



This is the Course Descriptions section of the 2007-2009 Duluth Catalog for the University of Minnesota

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# Courses

## Course Numbers

Semester courses have four-digit numbers as follows:

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

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

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

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

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

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

**6xxx**—Courses for postbaccalaureate students in professional degree programs.

**7xxx**—Courses for postbaccalaureate students in professional degree programs.

**6xxx and 7xxx**—Courses to be used primarily for postbaccalaureate professional programs that are not offered through the Graduate School.

**8xxx**—Courses for graduate students.

## Liberal Education Abbreviations

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

**LECD** ..... Cultural diversity

**LEIP** ..... International perspectives

For more information about liberal education categories and requirements, see page 56.

## Prerequisites

**Prereq**—The prerequisite is intended to show what is required 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.

## Symbols and Abbreviations

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

**¶**...Concurrent registration is required (or allowed) in the course listed after this symbol.

**#**...Approval of instructor is required before registration.

**%**...Approval of the department offering the course is required for registration.

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

....In prerequisite listings, comma means "and."

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

**DGS**...Director of graduate studies

## Term Information

Not all courses are offered every term (semester). Refer to the *Course Schedule* or the online catalog at [www.catalogs.umn.edu/umd/index.html](http://www.catalogs.umn.edu/umd/index.html) to learn during which terms specific courses are offered.

## Medical School Grading

O..... Outstanding                    P .... Passing

E..... Excellent                      N .... Failing

S .... Satisfactory

# Accounting (ACCT)

## **Labovitz School of Business and Economics**

**ACCT 2001. Principles of Financial Accounting.** (3 cr; A-F only. Prereq-Min 15 or )

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; A-F only. Prereq-2001, LSBE student or )

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; A-F only. Prereq-Not open to LSBE students or non-LSBE acct minors LE 8)

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

**ACCT 3096. Volunteer Income Tax Assistance.** (1-2 cr [max 3 cr]; S-N only. Prereq-%, 2 cr first registration, 1 cr repeat)

Provides volunteer experience preparing tax returns for low and moderate income Duluth residents through both classroom and hands-on training.

**ACCT 3101. Intermediate Accounting I.** (3 cr; A-F only. Prereq-LSBE cand or non-LSBE acct minor or )

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; A-F only. Prereq-3101, LSBE cand or non-LSBE acct minor or )

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. Accounting Information Systems.** (3 cr; A-F only. Prereq-LSBE cand or non-LSBE acct minor or )

Overview of the characteristics and functions of modern accounting information systems. Focus on system use, internal controls, security issues, and system design and implementation in computerized accounting procedures within the business organization. Develop proficiency in the use of accounting software.

**ACCT 3191. Independent Study.** (1-3 cr [max 3 cr]; A-F only. Prereq-BAc cand with 80 cr; cr not available as acct elective)

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.** (2-6 cr [max 6 cr]; S-N only. Prereq-3101, %; repeatable for a max of 6 credits; 3 repeats allowed; max 3 cr may be applied to acct electives)

Participation in an approved program with professional accounting firms, businesses, government agencies, or non-profit organizations. Requires minimum 200 hours work experience, assigned written reports, and performance evaluations. Students can take an additional credit for each additional 100 hours of work, up to a maximum of 6 credits. 3 repeats allowed, max 3 credits may be applied to acct electives.

**ACCT 3201. Cost Accounting.** (3 cr; A-F only. Prereq-LSBE cand or non-LSBE acct minor or )

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

**ACCT 3401. Individual Income Taxation.** (3 cr; A-F only. Prereq-LSBE cand or approved non-LSBE acct minor or o, §4152 or 3152)

Provides an understanding of how taxes impact personal financial decisions. Takes tax planning/minimization perspective and provides a basic information on reporting tax positions to the IRS. In addition to tax planning and compliance, the student will be exposed to basic tax concepts.

**ACCT 3402. Advanced Business Taxation.** (3 cr; A-F only. Prereq-3401, LSBE cand or o, §3151)

Understanding how taxes impact basic business and entrepreneurial decisions. It takes a tax planning/minimization perspective and presents advanced tax research and resource materials available on the web.

**ACCT 4160. Auditing.** (3 cr; A-F only. Prereq-3102, 3110, LSBE cand or ; no Grad School cr)

Theory and procedures in audit process.

**ACCT 4261. Advanced Auditing.** (3 cr; A-F only. Prereq-4160, LSBE cand or )

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

**ACCT 4501. Advanced Accounting.** (3 cr; A-F only. Prereq-3102, LSBE cand or )

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

**ACCT 4505. International Accounting.** (3 cr; A-F only. Prereq-3102, LSBE cand or )

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; A-F only. Prereq-LSBE cand or )

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

**ACCT 4795. Special Topics** (Various Titles to be Assigned). (1-3 cr [max 9 cr]; A-F only. Prereq-3101, LSBE cand or ; no Grad School cr)

Enables students, working closely with the instructional faculty, to explore one or more contemporary accounting issues in substantial depth.

## Aerospace Studies (AIR)

### **College of Science and Engineering**

**AIR 100. AFROTC GMC Leadership Laboratory.** (0 cr; S-N or Aud)

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

**AIR 1000. AFROTC GMC Lead Lab.** (1 cr [max 4 cr]; S-N or Aud)

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

## Course Descriptions

### AIR 1101. Foundations of the U.S. Air Force. (1 cr; A-F or Aud)

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

### AIR 1102. Foundations of the U.S. Air Force. (1 cr; A-F or Aud)

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

### AIR 1591. Leadership Practicum. (1-4 cr [max 4 cr]; A-F or Aud)

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

### AIR 2101. The Evolution of the U.S. Air Force Air and Space Power. (1 cr; A-F or Aud)

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

### AIR 2102. The Evolution of the U.S. Air Force Air and Space Power. (1 cr; A-F or Aud)

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

### AIR 3000. AFROTC POC Leadership Laboratory. (1 cr [max 4 cr]; S-N or Aud)

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

### AIR 3001. AFROTC POC Lead Lab. (2 cr [max 8 cr]; S-N or Aud)

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

### AIR 3101. Air Force Leadership Studies. (3 cr; A-F or Aud)

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

### AIR 3102. Air Force Leadership Studies. (3 cr; A-F or Aud)

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

### AIR 3591. Leadership Practicum. (1-4 cr [max 4 cr]; A-F or Aud)

Practical application of leadership and management in structured realistic situations.

### AIR 4101. National Security Affairs, Preparation for Active Duty. (3 cr; A-F or Aud. Prereq-No Grad School cr)

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

### AIR 4102. National Security Affairs, Preparation for Active Duty. (3 cr; A-F or Aud. Prereq-No Grad School cr)

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

## American Indian Studies (AMIN)

### College of Liberal Arts

#### AMIN 1103. Beginning Ojibwe I. (3 cr; A-F only. LECD 03)

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

#### AMIN 1104. Beginning Ojibwe II. (3 cr; A-F only. Prereq-1103 or # LECD 03)

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

#### AMIN 1106. American Indian Prose, Poetry, and Oratory. (3 cr; A-F only. LE 9)

Survey of transcribed/translated American Indian oratory, post-1900 prose, and contemporary poetry by Indian writers/speakers. Works used to facilitate understanding of major themes in American Indian life.

#### AMIN 1120. American Indians in the 20th Century. (3 cr; A-F only. LECD 07)

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. LE 9)

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

#### AMIN 2115. Ojibwe History and Culture. (3 cr; A-F only)

Anishinabe, Ojibwe, and Chippewa. Origins and lifestyle; relationship between traditional and contemporary times. Emphasis on Minnesota.

#### AMIN 2203. Intermediate Ojibwe I. (3 cr; A-F only. Prereq-1104 or # LECD 03)

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

#### AMIN 2204. Intermediate Ojibwe II. (3 cr; A-F only. Prereq-2203 or # LECD 03)

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

#### AMIN 2520. Tribal Law and Government. (3 cr; A-F only. Prereq-Intro soc sci course, 1120, 3106 or #)

Review of American Indian law and analysis of modern tribal government.

**AMIN 3106. Indian-White Relations.** (3 cr; A-F only. Prereq-1120 or # LECD 08) Ten to twelve significant events and their ramifications for contemporary Indian affairs. Variety of options for fulfilling course requirements.

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

**AMIN 3300. Projects in American Indian Studies.** (1-5 cr [max 10 cr]; A-F only. Prereq-1120, #)

Directed reading, research, or involvement in social action culminating in the preparation of a paper.

**AMIN 3301. Advanced Ojibwe.** (3 cr; A-F only. Prereq-2204 or #)

Taught entirely in Ojibwe language. Fluent Ojibwe speaking, writing, reading, and conversations to increase oral and comprehension abilities.

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

**AMIN 3410. Fur Trade in Canada and the United States.** (3 cr; A-F only. Prereq-1120 or #)

Historical review and analysis of Canadian and U.S. Indians in the fur trades.

**AMIN 3750. American Indian Psychology.** (3 cr; A-F only. Prereq-Intro soc sci course, 1120, 3106 or #)

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.

**AMIN 3905. Special Topics:** (Various Title to be Assigned). (3 cr [max 12 cr]; A-F only. Prereq-Intro soc sci course or 1120 or #)

Study of topics not included in regular curriculum.

**AMIN 3997. Internship in American Indian Studies.** (4-8 cr [max 12 cr]; A-F only. Prereq-Amin major, #; may not be taken final semester of sr yr; may be taken in one or two semesters)

Supervised lab experience in American Indian agency or project or with significant Indian clientele. Advance, concurrent, and follow-up written and oral presentations.

**AMIN 4302. Independent Study of the Ojibwe Language.** (1-6 cr [max 12 cr]; A-F only. Prereq-1103, #; no Grad School cr)

Individual opportunity to devise and/or be involved in programs to increase fluency.

**AMIN 4630. American Indians and the Media.** (3 cr; A-F only. Prereq-1120 or #; no Grad School cr)

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.

**AMIN 4990. Directed Research.** (1-6 cr [max 12 cr]; A-F only. Prereq-max 8 cr to Grad School program, #)

Qualified seniors and graduate students may register for work on tutorial basis in research of an advanced nature in American Indian Studies

**AMIN 5905. Legal Aspects of Federal Indian Policy For Human Services.** (3 cr; A-F only. Prereq-Amin 1120 and one upper division soc sci course or #)

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

**AMIN 5910. Special Topics:** (Various Titles to be Assigned). (3 cr [max 12 cr]; A-F only. Prereq-Intro soc sci course or 1120 or #; no more than 6 cr may be applied to Grad School program)

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.

## Anthropology (ANTH)

### College of Liberal Arts

**ANTH 1080. Freshman Seminar: Understanding Global Cultures.** (3 cr; A-F only. Prereq-Freshman, fewer than 30 credits LEIP 08)

Explores nations around the globe towards the goal of developing a cross-cultural understanding of how cultures function. Explores America as a foreign culture, looking at the United States from the viewpoints of foreign anthropologists and other scholars, using comparative ethnographic perspectives to interpret aspects of American culture.

**ANTH 1095. Freshman Seminar: Topics:** (Various Titles to be Assigned). (3-4 cr [max 4 cr]; A-F or Aud. Prereq-Freshman, fewer than 30 cr LEIP 08)

Seminar designed specifically for freshmen.

**ANTH 1601. Freshman Seminar: Prehistoric Cultures.** (4 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr, §1602 LEIP 07)

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 1602. Prehistoric Cultures.** (4 cr; A-F or Aud. Prereq-§ 1601 LEIP 07)

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 or Aud. LEIP 06)

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 or Aud. LE 6)

Basic principles of archaeology with examples of their application to world prehistory.

**ANTH 2001. Career Development in Anthropology.** (2 cr; A-F only. Prereq-1602 or 1604 or equivalent, or #)

Overview of career opportunities for anthropological skill sets. The mechanics of career development: locating jobs; matching skills to job requirements; networking; writing resumes, cover letters, CV's, and graduate school application essays. A focus on the lifelong process of building a career.

**ANTH 3618. Ancient Middle America.** (3 cr; A-F or Aud. Prereq-1604, min 30 cr) Survey of the Aztecs, Maya, and their predecessors.

**ANTH 3622. Prehistoric Archaeology: Old World.** (3 cr; A-F or Aud. Prereq-1604, min 30 cr)

Archaeological survey of Europe, Africa, and Asia.

**ANTH 3624. Archaeology of North America.** (3 cr; A-F or Aud. Prereq-1604, min 30 cr)

Archaeological survey of major cultural areas of North America north of Mexico.

**ANTH 3628. Women in Cross-Cultural Perspective.** (3 cr; A-F or Aud. Prereq-1604, min 30 cr)

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

## Course Descriptions

**ANTH 3632. Latin American Cultures.** (3 cr; A-F or Aud. Prereq-1604, min 30 cr) Survey of social, political, economic, and religious organization of contemporary national and native cultures of Mexico, Central America, and South America.

**ANTH 3635. Peoples and Cultures of Europe.** (3 cr; A-F or Aud. Prereq-1604, min 30 cr, or #)

Exploration of European peoples to develop a cross-cultural understanding of how cultures function. Survey of social, political, economic, religious, family and kinship, gender, urban, globalization/globalization and the European Union (EU) on all of the above.

**ANTH 3638. Peoples and Cultures of the Middle East.** (3 cr; A-F or Aud. Prereq-1604, min 30 cr or #)

Examines how anthropologists study the cultures and social institutions of the modern Islamic Middle East. Focus on religion, family life, gender, politics, economy, urban ways of life, kinship and marriage, and the impacts of globalism on the Middle East.

**ANTH 3640. What is a City?: Archaeological Perspectives on Urbanism.** (3 cr; A-F or Aud. Prereq-Min 30 cr or #)

Focus on a variety of historically and archaeologically documented urban case studies and important concepts, e.g., the use of space, the physical manifestation of cities, urban abandonment, and the impact of cities on the environment.

**ANTH 3642. Exploring Human Origins.** (3 cr; A-F only. Prereq-Min 30 cr or #)

Designed to familiarize students with the discipline of paleoanthropology or human evolution. Addresses primate and hominid anatomy, dating techniques, stratigraphy, fossil formation and paleoecology as well as human evolution through the fossil evidence and associated archaeological material of various hominid groups including the australopithecines, Homo erectus, Neanderthals, and early modern humans. Explores human evolution and current debates surrounding the evolutionary relationships of various hominid taxa.

**ANTH 3691. Independent Study in Anthropology.** (1-5 cr [max 10 cr]; A-F or Aud. Prereq-Min 60 credits or #)

Directed reading and research in ethnography leading to preparation of paper.

**ANTH 3695. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 4 cr]; A-F or Aud. Prereq-1604, min 30 cr or #)

Seminar on contemporary topics in selected branches of anthropology.

**ANTH 4616. Culture and Personality.** (3 cr; A-F or Aud. Prereq-1604, min 60 cr)

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

**ANTH 4621. Myth and Sacred Symbols.** (3 cr; A-F or Aud. Prereq-1604, min 60 cr)

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

**ANTH 4623. Anthropology and Contemporary Human Problems.** (3 cr; A-F or Aud. Prereq-1604, min 60 cr)

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; A-F or Aud. Prereq-1604, min 60 cr)

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

**ANTH 4631. Anthropology and Environment.** (3 cr; A-F or Aud. Prereq-1604, min 60 cr)

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 4632. Anthropology of Landscapes.** (3 cr; A-F or Aud. Prereq-1604, min 60 credits or Grad School student or #)

Concepts of landscape and space in anthropology. Topics include culturally constructed landscapes, memory, pilgrimage, commemoration, and ways of making a living from the landscape. Theoretical background and analytical examples drawn from the four subfields of anthropology: cultural, physical, linguistics, and archaeology.

**ANTH 4640. Medical Anthropology.** (4 cr; A-F or Aud. Prereq-1604, min 60 credits or Grad School student, or #)

Comparative, cross-cultural examination of sickness and healing. Drawing from ethnographic work on indigenous, alternative, and Euro-American medical systems as well as shamanism, the course works with symbolic, social, political, and historical perspectives.

**ANTH 4651. Development of Anthropological Theory.** (4 cr; A-F or Aud. Prereq-1604, min 90 cr, no Grad School cr)

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

**ANTH 4653. Senior Seminar.** (3 cr; A-F or Aud. Prereq-1604, min 90 or #, no Grad School cr)

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; A-F or Aud. Prereq-1604, min 60 cr)

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 5 cr]; A-F or Aud. Prereq-Min 60 cr or #, no Grad School cr)

Directed reading and research in ethnology leading to preparation of paper.

**ANTH 4695. Special Topics:** (Various Titles to be Assigned). (1-5 cr [max 10 cr]; A-F or Aud. Prereq-1604, min 90 cr or #)

Seminar on contemporary topics in selected branches of anthropology.

**ANTH 4696. Field Research in Archaeology.** (1-10 cr [max 10 cr]; A-F or Aud. Prereq-1602 or 1612, #)

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

**ANTH 4697. Anthropology Internship.** (2-6 cr [max 6 cr]; S-N or Aud. Prereq-#, no Grad School cr)

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

**ANTH 4699. Honors Project.** (2-4 cr [max 4 cr]; A-F or Aud. Prereq-1604, #, no Grad School cr)

Advanced individual project in any area of anthropology demonstrating sound theoretical and research foundations and resulting in a written report, oral presentation. A web page or poster presentation may be done in consultation with the honors advisor.

**ANTH 4997. Teaching Assistantship in Anthropology.** (1-3 cr [max 3 cr]; A-F only. Prereq-Min 60 cr, #, no Grad School cr)

Practical experience in teaching-related activities in anthropology courses.

# Art (ART)

## School of Fine Arts

**ART 901. Graphic Design Portfolio Review.** (0 cr; S-N or Aud. Prereq-[repeatable one time], 9 cr in art courses, pre-graphic design major or %)

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

**ART 902. Studio Art Portfolio Review.** (0 cr; S-N only. Prereq-15 cr in art courses, pre-studio art major or %)

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

**ART 903. Art Education Portfolio Review.** (0 cr; S-N or Aud. Prereq-[repeatable one time], 9 cr in art courses, pre-art ed major or %)

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

**ART 1001. Art Today.** (3 cr; A-F or Aud. LEIP 09)

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; A-F or Aud. Prereq-Pre-elementary/middle sch educ or [BA theatre or music], or BFA theatre or BMus music education; §1005. LE 10)

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

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

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

**ART 1006. Freshman Seminar: Fundamentals of Drawing.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr; § 1009. LE 10)

Development of visual and conceptual skills through drawing as well as lectures, presentations, group discussions, critiques.

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

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

**ART 1010. Drawing I.** (3 cr; A-F or Aud. Prereq-Art or art ed major or art minor or architecture and design minor or #)

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; A-F or Aud. Prereq-Art or art ed major or art minor or #)

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

**ART 1012. 3-D Design.** (3 cr; A-F or Aud. Prereq-Art or art ed major or architecture and design studies minor or #; §1015)

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

**ART 1013. 2-D Digital Design.** (3 cr; A-F or Aud. Prereq-Art or art ed major or art minor or photography minor or architecture and design studies minor or communication arts or arts in media minor or #)

Two-dimensional studio and graphic design concepts using the computer as a creative tool. Laptop required; digital instruction presented only on the Mac platform.

**ART 1015. Freshman Seminar: 3-D Design.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr; §1012. LE 10)

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

**ART 1125. Watercolor I.** (3 cr; A-F or Aud. Prereq-1002 or 1010 or #)

Basic concepts and techniques.

**ART 1126. Watercolor II.** (3 cr [max 6 cr]; A-F or Aud. Prereq-1125 or #, §3125)

Advanced concepts and techniques.

**ART 1405. Fundamentals of Ceramics I.** (3 cr; A-F or Aud. Prereq-Not for art majors or minors LE 10)

Basic handbuilding and glazing of earthenware ceramics.

**ART 1605. Fundamentals of Photography.** (3 cr; A-F or Aud. Prereq-Not for art majors or minors; §1600 or 1607. LE 10)

Introduction to photography and its roles in the communications culture. Basic photographic principles and introduction to digital darkroom. Assignments emphasize creative thinking. Requires digital camera with adjustable shutter speeds and apertures. Laptop and software required; instruction presented only on the Mac platform. Plus 3 hours arranged studio work per week.

**ART 1607. Freshman Seminar: Fundamentals of Photography.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr; §1600 or 1605. LE 10)

Introduction to photography as a communicative tool and medium for creative expression. Investigation of photography's role in the communications culture and to historical influences in the medium. Students produce a final portfolio of photographic prints. Requires digital camera with adjustable shutter speeds and apertures. Laptop and software required; instruction presented only on the Mac platform.

**ART 1800. Creating Visual Narratives.** (3 cr; A-F or Aud. Prereq-Film studies minor, #)

Introductory level video course offering the basic concept of video narrative and the fundamental aspects of working with digital production processes and techniques.

**ART 1814. Creating Across Cultures.** (3 cr; A-F or Aud. Prereq-\$2814 LECD 09)

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

**ART 1900. Visual Literacy.** (3 cr; A-F or Aud. Prereq-\$2900 LE 9)

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

**ART 2014. 3-D Digital Studio I.** (3 cr; A-F or Aud. Prereq-1013 and art or ed major, pre-art educ major or pre-graphic design major, or art minor or architecture and design studies minor or #; §1014 or 3014)

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

**ART 2016. 2-D Digital Studio I.** (3 cr [max 6 cr]; A-F or Aud. Prereq-1013, art or art ed major, pre-art educ major or pre-graphic design major, or art or photography minor or #; §3016)

Introduction to digital printmaking and other 2-Dimensional outputs in relationship to contemporary fine art practice. Focus on digital input and output, with cross-media explorations. The class is conceptually driven, teaching skills, techniques, and introducing theory, history and criticism. Development of a serial approach to visual imagery. Laptop required; digital instruction presented only on the Mac platform.

## Course Descriptions

**ART 2030. Digital Arts I.** (3 cr [max 6 cr]; A-F or Aud. Prereq-1013, 2016, art or art ed major, pre-art educ major or pre-graphic design major, or art minor or #, §3030) Introduction to digital media practice and theory through lectures, studio time, readings and hands-on assignments. Introduction to the most vital forms of contemporary 4-D art making, including video art, sound/sonic, and web art/net.art. Other introductions may include narrative driven structures, interactivity and basic animation.

**ART 2100. Painting I.** (3 cr; A-F or Aud. Prereq-1006 or 1009 or 1010, 1011, art or art ed major or art minor or #, §1100)

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

**ART 2200. Sculpture I.** (3 cr; A-F or Aud. Prereq-1015 or 1012, art or art ed major or art minor or #, §1200)

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

**ART 2300. Printmaking I: Intaglio, Relief.** (3 cr; A-F or Aud. Prereq-1006 or 1009 or 1010, 1011, art or art ed major or art minor or #, §1300)

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 2301. Printmaking I: Litho, Screen.** (3 cr [max 6 cr]; A-F or Aud. Prereq-1006 or 1009 or 1010, 1011, art or art ed major or art minor or #, §1301)

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

**ART 2400. Ceramics I.** (3 cr; A-F or Aud. Prereq-1006 or 1009 or 1010, 1012, art or art ed major or art minor or #, §1400)

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

**ART 2500. Jewelry and Metals I.** (3 cr; A-F or Aud. Prereq-1011 or 1013, art or art ed major or art minor or #, §1500)

Basic jewelry design, fabrication, and surface enhancement techniques.

**ART 2600. Photography I.** (3 cr; A-F or Aud. Prereq-Art or art ed major or art or photography minor or #, §1600 or 1605 or 1607)

Introduction to photographic concepts, materials, and the digital darkroom. Varied thematic assignments within the visual arts context. Requires digital camera with adjustable shutter speeds and apertures. Laptop and software required; instruction presented only on the Mac platform.

**ART 2905. Design Technology I.** (3 cr; A-F or Aud. Prereq-1013 and graphic design major or pregrad art and tech major or arts in media minor or #)

Fundamentals of graphic reproduction and Web site design; application of digital programs used in preparing print and web work. Laptop required; digital instruction presented only on the Mac platform.

**ART 2907. Typography I.** (3 cr; A-F or Aud. Prereq-Graphic design major or digital arts and photography emphasis or #)

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

**ART 2911. Graphic Design I.** (3 cr; A-F or Aud. Prereq-1010, 1011, 1013, 2905, 2907, arts in media minor, graphic design major, or digital art and photography emphasis or #)

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

**ART 3015. 3-D Digital Studio II.** (3 cr [max 9 cr]; A-F or Aud. Prereq-2014, art or art ed major or architecture and design studies minor or art minor or #, §4014)

Advanced study in 3-D digital applications, particularly for the creation of images and animation for the purpose of artistic expression or for use as graphic elements. The class covers use of the software as well as artistic and design issues raised by this particular medium.

**ART 3017. 2-D Digital Studio II.** (3 cr [max 6 cr]; A-F or Aud. Prereq-2016, art or art ed major or art minor or #, §5016)

Advanced art making as part of the tradition of digital printmaking and other 2-Dimensional outputs in relationship to contemporary fine art practice.

**ART 3031. Digital Arts II.** (3 cr [max 6 cr]; A-F or Aud. Prereq-2030, art or art ed major, pre-art educ major or pre-graphic design major, or art minor or #, §5030)

Advanced art making for students interested in exploring interdisciplinary or advanced study and research in current or emerging technologies.

**ART 3095. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 12 cr]; A-F or Aud. Prereq-#)

Intensive study of special topics in visual arts. Topic announced before course offered.

**ART 3100. Painting II.** (3 cr [max 9 cr]; A-F or Aud. Prereq-2100, art or art ed major, pre-art educ major or pre-graphic design major, or art minor or #; max 9 cr)

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

**ART 3200. Sculpture II.** (3 cr [max 6 cr]; A-F or Aud. Prereq-2200, art or art ed major or art minor or #)

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

**ART 3214. Sculpture II: Robotics and Physical Computing.** (3 cr [max 6 cr]; A-F or Aud. Prereq-2200, art or art ed major or art minor or #)

Intermediate and advanced sculpture robotics and physical computing: Approaches to sculpture, digital control of objects, kinetic sculpture and sound in installation events, performances, and exhibitions.

**ART 3300. Printmaking II.** (3 cr [max 6 cr]; A-F or Aud. Prereq-2300 or 2301, art or art ed major or art minor or #)

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]; A-F or Aud. Prereq-2400 or #)

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

**ART 3405. Fundamentals of Ceramics II.** (3 cr [max 6 cr]; Stdnt Opt. Prereq-1405 or #; not for art majors or minors)

Handbuilding, glazing, and firing of earthenware ceramics.

**ART 3425. Ceramics II Wheel Throwing.** (3 cr; A-F or Aud. Prereq-2400, art or art ed major or art minor or #)

Introduction to the potters wheel and clay throwing techniques. Glazing and firing; surface work and enhancement, with conceptual support for pottery and sculptural clay forms.

**ART 3500. Jewelry and Metals II.** (3 cr [max 6 cr]; A-F or Aud. Prereq-2500, art or art ed major or art minor or #)

Advanced application of jewelry techniques and design.

**ART 3600. Photography II: Alternative Processes and Film.** (3 cr [max 6 cr]; A-F or Aud. Prereq-1013, 2600 or 1607 and art or art ed major or art or photography minor or #)

Continued development of photographic concepts using film and the wet darkroom, and selected other alternative processes techniques within the creative context. Portfolio requirements are project-based. Requires both digital and film cameras, at least one of them with adjustable shutter speeds and apertures. Laptop and software required; instruction presented only on the Mac platform.

**ART 3700. Drawing II.** (3 cr [max 6 cr]; A-F or Aud. Prereq-1010, art or art ed major, pre-art educ major or pre-graphic design major, or art minor or #)

Individually supervised projects supporting involvement in other studio areas.

**ART 3715. Figure Drawing.** (3 cr; A-F only. Prereq-3700, art or art ed or graphic design major or art minor or #)

The study of the human form, its structures and movements related to aesthetic considerations. Intermediate and advanced issues include perspective, space, foreshortening, proportioning and appropriation for the purposes of approaching the figure as an expressive and conceptual tool of art making.

**ART 3800. Community Involvement Through Art.** (1-3 cr [max 3 cr]; A-F or Aud. Prereq-#; 1 cr for each 45 hrs of fieldwork)

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

**ART 3806. Early Childhood Art.** (1 cr; A-F or Aud. Prereq-Art or art ed major or admission to ECh studies program or #)

Aspects of preschool art development, including studio experiences.

**ART 3809. Art in Elementary Education Methods.** (3 cr; A-F or Aud. Prereq-0903, art education cand)

Instructional problems based on the growth of artistic expression in children, philosophy of art education, and contemporary problems. Museum and multicultural based experiences are combined with outreach opportunities to develop inclusive elementary art curriculum and assessment.

**ART 3810. Art in Elementary Education.** (2 cr; A-F or Aud. Prereq-1002 or 1005, pre-elem/middle school ed major only)

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

**ART 3811. Art Education Elementary-Middle School Experience.** (2 cr; A-F or Aud. Prereq-3809 or 3810, Art ed major or #)

Experience of the complex role of the teacher in a postmodern setting within the framework of teacher as artist.

**ART 3814. Digital Methods in Art Education.** (3 cr; A-F or Aud. Prereq-Art education major or #)

Theoretical and practical experiences with emerging visual technologies. Assignments will integrate contemporary pedagogical theories of visual culture and digital media in art education. Art projects will use the computer as a creative tool.

**ART 3815. Art in Secondary Education.** (3 cr; A-F or Aud. Prereq-3811, art ed majors only or #)

Nature and objectives of art programs in secondary school; content and methods. Development of secondary art curriculum and classroom site visits.

**ART 3895. Problems in Art Education.** (1-3 cr [max 3 cr]; A-F or Aud. Prereq-Art ed major or #)

Individual supervised study for advanced art education students. Applied research in art education.

**ART 3907. Typography II.** (3 cr; A-F or Aud. Prereq-2907, graphic design major or #)

Advanced exploration of typography concepts and issues in screen and print media.

**ART 3922. Graphic Design II.** (3 cr; A-F or Aud. Prereq-2911, graphic design major or #)

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; A-F or Aud. Prereq-3922, graphic design major or #)

Continuation of theory and practice of graphic design. Graphic design as an organizational and informative medium and as a purely aesthetic pursuit.

**ART 3950. Architecture Studio.** (3 cr; A-F or Aud. Prereq-1009, 1012, 1013, 2016, Hist 3361, architecture and design studies minor or #)

Architectural concepts, methods, and materials, with experience in architectural planning and problem-solving.

**ART 4040. Introduction to Digital Filmmaking.** (3 cr; A-F only. Prereq-2030, art or art ed major, pre-art educ major or pre-graphic design major, or art minor or #)

Introduction to the narrative, documentary and experimental possibilities of digital filmmaking production, development of critical appreciation of film, with an exposure to history and theory of the medium and factors influencing intercultural communication in these genres. Students develop, produce and complete a digital film.

**ART 4100. Painting III.** (3 cr [max 9 cr]; A-F or Aud. Prereq-3100, art or art ed major or art minor or #, no Grad School cr)

Advanced individually supervised projects using both traditional and contemporary painting media and techniques.

**ART 4191. Individual Study in Painting.** (1-3 cr [max 9 cr]; A-F or Aud. Prereq-Two sem painting, #; no Grad School cr)

Instruction tailored to individual's needs outside of traditional class structure.

**ART 4200. Sculpture III.** (3 cr [max 6 cr]; A-F or Aud. Prereq-3200, art or art ed major or art minor or #, no Grad School cr)

Sculpture in area of specialized interest.

**ART 4291. Individual Study in Sculpture.** (1-3 cr [max 9 cr]; A-F or Aud. Prereq-Two sem sculpture, #; no Grad School cr)

Individual study in sculpture.

**ART 4300. Printmaking III.** (3 cr [max 6 cr]; A-F or Aud. Prereq-3300, art or art ed major or art minor or #)

Further exploration of print processes. Emphasis on refinement of technical skills as well as development of concepts and imagery. Experimentation encouraged in nontraditional, collaborative, and cross-disciplinary approaches. Increased experience in editioning and alternative formats combined with a more comprehensive critical review.

**ART 4391. Individual Study in Printmaking.** (1-3 cr [max 9 cr]; A-F or Aud. Prereq-3300, %)

Graduate students complete a project by contract with instructor, supported by a research paper.

**ART 4400. Ceramics III.** (3 cr [max 6 cr]; A-F or Aud. Prereq-3400, art or art ed major or art minor or #, no Grad School cr)

Technical and conceptual refinement of advanced body of ceramic work.

**ART 4491. Individual Study in Ceramics.** (1-3 cr [max 9 cr]; A-F or Aud. Prereq-Two sem ceramics, %)

Directed study in specific areas.

**ART 4600. Photography III: Digital Portfolio.** (3 cr [max 9 cr]; A-F or Aud. Prereq-2900, 3600 or 3625, art or art ed major or art or photography minor or #)

Intensive digitally-based portfolio development in area of special interest. Selected readings in photographic theory and criticism. Graduate student portfolios are complemented by a

## Course Descriptions

related research project. Requires digital camera with adjustable shutter speeds and apertures. Laptop and software required; instruction presented only on the Mac platform.

**ART 4650. Photography IV: Alternative Processes Portfolio.** (3-6 cr [max 6 cr]; A-F only. Prereq-1900, 3600 or 3625, 4600, art or art ed major or art or photography minor or #)

Intensive portfolio development using alternative contemporary and historic photographic processes in area of special interest. Graduate student portfolios are complemented by a related research project. Requires both digital and film cameras, at least one of them with adjustable shutter speeds and apertures. Laptop required. Instruction presented only on the Mac platform.

**ART 4675. Photography V: The Photographic Book.** (3-9 cr [max 9 cr]; A-F only. Prereq-1900, [3600 or 3625], [4600 or 4650], art or art ed major or art or photography minor or #)

Intensive portfolio development using alternative contemporary and historic photographic processes in area of special interest. Selected readings in photographic theory and criticism. Graduate student portfolios are complemented by a related research project. Requires digital camera with adjustable shutter speeds and apertures. Laptop required; instruction presented only on the Mac platform.

**ART 4691. Individual Study in Photography.** (1-3 cr [max 9 cr]; A-F or Aud. Prereq-2 semesters of photography, %)

Graduate students complete a project by contract with instructor, supported by a research paper.

**ART 4700. Drawing III.** (3 cr [max 6 cr]; A-F or Aud. Prereq-3700, art or art ed major or art minor or #)

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 [max 9 cr]; A-F or Aud. Prereq-#; no Grad School cr) Directed, but largely independent, creative inquiry for students of exceptional ability.

**ART 4791. Individual Study in Drawing.** (1-3 cr [max 9 cr]; A-F or Aud. Prereq-2 semesters of drawing, #)

Graduate students complete a project in drawing by contract with instructor, supported by a research paper.

**ART 4812. Senior Seminar.** (3 cr; A-F or Aud. Prereq-Sr or #; no Grad School credit)

Current visual arts and design issues investigated through research, lectures, assigned readings, discussion, writing assignments, and presentations.

**ART 4813. Senior Seminar II: Studio Practice.** (3 cr; A-F or Aud. Prereq-4812, Sr or #, studio art-general major; no Grad School cr)

Preparation for the emerging studio professional in such areas as documenting work, building an exhibition history, and arts-related employment opportunities, through lectures, presentations, discussion, assigned readings, writing assignments, and field experience.

**ART 4891. Honors Art Education Research.** (3 cr [max 9 cr]; A-F or Aud. Prereq-Art ed major and #; no Grad School cr)

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]; A-F or Aud. Prereq-1-6 cr or with %, sr standing advisable; no Grad School cr)

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]; A-F or Aud. Prereq-#; 1 cr for each 45 hrs of fieldwork; no Grad School cr)

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

**ART 4899. Senior Presentation/Exhibition.** (1 cr; A-F or Aud. Prereq-Sr art major or #; no Grad School cr)

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

**ART 4901. Honors Graphic Design.** (3 cr [max 9 cr]; A-F or Aud. Prereq-Graphic design major and #; no Grad School cr)

Directed, but primarily independent, creative research for outstanding students.

**ART 4903. Art Education Student Teaching Seminar.** (1 cr; A-F or Aud. Prereq-Art ed major and [P]Educ 4500, EdSe 4600, EEd 4650; no Grad School cr)

For students currently student teaching in art (K-12). Students will share concerns and situations, suggestions, and gain group support. The seminar supplements the field experience and builds on issues of supervision, evaluation, professional development, and the culminating Standards of Effective Practice art education portfolio.

**ART 4905. Design Technology II.** (3 cr; A-F or Aud. Prereq-2905, graphic design major or #)

Advanced concepts and digital program applications for print and web graphic contexts.

**ART 4907. Motion Graphics.** (3 cr; A-F or Aud. Prereq-2911 and graphic design major, or digital art and photography emphasis or Grad Student, or #, §5907)

Introduces aesthetics, mechanics, and meaning of motion graphics.

**ART 4908. Interactive Design I.** (3 cr [max 6 cr]; A-F or Aud. Prereq-4907, graphic design major, or digital art and photography emphasis or Grad Student or #, §5909)

Interactivity in graphic design, concentrating on computer-based interactive presentations.

**ART 4909. Interactive Design II.** (3 cr [max 6 cr]; A-F or Aud. Prereq-4908, graphic design major, or digital art and photography emphasis or Grad Student, or #, §5910)

Interactivity in graphic design, concentrating on computer-based interactive presentations.

**ART 4922. Senior Design Studio I.** (3 cr [max 6 cr]; A-F or Aud. Prereq-3933 or #, no Grad School cr, §4910)

Exploration of advanced graphic design topics through an extensive project for print and/or screen: research, creative production and development of a presentation system. Done individually or in groups.

**ART 4933. Senior Design Studio II.** (3 cr [max 6 cr]; A-F or Aud. Prereq-4922 or #, no Grad School cr)

Professional presentation, portfolio development and professional practice.

**ART 4950. Architecture Capstone/Portfolio.** (3 cr; A-F or Aud. Prereq-3950 and architecture and design studies minor, Arth 3331 or Arth 3361 or Hist 3365 or #; no Grad School cr)

Continued work in architectural concepts, methods, and materials, culminating in a capstone portfolio.

**ART 5091. Individual Study in Electronic Arts.** (1-3 cr [max 9 cr]; A-F or Aud. Prereq-1014 or 3016, art or art ed major or art minor and #; no Grad School cr) Individually supervised projects in electronic arts media.

**ART 5095. Special Topics in Art Education:** (Various Titles to be Assigned). (.5-3 cr [max 12 cr]; A-F or Aud. Prereq-#)

Intensive study of special topics in art education.

**ART 5795. Intermedia Studio Problems.** (1-3 cr [max 9 cr]; A-F or Aud. Prereq-2 sem work in each subject area with #)

Directed study emphasizing intermedia concerns.

**ART 5991. Independent Study in Graphic Design.** (1-3 cr [max 9 cr]; A-F or Aud.)  
Prereq-2 sem work in graphic design and graphic design major and #)

Independent work in graphic design

**ART 5997. Art Museum Internship.** (1-3 cr [max 12 cr]; A-F or Aud. Prereq-1001, 6 cr Arth; 1 cr for each 45 hrs of work; no Grad School cr, #)

Supervised practicum in art museum operation

**ART 5999. Special Projects in Design.** (3 cr [max 6 cr]; A-F or Aud. Prereq-Graphic design major or Grad Student; #)

Specific projects in graphic design practice.

**ART 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

**ART 8901. Graduate Seminar.** (4 cr [max 16 cr]; A-F or Aud. Prereq-[P]8980)

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]; A-F or Aud. Prereq-Grad tchg ass't or #)

Theory and experience in teaching college-level art.

**ART 8980. Graduate Studio.** (4 cr [max 16 cr]; A-F or Aud. Prereq-[P]8901; Grad student)

Production of graphic designs based on problems and topics that are discussed in Art 8901 (Graduate Seminar), in which students enroll concurrently.

**ART 8990. M.F.A. Creative Thesis.** (3-6 cr [max 6 cr]; A-F or Aud. Prereq-Grad Student and #)

In consultation with advisor, completion of major project as culmination of M.F.A. studies.

## Art History (ARTH)

### School of Fine Arts

**ARTH 1303. History of World Art I.** (3 cr; A-F or Aud. LE 9)

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

**ARTH 1304. History of World Art II.** (3 cr; A-F or Aud. LEIP 09)

Development of world art and architecture from Renaissance to present.

**ARTH 1400. Freshman Seminar: Honors: Paris in the Age of Impressionism.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr, honors student LE 9)  
Paris in art and literature, 1860-1900.

**ARTH 2305. Classical Themes in Art History.** (3 cr; A-F or Aud. LE 9)

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

**ARTH 2390. American Art of the 20th Century.** (3 cr; A-F or Aud. LECD 09)

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

**ARTH 2815. Women Artists in History.** (3 cr; A-F or Aud. LECD 09)

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

**ARTH 3091. Honors Research in Art History.** (1-3 cr [max 3 cr]; A-F or Aud. Prereq-#)

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 or Aud)

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

**ARTH 3330. Renaissance Painting and Sculpture.** (3 cr; A-F or Aud)

Developments in Europe, 1300-1600.

**ARTH 3331. European Architecture, 1400-1800.** (3 cr; A-F or Aud)

Developments during Renaissance and Baroque periods.

