

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

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

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

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

**InAr 8888. Thesis Credits: Doctoral.** (1-18 cr; SP–Max 18 cr per semester or summer; 24 cr required)

## Interdisciplinary Studies (IS)

### College of Liberal Arts

**IS 3001. Interdisciplinary Methods Seminar.** (3 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 in Interdisciplinary Studies: (Various Titles to be Assigned).** (1-4 cr; SP–15 cr or #)

**IS 3099. Senior Project.** (1-10 cr; QP–; 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 in Liberal Studies: (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)

**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.

**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 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 master of liberal studies program.

## International Business (IntB)

### School of Business and Economics

**IntB 3201. International Business.** (3 cr; QP–SBE candidate of □ 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)  
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)  
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 for 8 cr max; A-F only)  
Special topic identified at time course offered.

**IntS 1191. International Study.** (1-5 cr [max 15 cr]; QP–Δ; may be repeated simultaneously or sequentially for 15 cr max; SP–Δ; A-F only)  
For students who want to take an independent study course while traveling or living in a foreign country. Course must be approved by supervising faculty member and director of international studies.

**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 3191. International Study.** (1-5 cr [max 15 cr]; QP–Δ; may be repeated simultaneously or sequentially for 15 cr max; SP–Δ; A-F only)  
For students who want to take an independent study course while traveling or living in a foreign country. Course must be approved by supervising faculty member and director of international studies.

**IntS 3195. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 8 cr]; QP–May be repeated simultaneously or sequentially for 8 cr max; 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 may be applied to IntS major; SP–50 cr, Δ: max 4 cr may be applied to 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 for 8 cr max; 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.

## Language (Lang)

### *College of Liberal Arts*

**Lang 1101. Beginning Foreign Language I.** (4 cr; A-F only)  
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)

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 1201. Intermediate Foreign Language I.** (4 cr; QP–1103 or equiv or #; SP–1102 or #)

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)

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 3091. Directed Study.** (1-3 cr [max 6 cr]; QP–#, Δ; SP–#, Δ; A-F only)

Students plan their program of study in conference with the instructor in an area not covered by regular courses.

**Lang 3095. Special Topics in Languages: (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; SP–Δ)

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; cannot apply cr to Graduate School program; 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.

## Limnology (Lim)

### *College of Science and Engineering*

**Lim 5601. Limnology I: Physics and Chemistry.** (4 cr; QP–15 qtr cr of upper div sciences, #; SP–10 sem cr of upper div sciences, #; A-F only)

Physical and chemical processes in lakes and watersheds. Origins, heat budgets, circulation dynamics, biogeochemical cycling of major and trace elements, nutrient dynamics. (3 hrs lect, 3 hrs lab, field trips)

**Lim 5602. Limnology II: Biology and Geology.** (4 cr; QP–5001, 5002; SP–5601; A-F only)

Biological and geological processes in lakes and watersheds. Trophic dynamics, ecosystem-level and watershed-level integration of biota with chemical and physical processes. Sedimentary processes and composition of sediments. Geochronology, paleolimnology. (3 hrs lect, 3 hrs lab, field trips)

## Linguistics (Ling)

### *College of Liberal Arts*

**Ling 1811. Introduction to Language.** (3 cr; A-F only)

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 in Linguistics: (Various Titles to be Assigned).** (3 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 in Linguistics: (Various Titles to be Assigned).** (3 cr; SP-1811 or #)  
Subdisciplines, including pragmatics, semantics, regional and social language variation, sociolinguistics, childhood language acquisition, second language learning, language change and linguistics reconstruction, 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 Mgmt-Human Resource or Mgmt-Organizational 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 approved 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 Mgmt-Human Resource or Mgmt-Organizational 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 consent of internship director; 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-Organizational 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 □ 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-Organizational 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; 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.

## Course Descriptions

**Mgts 4461. Business and Society.** (3 cr; SP—SBE candidate or approved non-SBE Mgmt-Organizational 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-Organizational 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. Seminar: Topics in Management Studies (Various Titles to be Assigned).** (1-3 cr [max 9 cr]; SP—SBE candidate 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 ☐ cannot apply cr to Graduate School program; 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 Field Studies.** (3 cr; SP—90 cr, SBE candidate, Δ; cannot apply cr to Graduate School program; 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, 3731, 1 other marketing course, 90 cr, SBE candidate or ☐ cannot apply cr to Graduate School program; 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 Mgmt-Human Resource minor or ☐ cannot apply cr to Graduate School program; 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 Mgmt-Human Resource minor or ☐ cannot apply cr to Graduate School program)

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.

**Mgts 4841. Training and Development.** (3 cr; SP—3801, SBE candidate, approved non-SBE Mgmt-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 Mgmt-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 [non-MBA grad student, ☐]; 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; QP—Econ 1203, Econ 1204 or equiv; SP—Econ 2020 or equiv; 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, MBA student or [non-MBA grad student, □; 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; QP–Acct 8512, FMIS 8211, FMIS 8611, MgtS 8711; SP–8311, 8501, 8611, 8711, MBA student or [non-MBA grad student, □; 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 1995 or equiv, grad student; SP–Acct 2005 or equiv, MBA student or [non-MBA grad student, □; A-F only])  
Students develop an understanding of the significance and limitations of information presented in financial statements used by managers to evaluate overall performance of an organization and its segments. Provides managers with the skills and understanding to use tools to enhance quality of managerial decisions.

**MBA 8512. Managerial Economics.** (2 cr; QP–[Econ 1004, Econ 1005 or equiv], grad student or □ SP–[Econ 1022, Econ 1023 or equiv], MBA student or [non-MBA grad student, □; 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; QP–FMIS 3611 or equiv; SP–FMIS 3601 or equiv, MBA student or [non-MBA grad student, □; A-F only])  
Corporate financial policy. Application of financial theory and decision-making tools.

**MBA 8711. Marketing Management.** (3 cr; QP–MgtS 3701 or equiv, grad student; SP–MgtS 3701 or equiv, MBA student or [non-MBA grad student, □; 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; QP–Mgmt 3304 or equiv, grad student; SP–MgtS 3401 or equiv, MBA student or [non-MBA grad student, □; 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; QP–MgtM 3804 or equiv; SP–MgtS 3801 or equiv, MBA student or [non-MBA grad student, □; 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–MBA student or [non-MBA grad student, □; A-F only])  
Provides opportunity for 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 student or [non-MBA 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 student or [non-MBA 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 student or [non-MBA 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)

### Mathematics and Statistics

#### College of Science and Engineering

(See *Statistics for Stat* courses.)

**Math 1002. Euclidean Geometry.** (3 cr, cannot apply cr toward degree; QP–1001 or equiv; SP–High school algebra; 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 1004. Intermediate Algebra.** (5 cr, cannot apply cr toward degree; QP–1001, 1002; SP–Math placement or  $\Delta$ ; A-F only)  
Basic concepts of solving equations and inequalities. Introduction to function concept and graphing. Polynomial, rational, logarithmic, and exponential functions.

**Math 1024. Introduction to Contemporary Mathematics.** (3 cr; SP–1004 or math placement; A-F only)  
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.

## Course Descriptions

**Math 1141. Mathematics for Elementary Education.** (4 cr; QP-1002, 1003; SP-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-1002; 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; 1004; A-F only)

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-Fewer than 30 cr; A-F only)

**Math 1250. Precalculus Analysis.** (4 cr; QP-1002, 1003; SP-1004 or math placement; A-F only)  
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 Modeling.** (5 cr; SP-§1160, §1296; 1250 or math placement; A-F only)

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-§1160, §1290; 3 1/2 yrs high school algebra or trig or geometry or college precalc course; A-F only)

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-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 3010. Actuarial Calculus.** (1 cr, cannot apply cr toward math major or minor; QP-3350; SP-3298; ; S-N only)  
Problem-solving techniques in calculus and linear algebra needed in actuarial work.

**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,  $\Delta$ ; 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 3320. Introduction to Linear Algebra.** (3 cr; QP-3298; SP-1297; A-F only)

Systems of linear equations, matrix algebra, determinants, real vector spaces, basis and dimension, linear transformations, eigenvectors and eigenvalues, Gram-Schmidt orthogonalization.

**Math 3355. Discrete Mathematics.** (4 cr; QP-3320, CS 1502 or CS 1621; SP-1296, college-level programming course, 1297 or 2nd programming course; 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; 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- $\Delta$ ; SP- $\Delta$ ; 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 4820. Applied Mathematics: Numerical Methods.** (3 cr; QP-1297, 3320, proficiency in FORTRAN or Pascal; SP-3280 or 3320)

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  $\mathcal{L}^p$ . Metric spaces; continuous functions, connectedness, compactness, completeness. 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, 3699; 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 5326. Linear Algebra I.** (3 cr; QP-3320; SP-3280 or 3320; A-F only)

Fields, vector spaces over fields, subspaces, coordinates, change of basis, linear transformations, matrix representations, inner product spaces, Gram-Schmidt diagonalization, and orthogonal diagonalization.

**Math 5327. Linear Algebra II.** (3 cr; QP-5326; SP-5326; A-F only)

Linear operators, projection operators, annihilating polynomials, triangular and Jordan forms, singular-value decomposition, least squares and generalized least squares, quadratic and bilinear forms.

**Math 5330. Theory of Numbers.** (3 cr; QP-3320 or 3555; SP-3320 or 3355; 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-3280 or 3320; 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-3280 or 3320; A-F only)

Introduction to groups and rings and their applications.

**Math 5372. Abstract Algebra II.** (3 cr; QP-3320, 5670; SP-5371; A-F only)

Polynomial rings, divisibility in integral domains, field extensions, finite fields, special topics, and applications.

**Math 5384. Algebraic Coding Theory.** (3 cr; QP-3320; SP-3280 or 3320; 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-\$JE 3070; 3320; SP-3280 or 3320; 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 3320)

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 3320)

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-5280; A-F only)

Computational differencing techniques as applied to initial- and boundary-value problems. Introduction to variational formulations of differential equations and the general technique of weighed residuals.

**Math 5900. Team Modeling Project.** (3 cr; SP-sr, #; cannot apply cr to Graduate School program)

Team-based, model-design project. Applications and methods vary. (offered alt yrs)

**Math 5991. Independent Study.** (1-4 cr [max 8 cr]; QP- $\Delta$ ; SP- $\Delta$ ; cannot apply more than 6 cr to Graduate School 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- $\Delta$ ; SP- $\Delta$ ; 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; SP-max 18 cr per semester or summer; 10 cr total required [Plan A only]; S-N only)

## Course Descriptions

**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)  
Original research in mathematics or statistics.

**Math 8995. Special Topics: (Various Titles to be Assigned).** (1-3 cr [max 6 cr]; QP–#; SP–#; A-F only)  
Topics not available in standard curriculum. (offered when feasible)

## Medical and Molecular Physiology (Phsl)

### School of Medicine

**Phsl 3011. General Physiology.** (4 cr; SP–Biol 1012, Chem 1101 or #; A-F only)  
Function and mechanisms of action of major organ systems; lab and/or lecture demonstrations illustrate key aspects of muscle contraction, heartbeat, and respiration. Primarily for students preparing for nursing, dental hygiene, pre-professional programs, communication disorders, or life science teaching.