**ARTH 3340. Baroque and Rococo Art.** (3 cr; A-F or Aud)

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

**ARTH 3360. European Art in an Age of Revolution.** (3 cr; A-F or Aud)

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 or Aud)

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 or Aud)

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 or Aud)

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

**ARTH 3395. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud)

Title announced before course is offered.

**ARTH 4491. Directed Study in 19th- and 20th-Century European Art.** (1-4 cr [max 9 cr]; A-F or Aud. Prereq-Grad Student or #; max 6 cr for undergrads, max 9 cr for grad)

Independent research in an area of the student's interest; fundamental knowledge of period or subject required.

**ARTH 4620. History of Photography.** (3 cr; A-F or Aud. Prereq-2390 or 3370 or art or art ed major or art, photography or communication arts minor or #)

Conceptual and technical evolution of the photographic medium from its inception to the present, with special emphasis upon its development within art, design and new media contexts.

**ARTH 4691. Directed Study in the History of Photography.** (3-4 cr [max 4 cr]; A-F only. Prereq-#, [P]4620 is not allowed)

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

**ARTH 4901. History of Graphic Design.** (3 cr; A-F or Aud. Prereq-Art or art ed major or graphic design major or art or communication arts or arts in media minor or Grad student or #)

Introduction to the history of graphic design, from the origins of written communication to present. Graduate students complete a substantial research paper or project on a topic in consultation with the instructor.

**ARTH 4991. Directed Study in the History of Graphic Design.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Grad student or #)

Independent research in an area of the student's interest, culminating in a paper or project. Fundamental knowledge of subject required.

**ARTH 4999. Senior Paper Art History.** (1 cr; A-F or Aud. Prereq-Major in Arth with 90 cr, #; no Grad School credit)

Students write and/or revise a final paper demonstrating their competency in art historical research and writing.

**ARTH 5191. Directed Study in Ancient and Medieval Art.** (1-3 cr [max 9 cr]; A-F or Aud. Prereq-#, max 6 cr for undergrads)

Independent research in an area of art history pertinent to the interests of the student. Fundamental knowledge of period or subject required.

## Course Descriptions

**ARTH 5391. Directed Study in Renaissance and Baroque Art.** (1-3 cr [max 9 cr]; A-F or Aud. Prereq-#; max 6 cr for undergrads)

Independent research in an area of art history pertinent to the interests of the student. Fundamental knowledge of period or subject required.

**ARTH 5591. Directed Study in American Art.** (1-3 cr [max 9 cr]; A-F or Aud. Prereq-#; max 6 cr for undergrads)

Independent research in an area of art history pertinent to the interests of the student. Fundamental knowledge of period or subject required.

## Astronomy (AST)

### College of Science and Engineering

**AST 1040. Introductory Astronomy.** (3 cr; A-F or Aud. LE 5)

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

**AST 1051. Freshman Seminar: The New Solar System.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits LE 5)

Examination of the planets and moons of our solar system and other star systems from the perspective of planet formation and evolution. Are there other Earths? Are there other places which could sustain life?

**AST 1061. Freshman Seminar: Observing the Universe.** (4 cr; A-F or Aud. Prereq-Freshman, fewer than 30 or LE 4)

Introduction to principles of astronomical observation, telescopes and mounts, naked-eye astronomy, constellation identification, lunar phases, motion of the planets, astrophotography, image processing, and image analysis. Highlights the work of Galileo Galilei and the 18th century astronomer Charles Messier.

**AST 2040. The Solar System.** (3 cr; A-F or Aud. Prereq-1040, Math 1250 or #)

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.

**AST 4110. Observational Astronomy.** (3 cr; A-F or Aud. Prereq-Phys 2012 or #)

Applied principles of astronomical observation; review of optical telescopes and mounts; locating and tracking objects; remote telescope operation, CCD, CMOS, and film astrophotography, astrometry, photometry, spectroscopy, astronomical image processing and analysis.

## Behavioral Sciences (BHSC)

### School of Medicine

**BHSC 5432. Clinical Psychopharmacology.** (3 cr; Stdt Opt)

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

**BHSC 5491. Problems in Medical Behavioral Sciences.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-Med or upper div or Grad Student, #; max 6 cr to Grad School program)

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; P-N only. Prereq-Regis med student, #)

Selectives on topics in general medical behavioral science, typically including women's mental health issues, chronic pain, socialization into medicine, aging, hypnosis and others.

**BHSC 6200. Behavioral Medicine.** (1 cr; O-N only. Prereq-Regis med student)

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

**BHSC 6211. Medical Sociology.** (1 cr; P-N only. Prereq-Regis med student)

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

**BHSC 6230. Medical Psychology: Interviewing.** (1 cr; P-N or Aud. Prereq-Regis med student)

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

**BHSC 6260. Psycho-Social-Spiritual Aspects of Life-Threatening Illness.** (2 cr; O-N only. Prereq-Regis med student)

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

**BHSC 6652. Human Behavioral Development and Problems.** (4 cr; O-N only. Prereq-Regis med student)

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

**BHSC 6701. Medical Ethics.** (2 cr; O-N only. Prereq-Regis med student)

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

## Biochemistry and Molecular Biology (MDBC)

### School of Medicine

**MDBC 5201. Topics in Biochemistry.** (3 cr; A-F or Aud. Prereq-Chem 3322 or Chem 4341 or #)

In-depth coverage and expansion of selected biochemical principles introduced in introductory undergraduate courses

**MDBC 5202. Cellular and Molecular Biology.** (3 cr; A-F or Aud. Prereq-Biol 2102 or Biol 5231 or Chem 4342 or #)

In-depth coverage of selected topics in cellular and molecular biology. Most topics will have been introduced in undergraduate courses.

**MDBC 5501. Neurobiochemistry.** (2 cr; A-F or Aud. Prereq-Chem 3322 or Chem 4342 or #)

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]; S-N or Aud. Prereq-Biochem or Chem Graduate Student or #)

Current topics in biochemistry.

**MDBC 8294. Current Research Techniques.** (1-3 cr [max 4 cr]; S-N or Aud. Prereq-Biochem or Chem Graduate Student or #)

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

**MDBC 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

**MDBC 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**MDBC 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Max 6 cr per semester or summer; doctoral student who has not passed prelim oral; no required consent for the first two registrations up to 12 cr; departmental consent for the third and fourth registrations up to an additional 12 cr, or 24 cr total (for doctoral students admitted summer 2007 and beyond; doctoral students admitted prior to summer 2007 may register up to 4 times totaling 60 cr))

**MDBC 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**MDBC 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

## Biology (BIOL)

### College of Science and Engineering

**BIOL 1001. Biology and Society.** (4 cr; A-F or Aud. Prereq-For nonmajors LE 4) Contemporary issues in biology. (3 hrs lect, 2 hrs lab)

**BIOL 1010. Home Horticulture.** (3 cr; A-F or Aud)

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

**BIOL 1011. General Biology I.** (5 cr; A-F or Aud. Prereq-1 yr high school Chem or 1 sem college Chem LE 4)

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

**BIOL 1012. General Biology II.** (5 cr; A-F or Aud. Prereq-1011)

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

**BIOL 1083. Freshman Seminar: Honors: Biological Illustration.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr, honors student, §1093 LE 5)

Introduces the diversity and beauty of the biological world through sketching and drawing. Develops the student's observational abilities by drawing animals and plants in various settings. Retention of biological concepts is enhanced when a drawing class is included at the introductory level.

**BIOL 1086. Freshman Seminar: Food Preservation, Sanitation and Handling.** (3 cr; Stndt Opt. Prereq-Freshman, fewer than 30 credits LE 5)

Association of microorganisms with food, contamination in nature, during handling and processing, food spoilage and prevention, role of microorganisms in food production, vehicle for bioterrorism will be emphasized. Lectures, discussions, demonstrations, student participation by hands-on experience, field trips.

**BIOL 1087. Freshman Seminar: Darwinian Medicine.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits LE 5)

Darwinian medicine integrates evolutionary explanations into understanding human vulnerabilities to disease. This course introduces principles of evolution including natural selection,

adaptation and phylogeny within Darwinian medicine's major subject categories: defenses, infection, novel environments, genes, design compromises, and evolutionary legacies.

**BIOL 1088. Freshman Seminar: Biodiversity at Risk; Exotic and Invasive Species.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits LE 5)

Introduction to basic ecological concepts of plant, animal and microbial interactions in communities and ecosystems. Popular articles, literature reviews, discussions and student presentations focused on selected exotic and invasive species of local, regional, continental and global concern.

**BIOL 1089. Freshman Seminar: Northland Environmental Issues.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr. LE 5)

Many significant environmental issues affect those who live in the upper Midwest. This course will identify those issues and provide students with a scientific framework for studying the problems involved and evaluating possible solutions.

**BIOL 1092. Freshman Seminar: Earth's Life Support System.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits LE 5)

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

**BIOL 1093. Freshman Seminar: Biological Illustration.** (3 cr; A-F or Aud. Prereq-§1083, freshman, fewer than 30 credits LE 5)

Introduces the diversity and beauty of the biological world through sketching and drawing. Develops the student's observational abilities by drawing animals and plants in various settings. Retention of biological concepts is enhanced when a drawing class is included at the introductory level.

**BIOL 1094. Freshman Seminar: Northern Stream Ecosystems and the Angler.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits LE 5)

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

**BIOL 1096. Freshman Seminar: Science, Policy and Environment.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits. LE 5)

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

**BIOL 1097. Freshman Seminar: Topics:** (Various Titles to be Assigned). (3 cr; Stndt Opt. Prereq-Freshman, fewer than 30 cr. LE 5)

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

**BIOL 1761. Human Anatomy.** (4 cr; A-F or Aud. Prereq-1 yr high school Biol or 1011)

Gross and microscopic structure of body from functional standpoint using charts, models, skeletons; cat and sheep organ dissection demonstrates mammalian anatomy. Not for biology majors/minors; primarily for students in nursing, allied health professions, preprofessional programs, communication disorders, physical education. (2 hrs lect, 4 hrs lab)

**BIOL 2101. Cell Biology.** (3 cr; A-F or Aud. Prereq-1012, chem 1152 or 1162)

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

## Course Descriptions

### Course Descriptions

**Biol 2102. Cell Biology Laboratory.** (2 cr; A-F or Aud. Prereq-[P]2101) Contemporary cell biology research techniques, hypothesis testing and communication of results.

**Biol 2201. Genetics.** (3 cr; A-F or Aud. Prereq-1012) Basic principles of Mendelian inheritance, molecular genetics, chromosomal aberrations, and population genetics. (3 hrs lect)

**Biol 2202. Genetics Laboratory.** (2 cr; A-F only. Prereq-1011, 2201 (concurrent registration is allowed for 2201))

Mendelian and molecular research techniques used to illustrate fundamental principles of genetics.

**Biol 2763. Biology of Women.** (2 cr; A-F or Aud. Prereq-1012 LECD 05) 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 birth; birth control; menopause; aging; cancer; and nutrition. (2 hrs lect)

**Biol 2801. General Ecology.** (3 cr; A-F or Aud. Prereq-1012 or #) 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; A-F or Aud. Prereq-[P]2801) Experience in methods of measuring environmental factors, interpreting data. (4 hrs lab)

**Biol 2961. Introduction to Veterinary Medicine.** (1 cr; S-N or Aud. Prereq-1012 or #)

Lecture and discussion on principles and practices of veterinary medicine.

**Biol 3601. Plant Diversity.** (3 cr; A-F or Aud. Prereq-1012) Evolutionary survey of plants, focusing on diversity of life histories and patterns of organization. Fossil and extant groups, including algal and nonvascular and vascular land plants. (2 hrs lect, 2 hrs lab, field trip)

**Biol 3603. Plant Taxonomy.** (3 cr; A-F or Aud. Prereq-1012) 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; A-F or Aud. Prereq-1012) Survey of major animal phyla, focusing on phylogeny, anatomy, physiology, and ontogeny. (2 hrs lect, 4 hrs lab)

**Biol 3703. Animal Physiology.** (3 cr; A-F or Aud. Prereq-1011, 1012, one semester college chemistry) Examination of principles, patterns, and mechanisms of biological function from the level of cells and tissues to the whole animal. Primary focus on comparative vertebrate physiology.

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

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

**Biol 3993. Laboratory Teaching Experience.** (1-2 cr [max 2 cr]; S-N or Aud. Prereq-#, Biol or Cell Biol major, 90 cr incl 25 cr Biol; max 2 cr may be applied toward Biol major)

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]; S-N or Aud. Prereq-1012, 60 cr, #; max 4 cr may be applied to Biol or Cell Biol major or Biol minor as upper div elective)

Advanced independent work in special fields.

**Biol 3996. Internship in Biology.** (1-2 cr [max 2 cr]; S-N or Aud. Prereq-1012, #; max 1 cr may be applied to Biol or Cell Biol major)

Credit given for professional work experience outside an academic department. Requires prior department approval and coordination with faculty sponsor.

**Biol 3997. Seminar I.** (.5 cr; S-N or Aud. Prereq-60 cr or #)

Students attend and evaluate department seminars.

**Biol 3998. Seminar II.** (.5 cr; A-F or Aud. Prereq-3997, 60 cr or #)

Experience in oral presentation of student-initiated field, lab, or library research findings. (1 hr sem)

**Biol 4199. Frontiers in Cell Biology.** (2 cr; A-F or Aud. Prereq-2101, 2201, 90 cr, or Biol or IBS Grad Student, §5199)

Analysis and discussion of current literature and topics.

**Biol 4231. Molecular Biology.** (3 cr; A-F only. Prereq-2101, 2201 or #, or Biol or IBS Grad School student, §5231)

Contemporary molecular biology techniques, linkage analysis, mutation, DNA repair and recombination, genetics of viruses and bacteria, transposable genetic elements, genetics of mitochondria and chloroplasts, genomics, genetic control of animal development and the vertebrate immune system.

**Biol 4361. Developmental Biology.** (3 cr; A-F or Aud. Prereq-2101, 2201 or #, or Biol or IBS Grad School student, §5361)

Molecular and cellular mechanisms of development, emphasizing animal systems and including cell cycle, gametogenesis, fertilization, morphogenetic movements, cytotdifferentiation, cell interactions, pattern formation, gene expression, organogenesis, metamorphosis, regeneration, and aging. (2 hrs lect, 3 hrs lab)

**Biol 4501. General Microbiology.** (4 cr; A-F or Aud. Prereq-2101 or #, or Biol or IBS Grad School student)

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 4503. General Microbiology offered in Wroclaw, Poland.** (4 cr; A-F or Aud. Prereq-2101, §1; no Grad School cr)

Microbial cell structure, metabolism, nutrition, growth, and genetics. Structure and pathogenicity of viruses. Microbial taxonomy and diversity. Microbial diseases, immunity, serology, and control. Applied and environmental microbiology including medical, food, aquatic, and soil microbiology. Offered at Wroclaw University, Poland.

**Biol 4603. Plant Physiology.** (3 cr; A-F or Aud. Prereq-2101, one year of college chem, or Biol or IBS Grad School student)

Overview of the mechanisms underlying plant function, growth and development. Topics include plant metabolism, plant water relations, mineral nutrition, transport, internal and external regulators of plant growth and development, plant stress physiology and plant biotechnology.

**Biol 4731. Entomology.** (3 cr; A-F or Aud. Prereq-1012 or #, or Biol or IBS Grad School student)

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; A-F or Aud. Prereq-2801 or #, or Biol or IBS Grad School student)

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; A-F or Aud. Prereq-2801 or #, or Biol or IBS Grad School student)

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 4764. Mammalogy.** (3 cr; A-F or Aud. Prereq-2801 or #, or Biol or IBS Grad School student)

Origin, taxonomy, distribution, physiology, ecology and behavior of mammals. Laboratory and fieldwork includes collection, preparation and identification of Minnesota species. (2 hrs lecture, 3 hours lab, field)

**BIOL 4801. Evolution.** (2 cr; A-F or Aud. Prereq-1012, 2201 or #, or Biol or IBS Grad School student)

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 4805. Ecological Invasions.** (2 cr; A-F or Aud. Prereq-2801 or Biol or IBS Grad School student)

Characteristics of successful invaders, ecological effects of invasive species, genetic effects on native populations, impacts on human societies, options for control, relationships to other global changes. Case studies

**BIOL 4891. Animal Behavior.** (2 cr; A-F or Aud. Prereq-1012, 2801 or #, or Biol or IBS Grad School student)

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 5232. Molecular Biology Laboratory.** (2 cr; A-F only. Prereq-[P]4231 or #, or Biol or IBS Grad School student, §4232)

Regulation of gene expression in prokaryote and eukaryotes explored through use of recombinant DNA technologies.

**BIOL 5233. Genomics.** (3 cr; A-F or Aud. Prereq-1012, 2201, 2101 or a course in biochemistry or molecular biology or #)

A comprehensive examination of how the genomic revolution has shed insight into eukaryotic gene expression by illustrating the methods that show how coordinate sets of genes control biochemical events at the cellular level.

**BIOL 5235. Biotechnology.** (4 cr; A-F or Aud. Prereq-(2101, 2102, 2201, Chem 3322 or Chem 4341) or Biol or IBS Grad School student)

Genetic engineering with emphasis on large-scale production and isolation of recombinant proteins and metabolites. Microbial, plant and animal cell culture. Comparison of recombinant DNA technology to selective breeding and natural isolate use. Practical, legal and ethical considerations of genetic engineering.

**BIOL 5240. Ecological Genetics.** (3 cr; A-F or Aud. Prereq-1012, 2201 and Stat 1411, or Biol or IBS Grad School student)

Examines basic concepts in population and quantitative genetics. Focus is on techniques that reveal the genetic structure and adaptive value of ecologically important traits.

**BIOL 5365. Developmental Physiology.** (2 cr; A-F or Aud. Prereq-1012; 4361 and 3703 strongly recommended, or Biol or IBS Grad School student)

Review of physiological mechanisms of animal development. Emphasis on well-studied animal models such as insects, crustaceans, zebrafish, and mice.

**BIOL 5401. Coevolution of Plants, Animals and Microbes.** (3 cr; A-F or Aud. Prereq-2801, 2802, or Biol or IBS Grad School student)

Explores the evolution of interactions between species ranging from strongly antagonistic such as predator-prey interactions to strongly cooperative such as obligate mutualisms. The behavior,

ecology and genetics of interacting organisms will be studied to understand their evolution. Includes two hours lecture and one three-hour lab per week.

**BIOL 5511. Virology.** (3 cr; A-F or Aud. Prereq-4501, or Biol or IBS Grad School student)

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

**BIOL 5513. Experimental Immunology.** (4 cr; A-F or Aud. Prereq-4501 or #, or Biol or IBS Grad School student)

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

**BIOL 5515. Microbial Diversity and Phylogeny.** (3 cr; A-F only. Prereq-2101 or 4501 or #, or Biol or IBS Grad School student)

Evolutionary survey and characteristics of microorganisms focusing on autotrophic and heterotrophic prokaryotes from various habitats. Isolation, examination, and identification of bacteria from field collections using microscopic, physiological, biochemical, molecular, phylogenetic, and computer database techniques.

**BIOL 5603. Plant Physiology Laboratory.** (2 cr; A-F or Aud. Prereq-2101, one year of college chemistry, prior or concurrent enrollment in 4603 or #, or Biol or IBS Grad School student)

Lab exercises that evaluate the physiological processes that enable plants to grow under the varied conditions found in nature such plant water relations, mineral nutrition, metabolism, and plant growth and development. Exposure to modern plant physiology techniques includes gas exchange, chlorophyll fluorescence, spectrophotometry, and pressure chamber methods to assess plant function. Independent projects include hypothesis testing data analysis and communication of results.

**BIOL 5760. The Physiology of Fishes.** (3 cr; A-F or Aud. Prereq-1012, 3703, or Biol or IBS Grad School student)

Comprehensive review of major areas of research in fish physiology. Comparative approach will focus on recirculating fresh and salt water systems, reproductive physiology and neurophysiology.

**BIOL 5772. Mechanisms of Neural Behavior.** (3 cr; A-F or Aud. Prereq-1012, 3703 or Biol or IBS Grad School student)

Review of the basic neurophysiological components of animal behavior. Emphasis will be on well studied neuroethological models such as weakly electric fish, bats, owls and crayfish.

**BIOL 5777. Plankton Biology.** (2 cr; A-F or Aud. Prereq-2801, 2802 or Biol or IBS Grad School student)

Explores topics in the biology of plant and animal plankton with emphasis on lake communities. Topics include biogeography, life-history, anatomy, physiology, and ecology of plankton. Basic limnology covered as relevant. Meets twice weekly for lecture and literature discussion.

**BIOL 5801. Microbial Ecology.** (2 cr; A-F or Aud. Prereq-(2101, (2801 or 4501) or #, or Biol or IBS Grad School student)

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

**BIOL 5802. Microbial Ecology Laboratory.** (2 cr; A-F or Aud. Prereq-[P]5801 or # or Biol or IBS Grad School student)

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.

## Course Descriptions

**Biol 5803. Water Pollution Biology.** (3 cr; A-F or Aud. Prereq-5861 or # or Biol or IBS Grad School student)

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

**Biol 5805. Fisheries Ecology.** (3 cr; A-F or Aud. Prereq-2801, 2802, college-level course in statistics or Biol or IBS Grad School student)

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

**Biol 5807. Mathematical Ecology.** (3 cr; A-F or Aud. Prereq-(2801, (Math 1290 or Math 1297)) or Biol or IBS Grad School student)

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

**Biol 5808. Landscape Ecology: Theory and Application.** (3 cr; A-F or Aud. Prereq-2801, 2802 or Biol or IBS Grad School student)

Key issues in landscape ecology including scale, measuring landscape patterns, mechanisms shaping landscapes, implications of landscape patterns on plant and animal populations, communities, and ecosystems, and implementing landscape principles for natural resource management.

**Biol 5811. Plant Autecology.** (2 cr; A-F or Aud. Prereq-2801 or Biol or IBS Grad School student)

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

**Biol 5831. Plant Population and Community Ecology.** (4 cr; A-F or Aud. Prereq-2801 or Biol or IBS Grad School student)

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

**Biol 5833. Stream Ecology.** (4 cr; A-F or Aud. Prereq-2801 or # or Biol or IBS Grad School student)

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

**Biol 5839. Coral Reef Field Studies.** (3 cr; A-F or Aud. Prereq-2801 or # or Biol or IBS Grad School student; \$GeoI 5839)

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

**Biol 5861. Lake Ecology.** (3 cr; A-F or Aud. Prereq-2801 or # or Biol or IBS Grad School student)

Ecology of lakes and reservoirs. (3 hrs lect)

**Biol 5862. Advanced Lake Ecology.** (3 cr; A-F or Aud. Prereq-[P]5861 or Biol or IBS Grad School student)

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; A-F or Aud. Prereq-2801 or #, or Biol or IBS Grad School student)

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

**Biol 5864. Ecosystems Ecology Laboratory.** (1 cr; A-F or Aud. Prereq-[P]5863; 2802 or Biol or IBS Grad School student)

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

**Biol 5865. Conservation Biology.** (2 cr; A-F or Aud. Prereq-2801 or Biol or IBS Grad School student)

Introduction to science of species, habitat, and ecosystem conservation and management.

**Biol 5867. Managing and Monitoring Lakes and Streams.** (3 cr; A-F or Aud. Prereq-[2801, 2802, [5833 or 5861] or #, or Biol or IBS Grad School student)

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

**Biol 5868. Ecotoxicology.** (3 cr; A-F or Aud. Prereq-2101, 2801, college-level statistics course or #, or Biol or IBS Grad School student)

Examines the effects of toxicants on constituents of the biosphere at levels of biological organization from cells to ecosystems. Toxicant identification, toxicity testing, exposure routes, bioaccumulation, toxicant effects, regulations, and current issues.

**Biol 5870. Wetland Ecology.** (3 cr; A-F or Aud. Prereq-2801, 2802 or Biol or IBS Grad School student)

Hydrology, nutrient cycling, and productivity of wetland ecosystems and the adaptations and interactions of resident biota; assessment, management, conservation, restoration, and creation of wetlands. Two daylong weekend field trips required.

**Biol 5990. Special Topics:** (Various Titles to be Assigned). (1-5 cr [max 10 cr]; A-F or Aud. Prereq-1012, #)

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

**Biol 8139. Seminar in Cell Biology.** (1 cr [max 10 cr]; S-N or Aud. Prereq-2101, grad student in Biol or related field)

Analysis of current topics.

**Biol 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

**Biol 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**Biol 8899. Seminar in Ecology.** (1 cr [max 10 cr]; S-N or Aud. Prereq-2801, grad student in Biol or related field)

In-depth analyses of topics in ecology.

**Biol 8893. Graduate Seminar.** (1 cr [max 10 cr]; S-N or Aud. Prereq-Grad student in Biol or related field)

Reports on recent developments in biology and on research projects in the department.

**Biol 8994. Graduate Research.** (1-4 cr [max 10 cr]; S-N or Aud. Prereq-Grad student in Biol or related field)

Directed research or study on an advanced topic.

## Business Law (BLAW)

### Labovitz School of Business and Economics

**BLAW 2001. The Legal Environment.** (3 cr; A-F only. Prereq-Min 30 cr. LE 8)

Introduction to U.S. legal system and its impact on modern business operations. Ethical, economic, social, and political perspectives of legal environment. Constitutional law, administrative regulation, torts and products liability, contracts, business organizations, employment/labor law.

**BLAW 3001. Law and Ethics for Financial Professionals.** (3 cr; A-F only. Prereq-LSBE cand or #; \$3101)

Examination of the legal and ethical issues faced by financial professionals. Topics include agency, bankruptcy, insider trading and other securities laws, obligations of corporate directors and officers, negotiable instruments and secured lending transactions.

**BLAW 3101. Business Law.** (3 cr; A-F only. Prereq-2001, SBE cand or □)

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; A-F only. Prereq-SBE cand or □)

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

**BLAW 3301. Estate Planning Concepts and Strategies.** (3 cr; A-F only. Prereq-Acct 3401, LSBE cand or □)

Examines the basics of estate planning, including both the legal and tax aspects of developing an estate and/or incapacity plan. Topics include: probate and probate substitutes, wills and other estate planning documents, gifting and insurance strategies, use of trusts, and federal estate, gift and generation-skipping taxation.

## **Chemical Engineering (CHE)**

### **College of Science and Engineering**

**CHE 1011. Introduction to Chemical Engineering.** (3 cr; A-F or Aud. Prereq-High school chem, high school algebra LE 5)

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

**CHE 2001. Introduction to Environmental Engineering.** (3 cr; A-F or Aud. Prereq-High school chem, high school algebra LE 4)

Comprehensive survey of environmental engineering. Fundamental science and engineering principles as basis for analyzing environmental issues. Federal laws on air pollution, wastewater discharge, and hazardous waste. Wastewater treatment, air pollution control, waste minimization, resource recovery, and recycling.

**CHE 2011. Design of Engineering Experiments.** (3 cr; A-F or Aud. Prereq-Math 1297)

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; Stdn Opt. Prereq-Chem 1151 or Chem 1161)

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

**CHE 2121. Chemical Engineering Thermodynamics.** (3 cr; A-F or Aud. Prereq-2111, Math 1297, [P]1011)

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

**CHE 3031. Computational Methods in Chemical Engineering.** (3 cr; A-F or Aud. Prereq-B.S.Ch.E. candidate, 2111, Math 3280)

Modeling and simulation of chemical engineering processes; computational methods applied to chemical engineering; use of computation and process simulation tools.

**CHE 3111. Fluid Mechanics.** (3 cr; A-F or Aud. Prereq-Engr 2015, Math 3280)

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; A-F or Aud. Prereq-3111)

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

**CHE 3211. Chemical Engineering Laboratory I.** (3 cr; A-F or Aud. Prereq-3111)

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

**CHE 3231. Properties of Engineering Materials.** (3 cr; A-F or Aud. Prereq-2121, Chem 2521)

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

**CHE 3241. Principles of Particle Technology.** (3 cr; A-F or Aud. Prereq-B.S.Ch.E. candidate, 2111, Phys 2012, Math 3280 or #, §4621)

The science and engineering dealing with the production, handling, modification and use of a wide variety of particulate materials, both wet and dry, in sizes ranging from the sub-micron to the centimeter scale.

**CHE 3791. Independent Study.** (1-3 cr [max 3 cr]; Stdn Opt. Prereq-BSChE cand, %)

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

**CHE 3894. Chemical Engineering Research.** (1-3 cr [max 6 cr]; Stdn Opt. Prereq-BSChE cand, max 6 or 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]; Stdn Opt. Prereq-BSChE cand, %)

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]; A-F or Aud. Prereq-BSChE cand and %)

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; A-F or Aud. Prereq-3112; no Grad School cr)

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

**CHE 4211. Chemical Engineering Laboratory II.** (3 cr; A-F or Aud. Prereq-3211; no Grad School cr)

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

**CHE 4301. Chemical Reaction Engineering.** (3 cr; A-F or Aud. Prereq-3112; no Grad School cr)

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

**CHE 4401. Process Control.** (3 cr; A-F or Aud. Prereq-2121, 3112, 4301, Math 3280; no Grad School cr)

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

## Course Descriptions

**CHE 4402. Process Dynamics and Control.** (3 cr; A-F or Aud. Prereq-B.S.Ch.E. candidate, 2121, 3112, 4301, CS 11xx, Math 3280, #, no Grad School cr, §4401)

Dynamic behavior of open-and closed-loop systems. Design and operation of automatic controllers for chemical process systems. The programming of a microcontroller.

**CHE 4501. Chemical Engineering Design I.** (4 cr; A-F or Aud. Prereq-2121, 3231 and (prereq or coreq 4111, 4211, 4301); no Grad School cr)

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; A-F or Aud. Prereq-4501; no Grad School cr)

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; A-F or Aud. Prereq-2111)

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

**CHE 4602. Bioseparations.** (3 cr; A-F or Aud. Prereq-2111, Math 1297)

Application of engineering principles to the isolation, purification, and finishing of biologically derived products. Design of unit operations specific to biochemical processes, including cell disruption, sedimentation, precipitation, filtration, extraction, chromatography, crystallization and drying. Integration of operations with upstream processing.

**CHE 4612. Hazardous Waste Processing Engineering.** (3 cr; A-F or Aud. Prereq-2111, Chem 2521)

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

**CHE 4613. Air Pollution Control.** (3 cr; A-F or Aud. Prereq-2111, Math 3280, min 60 cr)

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

**CHE 4621. Particle Technology.** (3 cr; A-F or Aud. Prereq-2111, 3111)

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

**CHE 5021. Transport Phenomena.** (3 cr; A-F or Aud. Prereq-3112 or Grad student or #)

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

**CHE 5022. Transport Processes in Wells and Pipelines.** (3 cr; A-F or Aud. Prereq-3111, 3112 or Grad student or #)

Exposes students to various elements of fluid and heat flows that occur in oil/gas wells and pipelines. The fundamentals of multiphase flow are explained in terms of single-phase flow mechanics and configuration of the phases. Simplicity in modeling approach is retained. Field examples are used to reinforce understanding of the models.

**CHE 5031. Chemical Engineering Analysis.** (3 cr; A-F or Aud. Prereq-4111 or Grad student or #)

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

**CHE 5894. Chemical Engineering Research.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-Grad student and #)

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

**CHE 5895. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 10 cr]; Stdnt Opt. Prereq-#, no Grad School cr)

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 [max 4 cr]; A-F or Aud. Prereq-§1113, 1151, 1161 or 2172 LE 4)

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

**CHEM 1113. Introduction to General, Organic, and Biological Chemistry I.** (5 cr; A-F or Aud. Prereq-§1151, 1161, 2172; for students terminating study of chem with no more than 10 or LE 4)

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

**CHEM 1114. Introduction to General, Organic, and Biological Chemistry II.** (5 cr; A-F or Aud. Prereq-1113; §2521 or 3322)

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; A-F or Aud. Prereq-High school chem, high school algebra; §1161 or 2172 LE 4)

Fundamental principles exemplified by study of elements, compounds, and their reactions.

**CHEM 1152. General Chemistry II.** (5 cr; A-F or Aud. Prereq-1151 or 1161; §1162 or 2172)

Fundamental principles exemplified by study of elements, compounds, and their reactions.

**CHEM 1161. Honors: General Chemistry I.** (5 cr; A-F or Aud. Prereq-High school chem and high school algebra or %, §1151 or 2172 LE 4)

Fundamental principles exemplified by study of elements, compounds, and their reactions.

**CHEM 1162. Honors: General Chemistry II.** (5 cr; A-F or Aud. Prereq-1151 or 1161; §1152 or 2172)

Fundamental principles exemplified by study of elements, compounds, and their reactions.

**CHEM 1191. Independent Study.** (1-2 cr [max 4 cr]; A-F or Aud. Prereq-%)

For students wishing to do special work in areas useful to individual programs and objectives when such are not available in regular course offerings.

**CHEM 2095. Special Topics:** (Various Titles to be Assigned). (4 cr; A-F or Aud. Prereq-10 cr college chem or #)

Selected topics that fall outside currently offered courses. Topic announced before course offered.

**CHEM 2212. Environmental Chemistry.** (4 cr; A-F or Aud. Prereq-1152 or 1162)

Study of chemical processes in natural air, water, soil and sediment environments. Sources, reaction, transport, effects, and fates of natural and anthropogenic chemical species will be covered. Methods of analysis of environmental samples, with emphasis on quantitative treatment of data.

**CHEM 2222. Quantitative Analysis.** (3 cr; A-F or Aud. Prereq-1152 or 1162, [P]2223)

Theory in analytical techniques; introduces gravimetric, volumetric, and spectrophotometric methods.

**CHEM 2223. Quantitative Analysis Laboratory.** (1 cr; A-F or Aud. Prereq-[P]2222)

Lab companion to 2222 involving the quantitative analysis of organic and inorganic samples using classical and instrumental techniques. Students are instructed in the use of classical and modern computer-controlled instrumentation and techniques, as applied to the acquisition and analysis of experimental data.

**CHEM 2242. Analytical Chemistry Applied to Environmental Problems in Eastern Europe.** (4 cr; A-F or Aud. Prereq-1152 or 1162, §2222 and 2223)

Theory and practice in quantitative analysis, covering statistics, acid-base equilibria, chelometry, spectrometry, and chromatography, including volumetric, spectrophotometric, and separation methods, to be offered in Poland, with field trips to sites of environmental concern.

**CHEM 2521. Organic Chemistry I.** (4 cr; A-F or Aud. Prereq-1152 or 1162)

Structure and bonding, stereochemistry, functional group reactions.

**CHEM 2522. Organic Chemistry II.** (4 cr; A-F or Aud. Prereq-2521)

Functional group reactions, bioorganic chemistry.

**CHEM 2532. Organic Chemistry II for B.S. Chemistry Majors.** (5 cr; A-F or Aud. Prereq-2521)

Functional group reactions, bioorganic chemistry

**CHEM 3097. Internship in Chemistry.** (1-2 cr [max 2 cr]; S-N only. Prereq-2521 or 2223, chem or biochem/molecular biol majors and %)

Experience in a commercial, government, or industrial setting. Prior department approval and coordination with faculty sponsor are required.

**CHEM 3194. Chemistry Undergraduate Research.** (1-3 cr [max 30 cr]; S-N or Aud. Prereq-%)

Experience in a selected area of research.

**CHEM 3322. Biochemistry.** (3 cr; A-F or Aud. Prereq-2522 or 2532)

Survey of biochemistry, emphasizing enzyme catalysis, cellular energetics, and major metabolic processes.

**CHEM 3324. Biochemistry Laboratory.** (1 cr; A-F or Aud. Prereq-[P]3322)

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

**CHEM 4184. Undergraduate Seminar I.** (1 cr; S-N or Aud. Prereq-BS Chem or BS BMB Major; min 90 cr)

First course of a two-course senior seminar requirement for B.S. Chemistry and B.S. Biochemistry and Molecular Biology majors. Students will learn to prepare and present scientific talks. Use of visual aids and computer technology, presentation organization and delivery, and use of scientific literature will be among the skills students will learn. In addition, students will attend and evaluate weekly departmental seminars.

**CHEM 4185. Undergraduate Seminar II.** (1 cr; S-N or Aud. Prereq-4184)

Second course of a two-course senior seminar requirement for B.S. Chemistry and B.S. Biochemistry and Molecular Biology majors. Students will learn to prepare and present scientific

talks. Use of visual aids and computer technology, presentation organization and delivery, and use of scientific literature will be among the skills students will learn. In addition, students will attend and evaluate weekly departmental seminars. Students will participate in and present at the annual Departmental Undergraduate Symposium.

**CHEM 4242. Instrumental Analysis.** (3 cr; A-F or Aud. Prereq-2222, 4632 or 4642)

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

**CHEM 4243. Instrumental Chemistry Laboratory.** (2 cr; A-F or Aud. Prereq-2223, [P]4242)

Lab companion to 4242 involving the use of computerized chemical instrumentation in the analysis of organic and inorganic samples. Students learn the use of modern programming tools as applied to the control of chemical instrumentation and acquisition and analysis of data there from.

**CHEM 4351. Biochemistry I.** (3 cr; A-F or Aud. Prereq-2222, 2522 or 2532, Math 1296, concurrent registration in physical chem recommended, §Phar 6151)

Introduction to structural classes of biologically relevant molecules. Descriptions of monomeric small molecules and their incorporation into macromolecules. Covers amino acids, proteins, fatty acids, lipids, sterols, carbohydrates, nucleic acids, RNA, and DNA structures.

**CHEM 4352. Biochemistry II.** (3 cr; A-F or Aud. Prereq-4351, §Phar 6152)

Introduction to metabolism of carbohydrates, fatty acids, sterols, nucleic acids, amino acids, and xenobiotics. Common metabolic pathways of glycolysis, gluconeogenesis, citric acid cycle, et al. The interrelated nature of these pathways and their cellular regulation will be covered.

**CHEM 4363. Biochemistry Laboratory.** (2 cr; A-F or Aud. Prereq-2223, 2522 or 2532, [P]4341)

Applications of biochemistry and molecular biology techniques.

**CHEM 4434. Inorganic Chemistry.** (4 cr; A-F or Aud. Prereq-4632 or 4642)

Atomic structure and properties of elements based thereon. Chemical bonding. Chemistry of coordination compounds. Mechanisms of selected inorganic reactions; survey of chemistry of representative elements. Organometallic chemistry. Bioinorganic chemistry.

**CHEM 4435. Inorganic Chemistry Laboratory.** (1 cr; A-F or Aud. Prereq-[P]4434)

Preparation and study of the properties of selected inorganic compounds.

**CHEM 4632. Physical Chemistry.** (4 cr; A-F or Aud. Prereq-Phys 2012 or Phys 1002, 2 years of chemistry)

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

**CHEM 4633. Physical Chemistry Laboratory.** (1 cr; A-F or Aud. Prereq-[P]4632)

Laboratory program in physical chemistry, including thermodynamics, spectroscopy, kinetics and quantum mechanics.

**CHEM 4641. Physical Chemistry I.** (3 cr; A-F or Aud. Prereq-2 yrs chem, Math 3280, Phys 2012)

Quantitative treatment of physical principles and theories in chemistry, including topics in thermodynamics and kinetics.

**CHEM 4642. Physical Chemistry II.** (3 cr; A-F or Aud. Prereq-4641)

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

**CHEM 4643. Physical Chemistry Laboratory I.** (1 cr; A-F or Aud. Prereq-[P]4641)

Laboratory program in physical chemistry, accompanying lecture Chem 4641.

## Course Descriptions

**CHEM 4644. Physical Chemistry Laboratory II.** (1 cr; A-F or Aud. Prereq-[P]4642) Laboratory program in physical chemistry, accompanying lecture Chem 4642.

**CHEM 5150. Organic and Stable Isotope Biogeochemistry.** (3 cr; A-F or Aud. Prereq-Chem 1152 or 1162 or #, Geol 1110 or 2610 or #, Biol 1012 or #, upper level undergrad or grad standing in the sciences or engineering or #, Chem 2222 and 2521 (recommended))

Production and chemical composition of natural organic matter (OM), diagenesis and catagenesis of OM; stable isotopic

**CHEM 5350. Research Topics for High School Chemistry Teachers.** (2-4 cr [max 8 cr]; Stdt Opt. Prereq-Ed MA or MEd student, %)

Experimental work and philosophy associated with a selected research topic.

**CHEM 5424. Advanced Inorganic Chemistry I.** (3 cr; A-F or Aud. Prereq-4434 or equivalent or Grad student)

Advanced topics in inorganic chemistry including the following: Applications of Group Theory to inorganic chemistry such as molecular orbital theory and valence bond theory as well as vibrational analysis, organometallic chemistry including structure and bonding in organometallic compounds, reactions and reaction mechanisms of organometallic compounds, and the application of organometallic compounds as reagents and catalysts in organic synthesis, other advanced aspects of inorganic chemistry, e.g. Bioinorganic Chemistry and Aspects of Material Science.