**Phsl 5211. Literature Seminar.** (1-2 cr; QP–5927 or #; 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 or Biol 3245], [Chem 3311 or Chem 5336], [3011 or #]; SP–[Biol 2101 or Biol 2201], [Chem 3322 or Chem 4341], [3011 or #])  
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; 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; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Phsl 8888. Thesis Credits: Doctoral.** (1-18 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 2101 or #; SP–#; A-F only)  
The immune system and the cells and molecules that 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; SP–Max 18 cr per semester or summer; doctoral student who has not passed prelim oral)

**MicB 8777. Thesis Credits: Master's.** (1-16 cr; SP–Max 16 cr per semester or summer; 10 cr total required [Plan A only])

**MicB 8888. Thesis Credits: Doctoral.** (1-18 cr; SP–Max 18 cr per semester or summer; 24 cr required)

## Medicine (Med)

### School of Medicine

**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.

## Music (Mu)

### School of Fine Arts

**Mu 0100. Recital Hour.** (0 cr; QP–Regis required each qtr for music majors and minors when enrolled in applied instruction; SP–Concurrent regis in 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)

Various historical style periods; listening to develop understanding and enjoyment of music.

**Mu 1003. Beethoven to the Beatles.** (3 cr)  
Survey of 19th- and 20th-century classical, jazz, rock, pop, and ethnic music genres.

**Mu 1005. Jazz Studies.** (3 cr)

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.

**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.

## Course Descriptions

**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)  
Weekly half-hour individual lesson; A-F only)  
Weekly half-hour individual lesson.

**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 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)  
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)  
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)  
Rehearsal and performance of representative musical literature for symphony orchestra.

**Mu 1504. Chamber Orchestra.** (1 cr; QP—#; may be repeated; SP—#; may be repeated)  
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)  
Study and performance of large jazz ensemble literature.

**Mu 1510. Concert Chorale.** (1 cr; QP—Instructor determines placement, repeatable for 12 cr max; SP—Instructor determines placement, may be repeated)  
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)  
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)  
Study and performance of vocal chamber music.

**Mu 1513. Jazz Choir.** (1 cr; QP—Instructor determines placement, repeatable for 12 cr max; SP—Instructor determines placement, may be repeated)  
Study and performance of music for vocal jazz ensemble.

**Mu 1541. Chamber Music.** (0.5 cr; QP—#; may be repeated; SP—#; 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 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)  
Survey of music of selected world cultures.

**Mu 2003. Survey of American Music.** (3 cr)  
American folk, popular, and art music from colonial times to present.

**Mu 2005. African Roots of American Music.** (3 cr)  
Traditional African music and culture and their influence on American musical styles.

**Mu 2007. The Power of Music.** (3 cr)

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 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 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. Introduction to Jazz Improvisation.** (1 cr; QP-1114 or #; SP-2801; A-F only)

Beginning techniques and concepts.

**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 cr [max 4 cr]; QP-1127 or #; repeatable for 6 cr max; SP-1102; 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.

## Course Descriptions

**Mu 3625. Art of Accompanying.** (1 cr [max 2 cr]; QP=Repeatable for 2 cr max; SP=#; A-F only)  
Role of accompanist; musical, psychological, and technical problems.

**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. Topics in Music: (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 cr [max 2 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; QP–High school performance experience in strings or brass or woodwinds or percussion; instructor determines placement, repeatable for 12 cr max; 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 Choral.** (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.

**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, repeatable for 12 cr max; SP–Instructor determines placement; A-F only)  
Study and performance of vocal chamber music.

**Mu 4513. Jazz Choir.** (1 cr; QP–Instructor determines placement, repeatable for 12 cr max; SP–Instructor determines placement; A-F only)  
Study and performance of vocal jazz ensemble.

**Mu 4541. Chamber Music.** (0.5 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 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. Piano Techniques and Style.** (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 4805. MIDI Applications.** (3 cr; QP–3141, #; SP–2102; A-F only)  
Theoretical and applied study in the use of elements of music instrument digital interface.

**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 #; cannot apply cr to Graduate School program; A-F only)  
Traditional African music and culture and their influences on American musical styles.

## Course Descriptions

**Mu 5201. Advanced Music History.** (3 cr; QP–3200, 3201, 3202; SP–3201, 3202 or #; cannot apply cr to Graduate School program; A-F only)  
Specialized study of selected composers and/or genres.

**Mu 5203. Advanced Choral Literature.** (3 cr; QP–3794 or #; SP–3706 or #; cannot apply cr to Graduate School program; A-F only)  
Study of representative choral literature from various periods of music history.

**Mu 5603. Computer Applications for Music Educators.** (2 cr; QP–90 cr or #; SP–60 cr or #; cannot apply cr to Graduate School program; 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. Topics in Music Education: (Various Titles to be Assigned).** (1-3 cr [max 9 cr]; QP–#; can apply max 6 cr to Graduate School program, repeatable for 12 cr max; SP–#; can apply max 6 cr to Graduate School 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 max 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 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 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 8890. Problems in Music Education.** (1-9 cr [max 12 cr]; SP–Grad student or #; A-F only)  
Directed project.

**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)

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

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

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

**Phil 8888. Thesis Credits: Doctoral.** (1-18 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)

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)

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)

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.

**Phil 1008. Critical Thinking.** (3 cr; A-F only)

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)

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)

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 Pseudoscience: Thinking About Weird Things.** (3 cr; A-F only)

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; differences between rational beliefs and articles of faith and between science and pseudoscience.

**Phil 2250. Feminist Issues in Philosophy.** (3 cr; QP–1001 or #; SP–15 cr or #; A-F only)

Recent criticism by feminist philosophers and substantive feminist contributions, including gender bias in everyday modes of thought and in theories of human nature, relations between 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)

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 pre-Socratic era through Socrates, Plato, and Aristotle, including philosophy of nature, possibility and limits 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,

## Course Descriptions

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 10 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 12th lect; S-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-Phil 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. Contact department (or department Web site) for particular semester offering.

**Phil 4655. Theory of Knowledge.** (4 cr; QP-8 cr Phil; SP-1001, 1008 or 1018 or #; cannot apply cr to Graduate School program; 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 may be applied to Graduate School program; SP-12 cr Phil or #; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; 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.

**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: (Various Titles to be Assigned).** (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 tennis.

**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 bowling.

**PE 1500. Cross-Country Skiing.** (1 cr)  
Development of personal skills in cross country skiing. Understanding of the techniques and concepts for participation in cross-country skiing.