**CHEM 5524. Advanced Organic Chemistry I.** (3 cr; A-F or Aud. Prereq-2522 or equivalent or Grad student)

This course will cover advanced topics of Organic Reaction Mechanisms and Aspects of Organic Synthesis

**CHEM 5624. Advanced Physical Chemistry I.** (3 cr; A-F or Aud. Prereq-4642 or equivalent or Grad student)

Classical and statistical thermodynamics, chemical kinetics, other selected topics in physical chemistry.

**CHEM 5650. Computational Chemistry.** (3 cr; A-F or Aud. Prereq-4642 or equivalent or Grad student)

Molecular Mechanics, Quantum Mechanics, semiempirical and ab initio molecular orbital calculations, density functional theory, and selected additional topics in computation chemistry such as biochemical applications, QSAR, and ligand modeling and docking.

**CHEM 5714. Applications of Spectroscopy.** (4 cr; A-F or Aud. Prereq-4434 or equivalent or Grad student)

Application of spectroscopic techniques to structure elucidation, including NMR, FTIR, MS, UV-Vis, X-ray, EPR spectroscopy. Includes practical component.

**CHEM 5725. Advanced Analytical Chemistry I.** (3 cr; A-F only. Prereq-Grad student or 4424 or equivalent)

Intended for advanced undergraduate and beginning graduate students in chemistry and related fields. Augment basic coursework in wet and instrumental analytical chemistry. Topics include statistical and chemometric methods for experimental design and data analysis, electronics and computers in chemical instrumentation, and selected techniques of instrumental analysis such as mass spectrometry, inductively coupled optical emission spectroscopy and analytical gas chromatography.

**CHEM 5994. Directed Research in Chemistry.** (1-3 cr [max 9 cr]; Stdt Opt. Prereq- Min 90 cr or Grad in the sciences or engineering or #)

Directed laboratory or theoretical research in the chemical sciences.

**CHEM 8184. Seminar.** (1 cr; S-N or Aud. Prereq-Grad chem major or #)

Practice in preparation and oral presentation of reports on articles from the literature or on graduate research.

**CHEM 8224. Advanced Analytical Chemistry II.** (4 cr; A-F or Aud. Prereq-5725) Advanced treatment of selected methods in analytical chemistry.

**CHEM 8324. Advanced Biochemistry and Molecular Biology.** (4 cr; A-F or Aud. Prereq-4342 or equiv)

**CHEM 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master s student, adviser and DGS consent)

**CHEM 8424. Advanced Inorganic Chemistry II.** (4 cr; A-F or Aud. Prereq-5424)

Discussion of structure, reactions, and bonding in inorganic and organometallic compounds in terms of valence bond, molecular orbital, and ligand field theories.

**CHEM 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**CHEM 8524. Advanced Organic Chemistry II.** (4 cr; A-F or Aud. Prereq-5524)

Advanced treatment of synthetic methods and reaction mechanisms in organic chemistry.

**CHEM 8624. Advanced Physical Chemistry II.** (4 cr; A-F or Aud. Prereq-5624)

Advanced topics selected from quantum and computational chemistry, reaction kinetics and dynamics, statistical mechanics, and thermodynamics.

**CHEM 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq- Max 6 cr per semester or summer; doctoral student who has not passed prelim oral; no required consent for the first two registrations up to 12 cr, departmental consent for the third and fourth registrations up to an additional 12 cr, or 24 cr total (for doctoral students admitted summer 2007 and beyond; doctoral students admitted prior to summer 2007 may register up to 4 times totaling 60 cr))

**CHEM 8750. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 8 cr]; Stdt Opt. Prereq-Grad student or #)

Topics not available in standard curriculum.

**CHEM 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq- Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**CHEM 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq- Max 18 cr per semester or summer; 24 cr required)

## Chinese (CHIN)

### College of Liberal Arts

**CHIN 1101. Beginning Chinese I: A Practical Introduction to Everyday Mandarin Chinese.** (3 cr; A-F or Aud. LEIP 03)

Introduction to Mandarin Chinese for students with little or no prior study. Emphasis will be on expressions for daily living with appropriate grammar and vocabulary. Writing in the phonetic pin yin system will be introduced as will high frequency characters.

**CHIN 1102. Beginning Chinese II: A Practical Introduction to Everyday Mandarin Chinese.** (3 cr; A-F or Aud. Prereq-1101 LEIP 03)

Introduction to Mandarin Chinese for students with little prior study. Emphasis will be on expressions for daily living with appropriate grammar and vocabulary. Writing in the phonetic pin yin system will be introduced as will high frequency characters.

**CHIN 1201. Intermediate Chinese I: Mandarin Chinese.** (3 cr; A-F only. Prereq- 1102 or equivalent LEIP 03)

Consolidation and enrichment of previously acquired abilities speaking and understanding Mandarin Chinese. Emphasis on oral and aural skills, vocabulary building, some reading and writing in the phonetic pin yin system with high frequency characters.

**CHIN 1399. Chinese: Mandarin Chinese in China.** (6 cr; A-F only. LEIP 03)

Conversation and communicative course for students with little or no previous study of Chinese. Emphasis on oral and aural skills, some grammar. For study in China.

# Coaching (CC)

## College of Education and Human Service Professions

**CC 3101. Sport Science Applications.** (3 cr; A-F or Aud. Prereq-Coaching minor, min 30 cr or #, §3100)

Sport sciences applied to coaching: includes nutrition, training, conditioning and legal/illegal ergogenic agents and drugs.

**CC 3117. Functional Anatomy and Sport Injury Management.** (3 cr; A-F or Aud. Prereq-Min 30 cr, current Red Cross First Aid and CPR card or Hlth 1600, §3116)

Functional anatomy, care and prevention of sport injuries, emergency care and external support application. Principles and techniques appropriate for coaches, recreational personnel, pre-professional physical therapists and nurses.

**CC 3150. Coaching Methods.** (3 cr; A-F or Aud. Prereq-Coaching minor, min 30 cr or #)

Study and application of educational methods in an athletic setting. Skill development, learning styles, communication skills, technology skills and practice development as it pertains to sport.

**CC 3160. Psychological Aspects of Coaching and Athletic Performance.** (3 cr; A-F or Aud. Prereq-Coaching minor, min 30 cr or #)

Psychological techniques and interventions to enhance athletic performance. Emphasizes the implementation of mental skills that enhance athletic performance into sport practice by the coach and/or athlete.

**CC 3161. Administrative Aspects of Coaching.** (3 cr; A-F or Aud. Prereq-Coaching minor, min 30 cr or #)

Examines state governing organizations, budgeting, scheduling, insurance, contest administration, and public relations procedures in athletic programs.

**CC 3170. Coaching and Officiating Football.** (2 cr; A-F or Aud. Prereq-Coaching minor or #)

Systems of offense and defense, strategy, and methods of organizing practices and working with team members.

**CC 3171. Coaching and Officiating Basketball.** (2 cr; A-F or Aud. Prereq-Coaching minor or #)

Fundamentals, styles of offense and defense, training suggestions.

**CC 3172. Coaching and Officiating Volleyball.** (2 cr; A-F or Aud. Prereq-Coaching minor or #)

Coaching and officiating offenses and defenses; conditioning programs; coaching and officiating philosophies.

**CC 3173. Coaching and Officiating Baseball.** (2 cr; A-F or Aud. Prereq-Coaching minor or #)

Fundamentals, practice sessions, training techniques, and offensive and defensive strategies.

**CC 3174. Coaching and Officiating Soccer.** (2 cr; A-F or Aud. Prereq-Coaching minor or #)

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; A-F or Aud. Prereq-Coaching minor or #)

Fundamental skills, systems of offense and defense, strategy and rules of the game, methods of organizing practices.

**CC 3177. Coaching and Officiating Tennis.** (2 cr; A-F or Aud. Prereq-Coaching minor or #)

Strategies, fundamentals, psychology of tennis, attack and defensive patterns.

**CC 3178. Coaching and Officiating Track and Field.** (2 cr; A-F or Aud. Prereq-Coaching minor or #)

Fundamentals, mechanical analysis of events, training techniques and strategies.

**CC 3179. Coaching and Officiating Softball.** (2 cr; A-F or Aud. Prereq-Coaching minor or #)

Fundamentals, practice sessions, training techniques, and offensive and defensive strategies.

**CC 3991. Independent Study.** (2 cr; A-F or Aud. Prereq-Coaching minor and #)

A coaching methods experience. Directed individual study must be arranged with the instructor before registration.

**CC 3997. Coaching Practicum.** (2 cr; S-N only. Prereq-Coaching minor and #)

Supervised coaching in a school or agency setting. Coaching practicum must be arranged with the instructor before registration.

# College of Liberal Arts (CLA)

## College of Liberal Arts

**CLA 1001. Learning Community Integrative Seminar.** (1 cr [max 2 cr]; A-F only. Prereq-Freshman, fewer than 30 cr, □)

Designed to facilitate integration of learning community courses and collegiate academic expectations. The seminar supports integration of liberal education curriculum within the context of intellectual growth, academic goal setting, and major exploration. Study group practicum required.

# Communication (COMM)

## College of Liberal Arts

**COMM 1000. Human Communication Theory.** (3 cr; A-F or Aud. LE 3)

Introduction to fundamental concepts, models, and theories of human communication. Issues concerning verbal and nonverbal symbolic processes, language and meaning, and the relationship between communication and understanding. Communication processes and problems in various contexts.

**COMM 1010. Persuasion.** (3 cr; A-F or Aud. LE 6)

Social scientific theory and research on communication techniques used to influence attitudes, perceptions, knowledge, and behavior of others. Research evidence regarding processes and effects on individuals and society in multiple contexts.

**COMM 1112. Public Speaking.** (3 cr; A-F or Aud. Prereq-§1511 LE 3)

Application of the theoretical bases of rhetoric to the public speaking situation.

**COMM 1222. Interpersonal Communication.** (3 cr; A-F or Aud. LECD 03)

Analysis of the role communication plays in interpersonal relationships.

**COMM 1500. Media and Society.** (3 cr; A-F or Aud. LE 8)

Manipulative influence of contemporary media on American society. Examples drawn from campaigns, commercial advertising, and editorials.

**COMM 1511. Honors: Public Speaking.** (3 cr; A-F only. Prereq-Honors student, §1200 LE 3)

Application of the theoretical bases of rhetoric to the public speaking situation.

**COMM 1600. Argumentation and Debate: A Practical Approach.** (3 cr; A-F or Aud)

Utilizes a symbolic action approach to introduce the theory and practice of argumentation, particularly within practical contexts; aiming at the related goals of making students more effective arguers, more critical consumers of arguments, and more critical thinkers generally.

## Course Descriptions

### **COMM 1625. Philosophy and Rhetoric.** (3 cr; A-F or Aud)

Introduction to the philosophy and history of rhetoric from ancient to modern times, including rhetoric's role in reasoning about values, defining the duties and methods of citizenship, and shaping self-awareness.

### **COMM 2025. Communication Inquiry: Rhetorical and Historical Methods.** (3 cr; A-F or Aud)

Exploration/survey of rhetorical and historical approaches to understanding the role that communication plays in social influence.

### **COMM 2030. Communication Inquiry: Social Scientific Methods.** (3 cr; A-F or Aud)

Introduction to social scientific inquiry related to the study of communication, and will provide an overview of research methods and an introduction to statistics.

### **COMM 2101. Foundations of Mass Communication.** (3 cr; A-F or Aud. LE 8)

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

### **COMM 2102. Media Effects.** (3 cr; A-F or Aud. LE 8)

Theory and research on the effects of media. Topics include media violence effects, sexual media content, fight reactions to media, news and political content effects, the impact of stereotyping, advertising effects, and the impact of new media technologies.

### **COMM 2200. Leadership and Group Communication.** (3 cr; A-F or Aud)

How leaders should communicate in group context and how communication affects team processes. Definition of what a group is, different group processes (i.e., group development, decision-making, and conflict management), and the different ways of leading in groups.

### **COMM 2202. Introduction to Organizational Communication.** (3 cr; A-F or Aud)

Introduction to theories, systems, structures, and processes of communication in the organization. Explores the relationship between organizational characteristics (i.e., selection, socialization, training, and evaluation) and communication.

### **COMM 2505. Analysis of Public Discourse.** (3 cr; A-F or Aud. Prereq-1112)

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

### **COMM 2929. Intercultural Communication.** (4 cr; Stdnt Opt. LEIP 06)

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.** (3 cr; A-F or Aud. Prereq-1112, 2505)

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.** (3 cr; A-F or Aud. Prereq-1112, 2505)

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; A-F or Aud. Prereq-1000 or 1222)

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

### **COMM 3203. Communication and the Social Environment of the Internet.** (3 cr; A-F or Aud)

Familiarizes students with major theories, perspectives, and principles associated with Internet as a social realm. Facilitates student understanding of role of technology and communication in a variety of contexts available on the Internet.

### **COMM 3205. Relationship Communication.** (3 cr; A-F or Aud. Prereq-1222)

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

### **COMM 3210. Group Communication.** (3 cr; A-F or Aud. Prereq-Min 30 cr or #)

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

### **COMM 3211. Communication and Technology in the Information Age.** (3 cr; A-F or Aud)

Explores communication technologies in the information society; introduces students to new technologies used in contemporary organizations; explores implications of those technologies for human communication; and provides hands-on experience within a theoretical framework.

### **COMM 3215. Conflict Management.** (3 cr; A-F or Aud. Prereq-30 cr or #)

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

### **COMM 3223. Communication and Creativity.** (3 cr; A-F or Aud. Prereq-§3123, min 30 cr or #)

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

### **COMM 3300. Teaching Assistantship in Communication.** (1-3 cr [max 6 cr]; S-N or Aud. Prereq-Min 60 cr, Comm major or minor; #, may not be applied to elective or for a Comm major or minor)

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 3310. Research Assistant in Communication.** (1-3 cr [max 18 cr]; S-N or Aud. Prereq-#)

Practical experience in assisting communication faculty in ongoing research projects. Comm 3310 and 4397 carry variable credit, only some of which may count toward the comm major or minor. While all credits for these courses apply to the 120 cr required for graduation, the max number of credits from these courses (either one course or combined from the two courses) that may apply to the student's major or minor is three (3).

### **COMM 3390. Special Topics:** (Various Titles to be Assigned). (3 cr [max 6 cr]; A-F or Aud)

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

### **COMM 3392. Special Topics:** (Various Titles to be Assigned). (3 cr [max 9 cr]; A-F or Aud)

Topics not included in regular curriculum. Announced before course offered and will fit into Cluster A (Interpersonal Communication/Social Groups) electives.

### **COMM 3395. Special Topics:** (Various Titles to be Assigned). (3 cr [max 9 cr]; A-F or Aud)

Topics not included in regular curriculum. Announced before course offered and will fit into Cluster B (Rhetoric/Persuasion/Media) electives.

**COMM 3505. Media Communications.** (3 cr; A-F or Aud. Prereq-Comp 1120) 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 3510. Ethics in Human Communication.** (3 cr; A-F or Aud. Prereq-1112)

Examination of the recurring ethical questions faced by people as we communicate both in interpersonal/non-professional contexts and as practitioners in communication professions.

**COMM 3525. Deciding What's News.** (3 cr; A-F or Aud)

Review history of news in the United States, examine definitions of news, engage in critical evaluations of news in its various genres (news magazines, infotainment, investigative journalism, checkbook journalism, tabloid journalism, etc.), and apply news writing skills.

**COMM 3550. Children and Media.** (3 cr; A-F or Aud)

Theory and research on the impact of media on children.

**COMM 3560. Video Game Entertainment.** (3 cr; A-F or Aud)

Research and theory on video games, including work on content, uses, and effects. Overviews of game history, industry economics, design, and policy. Hands-on exposure to game technologies. Information about careers in video games.

**COMM 3605. Public Relations.** (3 cr; A-F or Aud)

Examines functions of public relations in society and surveys concepts, theories, and principles of effective, ethical public relations.

**COMM 3612. Rhetorical Criticism.** (3 cr; A-F or Aud. Prereq-1112, min 60 cr)

Survey of approaches to rhetorical analysis of communicative acts, events, and artifacts.

**COMM 3620. Controversy in the Boundary Waters.** (3 cr; A-F or Aud)

Considers the rhetorical and political processes conditioning the debate over the Boundary Waters Canoe Area's wilderness designation. Culminates in a class field trip to the BWCA, and a group project pertaining to contemporary environmental rhetoric.

**COMM 3700. Interpersonal Influence.** (3 cr; A-F or Aud)

Social scientific theory and research on communication techniques used to influence attitudes, perceptions, knowledge, and behavior of others. Research evidence regarding processes and effects on individuals and society in multiple contexts.

**COMM 4200. Communication in Organizations.** (4 cr; A-F or Aud. Prereq-Min 60 cr or #)

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 4300. Communication Teaching Methods.** (3 cr; A-F or Aud. Prereq-1112, 1222, 60 cr, §5300, no Grad School cr)

Issues in teaching communication theory and skills, suggested methods and materials of instruction. Specific focuses on public speaking, interpersonal communication, effective listening, and media literacy.

**COMM 4394. Directed Research in Communication.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-Min 60 cr, comm major, #; may not be applied to elective cr for comm major or minor)

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

**COMM 4397. Internship in Communication.** (1-8 cr [max 8 cr]; S-N or Aud. Prereq-Min 79 or comm major/minor, 2.50 GPA in major/minor; no Grad School cr)

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 3310 and 4397 carry variable credit, only some of which may count toward the comm major or minor. While all credits for these courses apply to the 120 cr required for graduation, the max number of credits from these courses (either one course or combined from the two courses) that may apply to the student's major or minor is three (3).

**COMM 4399. Directed Projects in Communication.** (1-3 cr [max 6 cr]; S-N only)

Prereq-Min 60 cr, comm major, #; may not be applied to elective or for comm major or minor; no Grad School cr)

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

**COMM 4500. History of Rhetoric.** (3 cr; A-F or Aud. Prereq-1112 or #, no Grad School cr)

Development of rhetorical thought as expressed by representative writers.

**COMM 4505. Media Theory and Research.** (3 cr; A-F or Aud. Prereq-1500 or 2101, min 60 cr or #, no Grad School cr)

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 4525. Foundations of Media Literacy.** (4 cr; A-F or Aud. Prereq-2101 or #)

Historical overview of the Media Literacy movement. Social scientific, critical and economic knowledge bases about media industries; appreciation of the production and content of media messages; development of media literacy skills and strategies for media literacy instruction.

**COMM 4949. Intercultural Communication Practicum.** (4-12 cr [max 12 cr]; S-N or Aud. Prereq-#, no Grad School credit; repeatable 3 times at different designated sites)

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

**COMM 5000. Senior Seminar.** (3-6 cr [max 6 cr]; A-F or Aud. Prereq-1000, 1112, 2025, 2030 with the grade of "C" or better in each course, %, no Grad School cr)

Advanced study and individual research on a selected topic or theme in communication; senior seminar course for communication majors.

**COMM 5095. Special Topics:** (Various Titles to be Assigned). (3 cr [max 36 cr]; A-F or Aud. Prereq-Grad Student, #)

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

**COMM 5200. Communication and Organizational Creativity.** (3 cr; A-F or Aud. Prereq-4200 or Grad Student or #)

Role of communication in establishing organization cultures that value and promote creativity and innovation. Emphasis on importance of social networks, narrative construction of organizational verity, intrinsic and extrinsic motivation, and understanding group and organizational creativity as communication events. Case studies.

**COMM 5390. Communication Workshop.** (1-3 cr [max 6 cr]; S-N only. Prereq-Min 60 cr or #)

Intensive study of various aspects of communication.

**COMM 5391. Independent Study in Communication.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-#)

Individual research project written under supervision of communication graduate examining faculty member, to result in a research project.

## Course Descriptions

# Communication Sciences and Disorders (CSD)

## College of Education and Human Service Professions

### CSD 1100. Phonetics. (2 cr; Stdnt Opt. LE 3)

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

### CSD 2001. American Sign Language Studies I. (3 cr; Stdnt Opt. LECD 03)

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; Stdnt Opt. Prereq-2001 or # LECD 03)

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

### CSD 2230. Human Communication Disorders. (3 cr; Stdnt Opt. LECD 08)

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.

### CSD 3103. Anatomy of Speech and Hearing Mechanisms. (3 cr; A-F only. Prereq- Pre CSD candidate or #)

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

### CSD 3130. Language Development and Disorders. (4 cr; A-F only. Prereq-Pre CSD candidate or #)

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

### CSD 3131. Language Development. (4 cr; A-F or Aud. Prereq-Pre CSD candidate or #)

Emphasis on the acquisition and development of language, verbal and nonverbal, as children learn to communicate effectively by selecting the most appropriate communication strategies.

### CSD 3150. Fundamentals and Clinical Applications of Speech Science. (3 cr; A-F or Aud. Prereq-Pre CSD candidate or #)

Basic principles of speech science including, acoustic characteristics of speech; physiology of respiration, phonation, and resonance; and theories of speech perception and production. Clinical and research applications of speech science will also be discussed.

### CSD 3160. Fundamentals of Hearing Science. (3 cr; A-F only. Prereq-3103, pre CSD candidate or CSD candidate or #)

Introductory study of acoustics and psychoacoustics.

### CSD 3200. Articulation and Phonological Disorders. (3 cr; A-F only. Prereq-1100, 2230, pre CSD candidate or #)

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

### CSD 3232. Language Disorders. (3 cr; A-F or Aud. Prereq-3131, pre CSD candidate or CSD candidate or #)

Focuses on the functional applications in the assessment and intervention of language disorders including a review of the various formal and informal assessment tools, and the approaches to language intervention.

**CSD 3241. Foundations of Treatment in Communication Disorders.** (3 cr; A-F or Aud. Prereq-3103, 3131, 3150, 3200, pre CSD candidate or CSD candidate or #) Focuses on foundational principals of treatment, applicable to a variety of communication disorders.

### CSD 4010. Portfolio Development. (1 cr; A-F or Aud. Prereq-CSD candidate or #, no Grad School cr)

Introduction to the ongoing process of developing and updating an undergraduate student portfolio that may be used for purposes of reflection and self assessment, documentation of professional organization designated competencies, and/or application to graduate programs.

### CSD 4097. Introduction to Clinical Practicum in Communication Disorders. (1 cr; A-F only. Prereq-CSD candidate, C grade or better in 3241, 25 hrs clinical observation)

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

### CSD 4197. Clinical Practicum in Communication Disorders. (3 cr; A-F only. Prereq-3241 with C grade or better, CSD candidate or #, no Grad School cr)

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

### CSD 4200. Introduction to Fluency Disorders. (3 cr; A-F or Aud. Prereq-2230, CSD candidate or #, no Grad School cr)

Etiologies, characteristics, and development of stuttering and other fluency disorders.

### CSD 4297. Advanced Clinical Practicum in Communication Disorders. (3 cr; A-F or Aud. Prereq-4197 with C grade or better, CSD candidate or #, no Grad School cr)

Clinical practicum with speech, language, and/or hearing impaired individuals in the on-campus clinic, under the supervision of an ASHA certified speech-language pathologist, with expectation for increased level of independence than demonstrated in CSD 4197.

### CSD 4400. Hearing Disorders and Evaluation. (3 cr; A-F only. Prereq-3103, 3160, CSD candidate or #)

Characteristics, development, and etiologies of typical auditory pathologies. Overview of basic hearing assessment and diagnostic techniques. Clinical observation required.

### CSD 4500. Voice Disorders. (3 cr; A-F or Aud. Prereq-CSD candidate)

Theoretical and practical study of voice and voice disturbances in children and adults.

### CSD 5000. Departmental Seminar. (1-3 cr [max 6 cr]; Stdnt Opt. Prereq-CSD candidate or #)

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; Stdnt Opt. Prereq-2002 or #, no Grad School cr)

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; Stdnt Opt. Prereq-5003 or #, no Grad School cr)

Advanced-level study of grammatical and linguistic features of ASL; understanding deaf culture and fluency in expressive and receptive skills.

### CSD 5005. American Sign Language V. (3 cr; A-F or Aud. Prereq-5004 or #, no Grad School cr)

Continued study of American Sign Language vocabulary and structure. Expressive and receptive skill development. Additional focus on use of ASL by the deaf community.

# Communication Sciences and Disorders

**CSD 5010. Portfolio Development.** (1 cr; A-F only. Prereq-CSD Grad student or #) Introduction to the ongoing process of developing and updating a graduate student portfolio that may be used for purposes of reflection and self assessment, documentation of professional organization designated competencies. Used for ASHA standards

**CSD 5091. Independent Study.** (1-3 cr [max 6 cr]; Stdnt Opt. Prereq-CSD candidate with 90 cr or CSD Grad student)

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

**CSD 5095. Special Topics:** (Various Titles to be Assigned). (.5-3 cr [max 6 cr]; Stdnt Opt. Prereq-no Grad School cr)

Special topics of interest to speech-language pathologists, audiologists, special educators, and related professionals. Workshop and seminar format.

**CSD 5098. Communication Sciences and Disorders Workshop.** (1-3 cr [max 6 cr]; Stdnt Opt)

Opportunities for speech-language pathologists, audiologists, other related professionals, and students to concentrate study on a specific topic presented in a workshop format.

**CSD 5100. Research Methods in Communication Disorders.** (3 cr; A-F only. Prereq-CSD Grad)

Especially designed for new CSD graduate students to introduce them to the research process. Topics will include generating a research question, experimental designs, data collection, analysis, and interpretation, and writing the research paper. Students will conduct a guided class research project and begin their Plan B project.

**CSD 5142. Introduction to Diagnosis of Communication Disorders.** (2 cr; A-F or Aud. Prereq-CSD Grad or #; §4142)

General issues of evaluation and diagnosis of communication disorders pertinent to all age groups and disorders.

**CSD 5195. Special Topics:** (Various Titles to be Assigned). (.5-3 cr [max 18 cr]; A-F or Aud. Prereq-#)

Special topics of interest to speech-language pathologists, audiologists, special educators, and related professionals. Workshop and seminar format. Topics vary and will be announced in class schedule.

**CSD 5200. Dysphagia.** (3 cr; Stdnt Opt. Prereq-CSD Grad 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; Stdnt Opt. Prereq-4197 or CSD Grad or #)

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 5240. Dementia: Communication Impairment and Management.** (1-2 cr [max 2 cr]; A-F only. Prereq-CSD candidate or CSD Grad or #)

Examines the issue of communication with people with dementia. It will identify the features of communication as observed in the different stages of dementia. It will develop strategies for speech language pathologists and health professionals that will assist them to communicate more effectively with their clients.

**CSD 5301. Language Disorders in Infants, Toddlers, and Preschoolers.** (2 cr; A-F or Aud. Prereq-%)

Advanced study of language disorders in individuals birth to 6 years old. The course includes an examination of etiology, diagnosis, clinical techniques, and study of relevant research.

**CSD 5302. Language Disorders in School-Age Children.** (2 cr; A-F or Aud. Prereq-%)

Advanced study of language disorders in individuals 6 to 21 years old. The course includes an examination of etiology, diagnosis, clinical techniques, and study of relevant research.

**CSD 5400. Rehabilitative Procedures for the Hard of Hearing.** (3 cr; A-F only. Prereq-4400, CSD candidate or CSD Grad or #)

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

**CSD 8097. Internship: Communication Disorders.** (1-3 cr [max 12 cr]; A-F only. Prereq-Can apply max 4 cr to a Graduate School program. 25 hrs supervised clinical observation, CSD Grad student or #)

Supervised clinical practicum in on-campus clinic and/or an approved professional setting under supervision of an ASHA-certified speech-language pathologist. (1 hr seminar per wk)

**CSD 8099. Projects in Communication Disorders.** (2 cr; A-F only. Prereq-CSD Grad student or #)

Plan B project or individual research under faculty supervision.

**CSD 8197. Externship: Communication Disorders.** (4 cr; A-F only. Prereq-8097, CSD Grad student or #)

Full-time professional clinical experience in an approved professional setting under supervision of an ASHA-certified speech-language pathologist.

**CSD 8205. Advanced Fluency Disorders.** (3 cr; Stdnt Opt. Prereq-4200 or equiv, CSD Grad student or #)

Differential diagnosis, assessment, and treatment considerations for developmental stuttering and other fluency disorders.

**CSD 8210. Professional Issues in Speech-Language Pathology.** (1 cr; Stdnt Opt. Prereq-CSD Grad student or #)

Identification and discussion of current issues and trends in the profession of speech-language pathology. Topics include professional work settings, credentialing agencies and requirements, federal and state laws influencing delivery of services, advocacy organizations, securing employment.

**CSD 8230. Neurogenic Language Disorders.** (3 cr; Stdnt Opt. Prereq-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; Stdnt Opt. Prereq-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; Stdnt Opt. Prereq-CSD Grad student, at least 4 cr of 8097 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]; S-N only. Prereq-5400, 8400, CSD grad student or #; Cannot apply more than 2 cr to a Graduate School program)

Clinical assessment and rehabilitative experiences in an on-campus clinic under supervision of an ASHA-certified audiologist.

**CSD 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

**CSD 8402. Clinical Seminar in Audiology.** (2 cr; Stdnt Opt. Prereq-5400, CSD Grad student or #)

Directed readings in current trends in rehabilitation of hard-of-hearing individuals.

## Course Descriptions

# Composition (COMP)

## College of Liberal Arts

**COMP 1005. Freshman Seminar: Cyber Theory and Practice.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr. LE 7)

Analyze some of the most recognized theoretical work on cyber theory, comparing theorists' characterizations of the emergent technologies to students' own experiences with them. Students will interact with many of the newest technologies, such as WWW, IM, course management software, and security software.

**COMP 1007. Freshman Seminar: The Rhetoric of Popular Culture.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits LE 8)

Students will reflect on the ways they are products of popular culture, in that the ways their thoughts, feelings and actions are in some sense constructed in response to the popular culture that surrounds them.

**COMP 1015. Freshman Seminar: Honors: Cyber Theory and Practice.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr, honors student, §1005 LE 7)

Analyze some of the most recognized theoretical work on cyber theory, comparing theorists' characterizations of the emergent technologies to students' own experiences with them. Students will interact with many of the newest technologies, such as WWW, IM, course management software, and security software.

**COMP 1017. Freshman Seminar: Honors, The Rhetoric of Popular Culture.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr, honors student, §comp 1007. LE 8)

Students will reflect on the ways they are products of popular culture, in that the ways their thoughts, feelings and actions are in some sense constructed in response to the popular culture that surrounds them.

**COMP 1120. College Writing.** (3 cr; A-F or Aud. Prereq-Students speaking English as a second language must have TOEFL score of 550 LE 1)

Instruction and practice in writing argumentative prose for academic situations with integrated computer lab. Emphasis on academic research, documentation, and the writing process.

**COMP 1506. Literacy, Technology and Society.** (3 cr; A-F or Aud. LE 7)

Historical survey of cultures without writing systems and cultures with writing systems and then later with printing, telegraph, radio, telephone, television, computers as well as other forms of technology. Survey of attitudes toward technology from Thoreau to Gandhi and beyond.

**COMP 3100. Advanced Writing: Language and Literature.** (3 cr; A-F or Aud. Prereq-1120, min 60 cr)

Study and practice of reading and writing about literature--poetry, fiction, drama, and creative non-fiction. Seeks to advance critical reading and analytical skills as a means to improving a student's proficiency in the conventions of academic and professional discourses, including grammar, style, organization, argumentation, and documentation. Addresses career documents, proposals, and grant writing.

**COMP 3110. Advanced Writing: Arts and Letters.** (3 cr; A-F or Aud. Prereq-1120, min 60 cr)

Study and practice of writing tasks appropriate for the arts and letters. Seeks to advance research and critical thinking skills as well as skills in applying conventions of grammar, style, argumentation, and documentation. In addition, the course addresses professional writing for the arts, including reviews, proposals, grant writing, and career documents.

**COMP 3121. Advanced Writing: Business and Organizations.** (3 cr; A-F or Aud. Prereq-1120, min 60 cr)

Study and practice of writing tasks in business and organizations, including oral presentations. Exploration of rhetorical situations in professional practice, including research methods, document design, editing, effective collaboration, and ethical issues in the production of professional documents, such as instructions, proposals, short and long reports, and career documents.

**COMP 3130. Advanced Writing: Engineering.** (3 cr; A-F or Aud. Prereq-1120, min 60 cr)

Study and practice of writing tasks in engineering, including oral presentations. Exploration of rhetorical situations in professional practice, including research methods, document design, editing, effective collaboration, and ethical issues in the production of professional documents, such as instructions, lab reports, proposals, short and long reports, and career documents.

**COMP 3140. Advanced Writing: Human Services.** (3 cr; A-F or Aud. Prereq-1120, min 60 cr)

Study and practice of writing tasks in education as well as other fields related to the human service professions. Designed to prepare students to master their use of Edited Standard Written English while producing professional documents, including a major research project with an oral presentation. Assignments focus on audience, purpose, and the process of writing as they relate to the workplace.

**COMP 3150. Advanced Writing: Science.** (3 cr; A-F or Aud. Prereq-1120, min 60 cr)

Study and practice of writing tasks in science, including oral presentations. Exploration of rhetorical situations in professional practice, including research methods, document design, editing, effective collaboration, and ethical issues in the production of professional documents, such as instructions, lab reports, proposals, short and long reports, and career documents.

**COMP 3160. Advanced Writing: Social Sciences.** (3 cr; A-F or Aud. Prereq-1120, min 60 cr)

Study and practice of writing for those whose professional interests are in sociology, anthropology, geography, criminology, psychology, women's studies, history, political science, and similar fields. Assignments center on producing documents encountered in the workplace, such as career documents, proposals, research projects, oral presentations, observational studies, and position papers.

**COMP 3180. Honors: Advanced Writing.** (3 cr; A-F only. Prereq-Min 60 cr, UMD Honors Program, or #)

Develops research, critical thinking, and collaborative writing strategies as well as rhetorical skills to draft documents in multiple genres for multiple audiences. This includes professional correspondence and reports, research proposals, literature reviews, oral presentations and related documents for the honors project.

**COMP 3220. Visual Rhetoric and Culture.** (3 cr; A-F or Aud. Prereq-1120)

Practical graphics techniques essential for effective presentations and web page design. Students will learn Photoshop and PageMaker software packages, and the techniques of video capturing, scanning, and digital photography. They will be introduced to the basic principles of document design and layout.

**COMP 3595. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud. Prereq-1120, 30 cr)

General composition topics not included in regular curriculum. Topic announced before course offered.

**COMP 5100. Introduction to Grant Writing and Project Planning.** (3 cr; A-F or Aud. Prereq-1120, 60 credits)

Introduction to basic grant writing principles, including common types of grants, project planning, locating and researching funders, and preparing effective narratives and budgets. Course utilizes lectures, discussion, group work, and guest speakers.

**COMP 5197. Internship in Writing.** (1-3 cr [max 3 cr]; S-N only. Prereq-#)

Practical writing experience with a media organization, publisher, business, or government agency.

**COMP 5220. Document Design and Graphics.** (3 cr; A-F or Aud. Prereq-1120, 60 cr; max 3 cr may be applied to Grad School prog)

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

**COMP 5222. Electronic Publication.** (4 cr; A-F or Aud. Prereq-Min 60 cr or Grad or #)

Introduces students to recent developments in the creation of books, journals and newsletters in electronic form and acquaints them with the conversion of print into electronically distributed form.

**COMP 5230. Web Design and Digital Culture.** (3 cr; A-F or Aud. Prereq-60 cr or Grad or #)

Design, creation, and posting of Web pages; theory of the World Wide Web; practical background in design principles; uploading and updating of Web sites; registering and marketing Web sites; HTML coding and Web design software, such as Dreamweaver.

**COMP 5250. New Media Writing.** (3 cr; A-F or Aud)

Combines the theory and production of new media writing--digital, verbal practices in converged media--through the application of readings and discussion to five projects that progress from written, print-based genres to new-media presentation.

**COMP 5290. Advanced Web Design and Digital Culture.** (3 cr; A-F or Aud. Prereq-5230)

Provides students with instruction and practice in creating increased functionality and interactivity in Web-based projects, and with the conceptual tools and cultural contexts needed to manage and direct rhetorical initiatives in digital environments.

**COMP 5300. Research Methods for the Study of Writing.** (3 cr; A-F or Aud)

Provides students with instruction and practice in critiquing research, generating research questions, designing research projects, and reporting research results in the study of writing.

**COMP 5591. Independent Study.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-Max 3 cr may be applied to Grad School prog, #)

Students choose projects with their instructor.

**COMP 5595. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud. Prereq-Min 60 cr)

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 5610. Technical Editing.** (3 cr; A-F or Aud. Prereq-Advanced writing course, Grad student or #)

Introduces editorial responsibilities, document management, copy marking, copy editing, comprehensive editing, and proofreading. It also covers ethical and legal issues related to editing.

**COMP 8500. Graduate Seminar.** (3-6 cr [max 6 cr]; A-F or Aud)

Varying topics appropriate to study of composition, English, language, and rhetoric.

**COMP 8902. Teaching College Composition.** (3 cr; A-F only. Prereq-Required for tchg assts in comp and Engl depts, #)

Analyze theoretical works and study pedagogical principals and practices related to teaching academic writing in college, including methods, materials, and objectives. Includes a major research project as well as oral presentations and/or teaching demonstrations.

**COMP 8910. Practicum in Teaching Composition.** (3 cr; A-F or Aud. Prereq-#)

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]; A-F or Aud. Prereq-8902; #)

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; A-F or Aud. Prereq-1 yr high school algebra, Comp 1120 or # LE 3)

Introduction to the personal computer, hardware and software. Recognition of the computer's role as a productivity tool in business and society as a whole. Focus on developing a broad understanding of computing systems and widely used software applications.

**CS 1094. Freshman Seminar: Computers and Society.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits LE 8)

Explores the impact of computers on each of us. Topics include history of computing, automation, information overload, the digital divide, privacy and security issues, virtual communities, piracy and copyright, internet and hacker culture, the open source movement, and future trends.

**CS 1121. Introduction to Programming in Visual BASIC.NET.** (3 cr; A-F or Aud. Prereq-1 yr high school algebra or # LE 3)

Introduction to programming in Visual BASIC, including event-driven Windows programming, data types, operators, objects and properties, menus, procedures, control structures, and database file processing. For students with no prior programming experience.

**CS 1131. Introduction to Programming in FORTRAN.** (3 cr; A-F or Aud. Prereq-\$1135; 3 1/2 yrs high school algebra or Math 1250 or # LE 3)

Study of FORTRAN and its application in science and engineering. Basic syntax and data types, operators, input and output, expressions, subprograms, control structures, data files, arrays, pointers, and programmer-defined types.

**CS 1135. Introduction to Programming in FORTRAN 90.** (2 cr; A-F or Aud. Prereq-\$1131; 3 1/2 yrs high school algebra or Math 1250 or # LE 3)

Study of FORTRAN and its application in science and engineering. Basic syntax and data types, operators, input and output, expressions, subprograms, control structures, and single-dimensional arrays.

**CS 1301. Solving Problems with Computers: Using Contemporary Tools to Program Computers.** (4 cr; A-F or Aud. LE 3)

Introduces skills used to solve problems with computers. Students learn fundamental computer programming skills through a variety of possible contemporary applications, including creating dynamic web pages, programming robots, and/or animating 3D computer graphics, and games. For students with no prior programming experience.

## Course Descriptions

### Course Descriptions

**CS 1511. Computer Science I.** (5 cr; A-F or Aud. Prereq-§1581, 3 1/2 yrs high school math or # LE 3)

Introduction to the discipline of computer science and its theoretical foundations. Introduction to structured programming, problem analysis and solution design, control structures, recursion, arrays and classes. Students will learn a high-level programming language. Requires design and implementation of computational solutions for sample problems.

**CS 1521. Computer Science II.** (5 cr; A-F or Aud. Prereq-1511)

Continuation of introduction to computer science. Methods for procedural and data abstraction. Focus on classical data structures, procedural and data abstraction, and the abstract data type. Introduction to software engineering technique. Algorithm analysis, principles of object-oriented programming issues in ethical use of computers. Requires implementation of significant programming projects.

**CS 1581. Honors: Computer Science I.** (5 cr; A-F or Aud. Prereq-Credit will not be received if credit granted for 1511, 3 1/2 yrs high school math, # LE 3)

Similar to 1511, but in greater depth and with more challenging assignments. For high-ability students.

**CS 2121. Introduction to Programming in Java.** (3 cr; A-F or Aud. Prereq-3 yrs high school math, or # LE 3)

Design and implementation of Java programs, including exception handling, graphical user interface components, file system interface and network interface. Emphasis is on internet programming and web applets.

**CS 2511. Software Analysis and Design.** (4 cr; Stdnt Opt. Prereq-1521 or #)

Techniques for analyzing, designing, and creating medium-scale software through object-oriented design and implementation. Introduction to design patterns. Emphasis on polymorphism and abstraction to increase software modularity, reusability, and flexibility. Includes a medium-scale team-development project.

**CS 2521. Computer Organization and Architecture.** (4 cr; Stdnt Opt. Prereq-1521, ECE 1315, Math 1296 or #)

Internal representation of programs and data. Computer organization and introduction to computer architecture. Machine and assembly language programming. Data and procedural structures. Addressing methods. Systems software including linking and loading. Introduction to hardware performance analysis and measurements.

**CS 2991. Independent Study.** (1-4 cr [max 8 cr]; Stdnt Opt. Prereq-#)

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 Hardware and Software.** (4 cr; A-F or Aud. Prereq-FMIS 3201 or FMIS 2201 or SBE 1101, 2511 or #)

Principles and application of telecommunication and computer systems hardware and software focusing on coding of data and programs, system hardware organization, and operating systems.

**CS 3111. Computer Ethics.** (4 cr; A-F or Aud. Prereq-Comp 3100 or 3110 or 3121 or 3130 or 3140 or 3150 or 3160 or Engr 4001, min 60 cr or #)

Ethical issues posed by computer use, including those related to networking, intellectual property, privacy, crime and security, risk and reliability, and effects on work and wealth. Includes significant writing and a class presentation

**CS 3121. Interactive Multimedia Technology.** (4 cr; A-F or Aud. Prereq-FMIS 3201 or FMIS 2201 or SBE 1101, 2511 or #)

Fundamentals of multimedia computing and interactive technologies; digitizing and manipulating images, audio, and video materials; perception, cognition, and communication issues; software engineering, design, and analysis; web-related languages (e.g., JavaScript, HTML, CSS); media formats and compression; copyright and ethics. Includes practical labs and authoring a large-scale project.

**CS 3211. Database System Concepts.** (4 cr; A-F or Aud. Prereq-FMIS 3201 or FMIS 2201 or SBE 1101, 2511 or #)

Design and use of database management systems. Emphasis on the relational data model, SQL, integrity constraints, relational database design, file structures, indexing, query processing, and optimization. Oracle-based laboratory work.

**CS 3221. Operating Systems Practicum.** (4 cr; A-F or Aud. Prereq-3011 or #, CIS majors only, min 60 cr)

Hands-on introduction to operating systems and tools. Systems administration experience with operating systems such as Linux, Unix, or Windows. Concepts of processor management and scheduling, memory management, file systems.

**CS 3512. Computer Science Theory.** (4 cr; A-F or Aud. Prereq-1296 or 1596, CS 2511 or #)

Sets, relations, functions. Recursive definitions of functions and sets. Proof methods, including mathematical and structural induction, diagonalization. Program correctness, time/space complexity. Formal language theory, including regular languages and expressions, deterministic/nondeterministic finite automata, Kleene's Theorem, context-free languages and grammars.

**CS 3996. Internship in Computer Science.** (1-3 cr [max 3 cr]; S-N or Aud. Prereq- Comp sci jr. #)

Practical, independent computer science experience in commercial, industrial, or educational setting. Department approval required before beginning internship.

**CS 4411. Data Communications and Network Technology.** (4 cr; A-F or Aud. Prereq-3011 or #, CIS majors only, min 60 cr)

In-depth experience with telecommunications fundamentals, including voice-video-data transmission in LAN and Internet. Network protocol analysis and implementation. Network layered architecture and abstractions. Installation, configuration, systems integration, and management of the technologies.

**CS 4511. Computability and Complexity.** (4 cr; A-F or Aud. Prereq-3511 or 3512 or #)

Fundamentals of the mathematical theory of computation. Turing machines, Church-Turing Thesis, recursive and recursively enumerable languages, unsolvable problems, Rice's Theorem, deterministic and nondeterministic time and space complexity, complexity classes, NP-completeness, Cook's Theorem, P vs NP.

**CS 4521. Algorithms and Data Structures.** (4 cr; A-F or Aud. Prereq-(2511, 3511) or 3512 or #)

Asymptotic analysis of algorithms. Methods for proving correctness. Implementation of algorithms. Survey of algorithms and data structures, such as: heaps and heapsort, quicksort, binary search trees, red-black trees, B-trees, hash tables, graph algorithms, dynamic programming, and greedy algorithms.

**CS 4531. Software Engineering.** (4 cr; A-F or Aud. Prereq-2511 or #)

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; A-F or Aud. Prereq-2511, 2521 or #)

Study of database management fundamentals focusing on the relational data model. Topics include database organization, file organization, query processing, concurrency control, recovery, data integrity, optimization and view implementation.

**CS 4821. Computer Security.** (4 cr; A-F or Aud. Prereq-(2511, 2521, 3511) or (2521, 3512) or #; §4711)

Entropy and the underlying characteristics of text. Encryption-basic techniques based on confusion and diffusion and modern day encryption. Access, information flow and inference control. Program threats and intrusion detection. Network and Internet security. Firewalls, trusted systems, network authentication.

**CS 4991. Independent Study.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-#)

Directed study of special interest topics not available in standard curriculum. Must be arranged with instructor before registration. May include readings, research, or special projects.

**CS 4993. Seminar.** (1 cr; A-F or Aud. Prereq-2511, Comm 1112, Comp 3130 or 3150, CS or CIS major and 90 cr; no Grad School credit)

Written report and oral presentation of a topic relating to the social and ethical implications of computing.

**CS 4994. Honors Project.** (2-3 cr [max 3 cr]; A-F or Aud. Prereq-Consent of comp sci honors prog committee)

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]; A-F or Aud. Prereq-#)

Study of selected topic announced in [Class Schedule].

**CS 5541. Artificial Intelligence.** (4 cr; A-F or Aud. Prereq-(2511, 3511) or 3512 or #)

Principles and programming methods of artificial intelligence. Knowledge representation methods, state space search strategies, and use of logic for problem solving. Applications chosen from among expert systems, planning, natural language understanding, uncertainty reasoning, machine learning, and robotics. Lectures and labs will utilize suitable high-level languages (e.g., Python or Lisp).

**CS 5551. User Interface Design.** (4 cr; A-F or Aud. Prereq-2511, (Math 1297 or Math 2326) or #)

Design and layout of interactive programs using menus, dialogs, and events. The use of color, text, fonts, and bitmaps; giving user feedback and help. Rapid prototyping and interface management systems. Design for accessibility and usability.

**CS 5621. Computer Architecture.** (4 cr; A-F or Aud. Prereq-2521 or #)

Advanced concepts in processor and computer system organization and their impact on performance. Exploitation of parallelism, multilevel memory organization, system interconnection, and input-output organization.

**CS 5631. Operating Systems.** (4 cr; A-F or Aud. Prereq-2511, 2521 or #)

Operating system as resource manager. Processor management and scheduling, deadlocks, concurrency, memory management and protection and security as applied in modern operating systems. Concepts are illustrated via laboratory assignments which heavily emphasize concurrency.

**CS 5641. Compiler Design.** (4 cr; A-F or Aud. Prereq-(2511, 2521, 3511) or (2521, 3512) or #)

A selection from the following topics: finite-state grammars, lexical analysis, 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; A-F or Aud. Prereq-2511, 2521 or #)

Introduction to computer networking and associated software protocols. Network reference models and layered architecture. Network services and applications. Design of computer networking software. Quality of service concepts.

**CS 5721. Computer Graphics.** (4 cr; A-F or Aud. Prereq-2511, (CS 3511 or Math 2326) or #)

Design of 2D and 3D graphics applications. Introduction to modeling and viewing transformations, illumination models, design of hierarchical geometric models, animation. Analysis and implementation of basic graphics algorithms: scan conversion, clipping, visible surface determination, and rendering.

**CS 5741. Object-Oriented Design.** (4 cr; A-F or Aud. Prereq-(2511, 3511) or 3512 or #)

Overview of software design and design methods, focusing on object-oriented design. Impact of object and class organization on software maintenance and reusability. Implementation of a significant project using object-oriented methods and tools.

**CS 5751. Introduction to Machine Learning.** (4 cr; A-F or Aud. Prereq-(2511, 3511, Stat 3611) or (3512 or Stat 3611) or #)

Survey of methods in machine learning including supervised and unsupervised methods. Topics covered may include clustering, decision trees, neural networks, support vector machines, genetic algorithms and reinforcement learning. Theoretical concepts associated with machine learning.

**CS 5761. Introduction to Natural Language Processing.** (4 cr; A-F or Aud. Prereq-(2511, 3511) or 3512 or #)

Techniques for creating computer programs that analyze, generate, and understand natural human language. Topics include syntactic analysis, semantic interpretation, and discourse processing. Applications selected from speech recognition, conversational agents, machine translation, and language generation. Substantial programming project required.

**CS 5831. Information and Text Processing.** (4 cr; A-F or Aud. Prereq-(2511, 2521, 3511) or (2521, 3512) or #)

The properties that underlie text processing and their application in terms of compression and encryption. Retrieval models. Digital libraries. Web applications.

**CS 5991. Independent Study.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-#)

Directed study of special interest topics not available in the standard curriculum. Must be arranged with the instructor in advance of registration. May include readings, research, or special projects.

**CS 5994. Advanced Topics in Computer Science.** (4 cr; A-F or Aud. Prereq-Grad student or #)

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; No grade. Prereq-Master s student, adviser and DGS consent)

**CS 8511. Advanced Theory of Computation.** (4 cr; Stdt Opt. Prereq-4511 or #)

Mathematical theory of computability and computational complexity. Deterministic and nondeterministic Turing machines. Recursive and recursively-enumerable languages. Undecidable problems. Rice's Theorem, the Church-Turing thesis. Time and space complexity. P-time reductions, completeness for complexity classes, Cook's Theorem, P=NP, and the polynomial hierarchy.

**CS 8561. Human Computer Interaction.** (4 cr; A-F only. Prereq-5551 or 5721)

Introduction to the software algorithms, hardware components, and concepts for building and evaluating virtual environments for effective human-computer interaction (visual, auditory, haptic, and mechanical aspects). Includes the perceptual components for constructing effective human-computer interaction with a virtual environment.

## Course Descriptions

**CS 8621. Advanced Computer Architecture.** (4 cr; A-F or Aud. Prereq-5621 or #) Algorithmically-specialized functional units. Principles of advanced memory subsystem organization, including virtual memory and caches. Novel hardware technologies. Foundations of parallel architectures: from supercomputers to cluster environments. Advanced hardware/software performance analysis.

**CS 8631. Advanced Systems Programming.** (4 cr; A-F or Aud. Prereq-5631, 5641 or #)

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; A-F or Aud. Prereq-5721 or #)

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; Stdnt Opt. Prereq-5731 or #)

Methods, major models, and theoretical issues in automatic processing and retrieval of text. Statistical and syntactic approaches, very large database issues (data mining), distributed retrieval, web retrieval and relevant applications.

**CS 8751. Advanced Machine Learning.** (4 cr; A-F or Aud. Prereq-5751 or #)

Survey of emerging research topics in machine learning and data mining plus the relation of machine learning to fields such as bioinformatics. Topics drawn from emerging techniques such as support vector machines, ensemble methods and Bayesian networks.

**CS 8761. Natural Language Processing.** (4 cr; A-F or Aud. Prereq-5761 or #; Graduate Student)

Techniques to analyze, generate, and understand human language via computational techniques. This course focuses on empirical approaches to lexical and syntactic analysis, semantic interpretation, and discourse processing. Applications include part-of-speech tagging, parsing, lexical acquisition, and machine translation.

**CS 8771. Advanced Computational Logic.** (4 cr; A-F or Aud. Prereq-4511 or #; Graduate Student)

Mathematically sound reintroduction to classical logic. Syntax, semantics, and proof theory for propositional and first-order logic. Soundness and completeness. Incompleteness. Additional topic(s) from among: automated theorem proving, second-order logic, nonmonotonic logics and knowledge representation, logic programming.

**CS 8777. Thesis Credits: Master's.** (1-24 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**CS 8993. Seminar.** (1 cr [max 3 cr]; A-F or Aud. Prereq-#)

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]; A-F or Aud. Prereq-CS grad student, #)

Topics not available in standard curriculum. Topic announced in [Class Schedule].

## Criminology (CRIM)

### College of Liberal Arts

**CRIM 8100. Criminology and Criminal Justice Systems.** (3 cr; A-F or Aud. Prereq-Grad student or #)

Review of the historical development of criminology and the criminal justice system. Emphasis on a systems/organizational approach to the structural aspects of the criminal justice system including comparative analyses of systems in other countries.

**CRIM 8110. Correctional Systems.** (3 cr; A-F or Aud. Prereq-Grad student or #)

Corrections consists of a continuum of sanctions ranging from probation to institutional confinement. This class is an analysis of issues that arise in these settings, including; theory and philosophy of corrections, risk assessment, prison culture and violence, and correctional intervention.

**CRIM 8120. Law, Courts, and The Judiciary.** (3 cr; A-F or Aud. Prereq-Grad student or #)

Investigates the interplay of the form, nature, and contents of law and judicial administration in the United States by investigating a broad range of legal and judiciary issues including law and social control, theories of law, functions of law in society, types of law, processes of law, the American judiciary, principal agents in the court system, adjudication, litigation, features of the U.S. court system, issues and problems facing the legal and court systems.

**CRIM 8130. Law Enforcement and Community.** (3 cr; A-F or Aud. Prereq-Grad student or #)

Focuses on the variety of law enforcement agencies in the U.S. and other countries, the structure of those agencies, the nature and behavior of personnel, role of the agencies in society and in the criminal justice system, and the connection of the law enforcement function to the community.

**CRIM 8200. Criminology Research Methods and Statistics.** (4 cr; A-F or Aud. Prereq-Grad student or #)

Survey of research methods and statistics appropriate for the study of criminal behavior and criminal justice system organizations. Focus is on conceptualization, measurement, and the application of designs and statistical techniques.

**CRIM 8210. Advanced Research Design and Analysis.** (3 cr; A-F or Aud. Prereq-Grad student or #)

Survey of advanced bivariate and multivariate statistics appropriate for large and small data sets. Includes the application of qualitative analysis techniques and the use of secondary data.

**CRIM 8220. Advanced Evaluation Research Methods.** (3 cr; A-F or Aud. Prereq-Grad student or #)

Reviews the history and development of evaluative research. Focuses primarily on process/outcome and project/program evaluation. Involves students in the application of formative and summative evaluation in criminal justice.

**CRIM 8295. Special Topics:** (Various Titles to be Assigned). (3-4 cr [max 8 cr]; A-F or Aud. Prereq-Grad student or #)

Provide graduate students with a diversity of topics that reflect developments and changes in the field while providing students the opportunity to work with a wide range of faculty.

**CRIM 8300. Theories of Crime and Delinquency.** (3 cr; A-F or Aud. Prereq-Grad student or #)

Looks at the causal explanations of crime and delinquency and to a lesser extent other nonconforming behavior. Various theoretical accounts of deviant behavior and attempts to describe explain, and predict deviance from structural and social psychological perspective. Explore policy directives stemming from alternative theories aimed at elevating what is considered by some as undesirable behavior.

**CRIM 8310. Advanced Theory.** (3 cr; A-F or Aud. Prereq-Grad student or #) The application of criminological theories and concepts that may contribute to the framing of various relevant issues to criminologists. These may include but are not limited to the influence of class, ethnicity, and gender.

**CRIM 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

**CRIM 8395. Topics in Advanced Theory:** (Various Titles to be Assigned). (3-4 cr [max 8 cr]; A-F or Aud. Prereq-Grad student or #)

Provide graduate students with a diversity of topics that reflect theoretical developments in the field while providing students the opportunity to work with a wide range of faculty.

**CRIM 8600. Practicum in Criminology.** (1-15 or [max 15 cr]; S-N or Aud. Prereq-Grad student or #)

Supervised direct experience in a criminal justice agency and a concurrent seminar which focus on identification, application, and evaluation of the implementation of concepts, principles, theories and best practices in criminal justice. Experience in law enforcement agencies, juvenile courts, probation and parole departments, correctional institutions, delinquency control programs and public or voluntary agencies. Orientation sessions precede placement. Student must submit internship application during the first 30 days of the preceding spring or fall semester.

**CRIM 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**CRIM 8900. Directed Readings.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-Grad student or #)

Students conduct intense and detailed reading in a topic area of their choice under the guidance of a professor.

## Cultural Studies (CST)

### College of Liberal Arts

**CST 1004. From Classical Antiquity to Medieval Culture.** (4 cr; A-F or Aud. LE 7)

Ancient Greek and Roman world. Historical and cultural contexts. Reorganization of late Roman world from Diocletian to 13th century A.D. Emergence of feudalism and medieval experience. Idea of "Classicism" which the Renaissance discovered and promoted.

**CST 1010. Romanticism and Revolutions.** (4 cr; A-F or Aud. LE 9)

Exploration of the changes in the arts and humanities produced by political, scientific, social, and revolutions that spring from the industrial revolution and the Romantic response to that revolution.

**CST 1020. Landscapes, Environments, and U.S. Culture.** (3 cr; A-F or Aud. Prereq-\$AmS 1031 LE 7)

Interdisciplinary study of U.S. landscapes and environments as an index to the diverse cultures of the United States. Readings from travelers, naturalists, ecologists, geographers, poets, and fiction writers; slides of paintings and photographs; films.

**CST 1022. The Bible as Literature.** (3 cr; A-F or Aud. LE 9)

The Hebrew Bible, the New Testament, and the Apocrypha examined as literary works of their time.

**CST 1030. Frontier Heritage in Canada and the United States.** (4 cr; A-F or Aud. LECD 07)

The frontier experience examined through primary documents, film, art, myth, literature, and historiography, with emphasis on cross-cultural comparisons of the Canadian and American frontiers from perspective of Europeans and Native Americans of both genders.

**CST 1040. American Immigrant Heritage.** (3 cr; A-F or Aud. Prereq-\$AmS 1061 LECD 08)

Immigrant and ethnic experiences in the 20th century as depicted in prose, poetry, and the arts; patterns of contemporary prestige and status.

**CST 1095. Freshman Seminar: Bodies and Culture Through Film.** (4 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits. LE 8)

Explores the ways in which our bodies are culturally constructed through gender, race, and sexual orientation. Using documentary film as a primary pedagogical tool, attention will focus on how marginalization is embodied in everyday life.

**CST 1096. Freshman Seminar: Topics** (Various Titles to be Assigned). (3-4 cr [max 4 cr]; A-F or Aud. Prereq-Freshman, fewer than 30 credits LE 8)

Seminar specifically designed for freshmen.

**CST 1101. Introduction to Cultural Studies.** (4 cr; A-F or Aud. LE 8)

Examines how cultural practices relate to everyday life by introducing students to each of the four core areas of the Cultural Studies minor: Identity Politics, Media Cultures, Cultures of Space & Place, and Cultures of Science, Technology, & Medicine.

**CST 1201. American Working Class History and Culture: The Struggle for Control.** (4 cr; A-F or Aud. LE 7)

Introduces students to working class history and culture and examines the struggle by workers to control their work, communities, identity, and social norms.

**CST 2001. Introduction to Gay Lesbian Bisexual and Transgender Studies.** (4 cr; A-F or Aud. LECD 08)

Examines identity politics, GLBT popular media images and analysis, birth and history of GLBT social movement and intersections with other social movements, HIV/AIDS, policy/legislative issues especially immigration, marriage, adoption, and U.S. military policy; all with international comparative analysis.

**CST 3010. Popular Culture in the 1960s.** (3 cr; A-F or Aud. Prereq-Min 30 cr)

Interrelationships among the arts, popular culture, politics, and social change as found in literature, theatre, film, photography, painting, and music in the United States during the 1960s.

**CST 3030. Science Fiction.** (3 cr; A-F or Aud. Prereq-Min 30 cr)

Selected science fiction short stories, novels, films, videos, and music that explore impact of physical, biological, and social sciences in producing changing views of human nature, values, institutions, and societies.

**CST 3040. The Music and Lives of the Beatles.** (3 cr; A-F or Aud. Prereq-Min 30 cr)

Impact on our culture of music and lives of the Beatles. Their music; influence on music, fashion, and attitudes; Beatles' movies; interrelationship with political and social movements; later careers; their legacy.

**CST 3050. Utopian Images.** (3 cr; A-F or Aud. Prereq-Min 30 cr)

Ways that humans imagine a better existence in a finer world, with examples from such expressive forms as utopian treatises, science fiction, pastoral poetry and art, religious traditions, landscape architecture, urban designs.

**CST 3060. Women and Men in Popular Culture.** (3 cr; A-F or Aud. Prereq-Min 30 cr or #)

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.

## Course Descriptions

**CST 3080. Cultural Constructions of the Body.** (4 cr; A-F or Aud. Prereq-Min 30 or #)

Contemporary cultural constructions of the human body. How biology and culture intersect in body building, menstruation, childbirth, and tattooing. Students gain skills in reading the body as social text and learn core theoretical approaches to cultural studies of the body.

**CST 3095. Special Topics:** (Various Titles to be Assigned). (3-4 cr [max 8 cr]; A-F or Aud. Prereq-1101, min 30 cr)

Special Topics courses will be offered at least one time per year in order to increase possible course offerings in the Cultural Studies minor and give students the opportunity to work with a wide range of interdisciplinary faculty and topics.

**CST 3161. Egyptian Literature and Language.** (3 cr; A-F or Aud. Prereq-Min 30 cr)

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.

**CST 3715. Popular Culture.** (3 cr; A-F or Aud. Prereq-Min 30 cr or #)

What qualifies as American popular culture, methodologies used to study popular culture, and sociological significance of such study.

**CST 4653. Cultural Studies Senior Seminar/Capstone.** (4 cr; A-F or Aud. Prereq-1101, CST minor, no Grad School credit)

As the capstone for the cultural studies minor, this course asks students to engage with current work produced in the field of cultural studies, including (but not limited to) texts, documentary videos, and experimental films produced for both popular and academic audiences.

**CST 4691. Independent Study in Cultural Studies.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-#)

Directed reading, research, or involvement in an issue leading to the preparation of a paper or other product.

**CST 4997. Teaching Assistant in Cultural Studies.** (1-3 cr [max 3 cr]; A-F only. Prereq-Min 60 cr; #, no Grad cr)

Practical experience in teaching-related activities in cultural studies courses.

## Dance (DN)

### School of Fine Arts

**DN 1001. Introduction to the World of Dance.** (3 cr; A-F or Aud. LEIP 09)

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 1011. Tap Dance Fundamentals.** (2 cr [max 4 cr]; A-F or Aud. LE 10)

Fundamental tap dance technique, emphasizing tap dance as a social and performing art form.

**DN 1101. Modern Dance Technique I.** (2 cr [max 12 cr]; A-F or Aud. LE 10)

Beginning work, emphasizing modern dance as a performing art form.

**DN 1111. Jazz Dance Technique I.** (2 cr [max 8 cr]; A-F or Aud. LE 10)

Beginning work, emphasizing jazz dance as a performing art form.

**DN 1121. Tap Dance Technique I.** (2 cr [max 8 cr]; A-F or Aud. Prereq-4 cr of 1101 or 1111, #)

Beginning work, emphasizing tap dance as a performing art form.

**DN 1131. Ballet Technique I.** (2 cr [max 12 cr]; A-F or Aud. LE 10)

Beginning work, emphasizing ballet as a performing art form.

**DN 3201. Modern Dance Technique II.** (2 cr [max 12 cr]; A-F or Aud. Prereq-#)

Intermediate work, emphasizing modern dance as a performing art form.

**DN 3211. Jazz Dance Technique II.** (2 cr [max 18 cr]; A-F or Aud. Prereq-#)

Intermediate work in lyrical and percussive jazz dance techniques.

**DN 3221. Tap Dance Technique II.** (2 cr [max 8 cr]; A-F or Aud. Prereq-1121 or #)

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]; A-F or Aud. Prereq-#)

Intermediate work, emphasizing ballet as a performing art form.

**DN 3401. Dance Composition.** (3 cr; A-F or Aud. Prereq-3201, 3231 or 3211, #)

Study and development of dance choreography through creative experiences.

**DN 3611. Dance History.** (3 cr; A-F or Aud. Prereq-1001 or #)

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]; A-F or Aud. Prereq-#, undergrads may not take more than 6 cr in 3991 and 5991 combined)

Directed readings and projects arranged between student and faculty mentor.

**DN 4116. Musical Theatre Audition Techniques.** (3 cr; A-F or Aud. Prereq-#, no Grad School cr)

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

**DN 4311. Jazz Dance Technique III.** (2 cr [max 12 cr]; A-F or Aud. Prereq-#, no Grad School cr)

Advanced work, emphasizing jazz dance as a performing art form.

**DN 4331. Ballet Technique III.** (2 cr [max 12 cr]; A-F or Aud. Prereq-3231, #; no Grad School cr)

Advanced work, emphasizing ballet as a performing art form.

**DN 4901. Intern Teaching Dance.** (2 cr [max 6 cr]; A-F or Aud. Prereq-3201 or 3211 or 3221 or 3231, #; no Grad School cr)

Practical experience teaching introductory level dance classes. Students serve as intern teachers assisting instructor in administration of course.

**DN 5991. Independent Study in Dance.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-#, undergrads max 6 cr in 3991 and 5991 combined; no Grad School credit)

Advanced directed readings and projects arranged between student and faculty mentor.

**DN 5997. Internship in Professional Dance.** (1-12 cr [max 12 cr]; A-F or Aud. Prereq-%; 1 cr for each 45 hrs of work; no Grad School credit)

Internship with a cooperating professional, commercial, or regional dance company.

## Early Childhood Studies (ECH)

### College of Education and Human Service Professions

**ECH 2010. Foundational Issues in Early Childhood Studies.** (3 cr; A-F or Aud)

Historical and cultural perspectives of Early Childhood Studies. Theoretical models for the education of young children from birth through age eight will be addressed through professional exploration. Methods for facilitating child development as well as strategies for collaborating with families and communities will be discussed. Practicum experience with young children will provide a hands on experience for the students.

**ECH 2015. Literature for Young Children.** (3 cr; A-F or Aud)

Introduces professionals who work with children from birth through age eight to literature for young children. Criteria for selecting book and non-book materials will be presented, discussed and utilized when examining, selecting, and reading such materials. Strategies for sharing the books and non-book materials with children and for integrating the materials into day care, preschool, and primary settings will be explored.

**ECH 2025. Cognitive Development: Theory to Practice.** (3 cr; A-F or Aud)

Issues related to early brain development and the biological underpinnings of early emotional and cognitive development. A biological view of attachment and social vulnerability.

**ECH 3006. Early School Years.** (2 cr; A-F or Aud. Prereq-Pre-EIEd major, concurrent registration is required (or allowed) for EIEd 1010)

Theoretical, historical, and cultural influences that impact early childhood education. Environments, methods, and materials that facilitate development. Collaborating with families and communities. Practicum required.

**ECH 3021. Teaching Mathematics: Birth-Age Eight.** (4 cr; A-F or Aud. Prereq-Admission to the ECh program)

Development and instruction in play-based and problem-based mathematics in birth to age 8 settings. Methods, materials, and research findings related to teaching of mathematics. Practicum required.

**ECH 3022. Literacy for Young Children: Teaching Reading, Writing, Speaking, and Listening.** (4 cr; A-F or Aud. Prereq-Admission to the ECh program)

Prepares professionals who work with children from birth to age eight to introduce and teach developmentally appropriate skills and strategies related to reading, writing, speaking, and listening. Course assignments will be linked to practicum experiences. Practicum required.

**ECH 3030. Inquiry, Social Studies, and Science Learning: Birth-Age Eight.** (5 cr; Stndt Opt. Prereq-ECh major, 2010, 3010, ¶: 3020, 4011 and 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 required.

**ECH 3050. Observing and Guiding Behavior: Birth-Age Eight.** (4 cr; Stndt Opt. Prereq-UECh major, 2010, 3010, SpEd 3103)

Observing, recording, and guiding behaviors in children from birth through age eight. Focuses on informal methods for observation. Practicum is required. Use of technology for behavioral observation.

**ECH 3055. Creative Expressions in Early Childhood: Birth-Age Eight.** (3 cr; A-F or Aud. Prereq-Admission to the UECh program)

Exploration of developmentally appropriate methods and materials for the integration of art, music and movement experiences for children's overall growth, ages birth-age 8.

**ECH 3104. Family Partnerships.** (1 cr; A-F or Aud. Prereq-Admission to the ECh program)

Practicum experience in which students partner with a young child and their family. Through this experience, students practice advocacy skills, integrate theory in early childhood, and observe children in the context of the family.

**ECH 4009. Leadership in Early Childhood Studies.** (3 cr; A-F or Aud. Prereq-Admission to UECh program; no Grad School cr)

Develops knowledge and competencies in the area of educational leadership, including development and administration of early childhood programs, professionalism, ethics and social policy.

**ECH 4011. Parent Education.** (4 cr; A-F or Aud. Prereq-¶: 3020, 3030, SpEd 3105, #; no Grad School cr)

Planning, presenting, and evaluating educational programs for parents; adult learning and development; philosophy of Minnesota early childhood family education program; teaching strategies; curriculum development.

**ECH 4251. Parenting.** (3 cr; A-F or Aud. Prereq-UECh major, Educ 1000 or Psy 2021 or Psy 3371 or #; no Grad School cr)

Parent-child interaction, roles and responsibilities throughout the life cycle; analysis of parenting strategies; contemporary variation of family cultures, structures and lifestyles; sources of education and support.

**ECH 4400. Professional Development Seminar.** (1 cr [max 3 cr]; A-F or Aud. Prereq-#, no Grad School cr)

Professional development through documentation, reflection, synthesis of learning as related to standards. Development of process and product portfolios. Presentation of and dialogue about emergent learning.

**ECH 4600. Student Teaching in Early Childhood/Primary.** (3-12 cr [max 12 cr]; S-N only. Prereq-3005, 3007 or #; no Grad School cr)

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.** (1 cr; Stndt Opt. Prereq-¶ in 4600; no Grad School cr)

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]; A-F or Aud. Prereq-#; no Grad School cr)

Individualized reading and research in a special topic.

**ECH 4993. Special Area Project.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq-#, no Grad School cr)

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; A-F or Aud. Prereq-MEd Student)

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 5050. Observing and Guiding Behavior: Birth-Age Eight.** (4 cr; Stndt Opt. Prereq-2010, ¶: 3010, SpEd 3103)

Observing, recording, and guiding behaviors in children from birth to age eight. Focuses on informal methods for observation. Practicum is required. Use of technology for behavioral observation.

**ECH 5993. Special Area Project.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq-no Grad School cr)

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

**ECH 5995. Special Topics:** (Various Titles to be Assigned). (1-6 cr [max 96 cr]; A-F or Aud. Prereq-Grad student or post-baccalaureate status; no Grad School cr)

Special topics in early childhood education to meet needs and interests of different groups of students.

**ECH 7030. Cognitive Development.** (4 cr; A-F or Aud. Prereq-Collegiate grad program admission or #)

Issues related to early brain development and the biological underpinnings of early emotional and cognitive development. A biological view of attachment and social vulnerability will also be addressed.

## Course Descriptions

**ECH 7031. Critical Connections During the Early Years.** (3 cr; A-F or Aud. Prereq-7030, collegiate grad program admission or #)

Issues related to quality care and appropriate support for young children, as well as the role of attachment, and the role teachers, parents and community members play in the facilitation of the development of social skills for young children.

**ECH 7032. The Competent Child.** (3 cr; A-F or Aud. Prereq-7030, collegiate grad program admission or #)

Addresses the role early childhood education plays in the facilitation of early regulation, coping strategies, and the development of social and emotional competence within the context of adult relationships.

**ECH 7033. The Child as a Citizen.** (4 cr; A-F or Aud. Prereq-7030, collegiate grad program admission or #)

Children in the context of the family and community. Focuses on the child as a contributor within the family structure and as a member of the greater society. Issues of gender, culture and early citizenship will be discussed as well as the emergence of developmental skills related to these issues.

## Economics (ECON)

### Labovitz School of Business and Economics

**ECON 1003. Economics and Society.** (3 cr; A-F or Aud. Prereq-Cannot apply cr to econ major or minor or BAC or BBA majors LE 8)

General description of U.S. economy and analysis of contemporary economic problems. Introduction to major economic issues and problems of the day, providing a simple framework used by economists for analysis.

**ECON 1022. Principles of Economics: Macro.** (3 cr; A-F or Aud. Prereq-Min 15 cr or % LE 6)

Analyzing overall performance of an economic system. National income accounting and theory, unemployment, inflation, fiscal policy, money, monetary policy, economic growth, international trade, non-U.S. economies, and real-world application of these concepts.

**ECON 1023. Principles of Economics: Micro.** (3 cr; A-F or Aud. Prereq-Min 15 cr or % LE 6)

Analyzing free enterprise system through study of product and resource markets. Supply and demand, utility, production and cost, market structure, resource use, market failures, regulatory role of government, and real-world application of these concepts.

**ECON 2030. Applied Statistics for Business and Economics.** (3 cr; A-F or Aud. Prereq-Min 30 cr; \$Econ 2020, Stat 1411, Stat 2411, Stat 3611, Soc 3151, Psy 3020)

Introduction to modern business statistics, emphasizing problem solving through statistical decision making using case studies. Topics include organization and presentation of data, summary statistics, probability theory, distributions, statistical inference including estimation, hypothesis testing, introduction to regression and correlation, introduction to use of computers in statistical analysis.

**ECON 3022. Macroeconomic Analysis.** (3 cr; A-F or Aud. Prereq-1022, 1023, Math 1160 or Math 1296)

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; A-F or Aud. Prereq-1022, 1023, Math 1160 or Math 1296)

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; A-F or Aud. Prereq-1022, 1023, 2030, Math 1160 or Math 1296)

Techniques used in analyzing economic and business data; emphasis on computer methods and research applications. Analysis of variance, qualitative data analysis, modeling, regression, residual and influence analysis, time series.

**ECON 3031. History of Economic Thought.** (3 cr; A-F or Aud. Prereq-1003 or 1022, 1023 LE 7)

Development of economic ideas, principles, and systems of analysis from early times to present, emphasizing personalities and historical events surrounding development of economic thought.

**ECON 3036. Radical Economics.** (3 cr; A-F or Aud. Prereq-1003 or 1022, 1023 LE 7)

Radical Marxist critique of traditional economic models and of methodology used in developing and applying these models. Alternatives to market system. Analysis of current economic issues from radical's perspective.

**ECON 3150. Development Economics.** (3 cr; A-F or Aud. Prereq-1022, 1023)

Overview of the conceptual meaning of economic growth and development, problems facing developing countries, economic models underlying different development paths. Exploration of socio-historical and economic reasons for lack of development in selected areas and policy options to promote economic progress.

**ECON 3311. Money and Banking.** (3 cr; A-F or Aud. Prereq-1022)

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 3402. Global Economic Issues.** (3 cr; A-F or Aud. Prereq-LSBE cand; cannot apply cr to econ major or minor)

Application of economic theory of marke6s to analyze major issues shaping the future of the world economy. Emphasized globalization of markets and the institutions involved in coordinating economic policies among world economies

**ECON 3512. Managerial Economics.** (3 cr; A-F or Aud. Prereq-1023, 2030)

Application of economic theory to management decision making and policy formulation within the firm. Demand analysis, production and cost analysis, price analysis, capital budgeting. Strategic interaction of firms.

**ECON 3595. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 3 cr]; A-F or Aud. Prereq-1003 or 1022, 1023 or #)

Topics announced in Class Schedule.

**ECON 3821. Labor Economics: Theory and Issues.** (3 cr; A-F or Aud. Prereq-1023, preferred but not required 3023)

Labor markets from theoretical and institutional perspectives, including wage theories, labor supply, labor demand and employment, human capital investments, and occupational choice.

**ECON 3910. Economics of Health Care.** (3 cr; A-F or Aud. Prereq-1022, 1023, Econ major or minor or LSBE cand)

Explores the health care sector and health policy issues from an economic perspective. Topics to be examined include the demand for health and medical care services, health insurance markets, federal health insurance programs, and the pharmaceutical industry.

**ECON 4040. Tools: Applications of Economic Analysis.** (3 cr; A-F or Aud. Prereq-3030 or Stat 5511)

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; A-F or Aud. Prereq-1022, 1023, Math 1160 or Math 1296)

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; A-F or Aud. Prereq-3022)

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]; S-N only. Prereq-Econ major, 3022, 3023, #, §4497)

Following written approval of proposal, student engages in supervised program of half-time work experience in public agency, private business, or other organization. Advance, concurrent, and follow-up written and oral presentations required. 20 hr per wk over 15 wk period.

**ECON 4410. International Economics .** (3 cr; A-F or Aud. Prereq-1022, 1023, 3022, 3023, no Grad School cr)

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 4497. Full-Time Internship.** (6 cr; S-N only. Prereq-Econ major 3022, 3023, #, §4397.)

Following written approval of proposal, student engages in supervised program of full-time work experience in public agency, private business, or other organization. Advance, concurrent, and follow-up written and oral presentations required. 40 hr per wk over 15 wk period.

**ECON 4570. Public Finance.** (3 cr; A-F or Aud. Prereq-1022, 1023)

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; A-F or Aud. Prereq-3023 or 3512)

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 4613. The Economics of Antitrust and Regulation.** (3 cr; A-F or Aud. Prereq-1023, 3023)

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 4721. Natural Resource and Energy Economics.** (3 cr; A-F or Aud. Prereq-1023, preferred but not required: 3023)

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; A-F or Aud. Prereq-1023, preferred but not required: 3023)

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; A-F or Aud. Prereq-1003 or 1022, 1023, preferred but not required 3023)

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]; A-F or Aud. Prereq-Econ major, 12 cr or Econ 3xxx or above, #)

For students wishing to do special work in areas useful to individual programs and objectives and not available in regular course offerings.

## Education (EDUC)

### College of Education and Human Service Professions

**EDUC 1000. Human Development.** (3 cr; A-F or Aud)

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 or Aud. LECD 08)

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 or Aud. LE 7)

Survey of educational institutions and practices used in different sectors of society. Historical and philosophical foundations of American education.

**EDUC 1201. Managing Planet Earth.** (3 cr; A-F or Aud. LE 8)

Environmental education; exploration of key concepts and principles that govern how nature works; potential solutions to environmental and resource problems.

**EDUC 3412. The Computer in Education.** (1-4 cr [max 6 cr]; A-F or Aud. Prereq-Pre educ or educ majors or cand)

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 3416. Teaching Elementary Keyboarding and Computer Applications.** (2 cr; A-F or Aud. Prereq-3412 or 5412, pre EIEd, EIEd, pre-UECh, UECh, or non-degree cand, §5416)

Developing the competencies and skills to provide students in grades K-8 age-appropriate instruction that focuses on keyboarding knowledge, application, and skills, including keyboarding terminology, techniques, ergonomics, and appropriate fingering on computer keys, and basic computer applications, including word processing, graphics, multimedia presentations, and gathering information from electronic sources.

**EDUC 3417. Teaching Elementary Keyboarding and Computer Applications Practicum.** (1 cr; S-N or Aud. Prereq-3416, pre EIEd, EIEd, pre UECh, UECh, §5417)

Supervised practicum in elementary schools with a specific focus on elementary keyboard and computer applications. Supervision conducted by University faculty in conjunction with licensed elementary teacher or the school's designated elementary computer instructor.

## Course Descriptions

**EDUC 4226. Geometry for Teachers in Grades 5-8.** (3 cr; A-F or Aud. Prereq-Math 1141 or #; no Grad School cr)

The development of geometry concepts through investigations of geometric relationships and informal properties provides the basis for examining the teaching and learning of geometry in grades 5-8.

**EDUC 4227. Number Theory for Teachers in Grades 5-8.** (3 cr; A-F or Aud. Prereq-Math 1141 or #; no Grad School cr)

The development of number concepts and theories through investigations and applications of discrete mathematics strategies provides the basis for examining the teaching and learning of number theory in grades 5-8.

**EDUC 4228. Teaching Mathematics with Technology.** (3 cr; A-F only. Prereq-Math 1141 or declared secondary mathematics education major; no Grad School cr)

Using mathematics-based technology such as computer software, calculators, and Internet applets to examine the teaching and learning of mathematics.

**EDUC 4234. Science, Technology, and Society.** (3 cr; A-F or Aud. Prereq-Min 30 cr, or no Grad School cr)

Nontechnical study of historical and cultural impact of natural science and technology on the earth and its inhabitants.

**EDUC 4360. Teaching Methods for Ojibwe Language.** (1-4 cr [max 12 cr]; A-F or Aud. Prereq-Admitted to EIEd or pre-EIEd, no Grad School cr)

Prepares teachers to teach the Ojibwe language including: Hands-on micro teaching; demonstration of various methods; and a developmental and theoretical understanding of teaching an Indigenous language.

**EDUC 4381. Teaching American Indian Students.** (2 cr; A-F or Aud. Prereq-10 cr Ed; no Grad School cr)

Survey of contemporary Indian education; evaluation of one's attitudes toward Indian students; direct interaction with Indian parents and students; development of culturally sensitive teaching plans regarding Indians.

**EDUC 4500. Professional Issues in Teaching.** (1 cr; A-F or Aud. Prereq-Admission to the elementary education program, successful completion of courses in block one and block two, no Grad School cr)

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 4650. Student Teaching in Parent Education.** (1-3 cr [max 3 cr]; S-N or Aud. Prereq-Admission to parent ed program; no Grad School cr)

Application of knowledge, understandings, and skills related to working with adult learners in parent education or early childhood/family education programs.

**EDUC 4991. Independent Study.** (.5-3 cr [max 6 cr]; A-F or Aud. Prereq-#, no Grad School cr)

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

**EDUC 4993. Special Area Project.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq-#, no Grad School cr)

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

**EDUC 5128. Urban Education.** (3 cr; Stdnt Opt. Prereq-No Grad School cr)

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 5295. Special Topics:** (Various Titles to be Assigned). (.5-4 cr [max 8 cr]; A-F or Aud. Prereq-No Grad School cr)

Current issues in Education to meet needs and interests of various groups, particularly practicing professionals.