**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 alpine skiing.

**PE 1504. Ice Skating.** (1 cr)  
Development of personal skills in ice skating. Understanding of techniques and concepts for participation in ice skating.

**PE 1506. Sailing.** (1 cr)

Development of personal skills in sailing. Understanding of the techniques and concepts for participation in sailing. 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-#)

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 sport of fishing.

**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.

**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 cr; SP-1612 or #)

For experienced students who have 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]; QP-#; SP-#; S-N only)

Participation in intercollegiate football competition.

**PE 1903. Varsity Soccer.** (1 cr [max 4 cr]; QP-#; SP-#; S-N only)

Participation in intercollegiate soccer competition.

**PE 1905. Varsity Basketball.** (1 cr [max 4 cr]; QP-#; SP-#; S-N only)

Participation in intercollegiate basketball competition.

**PE 1907. Varsity Ice Hockey.** (1 cr [max 4 cr]; QP-#; SP-#; S-N only)

Participation in intercollegiate ice hockey competition.

**PE 1913. Varsity Cross Country.** (1 cr [max 4 cr]; QP-#; SP-#; S-N only)

Participation in intercollegiate cross country competition.

**PE 1917. Varsity Volleyball.** (1 cr [max 4 cr]; QP-#; SP-#; S-N only)

Participation in intercollegiate volleyball competition.

**PE 1919. Varsity Track.** (1 cr [max 4 cr]; QP-#; SP-#; S-N only)

Participation in intercollegiate track competition.

**PE 1921. Varsity Tennis.** (1 cr [max 4 cr]; QP-#; SP-#; S-N only)

Participation in intercollegiate tennis competition.

**PE 1925. Varsity Baseball.** (1 cr [max 4 cr]; QP-#; SP-#; S-N only)

Participation in intercollegiate baseball competition.

**PE 1927. Varsity Softball.** (1 cr [max 4 cr]; QP-#; SP-#; S-N only)

Participation in intercollegiate softball competition.

**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 3117. Sport and the American Society.** (3 cr; A-F only)

In-depth examination of critical issues and controversies of sport in modern society.

**PE 3126. Elementary School Physical Education.** (2 cr; SP-ELED major or #; A-F only)

Developing elementary school physical education program, for elementary school classroom teacher, with

emphasis on planning appropriate curriculum guide and teaching developmental movement experiences.

**PE 3470. Sports Nutrition I.** (3 cr; SP–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.

**PE 3750. Movement Experience for the Young Child.** (1 cr; SP–Eled or SpEd candidate; A-F only)

Movement patterns, planning, and instruction in early childhood education.

**PE 5470. Sports Nutrition II.** (3 cr; SP–3470, Hlth 1470, exer sci or grad student or #; cannot apply cr to Graduate School program; 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 or #; A-F only)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching square dance.

**PEP 1400. Teaching Tennis and Track.** (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 tennis and track.

**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.** (1 cr; SP–#)

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. Teaching Alpine Skiing.** (1 cr; SP–PE or exer sci or rec major; A-F only)

Professional development as an alpine ski 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, 1003, PE major or #; A-F only)

Analysis of philosophy, objectives, programs, methods, evaluation, and developmental motor patterns for elementary school physical education.

**PEP 2071. Clinical Experience: Elementary.** (1 cr;

SP–¶1070, 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. Principles of Athletic Training and Emergency Care.** (2 cr; SP–Exer sci major, Hlth 2030, 2040 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, exercise science majors pursuing athletic training concentration.

**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–BAA or BAS 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 3030. Human Biomechanics.** (3 cr; OP–\$PE 3118; [Hlth 1901 or Hlth 1903], [Hlth 1905 or Phsl 1043], [3-5 cr from Math 1156-1297 or #]; SP–Hlth 2030, Math 1160; A-F only)  
Application of neurophysiological, anatomical, and physical principles to human movement.  
Cinematographical analysis of motion.

**PEP 3040. Exercise Physiology.** (3 cr; SP–[Hlth 2040 or #], PE candidate or Δ; A-F only)  
Physiological responses and adaptations to acute and chronic exercise. (2 hrs lect, 2 hrs lab)

**PEP 3400. Exercise Testing and Prescription.** (2 cr; SP–3040 or #, PE candidate or Δ; A-F only)  
Physical fitness programming for adults; principles of exercise testing and prescription. (1 hr lect, 2 hrs lab)

**PEP 3500. Facilities Management.** (3 cr; SP–BAS or BAA PE candidate or #; A-F only)  
Theory and practice of managing sports facilities.

**PEP 3600. Sport Injury Assessment and Management.** (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. Diagnosis and Treatment of Sport Injuries.** (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. Techniques in Preventing Athletic Injury.** (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 Techniques in Preventing Athletic Injury.** (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 and Techniques 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 3700. Assessment Strategies in School Physical Education.** (4 cr; SP–BAS PE candidate or Δ; A-F only)  
Cognitive and motor performance test construction, selection, administration, evaluation, and statistical strategies; organization and analysis of test scores; grading theory and procedures; computer applications.

**PEP 3730. Secondary Physical Education Methods and Curriculum.** (4 cr; SP–PE major or #; A-F only)  
Analysis of philosophy, objectives, programs, methods, and curriculum for secondary school physical education.

**PEP 3731. Clinical Experience: Secondary.** (1 cr; SP–[1]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 or #; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; A-F only)

**PEP 4996. Internship.** (3-12 cr [max 12 cr]; SP–3040, 3400, PE candidate, #; cannot apply cr to Graduate School program; A-F only)  
Supervised field internship experience in hospital, fitness facility, or agency setting.

**PEP 4997. Practicum.** (1-4 cr [max 4 cr]; SP–PE or exer sci major; cannot apply cr to Graduate School program; 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 adult spec 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. Prevention and Care of Athletic Injuries.** (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.