**EDUC 5340. Interacting With Diverse Families.** (3 cr; A-F or Aud. Prereq-90 cr or #) 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 5381. Teaching American Indian Students.** (2 cr; A-F or Aud. Prereq-No Grad School cr)

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; A-F or Aud. Prereq-No Grad School cr)

Identification, characteristics, and service needs of creative and intellectually gifted children; various programs to meet needs.

**EDUC 5412. The Computer in Education.** (.5-4 cr [max 6 cr]; A-F or Aud. Prereq-No Grad School cr)

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; A-F or Aud. Prereq-3412 or 5412, min 60 cr or grad or #)

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; A-F or Aud. Prereq-Min 60 cr or Grad; 3412 or 5412, 5413 or #)

Develops basic computer and educational technology skills focusing on using microcomputers for administrative tasks of teaching.

**EDUC 5415. Advanced Educational Media Production.** (4 cr; A-F or Aud. Prereq-Min 60 cr or Grad, 3412 or 5412, 5413, 5414 or #)

Advanced multimedia design; hardware, software and peripherals including video and audio production and editing, compression software, virtual reality; development of an advanced multimedia project for production to CD Rom or the World Wide Web.

**EDUC 5416. Teaching of Elementary Keyboarding and Computer Applications.** (2 cr; A-F or Aud. Prereq-3412 or 5412, pre-EIEd or EIEd or pre-UECh or UECh or non-degree cand, §3416, no Grad School cr)

Competencies and skills to provide students in grades K-8 age-appropriate instruction that focuses on keyboarding knowledge, application, and skills, including keyboarding terminology, techniques, ergonomics, and appropriate fingering on computer keys, and basic computer applications, including word processing, graphics, multimedia presentations, and gathering information from electronic sources.

**EDUC 5417. Teaching Elementary Keyboarding and Computer Applications**

**Practicum.** (1 cr; S-N or Aud. Prereq-3416 or 5416, pre-EIEd, EIEd, pre-UECh, UECh or non degree cand, no Grad School cr, §3417)

Supervised practicum in elementary schools with a specific focus on elementary keyboard and computer applications. Supervision conducted by University faculty in conjunction with licensed elementary teacher or the school's designated elementary computer instructor.

**EDUC 5560. Current Research and Issues in Science Education.** (2-3 cr [max 6 cr]; A-F or Aud. Prereq-MEd student; offered summer only; #)

Examines science education research literature. Trends in research and teaching.

**EDUC 5570. Exemplary Models for Science Education.** (2-3 cr [max 6 cr]; A-F or Aud. Prereq-MEd student; offered summer only; #)

Emphasis on hands-on and/or integrated curriculum models.

**EDUC 5600. Practicum in Education.** (1-12 cr [max 12 cr]; S-N or Aud. Prereq-#, no Grad School cr)

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; A-F or Aud. Prereq-Grad student or #)

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 5850. Classroom Learning Applications.** (2 cr; A-F or Aud. Prereq-Admission to MEd or #)

Cognitive processes in education in preparation for developing curriculum and teaching. Emphasis on application of brain-based learning theory to development of knowledge systems in education.

**EDUC 5991. Independent Study.** (.5-4 cr [max 8 cr]; A-F or Aud. Prereq-#, no Grad School cr)

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

**EDUC 5993. Special Area Project.** (.5-4 cr [max 14 cr]; A-F or Aud. Prereq-No Grad School cr)

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

**EDUC 5995. Special Topics:** (Various Titles to be assigned). (.5-4 cr [max 16 cr]; A-F or Aud. Prereq-No Grad School cr)

Topics selected from education to meet needs and interests of different groups of students.

**EDUC 6111. Teacherline: Searching and Researching on the Internet.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Introduction to methods and concepts related to searching the Internet for useful information; explore and compare search engines and learn effective and efficient use; explore ethical issues surrounding use of these tools in the classroom.

**EDUC 6112. Teacherline: Evaluating and Organizing Internet Resources and Content.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

How to evaluate different types of material on the Internet and how to judge if it is appropriate for classroom use. Explore social and ethical issues that arise when students use material from the Internet. Critically evaluate the content of Web sites.

**EDUC 6113. Teacherline: The Online Learning Environment.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Introduction to basic concepts of using the Internet in the classroom. Review of critical perspectives about use of technology in the classroom.

**EDUC 6114. Teacherline: Teaching with WebQuests.** (1 cr; A-F or Aud. Prereq-No Grad School credit)

Introduction to WebQuest and how to use it to locate quality information on the Internet. Use of WebQuests for meaningful engagement of students in research in an elementary or secondary classroom.

**EDUC 6115. Teacherline: Math in Everyday Life Grades K-5.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Designed to help elementary school teachers effectively incorporate real world problem solving into their teaching. Exploration of ways that real life activities can help teach problem solving skills to students through the use of two classroom technologies--the Internet and calculators.

**EDUC 6116. Teacherline: Math in Everyday Life Grades 6-8.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Designed to convey the most effective planning and teaching methods for a problem-solving unit that integrates the use of technology. Through the use of two classroom technologies--the Internet and computer software--learners will discover ways to provide a richly engaging and instructive learning environment.

**EDUC 6117. Teacherline: Rational Numbers: Fractions, Decimals, and Percents for Grades 5-8.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Designed to increase the range and depth of teaching strategies and assessment formats for rational numbers.

**EDUC 6118. Teacherline: Count on it: Number Sense for Grades K-5.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Designed for participants to better understand number sense, with emphasis on additional ways to assess student number sense development.

**EDUC 6119. Teacherline: Teaching for Multiple Intelligences K-12.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Detailed study of the theory of multiple intelligences; practical application in a variety of subject disciplines.

**EDUC 6120. Teacherline: Children's Authors on the Web: Online Sites that Motivate Students to Write** (K-6). (1 cr; A-F or Aud. Prereq-No Grad School cr)

Exploration of an "Author Study," location of resources, and inclusion in the curriculum.

**EDUC 6121. Teacherline-Putting Technology to Use in the Classroom: Where to Start.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Designed for K-12 technology novices, focuses on understanding NETS standards, using a course bulletin board, and devising a plan to integrate technology into a K-12 lesson plan.

**EDUC 6122. Teacherline-Building Critical Thinking Skills for Online Research K-12.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Focuses on learning pre-K through grade- 12 strategies and tools to build students' critical thinking skills and help them attain information literacy. Based on ISTE, NCTM, and NCSS national standards, explore information search process models and create an Internet-based lesson.

**EDUC 6123. Teacherline-Creating Units to Support Different Learning Styles K-12.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Focuses on developing a K-12 technology-enhanced curriculum that meets the learning needs of a wide range of students. Design a thematic unit with technology-based adaptations to facilitate learning for all students.

**EDUC 6124. Teacherline-Enabling Students with Special Needs to Succeed in Math for Grades 4-8.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Techniques for providing equity in mathematics education for students with disabilities. Learn how to adapt curricula, use instructional accessibility strategies, and collaborate with special needs teachers to help students succeed. Develop a plan to incorporate accessibility strategies into teaching.

**EDUC 6125. Teacherline-Teaching Reading in Mathematics for Grades 3-12.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Examines strategies for teaching reading in mathematics, as well as elements of reading and the premises that guide reading in mathematics. Create learning environments that promote effective reading and learning in mathematics resulting in more effective readers and independent learners.

**EDUC 6126. Teacherline-Proportional Reasoning for Grades 6-8.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

NCTM Principles and Standards for School Mathematics (PSSM 2000) described mathematics of proportional reasoning and expectations for middle school students. Use rich mathematical problems to draw on a variety of different mathematics topics and relate them to a common idea.

## Course Descriptions

**EDUC 6127. Teacherline-Number and Operation Sense in Grades 3-5.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Focuses on how to consolidate and extend students' knowledge of addition and subtraction, develop understanding of multiplication and division, and build solid foundations for efficiently and flexibly computing with all four operations. Integrate technology into the study of number and operation sense while meeting national mathematics education standards.

**EDUC 7001. Introduction to Graduate Study.** (2 cr; A-F or Aud. Prereq-MEd candidate or #, no Grad School cr)

Expectations of graduate study, scholarly writing and online learning. Develop skills in using the Internet for scholarly research and writing, culminating in writing of a literature review.

**EDUC 7002. Human Diversity and Exceptionality.** (2 cr; A-F or Aud. Prereq-MEd candidate or #, no Grad School cr)

Stresses the importance of diversity and exceptionality in educational settings, and its relevance to teaching and learning strategies, assessment, and professional community building. The concepts of privilege and power will be explored from the standpoint of the educator and his/her role in the educational setting.

**EDUC 7003. Families and Social Service Systems.** (1-4 cr [max 12 cr]; A-F or Aud. Prereq-MEd candidate or #, no Grad School credit)

Explore diverse family systems, understand complexities of bilingual, single parent, lower/upper SES, transient, families with disabled/terminally ill members. Social services/special programs available to at-promise students, staff and families in crisis/need. Demonstrate parent involvement/mentoring/referral strategies.

**EDUC 7004. Research Methods in Education.** (4 cr; A-F or Aud. Prereq-MEd candidate or #, no Grad School credit)

Prepares students to design and conduct a scholarly research project. Practical application of the range of methods employed in educational research is guided by the principle: goodness of fit. Ethical issues in research with human subjects will include preparation of an IRB application.

**EDUC 7005. Teaching and Learning in a Systems Context.** (3 cr; A-F or Aud. Prereq-MEd candidate or #, no Grad School credit)

Concentrates on teaching and learning from a systems and community context. Systems theory will be addressed as it applies to educational systems, as well as teaching applications that cross traditional classroom boundaries.

**EDUC 7006. Ethics and Professionalism in Education.** (2 cr; A-F or Aud. Prereq-MEd candidate or #, no Grad School credit)

Offers a synthesis of previous courses, reviewed from the context of ethics and ethical dilemmas that touch on diversity, systems change, educators' roles, professional competencies, and leadership roles.

**EDUC 7007. Leadership, Change and Collaboration.** (2 cr; A-F or Aud. Prereq-MEd or #, no Grad School credit)

Focuses on change theory as it relates to systems issues and educational reform. Professional collaboration will be emphasized, as well as the dynamics inherent in the change process.

**EDUC 7008. Foundations of Teaching and Learning: Curriculum Theory and Design.** (4 cr; A-F or Aud. Prereq-MEd student or #, no Grad School credit)

Broad-based foundational course designed to study advanced learning theory and curriculum design, and develop skills in critical analysis of teaching application and student outcomes. Focuses on the importance of working in the context of a professional community.

**EDUC 7009. Assessment of Learning.** (3 cr [max 12 cr]; A-F or Aud. Prereq-MEd candidate, no Grad School credit)

Focuses on the design and application of appropriate learning assessment strategies that consider the pedagogical intent, state, federal, and subject standards, and the diversity for all learners. Teaching theory and practice will be viewed in the context of learning assessment.

**EDUC 7020. Writing for Publication.** (1 cr; A-F or Aud. Prereq-No Grad School credit)

Develop writing skill needed to prepare research article, grant proposal, or other material for publication.

**EDUC 7030. World Indigenous Language Revitalization.** (4 cr; A-F only. Prereq-7008, no Grad School cr)

Survey course on world language revitalization, special emphasis on indigenous languages. Includes basic introduction to language acquisition, readings from Hawaii, New Zealand, and indigenous nations within the US; principles of endangered language revitalization, context specific circumstances of several indigenous languages.

**EDUC 7032. Instructional Materials Design for Indigenous Language Revitalization.** (3 cr; A-F only. Prereq-7030, no Grad School cr)

Curriculum development and materials design for indigenous language revitalization. Builds on students' prior knowledge of planning and on proficiency in a language other than English. Includes design of curriculum and materials, such as creation of books, audio and video production with Elders and native communities, strategic design of materials as related to language and content objectives.

**EDUC 7033. Integrated Curriculum: History, Theory, Rationale, and Models of Implementation.** (3 cr; A-F or Aud. Prereq-No Graduate School credit)

Overview of the history, theory, rationale, and models for the implementation of integrated curriculum in the classroom.

**EDUC 7034. Content Reading Strategies.** (3 cr; A-F or Aud. Prereq-No Grad School credit)

Effective strategies in teaching reading to secondary students. Foci include examination of how students learn to read, analysis of specific strategies and materials used to teach reading, and facilitating reading strategies across content areas.

**EDUC 7035. Inquiry-based Science Teaching.** (4 cr; A-F or Aud. Prereq-Target audience is elementary teachers, no Grad School credit)

Develops appropriate instructional skills and strategies for inquiry-based science teaching, learn and apply recommended methods for inquiry-based science instruction and reflect upon their personal development and abilities to integrate science education and inquiry.

**EDUC 7040. Principles of Adult Education.** (3 cr; A-F or Aud. Prereq-No Grad School credit)

Philosophy and application of adult education principles.

**EDUC 7099. Portfolio: Reflective Practice with National Board for Professional Teaching Standards.** (1-6 cr [max 6 cr]; S-N only. Prereq-7008, no Grad School cr)

Field research for students sitting for candidacy for National Board certification or for MEd students choosing the portfolio option.

**EDUC 7444. Principles of Program Evaluation in Educational Settings.** (3 cr; A-F or Aud. Prereq-Acceptance to Master's of Special Education program; no Grad School cr)

Models, theories, and philosophies of program evaluation in education settings; evaluation of general and special education curriculum; specific strategies for family and professional involvement in educational planning, implementation, and evaluation.

**EDUC 8001. Historical, Social, and Philosophical Foundations of Education.** (3 cr; A-F only. Prereq-Ed.D. majors or #)

Survey of the historical, social, and philosophical issues in education, in order to prepare and build a foundation for doctoral level students in education.

**EDUC 8003. Educational Policy.** (3 cr; A-F only. Prereq-Ed.D. majors or # [Students enrolled in other Graduate School or collegiate graduate programs])

Modes of educational policy analysis; assessment of educational policy in its political, cultural, and economic contexts; and techniques for effective communication about education policy.

**EDUC 8005. Curriculum: Theory into Practice.** (3 cr; A-F only. Prereq-Ed.D. majors or #)

Overview of curriculum mapping, methods for analysis of scope and sequence and articulation, current curriculum theory, standards, and curriculum audit strategies, purposes and responsibilities.

**EDUC 8007. Research on Knowledge and Learning in Education.** (3 cr; A-F only. Prereq-Ed.D. majors or #)

An exploration of theoretical definitions of knowledge and a review of research on the processes of learning.

**EDUC 8009. Distance Education: From Theory to Practice.** (3 cr; A-F only. Prereq-Ed.D. majors or #)

Theoretical framework, historical development and practical applications of different models of distance education. Topics: theory and perspectives, adult education principles, course design, teaching strategies, assessment, and current and emerging technologies applied to distance education.

**EDUC 8015. Research Design.** (3 cr; A-F only. Prereq-Psy 5052 or equiv, Ed.D. majors or #)

An overview of research designs that span qualitative, quantitative, and mixed methods. The learners will critically examine and select the appropriate research methodology based on a specific question, hypothesis, or problem statement; and interpret and evaluate various research studies.

**EDUC 8016. Theory and Practice of Qualitative Research Methods.** (3 cr; A-F only. Prereq-8015 or equivalent, Ed.D. majors or #)

Qualitative research traditions and methods, and practice with the skills and attitudes necessary to successfully conduct qualitative research.

**EDUC 8017. Theory and Practice of Quantitative Research Methods.** (3 cr; A-F only. Prereq-8015 or equivalent, Ed.D. majors or #)

In-depth focus on quantitative research methods. Issues related to data collection methods and analysis using computer software packages.

**EDUC 8020. Doctoral Seminar.** (1 cr [max 6 cr]; S-N only. Prereq-Ed.D. majors)

Review of current research around best practices, or focused strategies for progression with the program or the dissertation.

**EDUC 8021. Theories, Principles, and Methodology of Assessment in Organizational Systems.** (3 cr; A-F only. Prereq-Ed.D. majors)

Designed to provide an understanding of assessment methods in organizational systems. Examines current practice and theory regarding the use of assessment as feedback to improve system processes.

**EDUC 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**EDUC 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Max 6 cr per semester or summer; doctoral student who has not passed prelim oral; no required consent for the first two registrations up to 12 cr; departmental consent for the third and fourth registrations up to an additional 12 cr, or 24 cr total (for doctoral students admitted summer 2007 and beyond; doctoral students admitted prior to summer 2007 may register up to 4 times totaling 60 cr))

**EDUC 8888. Thesis Credit: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

# Education and Human Service Professions (EHS)

## *College of Education and Human Service Professions*

### **EHS 799. CEHSP Masters Active Status.** (0 cr; No grade. Prereq-MEd or MSpEd students only)

Maintains continuous enrollment for collegiate masters students who have finished required coursework and are finishing the final product. Does NOT include eligibility (athletic, defer loans, etc.).

### **EHS 5595. Special Topics:** (Various Titles to be Assigned). (5-4 cr [max 16 cr]; A-F or Aud. Prereq-Course in human dev or ed psy or multicultural ed or spec ed, grad student or #, no Grad School cr)

Topics announced in [Class Schedule].

### **EHS 5713. American Indian Culture and Tradition: Oral Tradition and History.** (2 cr; A-F or Aud. Prereq-No Grad School cr)

Explores historical and current methods and issues in oral tradition and education with emphasis on Woodlands and Plains Indians.

### **EHS 5990. Research Project.** (1-12 cr [max 12 cr]; S-N only. Prereq-No Grad School credit)

Faculty-supervised research project required for MEd

# Education, Secondary (EDSE)

## *College of Education and Human Service Professions*

### **EDSE 3204. General Instructional Methods.** (4 cr; A-F or Aud. Prereq-Admission to EdSe program)

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; A-F or Aud. Prereq-Admission to EdSe program, concurrent registration is required (or allowed) for 3204)

Fifty hours of experience in a middle school, including observing, teaching, tutoring, working with individual students and small groups. Focuses on classroom management, multicultural education, and students with special needs. Weekly seminar.

### **EDSE 3206. Apprenticeship: Secondary School.** (2 cr; A-F or Aud. Prereq-Admission to EdSe program, [P]3204)

Fifty hours of experience in a high school, including observing, teaching, tutoring, working with individual students and small groups. Focuses on classroom management, multicultural education, and students with special needs. Weekly seminar.

### **EDSE 4100. Human Relations in Classrooms.** (2 cr; A-F or Aud. Prereq-Admission to EdSe program)

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 4120. Philosophy and Organization of the Middle School.** (2 cr; A-F or Aud. Prereq-Secondary majors admitted to teacher education or pre-elementary education majors, 45 cr, \$5120)

Philosophies and organization and structure of middle schools. Assessment of benefits, drawbacks, and rationale.

## Course Descriptions

**EDSE 4212. Literature for Adolescents.** (3 cr; A-F or Aud. Prereq-Teaching comm arts/lit major, minor or pre students or elem-middle educ comart/lit specialization, §5215)

Extensive reading in literature written for adolescents; analysis of studies of adolescent choices in literature; principles of selection; critical reading in broad fields of literary, biographical, historical, scientific interests of both genders; pedagogy and critical theory appropriate for adolescent study of literature.

**EDSE 4214. Reading in the Middle and Secondary School, Grades 5-12.** (2 cr; A-F or Aud. Prereq-§5215)

Teaching procedures, objectives, and materials; emphasis on teaching reading according to research and theory; analysis of reading difficulties; connected practicum.

**EDSE 4215. Teaching Reading and Literature: Grades 5-12.** (5 cr; A-F or Aud. Prereq-§4212 or 4214 or 5215; major, minor or pre teaching comm arts/lit students)

Teaching procedures, objectives, and materials; emphasis on teaching of reading in various subject-matter fields, practicum experience.

**EDSE 4222. Teaching Mathematics: Grades 5-12.** (4 cr; A-F or Aud. Prereq-Admission to EdSe program, 3204 or #; no Grad School credit)

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; A-F or Aud. Prereq-Admission to EdSe program, 3204 or #; no Grad School credit)

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; A-F or Aud. Prereq-Admission to EdSe program, 3204 or #; no Grad School credit)

Historical development of science education. Goals and purposes of science education in secondary schools; methods and materials; evaluation procedures; current trends.

### **EDSE 4400. Professional Development Seminar for Secondary Education Majors.** (1 cr [max 3 cr]; A-F or Aud. Prereq-Acceptance into EdSe program; no Grad School credit)

Professional development for Secondary Education majors through documentation, reflection, synthesis of learning as related to standards. Development of process and product portfolios. Presentation of and dialogue about emergent learning.

**EDSE 4501. Educational Psychology.** (3 cr; A-F or Aud. Prereq-Admission to EdSe program; no Grad School cr)

Principles of psychology applied to teaching; examination of adolescent growth and development; classroom management.

**EDSE 4600. Student Teaching.** (6-12 cr [max 12 cr]; S-N or Aud. Prereq-4100, 4501, appropriate methods course; no Grad School cr)

Supervised practicum in secondary or middle school under direction of licensed teacher. Demonstration of subject matter, teaching competence, and potential for future improvement.

**EDSE 4993. Special Area Project.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq-#; no Grad School credit)

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

**EDSE 5495. Special Topics:** (Various Titles to be Assigned). (.5-4 cr [max 8 cr]; A-F or Aud. Prereq-no Grad School credit)

Current issues in secondary education to meet needs and interests of various groups, particularly practicing professionals.

## Educational Administration (EDAD)

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

**EDAD 5911. Leadership and Personal Growth.** (3 cr; A-F or Aud. Prereq-EdAd lic program or collegiate grad program admission or #, no Grad School cr)

An overview of leadership from a theoretical perspective. Learners will begin to see the role and styles of leadership in relationship to the culture of schools and communities.

**EDAD 5912. Supervision of Teachers and School Staff.** (3 cr; A-F or Aud. Prereq-EdAd lic program or collegiate grad program admission or #, no Grad School cr)

Philosophy behind supervision of teachers, principals and skills needed to accomplish this task. Practitioners approach.

**EDAD 5913. Communication and Community Relations.** (3 cr; A-F or Aud. Prereq-EdAd lic program or collegiate program admission or #, no Grad School cr)

Schools as political systems; relationships between public perception and education's reality; public and media relations; definitions of community.

**EDAD 5914. Creation/Implementation and Interpretation of Rules and Regulations.** (3 cr; A-F or Aud. Prereq-EdAd lic program or collegiate graduate program admission #, no Grad School cr)

Provide basis for decision-making and school governance based in current federal and state law and mandates.

**EDAD 5915. Resource Management and Scheduling in Education.** (3 cr; A-F or Aud. Prereq-EdAd lic program or collegiate graduate program admission or #, no Grad School cr)

Focus on skills, knowledge and dispositions that enable administrators to plan and schedule work in ways that ensure that resources are used appropriately and goals are met.

**EDAD 5916. Curriculum and Instruction and Assessment.** (3 cr; A-F or Aud. Prereq-EdAd lic program or collegiate graduate program admission or #, no Grad School cr)

An overview of standards-based, culturally aware, curriculum design. Both traditional and backwards design frameworks presented. Elements of assessment and concepts of planned staff development. Current trends and curriculum theory introduced and analyzed.

**EDAD 5917. Technology Seminar.** (1 cr [max 10 cr]; S-N or Aud. Prereq-No Grad School cr)

Showcases school management systems and innovation in technology. Keynote speakers, panel discussions, demonstrations and workshop sessions on a variety of technology topics, such as data management systems for schools, assessment data, security issues, staff development plans, evaluating school technology software and equipment.

**EDAD 5918. Continuous Improvement Processes for Schools.** (3 cr; Stdnt Opt. Prereq-EdAd lic program or collegiate graduate program admission or #, no Grad School cr)

Effective site-based, data-driven continuous improvement spirals based on successful models exhibiting best practice in schools. Examine change literature, stages of adult development, strategic planning, accreditation process, state and federal accountability, AYP, and the improvement cycles.

**EDAD 5919. The Superintendency.** (3 cr; A-F or Aud. Prereq-EdAd lic program or collegiate graduate program admission or #, no Grad School cr)

Examine the level of decision making that differentiates district administration and identify the categories of responsibility unique to the superintendent. Gain practice in media relations at a district level and examine models of effective practices in school board leadership.

**EDAD 5920. Student Discipline and Behavior Management.** (3 cr; A-F or Aud. Prereq-EdAd lic program or collegiate graduate program admission or #, no Grad School cr)

Theories of behavior management; effectiveness of discipline approaches through lenses of development, culture, leadership styles and climate, gain experience in creating building and district level discipline policy.

**EDAD 5996. Professional Competency Assessment: Director of Special Education.** (1 cr; A-F or Aud. Prereq-EdAd lic program or collegiate graduate program admission or #, no Grad School cr)

Design and complete an electronic repository with evidence and reflection demonstrating proficiency in each of the components and subcomponents required for certificate approval. Prepare for final panel presentations by engaging in situational components and creating final presentation formats.

**EDAD 5997. Professional Competency Assessment:Principals.** (1 cr; A-F or Aud. Prereq-EdAd lic program or collegiate graduate program admission or #, no Grad School cr)

Design and complete an electronic repository with evidence and reflection demonstrating proficiency in each of the components and subcomponents required for certificate approval. Prepare for final panel presentations by engaging in situational components and creating final presentation formats.

**EDAD 5998. Professional Competency Assessment: Superintendents.** (1 cr; A-F or Aud. Prereq-EdAd Lic program no collegiate graduate program admission or #, no Grad School cr)

Design and complete an electronic repository with evidence and reflection demonstrating proficiency in each of the components and subcomponents required for certificate approval. Prepare for final panel presentations by engaging in situational components and creating final presentation formats.

**EDAD 6996. Internship: Directors of Special Education.** (4 cr; A-F or Aud. Prereq-EdAd lic program or collegiate graduate program admission or #, no Grad School cr)

Places the candidate for licensure in the schools, working with a practicing, licensed Director of Special Education for a minimum of 200 hours.

**EDAD 6997. Internship: Principals.** (6 cr; A-F or Aud. Prereq-EdAd lic program or collegiate graduate program admission or #, no Grad School cr)

To place the candidate for licensure in the schools, working with a practicing, licensed principal for a minimum of 320 total hours.

**EDAD 6998. Internship: Superintendents.** (6 cr; A-F or Aud. Prereq-EdAd lic program or collegiate graduate program admission or #, no Grad School cr)

Places the candidate for licensure in the schools, working with a practicing, licensed superintendent for a minimum of 320 total hours.

**EDAD 6999. Internship: Principals Additional Field.** (4 cr; A-F or Aud. Prereq-EdAd lic program or collegiate graduate program admission or #, no Grad School cr)

Places candidates for additional licensure in the schools, working with a practicing, licensed principal for a minimum of 200 total hours.

## Electrical and Computer Engineering (ECE)

### College of Science and Engineering

**ECE 1001. Introduction to Electrical and Computer Engineering.** (2 cr; A-F or Aud. Prereq-Pre-Engr, ChE, CS, ECE, IE majors 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 or Aud. Prereq-Pre-Engr, ChE, CS, ECE, IE majors 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.

**ECE 2006. Electrical Circuit Analysis.** (4 cr; A-F or Aud. Prereq-Phys 2011, [P]Math 3280)

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; A-F or Aud. Prereq-2006)

Signal and system modeling concepts, system analysis in time domain, Fourier series and Fourier transform. Discrete time domain signals and systems, Z transform, applications. (3 hrs lect, 3 hrs lab)

**ECE 2212. Electronics I.** (4 cr; A-F or Aud. Prereq-2006)

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; A-F or Aud. Prereq-1315)

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; A-F or Aud. Prereq-2111)

System mathematical modeling: differential equations, Laplace transform, block diagrams, signal flow graphs. System performance characteristics: time response, sensitivity, steady-state error. Stability analysis: Routh-Hurwitz, root locus and Nyquist. State variables. Compensation design, software tools. (3 hrs lect)

**ECE 3235. Electronics II.** (4 cr; A-F or Aud. Prereq-2212)

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; A-F or Aud. Prereq-2325)

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; A-F or Aud. Prereq-Math 3280, 3298, Phys 2011, 2012)

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)

## Course Descriptions

### Course Descriptions

**ECE 3611. Introduction to Solid-State Semiconductors.** (3 cr; A-F or Aud. Prereq-Phys 2012)

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 4305. Computer Architecture.** (4 cr; A-F or Aud. Prereq-3341)

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; A-F or Aud. Prereq-3235, 3341 or #)

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 4321. Computer Networks.** (3 cr; A-F or Aud. Prereq-3341, Stat 3611)

Network classification and services. Protocol and communication architectures. Hardware components: multiplexers, concentrators, bridges, routers, access servers. (3 hrs lect)

**ECE 4501. Power Systems.** (4 cr; A-F or Aud. Prereq-2006; no Grad School credit)

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 4781. Telecommunications.** (3 cr; A-F or Aud. Prereq-3445; no Grad School credit)

Switching theory, transmission, networking, traffic engineering, and associated engineering problems and solutions.

**ECE 4899. Senior Design Project I.** (1 cr; A-F or Aud. Prereq-3341, BSECE cand, \$4951 #; no Grad School credit)

Selection and completion of team project approved and supervised by faculty. See also ECE 4999.

**ECE 4951. ECE Design Workshop.** (4 cr; A-F or Aud. Prereq-Comp 3130, BSECE cand, 100 cr or #; \$4899 or 4999; no Grad School cr)

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 [max 3 cr]; A-F or Aud. Prereq-#; does not qualify as ECE technical elective; no Grad School cr)

Special projects not available in regular curriculum. Independent investigation, research studies, or survey of selected projects or problems.

**ECE 4999. Senior Design Project II.** (3 cr; A-F or Aud. Prereq-#, \$4951, 4899, BSECE cand; no Grad School credit)

Students present senior design project results in formal written and oral reports after making refinements. Complete documentation of results in professional manner required. Results must be presented in an oral report with other senior project team members. ECE 4899 and ECE 4999 must be completed within one year for credit.

**ECE 5151. Digital Control System Design.** (3 cr; A-F or Aud. Prereq-3151, 3341, \$4151)

Digital control system characteristics: transient and steady-state responses, frequency response, stability. Digital control system design using transform techniques. Controllability and observability. Design of digital control systems using state-space methods: pole placement and observer design, multivariable optimal control. Implementation issues in digital control

**ECE 5315. Multiprocessor-Based System Design.** (3 cr; A-F or Aud. Prereq-3341; \$4315)

Parallelism, interconnection networks, shared memory architecture, principles of scalable performance, vector computers, multiprocessors, multic平computers, dataflow architectures, and supercomputers.

**ECE 5351. Introduction to Robotics and Mobile Robot Control Architectures.** (3 cr; A-F or Aud. Prereq-3151, CS 1521, no Grad School credit)

Basic concepts and tools for the analysis, design, and control of robotic mechanisms. Topics include basic robot architecture and applications to dynamical systems, mobile mechanisms, kinematics, inverse kinematics, trajectory and motion planning, mobile robots, collision avoidance, and control architectures.

**ECE 5477. Antennas and Transmission Lines.** (3 cr; A-F or Aud. Prereq-3445, \$4477)

Concepts and theory of antennas and transmission lines; emphasis on design and applications. Topics: nonlinear source and loads, cross talk, interconnecting circuits, line characteristics, radiation, measurements. EM propagation, scattering and antenna design techniques. Numerical analysis of wire, aperture, reflector antennas; diffraction theory.

**ECE 5741. Digital Signal Processing.** (3 cr; A-F or Aud. Prereq-2111, §4741)

Discrete linear shift-invariant systems, z- & Fourier transform, sampling, discrete-time processing of signals, reconstruction of analog signals, filters and filter structures in direct, parallel, and cascaded forms, FIR & IIR digital filter design, impulse-invariant, bilinear transform & window functions, FFT, introduction to image processing.

**ECE 5765. Modern Communication.** (4 cr; Stdnt Opt. Prereq-2111, 3235; §4765)

Design and analysis of modern communication systems; evaluation of analog and digital modulation techniques. (3 hrs lect, 3 hrs lab)

**ECE 5801. Introduction to Artificial Neural Networks.** (3 cr; A-F or Aud. Prereq-CS 1521, Math 3280, Stat 3611 or #, §4801)

General techniques and theory of neural networks, their applications and limitations. The course particularly addresses the design issues and learning algorithms for diverse areas of applications.

**ECE 5813. Tools and Methods of Design Automation.** (3 cr; A-F or Aud. Prereq-3341, §4813)

Methods and techniques for designing electronic systems based on top-down strategy. Emphasis on high-level synthesis techniques and tools. Automated design of large, electronic systems. Design project using electronic design automation tools available in the ECE department.

**ECE 5831. Fuzzy Set Theory and Its Application.** (3 cr; A-F or Aud. Prereq-CS 1521, Math 3280, §4831)

Fuzzy sets and operations on fuzzy sets. Fuzzy relations and the extension principle. Linguistic variable and fuzzy IF-THEN rules. Fuzzy arithmetic. Fuzzy logic and approximate reasoning. Design of Fuzzy Systems from I/O data. Fuzzy logic-based control. Pattern Classifications.

**ECE 5995. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 3 cr]; A-F or Aud. Prereq-#)

Current problems and research. Discussions, selected reading, and/or invited speakers.

**ECE 8151. Linear Systems and Optimal Control.** (3 cr; A-F only. Prereq-3151)

State-space representations of dynamic systems. Input-output stability. Lyapunov stability. Controllability and observability. Minimal realizations. State and output feedback. Pole placement design. State observers. Linear quadratic optimal control: fixed and free end point, finite and infinite horizon. Pontryagin's Minimal Principle. Dynamic programming.

**ECE 8315. Embedded Systems and Microcomputer Interfaces Design.** (4 cr; A-F or Aud. Prereq-2325, 3341, CS 1511, CS 2521)

Introduces students to the design of advanced embedded and microprocessor based system, and microcomputer interfaces, with an emphasis on embedded systems hardware and software design relevant to talking with computer hardware.

**ECE 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, advisor and DGS consent)

**ECE 8611. Semiconductor Device Design, Fabrication, and Analysis.** (3 cr; A-F or Aud. Prereq-3611 or Phys 4021 and Math 3280)

Provides an in-depth treatment of the design, fabrication, and analysis of semiconductor devices including: Silicon bipolar transistors, Si MOS transistors, Integrated Circuits, III-V photonic devices, and Micro-Electro-Mechanical systems (MEMs).

**ECE 8741. Digital Image Processing.** (4 cr; A-F or Aud. Prereq-4741)

Mathematical foundations and practical techniques to process and manipulate images. Students will acquire the ability to analyze two-dimensional images, dealing with mathematical representation of images, image sampling and quantization, Image Transforms, Image Enhancement, Image Restoration, Image Coding, Edge Detection, Texture Analysis, and Compression.

**ECE 8765. Digital Communications.** (3 cr; A-F or Aud. Prereq-4765)

Overview of digital data transmission, performance analysis of digital modulation, quadrature multiplexed signaling schemes, signal-space methods in digital data transmission, information theory and block coding, convolutional coding, repeat-request system, spread-spectrum systems, satellite communications.

**ECE 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 or per semester or summer; 10 cr total required (Plan A only))

**ECE 8831. Soft Computing.** (3 cr; A-F or Aud. Prereq-Knowledge of linear algebra and computer programming)

Fuzzy set theory, neural networks, genetic algorithms, data clustering techniques, and several stochastic optimization methods that do not require gradient information which is aimed at solving real world decision-making, modeling, and control problem.

## Elementary Education (ELED)

### College of Education and Human Service Professions

**ELED 1010. Introduction to Elementary Education.** (3 cr; A-F or Aud. Prereq-Pre elementary education student)

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.

**ELED 3113. Learning Environments and Diverse Learning Communities.** (3 cr; A-F or Aud. Prereq-Admission to the elementary education program)

Teaching and learning models as a basis for structuring diverse learning environments for children. Curriculum, classroom management, and instructional strategies. Sociocultural and historical backgrounds, issues, and unique learner needs of students.

**ELED 3325. Language and Literacy.** (4 cr; A-F or Aud. Prereq-Concurrent registration is required (or allowed) in the following: 3113, 3331, 3355, 4400, SpEd 3310, admission to the elementary education program)

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.

**ELED 3331. Children's Literature and Integrated Creative Arts.** (4 cr; A-F or Aud. Prereq-Concurrent registration is required (or allowed) in the following: 3113, 3325, 3355, 4400, SpEd 3310, admission to the elementary education program)

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.

**ELED 3355. Critical Thinking: Elementary Mathematics.** (4 cr; A-F or Aud.)

Prereq-Successful completion of block one, concurrent registration is required (or allowed) in the following: 4344, 4345, 4366, SpEd 5310, admission to elementary education program)

Concepts learned through discovery, induction, critical reasoning, problem solving. Standards for elementary mathematics, use of a problematic approach to mathematical sense making.

**ELED 3381. Teaching American Indian Students in the Elementary Classroom.** (2 cr; A-F or Aud. Prereq-Elementary education major)

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.

**ELED 4344. Teaching Science and Environmental Education.** (4 cr; A-F or Aud.)

Prereq-admission to elementary education program, successful completion of block one, [P]3381, 4345, 4366, SpEd 5310, no Grad School cr)

Curriculum standards and research-based pedagogy. Includes field experience.

**ELED 4345. Instructional Strategies, Assessment, and Management.** (3 cr; A-F or Aud. Prereq-admission to elementary education program, successful completion of block one, [P]3381, 4344, 4366, SpEd 5310, no Grad School cr)

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.

**ELED 4366. Teaching Social Studies and Environmental Education.** (4 cr; A-F or Aud. Prereq-admission to elementary education program, successful completion of block one, [P]3381, [P]4344, [P]4345, [P]SpEd 5310; no Grad School cr)

Content and organization of social studies; planning instruction for diverse students; understanding and improving the learning situation; effective use of materials in environmental education.

**ELED 4400. Professional Development Seminar for Elementary Education Majors.** (1 cr; A-F or Aud. Prereq-Admission to elementary education program, [P]3113, 3325, 3331, 3355, SpEd 3310, no Grad School cr)

Professional development for Elementary Education Majors through documentation, reflection, synthesis of learning as related to standards. Development of process and product portfolios. Presentation of and dialogue about emergent learning.

**ELED 4600. Student Teaching.** (6-12 cr [max 12 cr]; S-N or Aud. Prereq-Admission to elementary education program, successful completion of block one and block two courses, no Grad School cr)

Planning, implementing, and evaluating an elementary curriculum. Assessing learning needs and collaborating with specialists to individualize methods and materials.

**ELED 4650. Student Teaching in Individual Subjects: K-8.** (1-6 cr [max 7 cr]; S-N or Aud. Prereq-Art ed cand or music ed cand , or phy ed cand or #; no Grad School credit)

Student teaching in, e.g., art, music, physical education. Demonstrating subject matter competence, instructional strategies, and management skills; self-evaluation.

**ELED 4991. Independent Study.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-%; no Grad School cr)

Directed independent study, reading, and/or projects in elementary or middle school education of interest to student.

## Course Descriptions

**ELED 4993. Special Area Project.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq-#; no Grad School cr)

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

**ELED 5695. Special Topics:** (Various Titles to be Assigned). (.5-4 cr [max 8 cr]; A-F or Aud. Prereq-No Grad School credit)

Current issues in Elementary Education to meet needs and interests of various groups, particularly practicing professionals.

**ELED 5993. Special Area Project.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq-#; no Grad School cr)

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

## Engineering (ENGR)

### College of Science and Engineering

**ENGR 1210. Introduction to Design and Reverse Engineering.** (3 cr; A-F only. Prereq-[P]Math 1297 or #; §IE 1225)

Explores “reverse engineering” (i.e., how engineers evaluate existing products for ideas to improve future products). Learn to communicate product features through engineering design graphics, recognize manufacturing processes involved, and understand how design objectives and constraints impact realization of part designs.

**ENGR 2015. Statics.** (3 cr; Stdnt Opt. Prereq-Math 1297, Phys 2011)

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.

**ENGR 2016. Mechanics of Materials.** (3 cr; Stdnt Opt. Prereq-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; Stdnt Opt. Prereq-2015, ¶ Math 3280)

Review of particle dynamics. Mechanical systems and rigid-body model. Kinematics and dynamics of plane systems.

**ENGR 2110. Introduction to Material Science for Engineers.** (3 cr; A-F or Aud. Prereq-Chem 1151, [P]2015)

Atomic bonding, structure, properties and characteristics of most common engineering materials: metal (ferrous and non-ferrous), polymers, ceramics and composites. Modes of material failure and standard laboratory tests for material properties. Use of equilibrium phase diagrams. Corrosion and their prevention methods

**ENGR 4001. Engineering Professionalism.** (3 cr; A-F or Aud. Prereq-BSECE or BSChE or BSIE or BSME student, min 60 credits, no Grad School credit)

Relationship of engineering to topics in economics, environment, sustainability, manufacturing, ethics, health & safety, society, and politics. Multidisciplinary engineering design lab experience. Written lab reports, proposals, professional letters, resume. Oral lab progress reports.