## Course Descriptions

**PEP 5991. Independent Study.** (1-4 cr [max 8 cr]; SP-Adult spec or grad student or #; 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-Adult spec or grad student or #; A-F only)

## Physics (Phys)

### *College of Science and Engineering*

**Phys 1001. Introduction to Physics I.** (5 cr; SP-Algebra, trig; A-F only)  
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)  
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-1Math 1296; SP-1Math 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)  
Calculus-level general physics course in Newtonian mechanics, including fluid mechanics.

**Phys 1202. Heat and Electricity.** (4 cr; QP-1107; SP-§1204; 1201; A-F only)  
Calculus-level general physics, including DC circuits.

**Phys 1203. Magnetism, Waves, and Optics.** (4 cr; QP-1108, Math 1297; SP-§1204; 1202, Math 1297; A-F only)  
Calculus-level general physics; also includes AC circuits.

**Phys 1204. Electricity, Magnetism, and Optics.** (5 cr; QP-1107, Math 1297; SP-§1202, §1203; 1201, Math 1297; A-F only)  
Calculus-level general physics.

**Phys 1205. Waves and Heat.** (3 cr; QP-1107; SP-§1202, §1203; 1204; 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-12021; 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-Δ; A-F only)  
Directed individual study.

**Phys 3094. Physics Research.** (1-6 cr [max 6 cr]; SP-Δ; 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-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-1Comp 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.

**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; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

## Political Science (Pol)

### *College of Liberal Arts*

**Pol 1011. American Government and Politics.** (3 cr; QP–§1010; A-F only)

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)

Introduction to contemporary international politics: levels of analysis; the international system; nation-state behavior; foreign policy decision making; economic and defense policy issues.

**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. Specific course announced in *Class Schedule*.

**Pol 1200. Introduction to Public Policy.** (3 cr; A-F only)

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)

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)

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 3003. Public Choice: Markets Versus Governments.** (4 cr; SP–1011 or 1610 or #; A-F only)

Ways in which public choices concerning resource allocation, property use, growth, development, and environmental use may be made by either markets or authoritative decisions of government. Failures of both markets and governments in making optimal, fair public choices.

**Pol 3004. The Political Theory of the Welfare State.** (4 cr; SP–1610 or Phil 1003 or #; A-F only)

Justifications and criticism of contemporary welfare state. How notions of social justice and equity, needs, desert, individual welfare, and social responsibility have been used in arguments for the welfare state. Criticisms of libertarian and new right theorists.

**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 3030. Urban Government and Politics.** (3 cr; QP–1011, 60 cr or #; SP–1011, 40 cr or #; A-F only)

Legal, administrative, political, and social aspects of American local government; emphasis on intergovernmental relations and regional cooperation.

## Course Descriptions

**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 3070. Civil Liberties.** (3 cr; QP-1011, 60 cr or #; SP-1011, 40 cr or #; A-F only)

Separation of church and state, death penalties, abortion, First Amendment rights, affirmative action. Legal, moral, and political implications of human rights.

**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.** (1-6 cr [max 8 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, #; 3 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 general upper div Pol major requirements; SP-Sr, Pol major, #; 3 cr max may be applied to advanced Pol major requirements; S-N only)

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 #; offered alt yrs; 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)

Contemporary topics in political science. Specific course announced in *Class Schedule*.

**Pol 3197. Nongovernmental Internship.** (1-6 cr [max 8 cr]; QP-Jr, Pol major, #; 4 cr max from 3105, 3114, 3405, 3414, 3505, 3514, 3605, 3614 may be applied to satisfy general upper div Pol major requirements; SP-Jr, #; 3 cr max from 3097, 3197, 3297 may be applied toward advanced 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.** (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. Ability of modern bureaucracy to meet its own goal of technical efficiency; impact of bureaucratic forms of organization on democratic society.

**Pol 3297. Public Policy Internship.** (1-6 cr [max 8 cr];

SP-Intro courses for public policy concentration or #; 3 cr max may be applied toward public policy concentration advanced cr; 3 cr max total from 3097, 3197, 3297 may be applied toward advanced Pol major; S-N only)

Supervised, scheduled work assignments in policy settings related to student's public policy 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 department 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 3415. International Law.** (4 cr; QP-\$3420, \$3421; 1050, 60 cr incl 12 cr soc sci or #; SP-40 cr incl 8 cr soc sci or #; A-F only)

Nature and sources of international law; cases, writers, and treaties that define content of international law, subjects; human rights; protection of aliens; extradition; territorial questions; diplomatic agents; international agreements; pacific settlement of disputes; law of war and war crimes.

**Pol 3426. Politics of International Organizations.** (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 organizations 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 3460. International Political Economy.** (4 cr; QP-1050, 60 cr or #; SP-40 cr or #; A-F only)

Relationship between politics and economics at international level, focusing on international trade and monetary policies, politics of economic growth and development, role of transnational corporations, and relations between rich and poor states.

**Pol 3510. Russian and Soviet Politics and Government.** (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."

**Pol 3520. Chinese Government and Politics.** (4 cr; QP-60 cr incl 12 cr soc sci or #; SP-40 cr incl 8 cr soc sci or #; A-F only)

Imperial China and the "Western Impact" in the 19th century. Twentieth-century transitions: the Republican, Nationalist, and Communist revolutions. Maoist and post-Maoist politics and policies: traditional, developmental, and ideological variables. Deng Xiaoping, political succession, and problems of future development.

**Pol 3550. Politics of Contemporary Southern Africa.** (2 cr; QP-60 cr incl 12 cr soc sci or #; offered through Study in England Program; SP-40 cr incl 8 cr soc sci or #; offered through Study in England Program; A-F only)

Contemporary political, economic, and social trends in Southern Africa.

**Pol 3560. Latin American Governments and Politics.** (4 cr; QP-60 cr incl 12 cr soc sci or #; SP-40 cr incl 8 cr soc sci or #; A-F only)

Government institutions/processes in Latin American nations. Regional differences; colonialism/imperialism; military populist, Marxist regimes; government repression, political conflict, revolution; models of development and role of the state; debt crisis, structural adjustment; democratization; international relations.