## Engineering Management (EMGT)

### College of Science and Engineering

**EMGT 4110. Engineering Professionalism and Practice.** (2 cr; A-F only. Prereq- COMP 3130 or 3150 or 3180 and BSChE or BSECE or BSIE or BSME candidate within 2 semesters of graduation or #; no Grad School cr; §IE 4155 or ME 4155)

Professional responsibilities of engineers and expectations of industry and society. Ethics and law for engineers. Codes of ethics and professional engineering societies. Design, intellectual property, record keeping. Environmental and safety issues in design. Group processes, conflict management. Project management.

**EMGT 5110. Management of Engineers and Technology.** (3 cr; A-F only. Prereq- EMgt student or %)

Managing the synergy of people and technology. Overview of management functions, tools, methods. Planning, organization, leadership, motivation, control, quality, human resources, effective decision making.

**EMGT 5120. Advanced Project Management.** (3 cr; A-F only. Prereq-EMgt student or %)

Project justification and finance. The development and management of project plans and resources. Working with contractors and union personnel. Covers the life cycle of projects. Applications to current practice.

**EMGT 5130. Operations Modeling and Analysis.** (3 cr; A-F only. Prereq-EMgt student or %)

Modeling and analysis of manufacturing and service systems. Linear programming, network analysis, queuing theory, Markov chains, and non-linear optimization.

**EMGT 5160. Quality Management.** (3 cr; A-F only. Prereq-EMgt student or %)

Global competitiveness, organizational culture, management role responsibilities, concepts for customer value, strategic management, measurement of customer value, organizing to improve systems, employee involvement, culture change and organizational learning. ISO 9000, quality awards.

**EMGT 5210. Information Technology for Management.** (3 cr; A-F only. Prereq-EMgt student or %)

Intended to bring the student up to date on developments in the field of information technology (IT) and to prepare the student to manage those technologies in the workplace. Presents a combination of current management and technical topics.

**EMGT 5220. Environmental Issues in Engineering.** (3 cr; A-F only. Prereq-EMgt student or %)

A historical perspective on society's environmental concerns, discussion of federal environmental statutes, our regulatory system, approaches to preventing and mitigating environmental problems, and the elements of an effective environmental management system.

**EMGT 5230. Technical Forecasting.** (3 cr; A-F only. Prereq-EMgt Student or %)

Statistical review, data sources, choosing a forecasting technique, moving averages, smoothing, regression analysis, time series analysis, the Box-Jenkins (ARIMA) methodology.

**EMGT 5240. Advanced Operations Management.** (3 cr; A-F only. Prereq-EMgt student or MBA student or %)

Emphasis on quantitative methods for designing and analyzing manufacturing and service operations, simulation, and recent paradigms in manufacturing including just-in-time production, synchronous manufacturing, and agile manufacturing. Current

competitiveness-enhancing techniques like continuous improvement, benchmarking, and business process re-engineering will also be covered.

**EMGT 5250. Legal and Ethical Issues in Engineering.** (3 cr; A-F only. Prereq-EMgt student or %)

Overview of the legal and ethical issues of concern to the engineering manager. Basic law, contracts, intellectual property, product liability. Ethics case studies.

**EMGT 5991. Independent Study in Engineering Management.** (1-4 cr [max 6 cr]; Stdt Opt. Prereq-MSEM cand, %)

Directed study of special interest topics not available in standard curriculum. Must be arranged with instructor before registration. May include readings, research and/or special projects.

**EMGT 5995. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 9 cr]; A-F or Aud. Prereq-EMgt student or %)

Selected current topics in engineering management. (Various titles to be assigned).

**EMGT 8310. Project Methodology and Practice.** (3 cr; A-F only. Prereq-5110, 5120, 5130, 5160)

Applying research, analysis, and management skills to a topic or situation of current interest to industry. Demonstrating the ability to achieve results in a fixed time frame with limited resources.

**EMGT 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

**EMGT 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**EMGT 8993. Engineering Management Seminar.** (1 cr [max 2 cr]; S-N only. Prereq-Grad student, %)

Reports on recent developments in engineering management and on research projects in the department.

**EMGT 8994. Directed Research.** (1-8 cr [max 8 cr]; Stdt Opt. Prereq-MSEM or Grad School student, %)

Directed research or study on an advanced topic.

## English (ENGL)

### College of Liberal Arts

**ENGL 1001. Great American Authors.** (3 cr; A-F or Aud. LE 9)

Introduction to American authors important for their artistic mastery and/or significant role in American literary history.

**ENGL 1101. Literature Appreciation.** (3 cr; A-F or Aud. Prereq-\$1907; primarily for nonmajors but also for potential majors and creative writers LE 9)

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

**ENGL 1507. Time and Place.** (4 cr; A-F or Aud. LE 9)

Close reading of selected works about experience of time and place.

**ENGL 1535. King Arthur in History, Literature, and Art.** (4 cr; A-F or Aud. LE 9)

Survey of historical accounts, and literary and artistic treatments of King Arthur in Latin, French, and German sources of the Middle Ages and in selected works in modern Arthurian literature.

**ENGL 1575. 20th-Century Literature.** (4 cr; A-F or Aud. Prereq-Primarily for nonmajors LE 9)

Readings primarily in American, British, and Irish literature.

**ENGL 1582. Introduction to World Literatures.** (3 cr; A-F or Aud. LEIP 09)

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

**ENGL 1585. Australian and New Zealand Literature and Culture.** (4 cr; A-F or Aud. LEIP 09)

Introduces students to the literature and cultures of Australia and New Zealand, focusing on the formation of national identity, both countries' relationship to Great Britain and the US, conventions like "mateship," and the cultural politics of aboriginal peoples.

**ENGL 1666. Tales of Terror.** (4 cr; A-F or Aud. LE 9)

Gothic masterpieces chiefly from English and American literature, with emphasis on sociological and psychological implications of the genre.

**ENGL 1801. Freshman Seminar: American Gothic.** (4 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr. LE 9)

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

**ENGL 1802. Freshman Seminar: Asian Culture.** (4 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits LE 7)

Exploration of Chinese and Japanese cultures with attention to Confucianism, Taoism, Buddhism, Shinto and arts such as calligraphy, painting, poetry, garden design, and music. Some attention also to political history.

**ENGL 1803. Freshman Seminar: Unseen Reality.** (4 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr. LE 9)

Concepts of "the ideal" and "the real" as developed by writers with differing perspectives, in various literary forms (e.g., fiction, non-fiction, poetry).

**ENGL 1805. Freshman Seminar: Satire and Humor.** (4 cr; A-F or Aud. Prereq-Freshman, fewer than 30 or LE 9)

Satire and humor in their historical, social, aesthetic, and intellectual contexts.

**ENGL 1907. Introduction to Literature.** (3 cr; A-F or Aud. Prereq-Primarily for nonmajors LE 9)

Literary modes and methods of literary study and interpretation.

**ENGL 2571. Contemporary Literature.** (4 cr; A-F or Aud. LE 9)

Readings in American and British literature since 1945. Emphases, authors, and titles vary.

**ENGL 2581. Women Writers.** (4 cr; A-F or Aud. Prereq-30 cr or # LECD 09)

Feminist reading of selected plays, poetry, prose (including critical works) written by women writers.

**ENGL 2922. Honors Seminar: The Art of the Memoir: Reading and Writing Memoir.** (4 cr; A-F or Aud)

Study of the memoir as a literary genre--its conventions, elements, and its historical importance--and as an art form. Use of critical approaches in the reading of memoirs. Directed practice writing the student's own memoir.

**ENGL 3115. Writing Fiction.** (4 cr [max 8 cr]; A-F or Aud. Prereq-Comp 1120, min 60 cr (6 cr lit) or #)

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 or Aud)

Writing of poetry, with emphasis on techniques learned through critical reading and classroom analysis.

**ENGL 3195. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 16 cr]; A-F or Aud)

Special topics in English.

## Course Descriptions

### **ENGL 3223. Shakespeare.** (4 cr; A-F or Aud. LE 9)

Introduction to Shakespeare. Selected plays from the histories, comedies, tragedies, and dramatic romances. Aspects of drama, such as structure, language, characterization, theme, and dramatic conventions examined in study of individual plays.

### **ENGL 3333. Children's Literature: Texts and Contexts.** (4 cr; A-F or Aud)

Forms of children's literature, from folk and fairy tales to contemporary stories, poems, and novels for children; major historical, literary and critical issues affecting the production and reception of literature for children.

### **ENGL 3411. The Modern Short Story.** (4 cr; A-F or Aud. Prereq-Min 60 cr (6 cr lit) or #)

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; A-F or Aud. Prereq-Engl major or minor or teach comm arflit major or minor or elem-middle educ comart/lit specialization)

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; A-F or Aud. Prereq-Engl major and minor)

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 3563. American Literature I.** (4 cr; A-F or Aud)

Historical survey of important authors, movements, conventions, genres, and themes: origins to Civil War.

### **ENGL 3564. American Literature II.** (4 cr; A-F or Aud)

Historical survey of important authors, movements, conventions, genres, and themes: Civil War to present.

### **ENGL 3906. Methods of Literary Study.** (4 cr; A-F or Aud. Prereq-Comp 1120, Engl major or Tch Comm Art/Lit major or #)

Introduction to interpretive and scholarly methods.

### **ENGL 4097. Internship in Publishing.** (1-4 cr [max 8 cr]; S-N or Aud. Prereq-minimum 60 credits,#Credit cannot be applied to Grad School program)

Practical experience in publishing at an approved business or organization.

### **ENGL 4292. Literature into Film.** (4 cr; A-F or Aud. Prereq-Min 90 cr (10 cr lit) or #)

Comparative study of novels and their film adaptations.

### **ENGL 4375. Drama.** (4 cr; A-F or Aud)

Selected playwrights, plays, types, traditions, or periods; relevant theoretical and critical writings. Authors and topics vary.

### **ENGL 4909. Senior Portfolio.** (1 cr; S-N or Aud. Prereq-Engl major, sr)

Required portfolio and research project undertaken for senior seminar.

### **ENGL 4931. Practicum in Teaching Literature.** (4 cr; A-F or Aud. Prereq-3906, 4 other upper division literature courses and #; no Grad School credit)

Assisting in teaching a 1-, 2-, or 3-level literature course; experience preparing course materials; advising students in course; learning about the grading process; experience in lecturing and leading discussions; conferences with professor about teaching issues.

### **ENGL 5097. Internship in Publishing.** (1-3 cr [max 3 cr]; S-N or Aud. Prereq- 8906, #)

Practical experience in publishing at an approved business or organization.

### **ENGL 5116. Advanced Writing of Fiction.** (4 cr [max 8 cr]; A-F or Aud. Prereq-#)

Writing of original fiction beyond the beginning stages; some experience required.

### **ENGL 5122. Advanced Writing of Poetry.** (4 cr [max 8 cr]; A-F or Aud. Prereq-3121 or #)

Study of poetics and poetry, with emphasis on student poems.

### **ENGL 5222. Shakespeare.** (4 cr; A-F or Aud. Prereq-6 cr literature)

Concentrated study of selected plays, with attention to Shakespearean criticism and scholarship. Recommended as the second course in Shakespeare.

### **ENGL 5312. Chaucer.** (4 cr; A-F or Aud. Prereq-6 cr literature)

Introduction to Middle English. Reading and analysis of Chaucer's works, primarily Canterbury Tales and Troilus and Criseyde.

### **ENGL 5331. Milton.** (4 cr; A-F or Aud. Prereq-6 cr literature)

Minor poems, Areopagitica, Paradise Lost, and Samson Agonistes.

### **ENGL 5375. Modern Poetry.** (4 cr; A-F or Aud. Prereq-6 cr literature)

Study of modern poetry written in English.

### **ENGL 5444. Childhood in Literature, History and Culture.** (4 cr; A-F or Aud. Prereq-Jr or sr or grad student or #)

Examines traditional kinds of children's literary texts, as well as literary and pedagogical theory, advertising, movies, and television to consider childhood as an historical, aesthetic and social construct in Western culture from the eighteenth century to the present.

### **ENGL 5471. The Novella.** (4 cr; A-F or Aud. Prereq-Min 90 cr (12 cr lit) or #)

In-depth study of selected masterworks of the form.

### **ENGL 5533. Studies in English Literature Before 1800.** (4 cr; A-F or Aud. Prereq-6 cr literature)

Intensive study of a theme, literary school or circle, literary genre in historical and cultural context. Topics vary.

### **ENGL 5541. Restoration and 18th-Century Literature.** (4 cr; A-F or Aud. Prereq-6 or literature)

Study of controversies and cultural change evident in English literature, 1660-1800. Such authors as Dryden, Behn, Pope, Fielding, Johnson

### **ENGL 5561. English Romanticism.** (4 cr; A-F or Aud. Prereq-6 or literature)

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; A-F or Aud. Prereq-6 cr literature)

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; A-F or Aud. Prereq-6 cr literature)

Anglo-Irish literature in its socio-historical context. Such authors as Yeats, Synge, Gregory, Joyce, and O'Casey.

### **ENGL 5572. American Renaissance.** (4 cr; A-F or Aud. Prereq-6 cr literature)

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 5574. Studies in American Literature to 1914.** (4 cr; A-F or Aud. Prereq-6 cr lit)

Study of selected North American authors from the Colonial Era to the end of WWI. Literature studied will vary in relation to what kind of literary or cultural study instructor intends or what kind of critical approach to literature is used.

**ENGL 5575. Studies in American Literature after 1914.** (4 cr; A-F or Aud. Prereq-6 cr lit)

Study of selected North American authors after 1914. Literature studied will vary in relation to what kind of literary or cultural study instructor intends or what kind of critical approach to literature is used.

**ENGL 5577. Major American Authors.** (4 cr [max 8 cr]; A-F or Aud. Prereq-6 cr literature)

Concentrated study in one to three authors, who are announced before course is offered.

**ENGL 5581. American Novel I.** (4 cr; A-F or Aud. Prereq-6 cr literature or #)

The American novel, origins through 1920; cultural, intellectual, and aesthetic contexts. Authors and topics vary.

**ENGL 5582. American Novel II.** (4 cr; A-F or Aud. Prereq-6 cr literature)

The American novel, 1920 to present; cultural, intellectual, and aesthetic contexts. Authors and topics vary.

**ENGL 5583. British Novel.** (4 cr; A-F or Aud. Prereq-6 cr lit)

The British novel in its social, aesthetic, and intellectual contexts.

**ENGL 5591. Independent Study.** (1-5 cr [max 8 cr]; A-F or Aud. Prereq-#, max 6 cr may be applied to Grad School program)

Students choose projects in consultation with their instructor.

**ENGL 5595. Special Topics:** (Various Titles to be Assigned). (1-5 cr [max 10 cr]; A-F or Aud. Prereq-Primarily for majors, minors, grads)

Topics not included in regular English curriculum. Topic and credits announced before course offered.

**ENGL 5661. Publishing the Middle Ages.** (4 cr; A-F or Aud. Prereq-Jr or sr or grad student or #)

Study of the ways in which the middle ages were defined and canonized in print culture. Instruction on the processes of medieval manuscript production and editing, followed by analysis of rhetorical framework within which “medievalism” was constructed in the 19th century.

**ENGL 5662. The Making of a Major Author:The Scholarly Edition in 17th-and 18th-Century England.** (4 cr; A-F or Aud. Prereq-Jr or sr or grad student or #)

Study of the ways in which writers such as Shakespeare and Milton were transformed into “major authors” and “national poets” through the publication of scholarly editions of their works subsequent to their deaths. Textual analysis of the editions is combined with study of their publication histories, including the roles of editors and publishers who produced them.

**ENGL 5663. Readers and the History of Books.** (4 cr; A-F or Aud. Prereq-Jr or sr or grad student or #)

History of reading, primarily in the United States and England. Study of factors affecting literacy in late 18th through early 20th centuries, including technological advances, educational reform and changes in authorship and literature.

**ENGL 5664. Small Presses, Little Magazines, and Modernism.** (4 cr; A-F or Aud. Prereq-Jr or sr or grad student or #)

The founding and promotion of the modernist movement in little magazines and small presses. Publishing careers of significant modernists (e.g. Ford, Pound, Yeats, H.D. Eliot, Joyce).

**ENGL 5811. Introduction to Modern English.** (4 cr; A-F or Aud)

Modern theories of English grammar.

**ENGL 5821. History of the English Language.** (4 cr; A-F or Aud)

History of sounds, word stock, and structures of English language from earliest records to present.

**ENGL 5902. Teaching Language, Cognition, and Writing.** (4 cr; A-F or Aud. Prereq- Teach comm art/lit major or minor or TESOL licensure or elem/middle educ comart/lit specialization or #)

Theory and practice of teaching composition; for prospective teachers grade five to community college level.

**ENGL 5922. Teaching Literature and Communication.** (5 cr; S-N or Aud. Prereq-5902, teach comm art/lit major or minor or TESOL licensure or #)

Theory and applications in teaching reading, writing, literature, speaking, listening, and non-print media, grades 5-12.

**ENGL 8171. Seminar in Pre-1800 British Literature.** (4 cr; A-F or Aud. Prereq- Graduate Student)

Selected topics in the study of British literature written prior to 1800.

**ENGL 8181. Seminar in British Literature, Late 18th - 20th Century.** (4 cr; A-F or Aud)

Graduate seminar on selected topics in the study of British literature written from the late 18th century through the 20th century.

**ENGL 8191. Seminar: American Literature.** (4 cr; A-F or Aud)

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; No grade. Prereq-Master's student, adviser and DGS consent)

**ENGL 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-doctoral student, adviser and DGS consent)

**ENGL 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-[max 18 cr per semester or summer]; 24 cr required)

**ENGL 8906. Introduction to Critical Theory.** (4 cr; A-F or Aud. Prereq-Grad Student)

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; A-F or Aud. Prereq-8 cr grad-level literature or #)

Teaching in sophomore literature courses; experience preparing supplementary materials, consulting with students, and assisting instructors in grading student work.

## Environmental Education (ENED)

### College of Education and Human Service Professions

**ENED 3309. Outdoor Leadership.** (1 cr; S-N or Aud. Prereq-Rec 2300, PEP 3507)

Theories of leadership practices commonly used in outdoor education settings. Includes group development stages and techniques of group management. Concludes with preparation for 9-day field experience (EnEd 3310). This course MUST be taken in conjunction with EnEd 3310.

**ENED 3310. Outdoor Leadership Field Experience.** (2 cr; A-F or Aud. Prereq-EnEd 3309)

Practice, theory, and methods involved in leadership development including a detailed analysis of the qualities and roles of leaders in outdoor educational settings. recreation settings. This course will occur as a 9-day field experience.

**ENED 3331. Organization of Environmental Education Centers.** (2 cr; A-F or Aud. Prereq-2300 or #; §Rec 3331)

Philosophy and organization of environmental education centers as non-formal education providers. Both residential and non-residential centers including history, philosophy, management, and educational delivery relative to environmental literacy will be studied. Visits to local environmental learning centers are included.

## Course Descriptions

**ENED 3341. Field Interpretive Techniques I.** (3 cr; A-F or Aud. Prereq-Rec 2300 or #, §Rec 3341)

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.

**ENED 3342. Field Interpretive Techniques II.** (3 cr; A-F or Aud. Prereq-3341, #, §Rec 3342)

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.

**ENED 4163. Outdoor Education Methods.** (3 cr; A-F or Aud. Prereq-Rec 3342 or #, no Grad School credit)

Methods and theoretical basis for teaching outdoor education. Emphasis on application at outdoor sites. Weekend experience at a regional nature center required.

**ENED 4315. Operations and Management.** (4 cr; A-F or Aud. Prereq-2300 or #, no Graduate School credit)

Methods and practice of administrative processes of personnel, fiscal, and facility management. Field study and presentation of a management plan.

**ENED 4410. Ropes Course Management.** (3 cr; A-F or Aud. Prereq-Rec 2300, Psy 3524 or #, no Grad School credit, §Rec 4410)

Management of a ropes course as a part of an outdoor education facility. Includes ropes course elements, instructional techniques, group debriefing skills, site inspection, safety, rescue and equipment maintenance. This course will follow industry standards such as Project Adventure.

**ENED 4555. Foundations of Environmental Education.** (3 cr; A-F or Aud. Prereq-Rec 2300 or #)

Provides a background of skills and understanding of environmental education delivery in various educational settings, with emphasis on formal classroom audience.

**ENED 4601. Wilderness Philosophy.** (2 cr; Stdnt Opt. Prereq-no Grad School credit)

People and social forces that have influenced land-use related to designated wilderness; philosophical and historical basis for wilderness management.

**ENED 4996. Outdoor Education Internship.** (12 cr; S-N or Aud. Prereq-Rec major, #, no Grad School credit; §Rec 4996)

Supervised field experience in outdoor education.

**ENED 5163. Outdoor Education Methods.** (3 cr; A-F or Aud. Prereq-MEd candidate or #, no Graduate School credit)

Methods and theoretical basis for teaching outdoor education. Emphasis on application at outdoor sites. Weekend experience at a regional nature center required

**ENED 5164. Environmental Education In-Service Training.** (.5-10 cr [max 10 cr; A-F or Aud. Prereq-#, no Grad School credit])

Environmental education methods, materials, and curricula for educators wishing to enhance their environmental education training.

**ENED 5165. Theories and Models in Outdoor Education.** (2 cr; A-F or Aud. Prereq-#, no Grad School credit)

Overview of theoretical foundations of outdoor education. Definitions of terms related to outdoor education, historical antecedents, futureadventure education, social and psychological benefits of outdooreducation.

**ENED 5167. Research and Issues in Outdoor Education.** (2 cr; A-F or Aud. Prereq- no Grad School credit)

Research literature and related issues pertaining to outdoor education,including research design and methods. Application of research tospecific issues.

**ENED 5236. Environmental Education for Teachers.** (5-3 cr [max 3 cr]; A-F or Aud. Prereq-#, §Educ 5236; no Grad School credit)

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.

**ENED 5325. Environmental Issues Investigation.** (3 cr; A-F or Aud. Prereq-#, no Grad School cr)

The study of resolving environmental problems as taught in environmental education. This includes issue identification; building an effective team of investigators; and, study of the issue to the point of making recommendations to resolution of the issue.

**ENED 5343. Advanced Field Interpretive Techniques.** (3 cr; A-F or Aud. Prereq-3341 or 3342 or #, no Grad School credit)

Techniques and methods used to interpret the natural and cultural history of unique field sites; For example, Isle Royale National Park. Specific, in-depth topics of natural and cultural history will be emphasized. Techniques for field site investigation and field based interpretation as an educational approach will be investigated.

**ENED 5495. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 4 cr]; Stdnt Opt. Prereq-no Grad School cr)

Treatment of topics not included in regular curriculum or in-depth treatment of topics associated with normal curricular offering.

**ENED 5555. Environmental Education for Practicing Educators.** (2 cr; A-F or Aud. Prereq-No Grad School credit)

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.

**ENED 5560. Current Research and Issues.** (3 cr; A-F or Aud. Prereq-MEd candidate or #, no Graduate School credit)

Examines research literature and related issues pertaining to outdoor education including disciplines of science, environmental experiential, and adventure education. Trends in research, teaching, plus research design and methods.

**ENED 5625. Program Development and Evaluation.** (3 cr; A-F or Aud)

A comprehensive approach to program development will be applied to youth-based environmental education programs. Course is designed for those working in supervisory capacities to gain skills in designing, implementing, and evaluating environmental education programs.

**ENED 5850. Classroom Applications.** (2 cr; A-F or Aud. Prereq-MEd candidate or #, no Graduate School credit)

Understanding the formal classroom environment: scope and sequence, management, assessment, and standards for applications pertinent to audience and setting in environmental education.

**ENED 5855. Programming for School Systems.** (2 cr; A-F or Aud. Prereq-5850, Educ 5850 or #, no Graduate School credit)

The relationship between environmental education and the formal school system (P-12) will be examined. Instructional approaches that use the environment as a context for helping students develop essential content and skills in the core academic disciplines will be emphasized.

**ENED 5998. Outdoor Education Seminar.** (1 cr [max 3 cr]; S-N or Aud. Prereq-§Rec 4998, #, no Grad School credit)

Facilitated discussions and presentations of contemporary recreation research, curricula, and/or issues.

# Environmental Science (ESCI)

## College of Science and Engineering

**ESCI 2210. Science and Management of Environmental Systems.** (4 cr; A-F or Aud. Prereq-Geol 1110 or #)

Scientific foundations of major environmental issues, water chemistry, atmospheric chemistry, natural resources, global climate, national and international environmental regulation and policy, and environmental economics.

**ESCI 3101. Nonrenewable Resources.** (4 cr; A-F or Aud. Prereq-2210, Chem 1151 or 1161, Phys 2011 or #)

Geology of nonrenewable resources and introduction to extractive industry methods and procedures. Formation and occurrence of natural resources, theory and practice of technologies associated with the production, separation, purification, conversion, consumption, and waste disposal of nonrenewable energy and mineral resources.

**ESCI 3102. Renewable Resources.** (4 cr; A-F or Aud. Prereq-3101 or #, Phys 2012)

Principles of renewable energy, energy conversion, irreversible thermodynamics and thermodynamic engines, thermoelectric generators, turbines, photovoltaic conversion, electrochemical conversion, fuel cells, pumping efficiency, wind energy, conversion of wave energy, heat pumps, ecosystems and biomass energy, and energy transmission and storage.

**ESCI 4101. Pollution and Technology.** (4 cr; A-F or Aud. Prereq-2210, Chem 1151 or 1161, Phys 2011 or #, no Grad School cr)

Sources, distribution, and ultimate fate of air, water and solid/hazardous wastes. Principles of treatment of point and non-point source wastes. Case studies of successful remediation technologies. Models of contaminant movement in the environment. Landfill construction. Application of federal law: National Environmental Policy Act, Clean Air Act, Clean Water Act, Pollution Prevention Act, Resource Conservation and Recovery Act, and Superfund Amendments and Reauthorization Act.

**ESCI 4102. Environmental Assessment.** (4 cr; A-F or Aud. Prereq-3102, 4101 or #, no Grad School cr)

Environmental issues identification and investigation. Review of case studies of environmental investigations and the components of environmental impact statements. Selection of local or regional environmental issues and evaluation of the environmental problems from a multidisciplinary perspective. Preparation of draft Environmental Impact Statement (EIS).

# Environmental Studies (ES)

## College of Liberal Arts

**ES 1001. Introductory Seminar.** (2 cr; A-F only)

Introduction to the complexities of multidisciplinary environmental issues through research and literature review with emphasis on development of critical thinking skills.

**ES 2001. Ecosystems I.** (3 cr; A-F only. Prereq-ES major)

Contains a theoretical description of the fundamental physical, chemical and biological components comprising ecosystems, how these components interact to determine ecosystem structure and function, and the response of these components, hence ecosystems, to anthropogenic stress.

**ES 2002. Ecosystems II.** (3 cr; A-F only. Prereq-2001)

Builds upon the theoretical information provided in ES 2001 by providing students a hands-on approach to understanding ecosystem dynamics. Students will learn hypothesis testing, experimental techniques, and methods for analyzing data that indicates ecosystems' response to anthropogenic stress.

**ES 2803. Issues in Global Ecology.** (3 cr; A-F or Aud. Prereq-\$Biol 2803 LEIP 05)

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

**ES 3050. Special Topics:** (Various Titles to be Assigned). (3 cr [max 6 cr]; Stdnt Opt. Prereq-30 cr, ES major or instructor's consent)

In depth examination of a particular problem, topic, or group thereof, in the field of interdisciplinary environmental studies.

**ES 3500. Ecological Economics.** (3 cr; A-F only. Prereq-ES major or cand or #)

Examine the basic principles and assumptions of Micro and Macro Economics, and their relevance in our modern global economic system. Examine the environmental/social consequences of deviations from these assumptions, and alternative economic models/analyses and policies consistent with sustainable development.

**ES 4001. Independent Study.** (1-3 cr [max 3 cr]; A-F only. Prereq-60 cr or #; no Grad School credit)

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

**ES 5001. Environmental Studies Seminar.** (4 cr; A-F only. Prereq-ES major, 90 cr; no Grad School credit)

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

**ES 5040. Environmental Studies Internship Preparation.** (1 cr; S-N only. Prereq-ES major, no Grad School credit)

Various employers and members of environmental organizations in the Duluth region, and in Minnesota will speak to the class each week to describe what they do in their perspective fields of environmental studies. Students will research careers in environmental studies, producing reports on prominent fields and directions in environmental sciences. Students will be placed with perspective internship experiences at the end of the semester.

**ES 5050. Environmental Studies Internship.** (3 cr; S-N only. Prereq-5040, ES major, No Grad School cr)

Practical experience in some field of environmental work, under direction of a faculty adviser and a work-site adviser.

# Exercise Science Athletic Training (ESAT)

## College of Education and Human Service Professions

**ESAT 2610. Introduction to Athletic Training.** (3 cr; A-F or Aud. Prereq-Pre-athletic training; \$PEP 2610)

An overview of the responsibilities of an athletic trainer and the athletic trainer's role as a sports medicine team member; as well as the basic concepts in the prevention, recognition, and care of injuries to the physically active.

**ESAT 2620. Prevention and Care of Athletic Injuries.** (2 cr; A-F or Aud. Prereq-Athletic training major, #, \$PEP 2620)

Principles and techniques of the prevention and care of common athletic injuries. Emphasis is on preparing the student to make appropriate decisions in the prevention, first aid treatments, emergency care, and transportation of the sick and injured in sports.

**ESAT 2697. Clinical Experience in Athletic Training I.** (2 cr; A-F or Aud. Prereq-2610, Athletic Training major)

Athletic training psychomotor skills are enhanced and assessed by an approved clinical instructor during the clinical rotation. Emphasis is on competencies and proficiencies previously instructed in courses. A minimum of 100 hours of clinical experience are required.

## Course Descriptions

**ESAT 2698. Clinical Experience in Athletic Training II.** (2 cr; A-F or Aud. Prereq-2697, Athletic Training major)

Athletic training psychomotor skills are enhanced and assessed by an Approved Clinical Instructor. Emphasis is on competencies and proficiencies previously instructed in courses. A minimum of 100 hours of clinical experience are required.

**ESAT 3200. Motor Learning and Development.** (5 cr; A-F or Aud. Prereq-Athletic training or exercise science or pe major or cand or #, \$PEP 3020)

Principles and practices that affect the learning and performing of motor skills; theories of motor learning; professional applications of the motor learning in exercise science, physical therapy, athletic training, and physical education.

**ESAT 3210. Exercise Adherence.** (3 cr; A-F only. Prereq-Psy 1003, exercise sci cand or #, \$PEP 3021)

Fundamental concepts of exercise psychology. Physical activity models of involvement; exercise determinates and correlates; exercise interventions.

**ESAT 3300. Human Biomechanics.** (4 cr; A-F or Aud. Prereq-Phys 1001, athletic training or exercise science cand or #, \$PEP 3030)

Application of physical laws to human movement. Laws of mechanics and tissue biomechanics concepts are applied to human motor function. (3 hr lect, 1 hr lab)

**ESAT 3400. Exercise Physiology.** (4 cr; A-F or Aud. Prereq-Hlth 2040, athletic training or exercise science cand or #, \$PEP 3040)

Physiological responses and adaptations to acute and chronic exercise. (3 hrs lect, 1.25 hrs lab)

**ESAT 3410. Performance Nutrition and Weight Management.** (4 cr; A-F or Aud. Prereq-Hlth 2030, Hlth 2040, ath tmng or exer sci or #, \$PE 3470 or PEP 3470)

A study of the principles of sports nutrition with emphasis on the effects of diet on body composition, metabolic processes, physiological function, and physical performance.

**ESAT 3420. Exercise Testing and Prescription.** (4 cr; A-F or Aud. Prereq-3400 or PEP 3040, athletic training or exercise science cand or #, \$PEP 3400)

Physical fitness programming for adults; principles of exercise testing and prescription.

**ESAT 3430. Principles of Strength and Conditioning Programs.** (4 cr; A-F or Aud. Prereq-3300 or PEP 3030, 3400 or PEP 3040, athletic training or exercise science cand or #, \$PEP 3402)

Theory and practice of developing and implementing strength training and conditioning programs; emphasis on technique analysis and instructional methods.

**ESAT 3432. Exercise Leadership.** (3 cr; A-F or Aud. Prereq-3400, exercise science cand or #)

Principles and practices of group exercise leadership and instruction.

**ESAT 3440. Clinical Exercise Physiology.** (4 cr; A-F or Aud. Prereq-3420 or PEP 3400, exercise science cand or #, \$PEP 3404)

Examination of the use of physiological principles and relationships in clinical situations where exercise is used for prevention or alleviation of disease.

**ESAT 3450. Management of Fitness Facilities.** (3 cr; A-F or Aud. Prereq-Exercise science cand or #, or will not be granted if cr received for PEP 3500)

Theory and practice of managing sports facilities.

**ESAT 3495. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 16 cr]; A-F or Aud. Prereq-Ex sci cand or #)

Treatment of topics not included in regular curriculum or in depth treatment of topics associated with normal curricular offering.

**ESAT 3600. Fundamentals of Athletic Training Evaluation.** (4 cr; A-F or Aud. Prereq-2620, athletic training major,\$PEP 3632)

Fundamental concepts of functional anatomy and biomechanics related to athletic performance and injury. An introduction to injury evaluation, palpation, goniometry, and manual muscle testing will also be presented.

**ESAT 3630. Athletic Injury Evaluation I.** (3 cr; A-F or Aud. Prereq-3600, athletic training major, \$PEP 3620)

Pathology, etiology, palpation, special tests, and neurological tests used by athletic trainers in the evaluation of injuries to the lower extremity, lumbar spine and pelvic structure.

**ESAT 3632. Athletic Injury Evaluation II.** (3 cr; A-F or Aud. Prereq-3630, athletic training major)

Pathology, etiology, palpation, special tests, and neurological tests used by athletic trainers in the evaluation of injuries to the upper extremity, head, neck and torso.

**ESAT 3640. Therapeutic Modalities.** (3 cr; A-F or Aud. Prereq-3600, 3630, 3632, athletic training major, \$PEP 3640)

Theories and concepts in the appropriate application and utilization of therapeutic modalities in the treatment of athletic injuries. A supervised laboratory experience is included within this course to ensure that students develop the appropriate psychomotor skills in applying and using each modality safely.

**ESAT 3642. Therapeutic Exercise.** (3 cr; A-F or Aud. Prereq-3640, athletic training major, \$PEP 3610)

Theories and concepts in the appropriate application and utilization of therapeutic exercises in the rehabilitation of athletic injuries. A supervised laboratory experience is included within this course to ensure that students develop the appropriate psychomotor skills in applying and using rehabilitation techniques.

**ESAT 3697. Clinical Experiences in Athletic Training III.** (2 cr; A-F or Aud. Prereq-2698, Athletic Training major)

Athletic training psychomotor skills are enhanced and assessed by an approved clinical instructor during the clinical rotation. Emphasis is on previously learned classroom material. 225 hours of clinical experiences are required.

**ESAT 3698. Clinical Experiences in Athletic Training IV.** (2 cr; A-F or Aud. Prereq-3697, Athletic Training major)

Athletic training psychomotor skills are enhanced and assessed by an approved clinical instructor during the clinical rotation. Emphasis is on previously learned classroom material. 225 hours of clinical experiences are required.

**ESAT 4001. Pharmacology in Athletic Training.** (2 cr; A-F or Aud. Prereq-3632, 3642, 3698, Athletic Training major, no Grad School cr)

Pharmacological application of therapeutic medications commonly prescribed for acute and chronic health problems and injuries in athletic populations. Also examined is the use and abuse of drugs, ergogenic aids and supplements frequently used by athletes.

**ESAT 4600. Senior Seminar Athletic Training.** (3 cr; A-F or Aud. Prereq-4001, Athletic Training major,\$PEP 5600, no Grad School cr, #)

A culminating course that includes the athletic training student portfolio, encompasses the final preparation for the NATABOC examination, and concludes with athletic training research techniques and synthesis.

**ESAT 4646. Medical Aspects of Athletic Training.** (3 cr; A-F or Aud. Prereq-3642, 3698, Athletic Training major, no Grad School cr)

The recognition, evaluation, management, and treatment of non-orthopedic medical conditions that affect the physically active population.

**ESAT 4650. Administrative Aspects of Athletic Training.** (3 cr; A-F or Aud. Prereq- 4646, 4001, Athletic Training major, no Grad School credit)

Managerial and organizational strategies for developing and directing athletic training services at the high school, collegiate, and clinical setting. Practical applications and case studies are emphasized.

**ESAT 4697. Clinical Experiences in Athletic Training V.** (2 cr; A-F or Aud. Prereq- 3697, Athletic Training major, no Grad School cr)

Athletic training psychomotor skills are enhanced and assessed by an approved clinical instructor during the clinical rotation. Emphasis is on previously learned classroom material. 300 hours of clinical experience are required

**ESAT 4698. Clinical Experiences in Athletic Training VI.** (2 cr; A-F or Aud. Prereq- 4697, Athletic Training major, no Grad School credit)

Athletic training psychomotor skills are enhanced and assessed by an approved clinical instructor during the clinical rotation. Emphasis is on previously learned classroom material. 300 hours of clinical experiences are required.

**ESAT 4700. Statistics and Research Methods in Exercise Science.** (4 cr; A-F or Aud. Prereq- ESAT 3200, 3300, 3400, 3410, exercise science candidate; \$PEP 5700, no Grad School credit)

Interpretation of statistical procedures and research design in exercise science. Prepares students to conduct research projects in the exercise physiology, biomechanics, motor learning, and the psychological factors that influence exercise.

**ESAT 4710. Applied and Experimental Exercise Science.** (4 cr; A-F or Aud.

Prereq-4700 or PEP 5700 or #, exercise science cand; \$PEP 5041; no Grad School cr)

Advanced study and research in exercise science; methods of quantifying exercise responses and adaptations; basic research design.

**ESAT 4996. Internship.** (3-12 cr [max 12 cr]; S-N or Aud. Prereq-3420, exercise candidate, #, no Grad School cr; \$PEP 4996)

Supervised field internship experience in hospital, fitness facility, or agency setting.

**ESAT 5420. Current Controversies in Nutrition.** (3 cr; A-F or Aud. Prereq-MEd candidate, upper-div health or exercise science student, no Grad School cr)

Exploration of current controversies in nutrition including such topics as: government good guides, food policy, weight reduction diets, childhood obesity, physical activity, supplements, organically grown foods, and products of biotechnology - functional foods and nutraceuticals, irradiation and genetically modified foods.

## Family Medicine (FMED)

### School of Medicine

**FMED 5591. Independent Study.** (1-8 cr [max 12 cr]; Stdnt Opt. Prereq-%)

Intensive, independent study project of student's interest in medical research, interdisciplinary fellowship, preceptorship in rural health care delivery, or another medical area approved by Department of Family Medicine.

**FMED 6101. Family Medicine.** (2 cr; P-N or Aud. Prereq-Regis med student)

Lectures and seminars on disease syndromes affecting human organ systems and on disease prevention with reference to health issues in epidemiology, environment, and public health; exposure to community preventive health and alternative medicine programs; provides basic foundation in current computer technology.

**FMED 6121. Preceptorship I.** (1 cr; P-N or Aud. Prereq-Regis med student)

Students spend periods with area physician in family medicine observing problems encountered in this type of practice and methods by which health care is delivered.

**FMED 6122. Preceptorship II.** (4 cr; P-N or Aud. Prereq-Regis med student)

Students spend periods with area physician in family medicine observing problems encountered in this type of practice and methods by which health care is delivered.

**FMED 6441. Clinical Rounds and Clerkship I.** (1 cr; O-N only. Prereq-Regis med student)

Clinical practicum, hospital based, covering core material in family practice, internal medicine, obstetrics, pediatrics, surgery. Patient work-ups with discussion by preceptor.

**FMED 6442. Clinical Rounds and Clerkship II.** (2 cr; O-N only. Prereq-Regis med student)

Clinical practicum, hospital based, covering core material in family practice, internal medicine, obstetrics, pediatrics, surgery. Patient work-ups with discussion by preceptor.

**FMED 6461. Preceptorship III.** (2 cr; P-N or Aud. Prereq-Regis med student)

Students spend periods of time with a physician in family practice in rural/small communities of Minnesota and Wisconsin observing methods by which health care is delivered.

**FMED 6462. Preceptorship IV.** (3 cr; P-N or Aud. Prereq-Regis med student)

Students spend periods of time with a physician in family practice in rural/small communities of Minnesota and Wisconsin observing methods by which health care is delivered.

**FMED 6501. Clinical Pathology Conferences I.** (1 cr; P-N or Aud. Prereq-Regis med student)

Applying knowledge gained in pathology and laboratory medicine to an unknown clinical case in order to work through a differential diagnosis.

**FMED 6502. Clinical Pathology Conferences II.** (1 cr; P-N or Aud. Prereq-Regis med student)

Applying knowledge gained in pathology and laboratory medicine to an unknown clinical case in order to work through a differential diagnosis.

**FMED 6967. The Healer's Art.** (1 cr; P-N or Aud. Prereq-Regis med student, #, no Grad School credit)

Provides a basis for inquiry and discussion between medical students and clinical faculty on topics that are entwined within the practice of medicine. Due to course content, enrollment is limited.

**FMED 6977. Family Connection.** (1 cr; P-N or Aud. Prereq-Preregis med, #, cannot be concurrently registered for 6987)

Introduces the first-year medical student to family health care concepts through contact with an assigned family in conjunction with their local family physician, lectures and small group discussions. Due to course content, enrollment is limited.

**FMED 6987. Obstetrical Longitudinal Course.** (1 cr; P-N or Aud. Prereq-Preregis med, #, cannot be concurrently registered for FMed 6977)

Introduces the first-year medical student to obstetrical care through small group lectures and discussions while following an obstetrical patient on a longitudinal basis in conjunction with a local family practitioner or OB specialist. Due to course content, enrollment is limited. Discussion.

**FMED 7100. Clinical Family Medicine.** (13 cr [max 117 cr]; P-N or Aud. Prereq-%; no Grad School credit)

Supervised care of patients of all ages emphasizing continuous, primary, preventive, acute, and chronic care in all general diagnostic categories.

## Course Descriptions

# Finance and Management Information (FMIS)

## Labovitz School of Business and Economics

**FMIS 2201. Information Technology in Business.** (3 cr; A-F or Aud. Prereq-\$1201 or 3201 or CS 1011, LSBE student or Computer Information Systems majors, min 15 cr or 0)

Introduction to information technology (IT) concepts: computer hardware and software; use of personal productivity tools (spreadsheet, database, and presentation software); system development processes; Web technologies; applications of IT in business processes.

**FMIS 2225. Introduction to Visual Basic .NET Programming.** (3 cr; A-F or Aud. Prereq-LSBE student, 1201 or 2201, or concurrent registration, or o, &CS1121)

Introduction to programming in Microsoft Visual Basic .Net. Introduction to the Microsoft .NET Framework and the Microsoft Visual Studio development interface. Emphasis on object-oriented approaches, event-oriented programming and development of business solutions.

**FMIS 3141. Business Communications.** (3 cr; A-F or Aud. Prereq-LSBE cand or Econ major or □)

Principles of business communication and their application to oral, written, and nonverbal communication.

**FMIS 3202. Enterprise System Architectures.** (3 cr; A-F or Aud. Prereq-2201 or 3201, 2225 or CS 1121, LSBE candidate or □)

Combines an accelerated introduction to an object-oriented programming language with an appreciation for developing scalable, flexible and interoperable enterprise-wide application. Focus is on how to select appropriate technologies and combine them in the design of effective enterprise architectures.

**FMIS 3222. Systems Analysis and Design.** (3 cr; A-F or Aud. Prereq-(2201 or 3201), 3421, LSBE cand or □)

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; A-F or Aud. Prereq-3201 or 2201, CS 1121 or CS 1511, LSBE cand or □)

Management of telecommunications networks from a business problem solving perspective. Survey of telecommunications technologies, network architectures, management issues, and evolving business environments.

**FMIS 3228. Electronic Commerce.** (3 cr; A-F or Aud. Prereq-2201 or 3201, CS 1121 or CS 1511, LSBE cand or □)

Overview of the impact of electronic commerce (EC) on business, principles and practices of Internet-based electronic commerce, business and IT strategies, and future developments. Survey of EC applications, business models and information technologies underlying these applications.

**FMIS 3230. Extensible Markup Language and its Applications.** (3 cr; A-F or Aud. Prereq-2201 or 3201, LSBE candidate, or □)

Covers XML and its applications ranging from an introductory to an intermediate level. The standard specifications and technologies will be delivered, including DTDs, XML schemas, XSLT, and Web services along with their real-world business applications.

**FMIS 3232. ASPNet and Web Services.** (3 cr; A-F or Aud. Prereq-2201 or 3201, LSBE candidate or □)

Introduces Microsoft .Net technology, which consists of the .Net Platform and the .Net Framework. Focuses on the ASP.Net with VB.Net, which is part of .Net Framework designed for developing Web applications and Web services.

**FMIS 3291. Independent Study MIS.** (1-3 cr [max 3 cr]; A-F only. Prereq-\$3991, IT) Special work in information sciences that extends beyond, or in greater depth than, regular course offerings.

**FMIS 3295. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud. Prereq-LSBE candidate or □)

Exploration of specific MIS problems, issues, and approaches.

**FMIS 3301. Production and Operations Management.** (3 cr; A-F or Aud. Prereq-LSBE cand or approved non-LSBE bus adm minor or □)

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. LSBE Internship.** (3 cr; A-F or Aud. Prereq-Admitted to LSBE candidacy, consent of internship director)

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 200 hours work experience, assigned written reports, and performance evaluations.

**FMIS 3421. Database Management and Design.** (3 cr; A-F only. Prereq-2225 or CS 1121 or CS 1511, LSBE cand or □)

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; A-F or Aud. Prereq-LSBE cand or approved non-LSBE bus adm minor or □)

Fundamental concepts of managerial financial decision making. Time value of money, valuation, risk and return, financial statement analysis, short-run financial management, capital budgeting, cost of capital, long-term financing, and corporate taxation.

**FMIS 3612. Managerial Finance.** (3 cr; A-F or Aud. Prereq-3601, LSBE cand or □)

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 3619. Analysis of Financial Statements.** (3 cr; A-F or Aud. Prereq-3601, LSBE candidate or #, §Acct 3619)

Analysis and interpretation of financial statements, presentation of analytical techniques, including trend, comparative, and ratio analysis. Use of computer assisted analysis

**FMIS 3644. Investment Fundamentals.** (3 cr; A-F or Aud. Prereq-3601, LSBE cand or □)

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; A-F or Aud. Prereq-3601, LSBE cand or □)

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; A-F or Aud. Prereq-3601, LSBE cand or □)

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 3655. Risk Management and Insurance.** (3 cr; A-F or Aud. Prereq-3601, LSBE candidate or #)

Foundations as well as the economic, financial and legal issues surrounding risk management and insurance. Students will discuss and analyze risk management techniques currently used in business and examine different types of insurance policies.

**FMIS 3691. Independent Study Finance.** (1-3 cr [max 3 cr]; A-F only. Prereq-[T], §3991)

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

**FMIS 3695. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud. Prereq-3601, LSBE cand or □)

Exploration of specific finance problems, issues, and approaches.

**FMIS 4220. Medical Informatics.** (3 cr; A-F or Aud. Prereq-2201 or 3201, LSBE cand or □, no Grad School cr)

Introduction to the convergence of computing, information systems, and healthcare with a focus on managing information and developing systems that leads to more effective decisions and actions in healthcare. Covers the standards, ethics and security of the electronic health record.

**FMIS 4222. Trends and Issues in Information Systems.** (3 cr; A-F or Aud. Prereq-3201 or 2201, CS 1121 or CS 1511, MIS major with 90 credits; no Grad School credit)

Exploration of new and emergent technologies, assessment of industrial opportunities for and impacts of the technologies, management of the enterprise's information system function, ethical issues, and other IS-related issues and trends.

**FMIS 4225. Advanced Applications Development.** (3 cr; A-F only. Prereq-3222, MIS major or □)

Development of advanced microcomputer-based applications using modern development environments (languages). Emphasis on systems development and integration, interface design, and data access strategies.

**FMIS 4295. MIS Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud. Prereq-2201 or 3201, LSBE cand or □)

Exploration of specific MIS problems, issues, and approaches

**FMIS 4615. Futures and Options.** (3 cr; A-F or Aud. Prereq-3644, LSBE cand with 60 cr or grad student or □)

Nature and functions of derivative security markets such as options, futures, options on futures, swaps, and financial engineering. Emphasizes their use as tools for risk reduction, portfolio management, and speculative medium for aggressive investor.

**FMIS 4616. Security Analysis.** (3 cr; A-F or Aud. Prereq-3644, Acct 3101 or FMIS 3619; %; no Grad School credit)

Introduction to theory, concepts, and practices of security analysis and investment practices. Common stock, fixed income securities, derivative securities, and mutual funds will be analyzed. Other topics include sector analysis, financial statement analysis, ratio analysis, diversification, and hedging.

**FMIS 4617. Management of Financial Institutions.** (3 cr; A-F or Aud. Prereq-3647, LSBE cand with 60 cr or grad student or □)

Techniques for managing commercial banks and other financial institutions through asset/liability management.

**FMIS 4620. Portfolio Theory and Analysis.** (3 cr; A-F or Aud. Prereq-4616, %; no Grad School credit; §FMIS 4611)

Portfolio management in a modern portfolio theory (MPT) framework. Risk measurements, risk-return relationships, and portfolio models are developed. Topics include Markowitz portfolio theory, risk-return models, bond portfolio management, evaluating portfolio performance, and outperforming the market.

**FMIS 4624. Applied Portfolio Management.** (3 cr; A-F or Aud. Prereq-4616, 4620, %; no Grad School credit)

Gives students in the financial markets program "hands on" learning experience by analyzing and managing a real-money investment fund. Students will be responsible for managing all aspects of the investment fund.

**FMIS 4644. Portfolio Management.** (3 cr; A-F or Aud. Prereq-3644, LSBE candidate)

Portfolio analysis in the mean-variance framework of Markowitz. Portfolio management strategies. The CAPM, APT, and other capital market theory implications. Portfolio performance evaluation.

**FMIS 4695. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud. Prereq-LSBE cand or □; no Grad School credit)

Exploration of specific finance problems, issues, and approaches.

## Fine Arts (FA)

### School of Fine Arts

**FA 1102. Creating Art.** (3 cr; A-F or Aud. Prereq-§1101 LE 9)

Discussion/direct experience of settings/ways in which art (including aesthetic philosophy and other creative work) arises.

**FA 1103. Freshman Seminar: Honors: Creating Art.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr, honors student LEIP 09)

Critical understanding of the means and concepts that foster creative work. Examination of the diversity within modern societies that link experiences to the products of the artistic mind.

**FA 1300. Creating Across Disciplines.** (3 cr; Stdt Opt)

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 2595. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 9 cr]; Stdt Opt) Selected studies with interdisciplinary or multidisciplinary focus.

**FA 5300. Creating Across Disciplines.** (3 cr [max 9 cr]; Stdt Opt. Prereq-No Grad School credit)

Advanced work in interdisciplinary and interactive or collaborative projects, performances, or installations, drawing upon concepts and processes from various arts disciplines.

## Foreign Studies (FST)

### Academic Adm—Adm

**FST 228. Foreign Studies Preparation.** (0 cr; No grade. Prereq-#)

Provides tools necessary to prepare for and improve their study abroad experience. On-line instruction allows students to explore the country and culture in which they will study abroad as well as preparing them to develop realistic expectations of themselves and their study abroad experience.

**FST 2929. Orientation to Foreign Studies.** (2 cr; S-N or Aud. Prereq-Admitted to an approved Study Abroad Program, required consent from the International Education Office)

Study Abroad Course

**FST 4949. Foreign Study Synthesis.** (2 cr; S-N or Aud. Prereq-Admitted to an approved Study Abroad Program, required consent from the International Education Office. INTL PERSP)

Study Abroad Course, IP theme

**FST 1xxx-5xxx. Foreign Studies Courses.** (1-20 or Prereq-Admitted to an approved study abroad program. Required consent from the International Education Office.)

Undergraduate and graduate courses used to designate study abroad programs.

## Course Descriptions

### French (FR)

#### College of Liberal Arts

**FR 1101. Beginning French I.** (4 cr; A-F or Aud. LE 3)

Conversation and communicative course for students with little or no previous study of French. Emphasis on oral and aural skills; some grammar. Taught in French and English.

**FR 1102. Beginning French II.** (4 cr; A-F or Aud. Prereq-1-2 yrs high school Fr or 1101 or # LE 3)

Conversation and communicative course for students with limited previous study of French. Emphasis on oral and aural skills; some grammar. Taught in French and English.

**FR 1201. Intermediate French I.** (4 cr; A-F or Aud. Prereq-3-4 yrs high school Fr or 1102 or # LE 3)

Consolidation and enrichment of previously acquired abilities speaking and understanding French, set within introduction to written French and survey of contemporary culture of French-speaking societies. Emphasis on oral, aural, and reading skills; vocabulary building; some writing. Taught in French.

**FR 1202. Intermediate French II.** (4 cr; A-F or Aud. Prereq-4 yrs high school Fr or 1201 or # LEIP 03)

Consolidation and enrichment of previously acquired abilities speaking and understanding French, set within introduction to written French and survey of contemporary culture of French-speaking societies. Emphasis on oral, aural, and reading skills; vocabulary building; some writing. Taught in French.

**FR 2301. Advanced French.** (4 cr; A-F or Aud. Prereq-5 yrs high school Fr or 1202 or # LEIP 03)

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 or Aud. LEIP 09)

Images of human diversity in French cinema. Films with English subtitles; class discussion in English.

**FR 3031–3032. French Language Study Abroad I–II.** (1-5 cr [max 10 cr]; Stdnt Opt. Prereq-%)

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 3045–3048. French Culture and Civilization Study Abroad I–IV.** (1-5 cr [max 10 cr]; Stdnt Opt. Prereq-%)

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 3302. Advanced French Composition and Conversation.** (4 cr; A-F or Aud. Prereq-2301 with grade of C or higher)

Refines students' skills in oral and written expression after they have completed the French language sequence. Individualized work on points of syntax and semantics, set in a contemporary context, using a variety of texts and resources.

**FR 3591. Independent Study.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-2301 with C or better, #)

Students develop and carry out reading and research programs in consultation with the instructor.

**FR 4412. Contemporary French Culture and Society.** (4 cr; A-F or Aud. Prereq-2301 with grade of C or higher or #; no Grad School credit)

Study of contemporary social, cultural, and political issues in France and other Francophone regions. Conducted in French.

**FR 4422. 20th-Century Novel.** (4 cr; A-F or Aud. Prereq-2301 or equiv with C or better or #; no Grad School credit)

Study of representative novels.

**FR 4472. French Classical Literature.** (4 cr; A-F or Aud. Prereq-2301 or equiv with C or better or #; no Grad School credit)

Representative works of 17th-century French prose, poetry, and theatre.

**FR 4482. Voltaire and Rousseau in English.** (4 cr; A-F or Aud. Prereq-2301 or equiv with C or better or #; no Grad School credit)

Representative works.

**FR 4492. 19th-Century Novel.** (4 cr; A-F or Aud. Prereq-2301 with C or better or #; no Grad School credit)

Study of several novels by major 19th-century writers: Hugo, Balzac, Stendhal, Flaubert, Zola, Maupassant).

### Geography (GEOG)

#### College of Liberal Arts

**GEOG 1202. World Regional Geography.** (3 cr; A-F only. LEIP 08)

Geography of human groups in diverse settings. Emphasis on cultural diversity, regional development, and human and environmental forces shaping regional patterns and processes. Geographic analysis of selected regions and countries.

**GEOG 1304. Human Geography.** (3 cr; A-F only. LECD 06)

Ecological basis of human existence. Human population patterns and cultural diffusion. Agricultural geography. Political geography. Geography of language, religion, and ethnic groups. Effects of urbanization; economic geography.

**GEOG 1414. Physical Geography.** (4 cr; A-F only. LE 4)

Earth-sun relations, maps and globes, and major factors of the natural environment, including water resources, landforms, weather and climate, natural vegetation, and soils. (3 hrs lect, 2 hrs lab)

**GEOG 2306. Environmental Conservation.** (3 cr; A-F only. LE 8)

Integrated study of physical, economic, social, and political aspects of natural resource management. Emphasis on identifying environmental problems and evaluating alternatives for resolution, including planning, regulation, market incentives, and mitigation activities.

**GEOG 2313. Economic Geography.** (3 cr; A-F only. LE 6)

Contemporary geographic pattern analysis of production, distribution, and consumption of goods and services. Development of geographic theories and models that attempt to explain spatial variations of economic activities such as agriculture, manufacturing, and trades and services.

**GEOG 2405. Geography of Cultural Diversity.** (3 cr; A-F only)

Culture is ubiquitous as it is ambiguous in social science research. Cultural geography overlaps into all other sub disciplines, along with current approaches, issues and debates in contemporary research. It defies any clear, satisfying definition. Consequently, the numerous philosophical, theoretical, methodological and ethical issues pertaining to the investigation and representation of culture in academia will be the focus.

**GEOG 2552. Introduction to Maps and Cartographic Methods.** (3 cr; A-F only. LE 2)

Defines maps and map-like images. Maps as communication tools. Scale, projections, cartographic generalization and symbolization. Compares spatial data models and types of spatial (geographic) data. How classification and symbolization methods determine representation of spatial data.

**GEOG 3334. Urban Geography and Planning.** (3 cr; A-F only. Prereq-Min 30 or incl 3 cr Geog or #)

Urbanization as a geographic process. Perspectives on economic, political and cultural foundations of cities; cities as life spaces; environmental aspects of urbanization; principles and history of urban planning; practice and politics of local government planning.

**GEOG 3342. Geography of Transportation.** (4 cr; A-F only. Prereq-6 cr Geog incl 2313, 30 cr or #)

Distribution and pattern of various transportation models; geographic aspects of transport systems at empirical and theoretical levels.

**GEOG 3350. Geography of Population, Gender, and Migration.** (3 cr; A-F only)

Explores issues and themes related to the special distribution of the world's population. Various factors are involved in population change including fertility, mortality, migration, immigration, food, health, and environment. Population geographers have begun to recognize the importance of gender in the spatial patterns and social dimensions of human activities. Focuses on the critical population theories; examines social constructions and geographical variations based on masculinity and femininity; and relates to the complex relations between gender and population in diverse historical and geographic settings.

**GEOG 3370. Geographies of Development.** (3 cr; A-F only. Prereq-Min 30 cr)

Focuses on the theories of development, development in practice, and the spaces of development. Specifically considers theories of development and their interpretations, strategies of development and developing nations, and interconnections and globalization and development.

**GEOG 3401. Weather and Climate.** (3 cr; A-F only. Prereq-1414, 25 cr or #)

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; A-F only. Prereq-1414, min 30 cr or #)

Geography of natural hazards. Human-physical environment interrelationships under extreme geophysical conditions; causes, characteristics, and consequences of natural hazards such as earthquakes, tornadoes, hurricanes, floods, and drought; human adjustment to these events.

**GEOG 3461. Geography of Global Resources.** (3 cr; A-F only. Prereq-Min 30 cr or #)

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 Ecology.** (3 cr; A-F only)

Introduction to theoretical, practical and policy aspects of urban ecology. Discusses methods of sustainable cities and ecologically responsible planning. Includes study of relevant field techniques and policy issues, including public participation in planning process and development of sustainable growth strategies.

**GEOG 3532. Map Design and Graphic Methods.** (4 cr; A-F only. Prereq-2552 or #; Stat 1411 recommended)

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; A-F only. Prereq-Min 30 cr or incl 6 cr Geog or #)

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 3712. Geography of Latin America.** (4 cr; A-F only. Prereq-Min 30 cr or incl 6 cr Geog or #)

Survey of cultural and physical diversities of Latin America. Physical resources, historical development, population characteristics, and economic activities.

**GEOG 3762. Geography of Europe.** (3 cr; A-F only. Prereq-Min 30 or incl 6 cr Geog or #)

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 3991. Independent Study in Geography.** (1-4 cr [max 6 cr]; A-F only. Prereq-#)

For students interested in doing advanced work in selected fields of geography.

**GEOG 3995. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 8 cr]; A-F only. Prereq-#)

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]; Stdt Opt. Prereq-Geog major, 60 cr or #)

Scheduled assignments with direct supervision in public agencies or relevant private firms.

**GEOG 4393. Political Geography.** (4 cr; A-F only. Prereq-Min 75 cr inc 6 cr Geog or #)

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. Gender, Space and Culture.** (4 cr; A-F only. Prereq-Min 75 cr inc 6 cr geog or #)

Gender differences in experiences of space and place; relationship between gender politics and geographies of cities, regions, nation-states, and other social institutions; gender differences in "making place" and interacting with environments; emphasis on possibility of feminist alternatives.

**GEOG 4451. The Geography of Soils.** (4 cr; A-F only. Prereq-1414 or Geol 1110 or Chem 1113 or Chem 1151 or grad student or #)

Examines soil formation and processes in varied environments, with emphasis on soil as a dynamic system, integral to all terrestrial ecosystems. Human impact and use of soils is examined with regard to land degradation and soil erosion.

**GEOG 4563. Introduction to Geographic Information Science.** (3 cr; A-F only. Prereq-3532, [P]4563, 60 cr incl 16 cr geog or #)

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; A-F only. Prereq-Min 60 cr, [P]4563 or #)

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.

## Course Descriptions

**GEOG 4580. Introduction to Remote Sensing and Image Interpretation.** (4 cr; A-F only. Prereq-2552, 4563, 4564; course in computer programming, introductory statistics recommended)

Introduces basic concepts of remote sensing of the environment. Intended to provide the background information necessary to successfully use remotely sensed imagery in conjunction with GIS technology to answer questions about the world in which we live.

**GEOG 5446. Water Processes and Management.** (4 cr; A-F only. Prereq-1414 or grad student)

Introduction to the components of surface water processes and water resources management, including precipitation, runoff generation, channel processes, spatial and temporal variations in water distribution, aspects of water quantity and quality, and basin management problems.

**GEOG 5541. Environmental Application of GIS.** (4 cr; A-F only. Prereq-4563 or #)

Introduction to ArcView GIS and its applications to the environmental issues such as natural hazards, forest management, contaminated sites, soil erosion, habitat assessment, and regional planning.

**GEOG 5543. Advanced Cartographic Methods.** (4 cr; A-F only. Prereq-3532, Stat 1411, 60 cr incl 12 cr geog or grad student or #)

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, 4hrs lab)

**GEOG 5612. Field Techniques.** (4 cr; A-F only. Prereq-Min 60 cr incl 12 cr geog or grad student or #)

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; A-F only. Prereq-30 cr incl 12 cr geog or grad student or #)

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]; A-F only. Prereq-Max 4 cr can be applied to Graduate School program; #)

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

**GEOG 5995. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 6 cr]; A-F only. Prereq-Grad student or #; max 8 cr to Grad School program)

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 [max 4 cr]; A-F only. Prereq-#; Max 3 cr can be applied to Grad School program)

Student-initiated field, lab, and/or library research topic. Formal written and oral presentation.

## Geology (GEOL)

### College of Science and Engineering

**GEOL 1040. Freshman Seminar: Topics:** (Various Titles to be Assigned). (3 cr; A-F or Aud. Prereq-Freshman. Fewer than 30 cr. LE 5)

Topics of general interest in the geosciences. Topic announced before course is offered.

**GEOL 1041. Freshman Seminar: Minerals and Life: All That Glitters is Not Gold.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr. LE 5)

Civilizations have been built by the exploitation of rock and mineral resources. This class chronicles mineral use from an ancient civilization to the present. Topics covered include mineral composition, use/exploitation through time as well as the identification of common useful minerals. Field Trip Required.

**GEOL 1042. Freshman Seminar: Natural Disasters and Civilization.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr, §1047, §1052 LE 5)

Natural disasters examined first from a geological perspective, and then in terms of their effects on civilizations and/or species.

**GEOL 1043. Freshman Seminar: Science and Societal Issues: Whom to Believe?** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr. LE 5)

Reading current topics in society dealing with scientific issues: e.g., global warming, water reserves, U.S. energy independence, evolutionary science vs creationism. How do we read about these issues critically to form an opinion? Seminar class primarily for non-science majors.

**GEOL 1044. Freshman Seminar: Revolution in the Earth Sciences.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr. LE 4)

How theories of mountain building evolved to continental drift to a not-quite-all-encompassing dynamic plate tectonics model for the outer reaches of the Earth--a triumph of observation and synthesis despite disbelief, ridicule, and hard luck.

**GEOL 1045. Freshman Seminar: Minnesota's Geologic History.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr. LE 4)

From volcanoes to oceans to Ice Ages, take a journey through 3.6 billion years of Minnesota's geologic history. The journey starts with volcanoes rising from the sea and takes students through episodes of mountain building, marine invasions, and Ice Ages. (Course fees assessed.)

**GEOL 1047. Freshman Seminar: People and Volcanoes.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits, §1042, §1052 LE 5)

From 3.7 million year old footprints in volcanic ash through world changing eruptions like Tambora and Santorini to robots investigating volcanic craters, this course explores the fascinating and dangerous relationship of humans and human civilizations with volcanoes.

**GEOL 1048. Freshman Seminar: Human Dimension of Global Environmental Change.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits, §1058 LEIP 05)

Study of environmental change on Earth, past and present. Integration of natural systems with human activity, including natural cycles in Earth systems, human population, resources, sustainability, global atmospheric change, and environmental ethics.

**GEOL 1052. Freshman Seminar: Honors: Natural Disasters and Civilizations.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits, honors student, §1042, §1047 LE 5)

Natural disasters examined from the perspective of the geological and climatic processes that govern them, and their effect on human civilization and/or living species.

**GEOl 1058. Freshman Seminar: Honors: Human Dimension of Global Environmental Change.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits, honors student, §1048 LEIP 05)

Study of environmental change on Earth, past and present. Integration of natural systems with human activity, including natural cycles in Earth systems, human population, resources, sustainability, global atmospheric change, and environmental ethics.

**GEOl 1110. Geology and Earth Systems.** (4 cr; A-F or Aud. LE 4)

Comprehensive survey of Earth's composition, structure, and dynamics to develop an understanding of internal processes, plate tectonics, and surface processes as a framework for geological history and development of life.

**GEOl 1120. Life and Death of the Dinosaurs.** (3 cr; A-F or Aud. LE 5)

Survey of dinosaurs, who dominated large-animal life on Earth for 150 million years; theories of dinosaur origins and extinction; habitat of dinosaurs on worldwide Mesozoic coastal plains; dinosaur fossilization and modern excavation.

**GEOl 1130. Introduction to Environmental Science.** (4 cr; A-F or Aud. LEIP 04)

Earth's physical and biological systems and human interaction with the environment. Climate, rocks, soils, ecosystems, human population, land use, energy use and its consequences, environmental policy, air and water pollution, and conservation issues.

**GEOl 1610. Oceanography.** (3 cr; A-F or Aud. Prereq-\$2610 LE 5)

Origin and history of ocean basins, sea floor morphology, chemistry of sea water, currents, waves, tides, life in the sea, primary productivity, nutrient dynamics, human impact.

**GEOl 2110. Earth History.** (3 cr; A-F only. Prereq-1110 or 1130 or 2610 or Ast 1040 or Geog 1414 or #)

The historical development of the science of geology, nature of the geologic record, fossils, the geologic time scale, and tectonic evolution of continents and ocean basins. Concepts presented are developed within the framework of the theory of plate tectonics.

**GEOl 2111. Earth History Laboratory.** (1 cr; A-F only. Prereq-1110 or 1130 or 2610 or Ast 1040 or Geog 1414 or #)

Laboratory companion to GEOL 2110, the historical development of the science of geology. Geological science majors and minor are required to take this 1 (one) 2-hour lab each week.

**GEOl 2120. The Earth's Dynamic Interior.** (3 cr; A-F or Aud. Prereq-1110 or 1130 or 2110 or 1610 or Geog 1414)

Treatment of the origin, structure and internal composition of the Earth, synthesizing geological, chemical and physical knowledge bearing on the Earth's inaccessible interior. Emphasis is placed on dynamic processes at all depths in the Earth.

**GEOl 2300. Basic Mineralogy and Petrology.** (4 cr; A-F or Aud. Prereq-§2311, 1 yr high school chem or 1 sem of college chem, 1110 or #, not for geol BS majors)

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) Taught alt. years

**GEOl 2311. Mineralogy.** (4 cr; A-F or Aud. Prereq-\$2300; 1110 or 2110, 1 sem college chem or Instructor approval)

Systematic study of minerals and their relationship to rocks. Emphasis will be placed on introductory crystal chemistry, crystallography and physical properties; optical mineralogy, and identification of minerals in hand specimen, thin section, and by x-ray diffraction. (Course fee assessed.)

**GEOl 2312. Petrology.** (4 cr; A-F or Aud. Prereq-2311)

Petrology of igneous, sedimentary and metamorphic rocks, including their occurrence, petrogenesis and tectonic setting. Emphasis on the relationships between mineral assemblages, rock textures, geochemistry, origins, and rock-forming processes. Course fees assessed.

**GEOl 2350. Earth's Resources.** (3 cr; A-F or Aud. Prereq-25 sem or # LEIP 05)

Distribution of Earth's resources through space and time, including metals, minerals, fossil fuels, building materials, water, and soil. Relationships between population growth and Earth's finite resources. (field trip)

**GEOl 3000. Geologic Maps.** (3 cr; A-F or Aud. Prereq-1110 or 1130 or Geog 1414)

Principles of reading and interpreting geological maps.

Emphasis will be placed on interpreting and visualizing published geologic maps, constructing geologic histories, and an introduction to the basic methods of making geologic maps in the field.

**GEOl 3091. Independent Study.** (1-2 cr [max 4 cr]; Stdt Opt. Prereq-#)

Directed readings and projects on topics not normally covered in other courses.

**GEOl 3100. Earth's Climate and Environment: Past and Future.** (3 cr; A-F or Aud. Prereq-1110 or 1130 or 1610)

Exploration of the processes that control Earth's climate and affect the environment on timescales of 100's of millions to 10's of years. Discussions will include how and why the dinosaurs environment was different from today's and concerns about future global warming.

**GEOl 3180. Teaching Assistant Experience I.** (1-2 cr [max 6 cr]; S-N only. Prereq-2110, 2120, 2311, 2312, geological sciences major, # (Max 2 cr can be applied toward geological sciences major.))

Participation in teaching Geological Sciences lecture and lab courses, including preparation of material, instruction, and student interaction.

**GEOl 3210. Geomorphology.** (3 cr; A-F or Aud. Prereq-1110 or 2110, Math 1250 or #, §2210)

Study of Earth surface processes emphasizing the origin and evolution of landforms; response of the physical environment to climatic change and tectonic events, and application of physical, chemical, and mathematical principles to the study and interpretation of landforms.

**GEOl 3420. Sedimentology and Stratigraphy.** (4 cr; A-F or Aud. Prereq-2110, 2311 or #)

Introduction to the concepts, methods, and application of sedimentology and stratigraphy, including the description and interpretation of sediments and sedimentary rocks, their provenance, stratal packaging, and tectonostratigraphic setting. (Course fee assessed.)

**GEOl 3710. Introduction to Geochemistry.** (3 cr; A-F or Aud. Prereq-Math 1296 or equiv. Chem 1152 or #)

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 4091. Geologic Problems and Research.** (1-2 cr [max 4 cr]; A-F or Aud. Prereq-#, no Grad School cr)

Individual research in lab or field problems.

**GEOl 4110. Advanced Earth Science for Teachers.** (2 cr; A-F or Aud. Prereq-1110, teaching science majors or grad student or #)

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)

## Course Descriptions

### Course Descriptions

**GEOl 4180. Teaching Assistant Experience II.** (1-2 cr [max 4 cr]; S-N only. Prereq- Geol core, geological sciences major, #; max 2 cr can be applied toward geological sciences major; cr cannot be applied to a Grad School program)

Participation in teaching Geological Sciences lecture and lab courses, including preparation of material, instruction, and student interaction.

**GEOl 4210. Glacial and Quaternary Geology.** (3 cr; A-F or Aud. Prereq-3210 or grad student or #, §5210)

Physics of glacier flow, processes of erosion and deposition, survey of glacial landforms, history and chronology of glaciation. Survey of geological and biological responses to changing environment resulting from climatic fluctuations during last three million years of Earth history. Field studies on the glacial deposits of Minnesota. (2 hrs lect, 2 hrs field lab)

**GEOl 4240. Physical Hydrogeology.** (3 cr; A-F or Aud. Prereq-2110, Phys 2011, Math 1296 or Math 1290 or grad student or #, §5240)

Introduction to concepts of fluid movement in Earth's crust and the interaction of rocks and water. Introduction to the hydrologic cycle, theory of flow through porous media, crustal-scale flow systems, role of fluids in the plate tectonic cycle.

**GEOl 4250. Environmental Hydrogeology.** (3 cr; A-F or Aud. Prereq-Math 1296 or Math 1290 and Phys 2011 or Grad student or #, §5250)

A quantitative introduction to hydrogeology and aquifer mechanics with emphasis on environmental applications, including, unsaturated flow, interaction between surface water and groundwater, wellhead protection, well hydraulics, inverse methods, and solute transport. Offered alternate years.

**GEOl 4320. Precambrian Geology.** (3 cr; A-F or Aud. Prereq-4460 or grad student or #, §5320)

Nature, distribution, origin, correlation, and special problems of the Precambrian, emphasizing Lake Superior region. Term paper. 3 hrs. lect, field trips; offered alternate years.

**GEOl 4335. Physical Volcanology.** (3 cr; A-F or Aud. Prereq-2312 or grad student or #, §5335)

Morphology and development of volcanic formations and deposits, and criteria for their recognition in ancient rock terranes. Types of eruptions and deposits, tectonic environments of volcanism, evolution of volcanoes, physical processes and controls of volcanism, and volcanic hazards. Offered alternate years.

**GEOl 4350. Economic Geology.** (3 cr; A-F or Aud. Prereq-2312 or grad student or #, §5350)

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. Course fees assessed.

**GEOl 4450. Structural Geology.** (4 cr; A-F or Aud. Prereq-2312 or #, §3520)

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. (Two hrs lec, 4 hrs lab, field trip - course fee assessed.)

**GEOl 4480. Tectonics.** (3 cr; A-F or Aud. Prereq-2120, 4450, or grad student or #, §5500)

Ancient and active plate-tectonic processes. Topics include tectonic theory, plate motions, evolution of divergent, convergent and transform margins, anatomy of orogenic belts, and neotectonics. Examines tectonic phenomena in the context of geological, geophysical and surficial processes. Offered alternate years.

**GEOl 4500. Field Geology.** (6 cr; A-F or Aud. Prereq-4450, %)

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 4610. Terrestrial Planets.** (3 cr; A-F or Aud. Prereq-2120 or 2312 or 2300 or grad student or #, §5610)

Investigate formation and evolution of the terrestrial planets through primary literature and data; examine the interaction between and within material reservoirs: interior (core and mantle), lithosphere, hydrosphere and biosphere, across a range of spatial and temporal scales; discuss critical unresolved questions.

**GEOl 4805. Environmental Geophysics.** (3 cr; A-F or Aud. Prereq-1110, Math 1297 or grad student or #, §5810)

Review of principle geophysical techniques used in the environmental and exploration industries. Emphasizes the application of these techniques for solving near-surface problems. Includes review of case histories and group projects.

**GEOl 4820. Global Geophysics.** (3 cr; A-F or Aud. Prereq-2120, Math 1290 or 1296 or grad student or #, §5820)

Build upon material presented in 2120, exploring the contribution of geophysics to our understanding of the Earth and the processes that control its appearance and behavior. Offered alternate years.

**GEOl 5091. Geologic Problems.** (1-2 cr [max 4 cr]; Stdt Opt. Prereq-Graduate Student or #)

Individual research in lab or field problems.

**GEOl 5095. Special Topics:** (Various Titles to be Assigned). (1-2 cr [max 4 cr]; A-F or Aud. Prereq-#)

Topics not covered in regular curriculum. Topic announced before course offered.

**GEOl 5100. Seminar.** (1-2 cr [max 4 cr]; Stdt Opt. Prereq-#)

Oral and written presentation on topics of current significance to geoscientists. Participation by department staff.

**GEOl 5200. Geological Field Studies.** (2-3 cr [max 6 cr]; Stdt Opt. Prereq-[2110 or 2120] or grad student or #)

Project-oriented field class in classical geological localities. Trips may be 1 or 2 weeks long, normally run during semester breaks or summer sessions. Examples of trips include Barbados, Hawaii, desert Southwest, California, and Big Bend area of Texas. Travel fee assessed for each location.

**GEOl 5215. Glaciology.** (3 cr; A-F or Aud. Prereq-8 cr geo, Math 1290 or Math 1296, Phys 2011 or grad student of #)

Theory of glacier flow. Anatomy of glaciers and ice sheets, mechanics and therodynamics of glacier flow. Reconstruction of physical characteristics of past ice sheets from glacial sediments and landforms. Glacier response to climate change. Offered alternate years

**GEOl 5220. Global Climate Change.** (3 cr; A-F or Aud. Prereq-#)

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 Nino; human impact on global climate. Offered alternate years.

**GEOl 5310. Advanced Petrology.** (3 cr; A-F or Aud. Prereq-2312 or grad student)

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 5430. Stratigraphy and Basin Analysis.** (3 cr; A-F or Aud. Prereq-2110, Math 1296 or grad student or #)

An integrated study of sedimentary basins as dynamical systems. Analysis of how tectonic and climatic processes drive sedimentation in basins, how these processes are preserved in the basin fill, and how stratigraphers interpret the rock record. Offered alternate years.

**GEOl 5440. Depositional Environment and Stratal Architecture I: Field Methods and Applications.** (2 cr; A-F or Aud. Prereq-3420 or grad student, #)

Advanced field-methods aimed at teaching the methods and applications of depositional-facies analysis and sequence stratigraphy using outcrop data over regional scales. Includes a one-week field trip. (Course fee assessed.)

**GEOl 5442. Depositional Environments, Stratal Architecture II: Conceptual, Mathematical, and Physical Modeling.** (2 cr; A-F or Aud. Prereq-3420, Grad school student, or instructor consent)

An introduction to techniques in forward and inverse stratigraphic modeling, with emphasis on developing an understanding of how physical processes in various depositional environments generate a stratigraphic response to climatic and tectonic forcing.

**GEOl 5450. Advanced Structure.** (3 cr; A-F or Aud. Prereq-2120, 4450, or grad student or #)

Modern structural analysis: strain (paths, partitioning, history), theology, displacement, deformation processes, (mesoscopic, grainscale, microstructures), and fabric evolution. Application of structural techniques to integrative problems (e.g., tectonics, hydrogeology, and planetary, sedimentary and economic geology). Offered alternate years. Course fee assessed.

**GEOl 5710. Aqueous Geochemistry/Chemical Hydrogeology.** (3 cr; A-F or Aud. Prereq-Math 1290 or Math 1297 and Chem 1152 or grad student or #)

Principles of solution chemistry, with application to chemical weathering, acid deposition, rivers, lakes, and oceans. Use of chemical equilibrium software to examine complex real world problems.

**GEOl 5730. Geochronology.** (3 cr; A-F or Aud. Prereq-2311, one year of college chemistry or grad student)

Covers both radiometric and non-radiometric methods of dating primarily Earth but also solar-system materials (meteorites). The chronometers discussed will cover a range of timescales, from early solar-system history to recent human-influenced history. Offered alternate years.

**GEOl 5839. Coral Reef Geology.** (3 cr; A-F or Aud. Prereq-Jr or sr or grad student in Geol or related field and #: §Biol 5839)

Physical, chemical and sedimentary processes in coral reef environments, reef morphology, stratigraphic framework of modern and ancient reefs, reef type and dependence on basin morphology and tectonic setting, coral reefs and Quaternary sea-level change. Includes field study of reef systems.

**GEOl 8094. Geologic Research.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-#)

Individual research.

**GEOl 8100. Seminar.** (1-2 cr [max 6 cr]; S-N or Aud. Prereq-Grad geol major or #)

Oral and written presentations on topics of current significance to geoscientists.

**GEOl 8200. Professional Issues in Earth and Environmental Science.** (1 cr; S-N or Aud. Prereq-Graduate student or #)

Introduces the incoming graduate student in geological sciences to professional practice, standards and ethics, including peer review, proposal writing, ethical problems, the purpose of a university.

**GEOl 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master s student, adviser and DGS consent)**GEOl 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-prereq doctoral student, adviser and DGS consent)**GEOl 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Max 6 cr per semester or summer; doctoral student who has not passed prelim oral; no required consent for the first two registrations up to 12 cr; departmental consent for the third and fourth registrations up to an additional 12 cr, or 24 cr total (for doctoral students admitted summer 2007 and beyond; doctoral students admitted prior to summer 2007 may register up to 4 times totaling 60 cr))**GER 8777. Thesis Credit: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))**GER 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-[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 or Aud. LE 3)

Conversation and communicative course for students with little or no previous study of German. Emphasis on oral and aural skills; some grammar. Taught in German and English.

**GER 1102. Beginning German II.** (4 cr; A-F or Aud. Prereq-1-2 yrs high school Ger or 1101 or # LE 3)

Conversation and communicative course for students with limited previous study of German. Emphasis on oral and aural skills; some grammar. Taught in German and English.

**GER 1201. Intermediate German I.** (4 cr; A-F or Aud. Prereq-3-4 yrs high school Ger or 1102 or # LE 3)

Consolidation and enrichment of previously acquired abilities speaking and understanding German, set within introduction to written German and survey of contemporary culture of German-speaking societies. Emphasis on oral, aural, and reading skills; vocabulary building; some writing. Taught in German.

**GER 1202. Intermediate German II.** (4 cr; A-F or Aud. Prereq-4 yrs high school Ger or 1201 or # LEIP 03)

Consolidation and enrichment of previously acquired abilities speaking and understanding German, set within introduction to written German and survey of contemporary culture of German-speaking societies. Emphasis on oral, aural, and reading skills; vocabulary building; some writing. Taught in German.