**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 3640. Theory and Practice of Nonviolence.** (4 cr; QP-60 cr or #; SP-40 cr or #; A-F only)

Nature of violence; philosophical bases, tactical strategies, and legitimate use of nonviolence for conflict resolution and social change.

**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; QP-Offered only in Birmingham, England;

SP-Offered only in Birmingham, England; A-F only)

Political argument in Britain at end of 20th century.

**Pol 3711. The Washington Semester: Introductory Seminar.** (4 cr; QP-\$3701, \$3702, \$3703, \$3704; 1011 or 1050, #; SP-1011 or 1050, #; A-F only)

Introductory seminar in American domestic or foreign policy.

**Pol 3712. The Washington Semester: Advanced Seminar.**

(4 cr; QP-\$3701, \$3702, \$3703, \$3704; 1011 or 1050, #;

SP-1011 or 1050, #; A-F only)

Advanced seminar in American foreign or domestic policy.

**Pol 3794. The Washington Semester: Research.** (4 cr;

QP-\$3701, \$3702, \$3703, \$3704; 1011 or 1050, #; SP-1011 or 1050, #; A-F only)

Research project in American domestic policy.

## Course Descriptions

**Pol 3797. The Washington Semester: Internship.** (4 cr; QP-\$3701, \$3702, \$3703, \$3704; 1011 or 1050, #; SP-1011 or 1050, #; A-F only)  
Internship in American domestic policy.

**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-\$5190, \$5390, \$5490, \$5590, \$5690; 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 public policy concentration. Economic, political, and societal constraints on policy-making process; 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)  
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]; QP-70 cr incl 12 cr soc sci or #; 5101 or 5401 or 5501 or 5601 may be repeated; 6 cr max may be applied to Graduate School program; SP-50 cr; 4 cr max may be applied to Graduate School program; A-F only)  
Intensive study in various aspects of political science.

**Pol 4610. Contemporary Political Theory.** (3 cr; QP-1600 or 1610, 70 cr incl 8 cr relevant upper div Pol courses or #; SP-\$5610; 1610, 50 cr incl 6 cr relevant advanced Pol courses or #; A-F only)  
Issues still under vigorous debate in contemporary political theory: Marxism, feminism, critical theory, Rawls.

## Psychology (Psy)

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

**Psy 1003. General Psychology.** (4 cr; A-F only)  
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)  
For psychology majors choosing an applied human service concentration. Academic and career advisement. Introduction to human service profession.

**Psy 2021. Developmental Psychology.** (4 cr; A-F only)  
Major processes in human development, conception through life span; 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)  
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)  
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. Topics in Human Sexuality.** (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 transcendent 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.

**Psy 3611. Learning and Cognition.** (4 cr; SP-3 cr Psy; A-F only)

Introduction to learning and cognition theories using historical, philosophical, and experimental perspectives; models of perception, memory, learning, conditioning, language, thinking, and reasoning; and application of these theories in human service professions.

**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 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.

## Course Descriptions

**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 in Psychology: (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, approval by Psy faculty, 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, approval by Psy faculty, 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.** (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.** (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 Life Span.** (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. Life Span and Career Development: Theories and Counseling.** (3 cr; QP-Ed psy grad major or #; SP-Couns psy grad major or #; A-F only)

Major life span, 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 in Psychology and Counseling: (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.

**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. Canoe camping, hiking, fishing, and hunting; 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, basic packing, 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. Canoe camping, hiking, fishing, and hunting; 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, backpacking, fishing; equipment and navigation.

**Rec 3300. Recreation Programming.** (3 cr; SP-3320 or 3340 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; SP-3300 or #; A-F only)

Practical and theoretical view of practices, methods, and processes involved in leadership development, including a detailed analysis of the qualities and roles of leaders in recreation activities. Field based; includes one-week camp trip.

**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 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 #; cannot apply cr to Graduate School program; A-F only) Methods and practice of administrative processes of personnel, fiscal, and facility management. Field study and presentation of a management plan.

**Rec 4991. Independent Study.** (1-4 cr [max 4 cr]; SP-#; cannot apply cr to Graduate School program; 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-#; cannot apply cr to Graduate School program; 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, #; cannot apply cr to Graduate School program; S-N only) Supervised field experience in recreation agency.

**Rec 4997. Recreation Practicum.** (2 cr; SP-1000, #; cannot apply cr to Graduate School program; 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.

## Russian (Russ)

### *College of Liberal Arts*

**Russ 1101. Beginning Russian I.** (4 cr; A-F only) 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) 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-MIS student or Δ; can apply cr to MIS 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.

**Safe 6011. System Safety and Loss Control Techniques.** (3 cr; SP-MIS student or Δ; can apply cr to MIS 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-MIS student or Δ; can apply cr to MIS 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-MIS student or Δ; can apply cr to MIS 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-MIS student or Δ; can apply cr to MIS 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-MIS student or Δ; can apply cr to MIS 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 MIS 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-MIS student or Δ; can apply cr to MIS 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 6112. Advanced Industrial Noise and Ventilation Control.** (2 cr; SP-6111 or Δ; can apply cr to MIS program only; A-F only) Principles of noise control and ventilation for control of airborne chemical contaminants. Complex system design, principles and function of control devices, troubleshooting, and solutions to industrial problems. Field and lab applications.

**Safe 6121. Epidemiology and Industrial Toxicology.** (2 cr; SP-MIS student or Δ; can apply cr to MIS 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-MIS student or Δ; can apply cr to MIS 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–MIS student or Δ; can apply cr to MIS 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–MIS student or Δ; can apply cr to MIS 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–MIS student or Δ; can apply cr to MIS 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–MIS student or Δ; can apply cr to MIS 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–MIS student or Δ; can apply cr to MIS 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–MIS student or Δ; can apply cr to MIS 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 6801. Conference Leading and Team Dynamics.** (2 cr; SP–MIS student or Δ; can apply cr to MIS 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–MIS student or Δ; can apply cr to MIS 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–MIS student or Δ; can apply cr to MIS 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–MIS student or Δ; can apply cr to MIS 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)  
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; A-F only)  
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 1619. Race, Class, and Gender in the United States.** (3 cr; A-F only)  
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)  
Federal, state, and tribal laws and court processes regulating child welfare practice. 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 in Social Work: (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.

**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-Admission to advanced standing MSW program 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 admission to advanced standing MSW program 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.** (1-2 cr; SP-Soc work grad major or #: 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 admission to advanced standing MSW program 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.** (4 cr; SP-Soc work 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)

## Course Descriptions

**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 1101. Introduction to Sociology.** (3 cr; A-F only)  
Introduction to sociological concepts and their application.

**Soc 1201. Sociology of the Family.** (3 cr; A-F only)  
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.** (3 cr; A-F only)  
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.** (3 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 2306. Deviance.** (3 cr; QP-1100, 1500, crim major or soc major or minor or crim-soc major, 40 cr or #; SP-1301, 2001 or #; 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 3151. Research Methods and Analysis.** (3 cr; QP-1500, 3305 or 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 3322. Law and Society.** (3 cr; QP-1100, 40 cr or #; SP-Crim major or soc major or minor or soc-crim major, 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.

**Soc 3324. Sociology of Criminal Law.** (3 cr; QP-1100, 1500, crim major or soc major or minor or crim-soc major, 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 3326. Justice, Women, and Race.** (3 cr; QP-1100 or 1300 or WS 1100, 40 cr or #; SP-Crim major or soc major or minor or crim-soc major, 30 cr or #; A-F only)

Experiences of women and minorities in U.S. justice system. Attitudes toward crime and justice from perspective of women and minorities both as defendants and practitioners.

**Soc 3328. Delinquency and Juvenile Justice.** (3 cr; QP-1100, crim major or soc major or minor or crim-soc major, 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 3342. Law Enforcement Administration.** (3 cr; QP-1100, 40 cr or #; SP-Crim major or soc major or minor or crim-soc major, 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-Crim major or soc major or minor or crim-soc major, 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, crim major or soc major or minor or crim-soc major, 40 cr or #; SP-1101, crim major or soc major or minor or crim-soc major, 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; QP-1300, crim major or soc major or minor or crim-soc major, 90 cr or #; SP-3361, crim major or soc major or minor or crim-soc major, 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 3395. Special Topics in Criminology: (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. Course announced in *Class Schedule*.

**Soc 3395. Special Topics in Sociology: (Various Titles to be Assigned).**

Contemporary topics. Course announced in *Class Schedule*.

**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 #; crim major or soc major or minor or crim-soc major or anth major or minor; 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-Crim major or soc major or minor or crim-soc major, 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, crim major or soc major or minor or crim-soc major, 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 4382. Victimology.** (3 cr; QP-1300, 90 cr or #; SP-3322 or 4925 or 4935, crim major or soc major or minor or crim-soc major, 60 cr or grad student or #; cannot apply cr to Graduate School program; 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 4395. Special Topics in Criminology: (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-#; cannot apply cr to Graduate School program; 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 in Sociology: (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. Course announced in *Class Schedule*.

## Course Descriptions

**Soc 4597. Internship.** (1-14 cr [max 14 cr]; QP-#; SP-#; cannot apply cr to Graduate School program; 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 4715. Popular Culture.** (3 cr; QP-1100, 40 cr or #; SP-3701, 60 cr or grad student or #; cannot apply cr to Graduate School program; A-F only) What qualifies as American popular culture, methodologies used to study popular culture, and sociological significance of such study.

**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-Crim major or soc major or minor or crim-soc major, 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-Crim major or soc major or minor or crim-soc major or 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-Crim major or soc major or minor or crim-soc major or 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-Δ; SP-#; cannot apply cr to Graduate School program; A-F only) Directed reading, research, or involvement in social action leading to preparation of a paper or other product.

**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; cannot apply cr to Graduate School program; 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) 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) Conversation and communicative course for students with limited 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) Consolidation and enrichment of previously acquired abilities in 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) Consolidation and enrichment of previously acquired abilities in 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-Fewer than 30 cr; A-F only) Literary and artistic works from Spain and Latin America which demonstrate cultural perspectives of reality.

**Span 2301. Advanced Spanish.** (4 cr; QP-1503 or equiv or #; SP-5 yrs high school Span or 1202 or #; A-F only) 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) 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 3030. Spanish Language Study Abroad.** (1-4 cr [max 12 cr]; SP-1202, #; offered abroad only)  
Advanced language study abroad.

**Span 3040. Culture Study Abroad.** (1-4 cr [max 24 cr]; SP-#; offered abroad only)  
Study abroad of Spanish or Hispanic American culture.

**Span 3042. Hispanic American Civilization and Culture.** (4 cr; QP-3002 or equiv, C or better in last advanced Span lang class taken or #; SP-2301 with C or better or #; offered all 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 advanced Span lang class taken or #; SP-2301 with C or better or #; offered all yrs; A-F only)  
Historical survey. Taught in Spanish.

**Span 3050. Mexican Culture.** (3 cr; QP-3002 or equiv, #; SP-1202, C or better in last Span lang class taken and #; offered in Mexico; A-F only)  
Study of Mexican culture, past and present, through on-site study. Taught in Spanish.

**Span 4011. Hispanic American Prose.** (4 cr; QP-3002 or equiv, C or better in last advanced Span language class taken or #; SP-2301 with C or better or #; cannot apply cr to Graduate School program; 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 advanced Span lang class taken or #; SP-2301 with C or better or #; cannot apply cr to Graduate School program; 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 advanced Span lang class taken or #; SP-2301 with C or better or #; cannot apply cr to Graduate School program; 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 advanced Span lang class taken or #; SP-2301 with C or better or #; cannot apply cr to Graduate School program; 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 advanced Span lang class taken or #; SP-2301 with C or better or #; cannot apply cr to Graduate School program; offered every 3rd yr; A-F only)  
Study of representative short works by Cervantes 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 advanced Span lang class taken or #; SP-2301 with C or better or #; cannot apply cr to Graduate School program; 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 advanced Span lang class taken or #; SP-2301 with C or better or #; cannot apply cr to Graduate School program; 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 advanced Span lang class taken or #; SP-2301 with C or better or #; cannot apply cr to Graduate School program; 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 in Spanish: (Various Titles to be Assigned).** (4 cr [max 8 cr]; QP-3002 or equiv, C or better in last advanced Span lang class taken or #; SP-2301 with C or better or #; cannot apply cr to Graduate School program; 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 advanced Span lang class taken or #; SP-2301 with C or better or #; cannot apply cr to Graduate School program; 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)

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 5103. 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.

## Course Descriptions

### **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 #; cannot apply cr to Graduate School program)

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 #; cannot apply cr to Graduate School program; 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.

### **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 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, EIEd 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 5600. Student Teaching.** (1-12 cr [max 12 cr]; SP-#; cannot apply cr to Graduate School program; 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; cannot apply cr to Graduate School program)

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-#; cannot apply cr to Graduate School program; A-F only)

Independent project for advanced students to substantially further their theoretical knowledge base or professional competencies.

### **SpEd 5995. Topics in Special Education: (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 profession through presentations, publications, and participation in national discussions.

## Statistics (Stat)

### Mathematics and Statistics

#### College of Science and Engineering

(See *Mathematics for Math courses.*)

**Stat 1411. Introduction to Statistics.** (3 cr; QP-Math 1003; SP-Math 1004 or math placement or  $\Delta$ ; A-F only)

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)

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 1160 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 4011. Actuarial Probability and Statistics.** (1 cr; QP-5596; SP-5572; cannot apply cr toward Math major or minor or MS in applied and computational math; S-N only) Problem-solving techniques in probability and statistics needed in actuarial work.

**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 5411. Analysis of Designed Experiments.** (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 3320; 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 Math 3320)

Hotelling  $T^2$ , multivariate analysis of variance, canonical correlation, discriminant analysis, principal components. Use of computer software. (offered alt years)

**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; SP-Doctoral student, adviser and DGS consent)

**Stat 8611. Linear Models.** (3 cr; QP-5596, Math 5326; SP-5515; 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; 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.** (1-18 cr; SP-Max 18 cr per semester or summer; 24 cr required)

## Supportive Services Program (SSP)

### Academic Support and Student Life

**SSP 1000. Introduction to College Learning.** (1-2 cr; A-F only)

Program to help facilitate the successful transition into college learning and student life at UMD.

**SSP 1003. Basic Mathematics and Introductory Algebra.**

(3 cr; SP-\$Math 1004; cannot apply cr toward degree; S-N only)

Computational math skills and applications, including arithmetic, introductory geometry, and introductory algebra.

**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)

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.

**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.

**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.

**SSP 3007. Student Advisers for Freshman Experience Training.** (1 cr; SP-§3001; #; A-F only)

Introduces contemporary student development and learning theory, its application to small group and one-on-one learning situations. Emphasis on philosophy, procedures, and practices known to assist a student's multi-dimensional growth and learning. Enhances student leadership skills and knowledge.

**SSP 3008. Student Advisers for Freshman Experience Practicum.** (1 cr [max 3 cr]; SP-3007 or #; S-N only)

Supervised practicum in small-group setting. Conditions of Safe experience outlined in Safe contract.

## Theatre (Th)

### *School of Fine Arts*

**Th 1001. Introduction to Theatre Arts.** (3 cr; A-F only)

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)

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)

How films influence the moral and cultural life of our time and critical analysis of those effects.

**Th 1071. Musical Theatre History.** (3 cr; A-F only)

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)

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)

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 all 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)

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.** (4 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. (3 hrs lect, 3 hrs lab)

**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.** (4 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. (3 hrs lect, 3 hrs lab)

**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 1901. B.F.A. Qualifying Presentation.** (0 cr; QP-Δ; SP-Δ; S-N only)

Presentation of performance audition or technical portfolio for admission to full B.F.A. candidacy.

**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, emphasizing 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-theatre majors. Project work emphasis on characterization and contemporary scene study.

**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 I.** (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; SP-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.

## Course Descriptions

**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. Play reading, script analysis, term projects.

**Th 3871. Playwriting.** (3 cr; A-F only)

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.

**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. Topics in Theatre or Dance: (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–#; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; 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–#; cannot apply cr to Graduate School program; SP–#; cannot apply cr to Graduate School program; 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; #; can apply max 6 cr to Graduate School program; SP–#; cannot apply cr to Graduate School program; 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 #; cannot apply cr to Graduate School program; 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, play scripts, and criticism.

**Th 4901. Intern Teaching in Theatre.** (3 cr [max 9 cr]; QP–#; SP–#; cannot apply cr to Graduate School program; 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; cannot apply cr to Graduate School program; 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; can apply max 6 cr to Graduate School program; SP–Δ; 1 cr for each 45 hrs work; cannot apply cr to Graduate School program; 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; 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; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**Txcl 8888. Thesis Credits: Doctoral.** (1-18 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 (Various Titles to be Assigned).** (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; 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; SP–Max 18 cr per semester or summer; 10 cr total required [Plan A only])

**WRS 8888. Thesis Credits: Doctoral.** (1-18 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)

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 2000. Feminist Inquiry.** (3 cr; SP–1000 or #; A-F only) Major issues, concepts, and questions addressed by feminist scholarship; context of feminist inquiry.

**WS 2101. Women, Race, and Class.** (3 cr; A-F only)

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.

## Course Descriptions

**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 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 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.

**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 in Women's Studies: (Various Titles to be Assigned).** (3 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 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.** (3 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 4050. 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 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.