**GER 2301. Advanced German.** (4 cr; A-F or Aud. Prereq-5 yrs high school Ger or 1202 or # LEIP 03)

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; A-F or Aud. Prereq-Cr will not count toward Ger major or minor LEIP 08)

Survey of culture, politics, and society of Germany and German-speaking countries, beginning with post World War II era and emphasizing the European Union's emergence and Germany's role in contemporary Eastern Europe.

**GER 3031-3032. German Language Study Abroad I-II.** (1-5 cr [max 10 cr]; Stdnt Opt. Prereq-%)

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 3040. Culture of Germany Studied in Germany.** (4 cr; A-F or Aud. Prereq-1202 or #)

Study of German culture, both contemporary and past as it informs the present, on site in Germany. Conducted entirely in German, and all language skills will be inculcated and improved. Format will include seminar, discussions, field trips, and small group projects

**GER 3045-3048. German Culture and Civilization Study Abroad I-IV.** (1-5 cr [max 10 cr]; Stdnt Opt. Prereq-%)

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.

## Course Descriptions

**GER 3302. Advanced Composition and Conversation.** (4 cr; A-F or Aud. Prereq-2301)

Refines students' skills in oral and written expression after they have completed the German language sequence. Individualized work on points of syntax and semantics, set in a contemporary context, using a variety of texts and resources.

**GER 3401. Introduction to Literary Studies.** (4 cr; A-F or Aud. Prereq-2301 or #P2301 or #)

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; A-F or Aud. Prereq-2301 with a grade of C or higher or #)

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 3405. German Literature until 1832.** (4 cr; A-F or Aud. Prereq-2301 (concurrent registration permitted with #))

A survey of German literature from the Lay of Hildebrant until the death of Goethe, including introduction to critical reading. Readings in German (primary texts) and English (commentaries); discussion and writing in German.

**GER 3406. German Literature from the Romantics** (1800) until the End of the Modern Era (1965). (4 cr; A-F or Aud. Prereq-2301 with a grade of C or higher or #, 3405 is recommended preparation)

A survey of German literature from the Romantic era (1800) until the beginning of the student movement in about 1965. Readings in German (primary texts) and English (commentaries), and an introduction to critical reading (with guides in German and English).

**GER 3591. Independent Study.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-2301 with a grade of C or higher or equiv or #)

Students develop and carry out reading and research programs in consultation with the instructor.

**GER 4095. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 8 cr]; A-F or Aud. Prereq-2301 with a grade of C or higher or #)

Various topics in the language history and structure, literature, and culture of the German-speaking countries.

**GER 4202. The German Novelle.** (4 cr; A-F or Aud. Prereq-2301 with a grade of C or higher or equiv or #, no Grad School credit)

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 4302. German Women Writers and Filmmakers.** (4 cr; A-F or Aud. Prereq-2301 or #, no Grad School credit)

Analysis of German written and visual texts and exploration of women's oppression within repressive political systems as well as Western democracies; women's exploration of their selves; and the question of whether there is a "female writing". Conducted in German.

**GER 4305. German Cinema.** (4 cr; A-F or Aud. Prereq-2301 with a grade of C or higher or instructor's consent; no Grad School credit)

An introduction to the history of German cinema and to film analysis with a focus on the relationship among German film, history, literature, culture, and politics. The course will examine representative works from various cinematic periods. Taught in German.

**GER 4404. Contemporary Germany.** (4 cr; A-F or Aud. Prereq-2301 with a grade of C or higher or equiv or #; no Grad School credit)

Civilization, culture, and politics of Germany and German-speaking countries since 1945. Research term paper in German.

## Graduate School (GRAD)

### Academic Adm-Adm

**GRAD 999. Graduate School Active Status.** (0 cr; No grade. Prereq-Grad School Students Only)

A zero-credit registration mechanism for Grad School students who must register solely to meet the Grad School's registration requirement. Registration requirements established by departments and agencies within or outside the University (which include, but are not restricted to registration required to hold an assistantship, athletic eligibility, maintain legal visa status or defer loans) are NOT met by Grad 0999.

## Health (HLTH)

### College of Education and Human Service Professions

**HLTH 1100. Health and Wellness Strategies for Life.** (3 cr; A-F or Aud. Prereq-#Hlth 1000 LE 8)

A lecture series introducing students to health and wellness encompassing nutritional, physical, emotional and spiritual aspects of health and well-being with emphasis on behavioral, environmental and social influences on developing a satisfying and productive lifestyle in our society.

**HLTH 1104. Health Science Terminology.** (1-3 cr [max 3 cr]; A-F or Aud)

Terms commonly used in health sciences and medical professions; emphasis on word structure.

**HLTH 1470. Human Nutrition.** (3 cr; A-F or Aud. LE 5)

Emphasis on chemical nature of dietary nutrients, physiological and metabolic aspects of human nutrition, effects of diet on human health, and global issues in health and nutrition.

**HLTH 1600. Basic First Aid and CPR.** (2 cr; A-F or Aud)

Basic skills and knowledge to respond correctly in first aid emergencies. Leads to American Red Cross Certification basic first aid and CPR certification.

**HLTH 1650. CPR/AED for the Professional Rescuer.** (1 cr; A-F or Aud)

Techniques of cardiopulmonary resuscitation involving one and two rescuers. Leads to American Red Cross certification for infant/child/adult CPR and AED.

**HLTH 1700. First Responder.** (3 cr; A-F or Aud)

Principles of emergency response and accident prevention in the home and community. Leads to Red Cross first emergency responder certification.

**HLTH 2030. Applied Human Anatomy.** (4 cr; A-F or Aud. Prereq-Athletic training, hth ed or pe or exer sci or rec major or cand, [Biol 1001 or Biol 1011] and [Chem 1102 or Chem 1113], \$801 1761)

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; A-F or Aud. Prereq-Athletic training or hth ed or pe or rec or ex sci majors or cand or hth ed minor, 1 sem each of college Biol, Chem, Anat recommended)

Physiological mechanisms of cells, organs, and organ systems; function, control, and coordination of body systems.

**HLTH 3101. Community Health.** (3 cr; A-F or Aud)

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 or Aud. Prereq-Min 30 credits) Overview of concepts of marketing, analysis, selection, and decision making regarding health care, products, services, and providers.

**HLTH 3116. Principles of Epidemiology and Human Disease.** (3 cr; A-F or Aud) Discussion of diseases and distribution among people. Topics include epidemiological concepts of how diseases are transmitted, surveillance and outbreak investigations, and prevention to eliminate diseases in the community. Vital statistics and methods of tabular-graphical data will be explored.

**HLTH 3117. Principles of Sex Education.** (3 cr; A-F or Aud. Prereq-hlth ed cand or #) 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 or Aud)

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 3161. School Health Programs: Early Childhood through Middle School.** (2 cr; A-F or Aud. Prereq-EEd 1010 and completion of 45 cr, el/middle school educ, hlth ed or ECh cand or pre el/middle school educ majors)

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 3202. Drug Education.** (2 cr; A-F or Aud. Prereq-45 cr, for students seeking and admitted to the STEP (Secondary Teaching Education program), cand in health education, physical education, exercise science and communication sciences and disorders or #)

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; A-F or Aud. Prereq-1100, hlth ed cand or #)

History, philosophy, and theories of health education; professional associations; basic functions of school and community health education programs; program planning.

**HLTH 3302. School Health Education Methods and Materials.** (3 cr; A-F or Aud. Prereq-3301, hlth ed cand or #)

Coordinated school health programming with a focus on comprehensive school health education for grades 5-12. Methods, strategies, and materials for effective teaching. Determining students needs and interest, selecting content, planning curriculum, stating objective, developing learning opportunities, and evaluating student learning.

**HLTH 3303. Health Education and Promotion Program.** (3 cr; A-F or Aud. Prereq- Concurrent registration is required (or allowed) in 3301, hlth ed cand or #, \$3450)

Introduction to planning models used in health education/promotion programming. Provides knowledge and skills necessary to assess, plan, and implement health education/promotion programs for multi-age populations. Includes needs assessment, community analysis and organization, program design, and implementation.

**HLTH 3305. Community Health Methods and Strategies.** (3 cr; A-F or Aud. Prereq-3301, 3303, hlth ed cand or #)

Theory, methods and practice of community health education. Includes identification and prioritization of community health problems with emphasis on development and implementation of strategies to address these problems. Students will test these strategies within community and school settings.

**HLTH 3500. Environmental Health.** (3 cr; A-F or Aud. Prereq-hlth ed cand or #)

Biological, ecological, and physiological aspects of the environment; concurrent effects on health of the community; and possible solutions to environmental problems.

**HLTH 3620. Wilderness First Response.** (3 cr; Stdt Opt)

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 3991. Independent Study.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-#)

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 [max 4 cr]; A-F or Aud. Prereq-#)

Special complementary work and investigation in undergraduate student's field of interest; survey of literature and resources available to health educators.

**HLTH 4000. Professional Issues for Health Educators.** (4 cr; A-F or Aud. Prereq-3305, hlth ed candidate or #; no Grad School cr)

Application of advanced skills/competencies. Identifying controversial issues, developing life/work balance and job seeking skills with electronic portfolio, professional networking, beginning grant writing, and preparing for Certified Health Education Specialist (CHES) exam. Students will spend 40 hour minimum in community.

**HLTH 4996. Internship in Health Education.** (1-15 cr [max 15 cr]; S-N or Aud. Prereq-hlth ed major, #; no Grad School credit)

Supervised entry-level health education practical experience in hospital, worksite, voluntary, or official agencies. Number of settings is limited to two.

**HLTH 5991. Independent Study.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-#, non-degree seeking or grad student; maximum of 6 cr can be applied toward degree)

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]; A-F or Aud. Prereq-#)

Special complementary readings and discussion in advanced or graduate student's field of interest in health and health education.

## Health Care Management (HCM)

### Labovitz School of Business and Management

**HCM 4510. Medical Sociology.** (3 cr; A-F only. Prereq-LSBE candidate or □, no Grad School cr)

Introduction to common theoretical and empirical approaches used by sociologists to study health and illness. Social inequalities in health and illness and the social processes that shape these experiences are the themes of the course.

**HCM 4520. Health Care Organization and Management.** (3 cr; A-F only. Prereq- LSBE candidate or □, MgtS 3401 preferred but not required, no Grad School cr)

Studies the organizational structures, types of governance and management issues of the American health care system.

## Course Descriptions

**HCM 4530. Legal Aspects of and Ethics in Health Care.** (3 cr; A-F only. Prereq-LSBE candidate or , no Grad School cr)

Introduction to the legal and ethical environment of health services administration and offers a current and historical overview of legal regulation of the health care industry.

**HCM 4540. Health Services Operations Management.** (3 cr; A-F only. Prereq-LSBE candidate or , FMIS 3301, no Grad School cr)

Analytical techniques to support operational decision making in health care operations. In particular, decision making, quality improvement methods, forecasting, project management, and process flow, inventory, and capacity management are discussed.

**HCM 4550. Health Care Finance.** (3 cr; A-F only. Prereq-4520, FMIS 3601, LSBE cand or , no Grad School cr)

Covers finance issues related to healthcare organizations. Topics include: reimbursement analysis, understanding the nature of costs, uncertainty, forecasting, service line profitability analysis, and preparation of operating and capital budgets.

**HCM 4560. International Comparisons of Health Care Systems.** (3 cr; A-F only. Prereq-LSBE candidate or , no Grad School cr)

Explores various health care systems offered around the world by evaluating their characteristics, issues and reforms.

**HCM 4570. Health Care Quality Management.** (3 cr; A-F only. Prereq-4520, LSBE cand or , no Grad School cr)

Covers basic principles of quality and patient safety measurement and improvement in health care. Methods for measuring health outcomes and satisfaction as well as regulatory and accreditation requirements affecting quality of care in hospitals, nursing homes, and other areas of healthcare will be discussed.

**HCM 4591. Independent Study.** (1-3 cr [max 3 cr]; A-F only. Prereq-LSBE candidate, #, no Grad School cr)

Special work in health care management that extends beyond or in greater depth than regular course offerings.

**HCM 4595. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 9 cr]; A-F only. Prereq-LSBE candidate or , 4520 or #, no Grad School cr)

Specific health care management problems, issues, and approaches.

**HCM 4597. Internship.** (3 cr; A-F only. Prereq-LSBE candidate, consent of program director or internship director, no Grad School cr)

Work-integrated learning program providing practical experiences within the health services industry. Students participate in approved program within cooperating businesses, governmental agencies, or civic organizations. Requires a minimum of 200 hours of work experience, assigned written reports, and performance evaluations.

## Health, Physical Education and Recreation (HPER)

**College of Education and Human Service Professions**

**HPER 3000. Organization and Administration of Health, Physical Education, and Recreation.** (3 cr; A-F or Aud. Prereq-hlth ed or pe or exer sci or rec cand or #)

Theoretical and practical basis of administrative process and organizational structure of HPER programs.

**HPER 3100. Risk Management.** (2 cr; A-F or Aud. Prereq-exer sci or rec cand or #)

Proactive approach to managing risks associated with conducting health, physical education, and recreation programs. Emphasis on planning for a safe environment.

**HPER 3200. Research and Evaluation in Health Science.** (3 cr; A-F or Aud. Prereq-Min 60 cr, Health ed major or minor or rec major or minor or #)

Exploration of the principles of investigation and evaluation in the health and human service professions with emphasis on methods, data analysis and presentation, and evaluation reports. Basic background information for scientific inquiry and use of evaluative data in health and human service programs.

## History (HIST)

**College of Liberal Arts**

**HIST 1025. Freshman Seminar: World War II: War of Technologies.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 or LE 7)

World War II saw the introduction or development of technologies that determined the fate of combatants. Focus on development of rocketry, radar, the A-bomb, cryptology, the fighter plane, the concentration camp, the submarine; their impact and results.

**HIST 1026. Freshman Seminar: The Cold War.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 or LEIP 07)

Origin and history of the Cold War between the United States and the Soviet Union, 1945-1991. Global examination of the foreign policy and military crises produced by this ideological contest that divided the planet.

**HIST 1027. Freshman Seminar: Introduction to Islam.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits LEIP 07)

Introduction to Islamic religion, covering the life of the prophet Muhammad; origins of the Qur'an and Qur'anic Traditions; sectarian intellectual and social developments in Islam; Islamic institutions and practices as well as Islam's encounter with other religions.

**HIST 1095. Freshman Seminar Topics:** (Various Titles to be Assigned). (3-4 cr [max 8 cr]; A-F or Aud. Prereq-Freshman, fewer than 30 or LE 7)

Treatment of historical subjects within the Freshman Seminar Program not included in the regular curriculum.

**HIST 1207. Dawn of Modern Europe.** (3 cr; A-F or Aud. LE 7)

Early history of the modern era: Renaissance, Reformation, Age of Reason, French Revolution and its impact, Napoleonic era.

**HIST 1208. Europe in the Modern Age.** (3 cr; A-F or Aud. LE 7)

Making of modern Europe; analysis of economic and technological revolution, collision of ideologies, imperialist expansion, revolutions, and wars.

**HIST 1304. US History Part I: 1607-1877.** (3 cr; A-F or Aud. LE 7)

Evolution of the United States from colonial origins into a modern nation. Frontier and agrarian heritage, constitutional development, emergence of modern U.S. political system, expansion of democracy, and cultural diversity. Colonial period to 1877.

**HIST 1305. US History Part II: 1865-Present.** (3 cr; A-F or Aud. LE 7)

Historical roots of major challenges facing Americans today: global responsibility as a world power; the quest for political, economic, and social justice; and community and family changes in modern society; 1877 to present.

**HIST 1603. Modern Latin America.** (3 cr; A-F or Aud. Prereq-\$3603)

Thematic survey of Latin American history in the nineteenth and twentieth centuries.

**HIST 2244. The History of Science: Ancients to Newton.** (3 cr; A-F or Aud)

The intellectual and cultural history of science from the Greeks (6th c. BC) to the work of Isaac Newton (17th c.).

**HIST 2245. Science and Society: 1500 to Present.** (3 cr; A-F or Aud. LE 7)

Explores a series of creative moments in development of science and scientific methods within their broader social and cultural contexts.

**HIST 2265. Russia in the 20th Century.** (3 cr; A-F or Aud. LEIP 07)

Revolutions of 1917, the Soviet period, collapse of the Soviet Union and evolution of Soviet successor states; 1900 to present.

**HIST 2353. American Youth Culture.** (3 cr; A-F or Aud)

Traces the emergence of youth culture through historical analysis of the experience of youth in the twentieth century and will examine what unified an encompassing "American youth culture," and what fragmented, divided, and reformulated it over time.

**HIST 2355. United States Military History.** (3 cr; A-F or Aud. LE 7)

Explore the history of the United States military from the colonial era to the present in the context of broader patterns of American history.

**HIST 2357. Women in American History.** (3 cr; A-F or Aud. LECD 07)

Roles and contributions of women in American life from colonial period to present.

**HIST 2515. Precolonial Africa.** (3 cr; A-F or Aud. LECD 07)

Political, cultural, and socioeconomic developments in precolonial Africa to 1800. Emphasis on slave trade, Islamic revolution, and European commercial penetration.

**HIST 2525. Islamic Societies.** (3 cr; A-F or Aud. LEIP 07)

An introduction to the cultural and religious base of Islamic Societies. Covers history from Qur'anic origins and career of Muhammad down to beliefs, observances, and socio-political and religious issues of the present day.

**HIST 2605. Honors: World War I History and Literature.** (3 cr; A-F only. Prereq: Honors student)

Examines the history and literature of World War I. Discussion of representative works of fiction along with historiographic questions of the war.

**HIST 3007. The World of Late Antiquity.** (3 cr; A-F or Aud. Prereq: \$HmCl 3007)

Historical transformation from ancient to medieval society in the eastern and western Mediterranean in the second to eighth centuries A.D. including the Germanic states in the West and Byzantium and the Islamic states in the Near East

**HIST 3021. The Age of the Heroes: Homer and his World.** (3 cr; A-F or Aud. Prereq: Min 30 cr, \$HmCl 3021, §CS1 3021)

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.

**HIST 3031. The Roman Republic.** (3 cr; A-F or Aud. Prereq: \$HmCl 3031)

Republican Rome from origins through collapse in 44 B.C., with emphasis on cultural and political attributes, leading figures, and causes of its demise.

**HIST 3041. The Roman Empire.** (3 cr; A-F or Aud. Prereq: \$HmCl 3041)

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.

**HIST 3055. The Ancient Near East.** (3 cr; A-F or Aud. Prereq: Min 30 cr, \$HmCl 3055 or CSt 3055)

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.

**HIST 3091. Directed Readings in History.** (1-4 cr [max 16 cr]; A-F or Aud. Prereq: #)

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). (1-4 cr [max 4 cr]; A-F or Aud)

Special topics in history.

**HIST 3097. Internship in History.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq: 60 cr, #)

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 3099. Practicum in Teaching History.** (3 cr [max 6 cr]; A-F or Aud. Prereq: History major, completion of 20 cr of 2xx and above history courses with GPS of 3.3, completion of 90 credits, #)

Assisting in teaching a 1xxx- or 2xxx-level history course; experience preparing course materials, advising students in learning about the grading process; experience in lecturing and leading discussions, conferences with professor about teaching issues.

**HIST 3151. Ancient Egyptian Culture.** (3 cr; A-F or Aud. Prereq: Min 30 cr; \$HmCl 3151 or CSt 3151)

History, culture, and arts of ancient Egypt as known through the archaeological record.

**HIST 3239. Europe in the Age of Renaissance and Reformation: 1348-1648.** (3 cr; A-F or Aud)

Social, economic, political, and cultural development of Europe from the Black Death to the Thirty Years' War. Central themes include Renaissance humanism and art, Columbus and European expansion, the Protestant and Catholic Reformations, and the era of religious wars.

**HIST 3240. Early Modern England: 1485-1689.** (3 cr; A-F or Aud. Prereq: §3245)

Early Modern English society and culture from the 15th to the 17th centuries.

**HIST 3243. Europe in Crisis in the 20th Century.** (3 cr; A-F or Aud)

Causes, conduct, and consequences of World Wars I and II from European perspective. Offered during day school and in Individualized Learning Program.

**HIST 3244. History of Holocaust.** (3 cr; A-F or Aud)

Anti-Semitic and extermination policies of the Hitler regime. Origins of that regime and its policies. European anti-Semitism and the Jewish experience in Europe. Conduct of perpetrators, victims, onlookers, resisters. Theological responses and Holocaust representations. Historiographic controversies.

**HIST 3245. Early Modern England, 1485-1689: Honors.** (3 cr; A-F or Aud. Prereq: §3240, 0)

Early Modern English society and culture from the 15th to the 17th centuries, with an emphasis on primary source research for UMD honors students.

**HIST 3257. Modern France.** (3 cr; A-F or Aud)

History of France from 1789 to present.

**HIST 3264. Imperial Russia.** (3 cr; A-F or Aud)

Peter I to end of reign of Alexander III.

**HIST 3316. US Social History, 1800-1916.** (3 cr; A-F or Aud)

Explores the social history of the United States during the long nineteenth century, focusing on the development of specific regional communities within the larger nation as examples of the richness and complexity of the American experience.

## Course Descriptions

### HIST 3317. American Expansion, 1800-1900. (3 cr; A-F or Aud)

Follows the geographic and economic development of the United States from a rural strip bordering the Atlantic Ocean, through civil war to emerge as an industrialized, continent-spanning global power.

### HIST 3320. American Popular Culture, 1940 to the Present. (3 cr; A-F or Aud)

Examines the intersection of the American popular arts--especially film, music, the visual arts, and literature--with national and international politics and American public life from World War II to the present.

### HIST 3333. From Homer to Alexander: Archaic and Classical Greece. (3 cr; A-F or Aud. Prereq-§HmCl 3333)

Early history of Greek world from Heroic Age to death of Alexander the Great, 850-323 B.C.

### HIST 3335. From Alexander to Mohammad. (3 cr; A-F or Aud. Prereq-§HmCl 3335)

Social and cultural analysis of the impact Alexander the Great had on eastern Mediterranean development between 323 B.C. and 631 A.D. Alexander and his world, the formation of its three great religions, and the Alexandrian legacy of his achievement.

### HIST 3361. The American City. (3 cr; A-F or Aud)

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 Culture and Globalization. (3 cr; A-F or Aud)

The U.S. as an importer and exporter of cultural and social trends from the colonial period to the present. Global relationships among reform movements, migration, business and labor, intellectual ideas, and popular culture. Analysis of the American character.

### HIST 3386. The United States and the World since 1898. (3 cr; A-F or Aud. Prereq-(\$3384 and 3385), students will receive credit if 3384 (only) or (3385) were taken)

Examines United States foreign relations--political, economic, social, and cultural--since 1898.

### HIST 3396. The Vietnam War. (3 cr; A-F only)

Examines the Vietnam war as a transformative event in both the United States and Vietnam. It will cover the decades-long history of the conflict, and will address its legacies in U.S. foreign relations, domestic politics and culture, and Vietnamese life.

### HIST 3505. Colloquium for Majors. (1-2 cr [max 2 cr]; S-N or Aud. Prereq-Hist or teaching soc studies major/minor; 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))

Lecture and discussion groups on a variety of topics.

### HIST 3515. Modern Africa. (3 cr; A-F or Aud)

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 or Aud)

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 3725. Islamic History from Muhammad to the Ottomans. (3 cr; A-F or Aud. Prereq-1027 or 2525 or #)

History and development of Islamic society from seventh to sixteenth century.

### HIST 3726. Modern Middle East: 18th Century-Present. (3 cr; A-F or Aud)

Survey from Ottoman to present times concentrating on themes, such as colonialism and the anti-colonialist struggle, the rise of state power, gender relations, the rise of new socio-economic groups, new expressions of identity, and western perceptions of the region.

### HIST 5094. Directed Research. (4 cr [max 12 cr]; A-F or Aud. Prereq-#, max 4 cr may be applied to Grad School program)

Directed Research

### HIST 5095. Special Topics: (Various Titles to be Assigned). (5-4 cr [max 12 cr]; A-F or Aud. Prereq-#)

To treat historical subjects not included in the regular curriculum.

### HIST 5905. History Seminar. (4 cr [max 8 cr]; A-F or Aud. Prereq-#)

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)

## Honors (HON)

### College of Liberal Arts

#### HON 400. Honors Capstone Seminar. (0 cr; S-N only. Prereq-Honors student)

Provides guidance for completion of Capstone projects required of all UMD Honors students, and provides a forum for the presentation of completed projects. Students will present their research, and will attend the presentations of fellow-students. Seminar participants will also mentor an incoming Honors student, and be provided with assistance in preparing graduate school applications and resumes.

## Industrial Engineering (IE)

### College of Science and Engineering

#### IE 1225. Introduction to Design and Manufacturing Engineering. (4 cr; A-F or Aud. Prereq-Math 1296 or #, §1105, 1205)

Introduction to methods used to design and manufacture high quality products. Through the use of a CAD system the student will learn design techniques relative to a product. Students, working in teams, will produce their design using appropriate manufacturing methods.

#### IE 2222. Design Manufacturing Laboratory. (2 cr; A-F only. Prereq-Engr 2015, Engr 2110; §1225)

Modern manufacturing processes to economically produce finished products that meet design and quality requirements. Student teams will design and manufacture a product to tolerance using the most appropriate methods. Topics include DFM, TQM, GD&T, machining, casting, and forming processes for ferrous, non-ferrous and organic materials.

#### IE 3105. Human Factors. (4 cr; A-F or Aud. Prereq-BSIE candidate or #)

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; A-F or Aud. Prereq-Math 3280, Stat 3411, BSIE candidate or #)

Optimization. Linear programming, network analysis, Markov chains, and queuing theory.

#### IE 3122. Materials Engineering Laboratory. (2 cr; A-F only. Prereq-2222)

ASTM standards for testing metals, polymer, ceramic, and composite materials. Measurement of material properties including: yield strength, tensile strength, stiffness, hardness, toughness, and hardenability. Traditional methods of processing materials including: punching, plastic injection molding, thermoforming, sand casting, sheet metal forming, extrusion, welding, polymer matrix composites vacuum bagging. Heat treatment and metallographic study of metals. Estimation of the effects processing techniques have on material properties using both analytical and empirical techniques. Use of Design of Experiments approach for estimation of process control factor effects and modeling of process quality characteristics. Detailed lab report writing and oral presentation of results.

**IE 3125. Engineering Economic Analysis.** (3 cr; A-F or Aud. Prereq-[P]Stat 3411, BSIE or BSME cand or #)

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 3130. Materials Processing Engineering.** (3 cr; A-F only. Prereq-Engr 2110, Engr 2016, Stat 3411)

An introduction to common materials processes and material responses, including thermal and mechanical processing of metals, polymers and composite materials.

**IE 3135. Materials Processing.** (4 cr; A-F or Aud. Prereq-Engr 2016, Engr 2210, IE 1225, Stat 3411, BSIE or BSME cand or #)

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

**IE 3140. Human Factors and Ergonomic Design.** (3 cr; A-F only. Prereq-Engr 2026 or #; \$IE 3105)

Through the study of perception, cognition, and motor performance, explores human abilities and limitations as well as the external factors impacting them. To improve performance of a human-machine system, learn about tools for analyzing products, identifying design elements to augment abilities, and recognizing limitations.

**IE 3222. Occupational Systems Laboratory.** (2 cr; A-F only. Prereq-3122, 3140, [P]4020 or #; §3105 and/or 3265)

Using principles of human factors and production management, introduces methods for assessing and optimizing performance of occupational systems (i.e., workers, workplaces and tasks, and tools and equipment). These methods are applied in laboratory exercises to evaluate effects of workplace factors on various performance measures.

**IE 3255. Statistical Quality Control.** (3 cr; A-F or Aud. Prereq-Stat 3411, BSIE or BSME cand or #)

Statistical quality control in manufacturing; modeling, process quality, control charts, process capability, acceptance sampling methods, reliability.

**IE 3265. Production and Operations Management.** (4 cr; A-F or Aud. Prereq-3115, 3125, BSIE cand)

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 4020. Lean Enterprises Management.** (3 cr; A-F only. Prereq-2222, 3125, §3265; no Grad School cr)

Develops management systems using lean methods: JIT, CMS, ERP, SCM, TQM, SMED, and Kaizen Techniques. Forecasting, aggregate planning, inventory management, and other facilities improvement techniques, including efficient scheduling of manufacturing and service systems.

**IE 4115. Facility Planning and Simulation.** (4 cr; A-F or Aud. Prereq-3255, 3265, BSIE candidate)

Facility and process design and analysis using flow rates, design relationships, graphical aids, and computer simulation.

**IE 4196. Cooperative Education.** (1 cr [max 2 cr]; A-F or Aud. Prereq-BSIE candidate; no Grad School credit)

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; A-F or Aud. Prereq-3265 or ME 4135, ECE 2006, CS 1121 or CS 1131 or CS 1211 or CS 1511 or CS 2121, BSIE cand)

Design and use of hardware and software to integrate computer control and decision making into product development and manufacturing systems.

**IE 4255. Multidisciplinary Senior Design.** (4 cr; A-F or Aud. Prereq-EMgt 4110, BSIE cand or #, no Grad School credit; \$ME 4255)

Capstone design course in industrial engineering. Project Management, problem definition, root cause analysis, baseline analysis, alternative solutions, analysis, reporting. Societal, economic, ethical, environmental, political considerations. Oral and written reports. Work is in teams focused on industrial or competition-based projects.

**IE 4491. Independent Study.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq-BSIE or BSME cand, %)

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]; Stndt Opt. Prereq-BSIE candidate or #)

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

**IE 4801. International Engineering Report.** (1 cr [max 2 cr]; S-N or Aud. Prereq-BSIE or BSME cand, %, no Grad School credit)

Directed self-examination of engineering study abroad in Sweden. Required for each semester abroad

**IE 4803. Simulation of Swedish Manufacturing.** (3 cr; A-F or Aud. Prereq-BSIE or BSME cand; no Grad School credit)

Facility and process design and analysis using flow rates, design relationships, graphical aids, and computer simulation. (MPR 003 at Lulea University of Technology, Sweden)

**IE 4812. Computer Integrated Manufacturing.** (4 cr; A-F or Aud. Prereq-BSIE or BSME cand; no Grad School credit)

Computers and computer systems in industrial settings, networks, CAD communication standards (IGES, STEP, Etc.). CAM, e-business, development of CIM strategies, future trends. (MPR012 at Lulea University of Technology, Sweden)

**IE 4823. Project Management and Swedish Industrial Design Project.** (6 cr; A-F or Aud. Prereq-BSIE or BSME cand, no Grad School credit)

Design or improve a product or system with a Swedish company and/or team. Define problem, assess baseline, develop alternatives, prioritize recommendations. Project management, team dynamics, reports and documentation. (MPR023 at Lulea University of Technology Sweden)

**IE 4827. Manufacturing Systems Project.** (8 cr; A-F or Aud. Prereq-BSIE or BSME cand; no Grad School credit)

Manufacturing equipment, processes, information control, budget, safety, maintenance of integrated production systems. Major project requires design, manufacture, handling of a project and design, modeling construction, and control of an automated projection system. (MPR 027 at Lulea University of Technology, Sweden)

**IE 4870. Advanced Manufacturing Processes.** (4 cr [max 8 cr]; A-F or Aud. Prereq-BSIE or BSME cand; no Grad School credit)

Advanced topics in material processes. Traditional and advanced materials. New processes like laser or waterjet cutting. (MPM, MPB, or MPP at Lulea University of Technology, Sweden)

**IE 4993. Industrial Engineering Seminar.** (1 cr [max 2 cr]; S-N or Aud. Prereq-BSIE or BSCE or BSME or MEHS cand or #, no Grad School credit)

Reports on recent developments in engineering and on research projects in the department.

**IE 5305. Supply Chain Management.** (3 cr; A-F or Aud. Prereq-3265, BSIE cand or MSEM student or #)

Concepts essential to understanding supply chain management, including strategy and design, as well as operational, managerial, technological, and implementation issues. It provides an integrated perspective of the supply chain, including purchasing, production, transportation, distribution and information systems.

## Course Descriptions

**IE 5315. Organizational Control Methods.** (3 cr; A-F or Aud. Prereq-BSIE or MSEM cand or %)

Roles of the engineer in managing organizational resources. Budgeting, cost-volume relationships, product costing, annual reports, audits. Project estimating and reporting.

**IE 5325. Advanced Engineering Economics.** (3 cr; A-F or Aud. Prereq-3125, BSIE or MSEM cand or %)

Fundamentals of engineering economics: decision trees, time value of money, analysis of alternatives for project investments, taxes, inflation. Applications to engineering services and manufacturing.

**IE 5335. Engineered Products and Services.** (3 cr; Stdt Opt. Prereq-BSIE or MSEM candidate, #)

Development, production, and distribution of engineered products and services. Strategies for positioning engineered products and services to successfully compete in a global market. Sales, purchasing, qualification, and service. Standards, regulations.

**IE 5991. Independent Study in Industrial Engineering.** (1-4 cr [max 6 cr]; Stdt Opt. Prereq-MSEM cand, %)

Directed study of special interest topics not available in standard curriculum. Must be arranged with instructor before registration. May include readings, research and/or special projects.

## Integrated Biosciences (IBS)

### College of Science and Engineering

**IBS 5101. Biochemistry and Molecular Biology.** (3 cr; A-F or Aud. Prereq-Chem 4341 or equivalent)

A thorough review of the structure and properties of biomolecules. This will include a complete understanding of the components and macromolecules that comprise nucleic acids, proteins, carbohydrates, and lipids.

**IBS 8011. Integrated Biological Systems.** (2 cr; A-F only. Prereq-IBS Graduate Student)

Introduction to integrated biosciences by way of a systems approach, including feedbacks between system components, stoichiometry, and energetics as integrating principles at all levels from molecular and cellular systems to physiological systems, population dynamics, and ecosystems. Required for all IBS students.

**IBS 8012. Integrated Evolutionary Processes.** (2 cr; A-F or Aud. Prereq-8011, IBS Grad student)

Review of advanced topics in evolutionary biology, including coevolution, evolution of disease organisms, ecosystem consequences of evolution, evolutionary stable strategies, and game theory. Required for all IBS students.

**IBS 8020. Integrated Biosciences Colloquia.** (1 cr [max 4 cr]; S-N only. Prereq-IBS Graduate Student)

Presentations by Integrated Biosciences Graduate Faculty on their research and how it is integrated with various other research programs in Duluth and worldwide.

**IBS 8030. IBS Research Club.** (1 cr [max 5 cr]; S-N or Aud. Prereq-Admission to the Integrated Biosciences Graduate Program)

Readings and discussion of current literature integrating the areas of Cell, Molecular and Physiological Biology with Ecology, Organismal, and Population Biology. Current literature emphasizing the application of novel techniques to biological problems at several levels of organization will be presented. Students will lead a discussion on at least one paper. Required for IBS students both semesters of their first two years.

**IBS 8094. Rotations.** (3 cr; S-N only. Prereq-IBS Graduate Student)

Rotations through laboratories of faculty members of the Integrated Biosciences Program. During the rotations students will be exposed to molecular, cellular, physiological, and ecological problems and techniques.

**IBS 8099. The Biological Practitioner.** (1 cr; S-N or Aud. Prereq-IBS Graduate Student)

A course designed to introduce the incoming graduate student in biological sciences to professional practice, standards and ethics, including peer review, proposal writing, ethical problems, the purpose of a university, and other problems. Required for all IBS students.

**IBS 8102. Cell, Molecular and Developmental Biology.** (3 cr; A-F only. Prereq-5101, Chem 4342 or equivalent, IBS Grad School student)

Comprehensive review of contemporary topics in modern molecular biology. This will include systemic examples from cell and developmental systems. Required for CMP emphasis.

**IBS 8103. Comparative Animal Physiology.** (3 cr; A-F only. Prereq-One year of college biol, two years of college chem; 8011, IBS Grad School student)

In depth review of selected topics in animal physiology. Lecture presentation of fundamental concepts of cardiovascular, neural, respiratory, renal, and endocrine physiology. In-depth discussion and student presentation of selected topics with particular emphasis on current advances.

**IBS 8201. Ecological Processes.** (2 cr; A-F or Aud. Prereq-8011, IBS Grad School student)

In depth survey of advanced topics in ecological processes, including allometry and scaling, animal behavior, food webs, and energy and material flows through organisms and ecosystems. Required for EOP Track.

**IBS 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

**IBS 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

## Inter-Institutional Cross-Registration (IICR)

### Continuing Education

**IICR 1001-5002. Inter-Institutional Cross Registration.** (1-9 cr [max 36 cr]; Stdt Opt. Prereq-#)

Inter-institutional cross registration reflecting the credit hour load of University of Minnesota Duluth students enrolling under the inter-institutional cross registration agreement with the College of Saint Scholastica and the University of Wisconsin Superior and any other institution with whom such an agreement exists.

## Interdisciplinary Studies (IS)

### College of Liberal Arts

**IS 3001. Interdisciplinary Methods Seminar.** (2 cr; A-F or Aud. Prereq-#)

Definitions, history, and philosophy of interdisciplinary research, writing, learning, and teaching. Readings in major types of interdisciplinary work; preliminary methods for interdisciplinary projects.

**IS 3095. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 12 cr]; A-F or Aud. Prereq-15 cr or #)

Special topics in interdisciplinary studies.

**IS 3099. Senior Project.** (1-10 cr [max 10 cr]; A-F or Aud. Prereq-#)

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 5001. Construction and Deconstruction of Nation: Reflections of 20th Century Hispanic History.** (2 cr; A-F only. Prereq-Min 90 cr)

Introduction to 20th Spanish cinema, literature, and culture: the historical, social aesthetic, and theoretical factors that brought about Spain's Civil War, Francoism, exile and deportation to Nazi camps, Basque separatism, ETA terrorism, and Spain's membership in the European Union. Spain, along with so many other countries in our increasingly "globalized world," is currently undergoing an "identity crisis." The concept of "Spanishness" will be addressed.

**IS 5002. Exodus and Exile in Contemporary Cinema.** (4 cr; A-F only. Prereq-Min 90 cr)

Cross-border and internal population movements have assumed dimensions beyond the response capacity of any single governmental and international body. A socio-historical understanding of uprooted social groups and individuals who voluntarily or involuntarily leave their country and culture. Effects and implications of displacement and examines how European exilic and diasporic filmmakers signify exile and diaspora by expressing, allegorizing, commenting upon and critiquing home, host societies and cultures. Analyses of film texts whose narrative strategies undermine conventional cinema, in particular cinematic realism.

**IS 8001. Introduction to Liberal Studies.** (1-4 cr [max 8 cr]; S-N or Aud. Prereq-MLS candidate or %)

Introduction to methods of interdisciplinary liberal studies. Minimum of 4 credits required of M.L.S. candidates.

**IS 8250. Ecological Economics.** (4 cr; A-F or Aud. Prereq-Econ 1003 or 1023 or Bio 2803 or #)

An introduction to the emerging new discipline of ecological economics, which situates traditional economic models with an ecological framework. Ecological economics views the notion of endless economic growth as not merely socially undesirable but actually ecologically impossible.

**IS 8501. Seminar: Ethics and the Human Condition.** (4 cr; A-F or Aud. Prereq-MLS candidate or %)

Explores applications of values and ethical considerations from humanistic study to problems of modern world.

**IS 8502. Ecology, Economics, and Ethics.** (4 cr; A-F or Aud. Prereq-8250, Grad Student or #)

Explores the nature of THE GOOD SOCIETY with respect to its economic, political, and moral dimensions. It considers alternative conceptions of THE GOOD and issues of distributive justice, including the distribution of economic wealth and its consequences.

**IS 8591. Directed Study.** (1-8 cr [max 8 cr]; A-F or Aud. Prereq-MLS candidate or %)

Individualized study under supervision of the director of the liberal studies program.

## International Business (INTB)

### Labovitz School of Business and Economics

**INTB 3201. International Business.** (3 cr; A-F only. Prereq-SBE cand or □)

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 or Aud. LEIP 08)

Interdisciplinary survey of British Isles: major geographic, historical, social, and cultural features of region.

**INTS 1070. An Introduction to Scandinavia.** (3 cr; A-F or Aud. LEIP 08)

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]; A-F or Aud)

Special topic identified at time course offered.

**INTS 1191. International Study.** (1-5 cr [max 15 cr]; A-F or Aud. Prereq-%)

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; S-N or Aud. Prereq-#)

Self-examination of study abroad experience in Britain.

**INTS 3191. International Study.** (1-5 cr [max 15 cr]; A-F or Aud. Prereq-%)

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]; A-F or Aud)

Special topic identified at time course offered.

**INTS 3197. International Internship.** (1-6 cr [max 8 cr]; S-N or Aud. Prereq-50 cr, %; max 4 cr may be applied to INTS major)

Supervised work experience involving international interaction.

**INTS 3295. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 8 cr]; A-F or Aud)

Special topic identified at time course offered.

**INTS 4100. Seminar in International Studies.** (4 cr; A-F or Aud. Prereq-Pol 1050, 60 cr incl 8 upper div or approved INTS courses or #)

Analysis of and supervised research and writing on selected topics.

**INTS 4891. Independent Study.** (1-5 cr; A-F or Aud. Prereq-8 cr INTS, #)

Advanced study and research under faculty member supervision.

**INTS 4995. Special Topics:** (Various Titles to be Assigned). (1-5 cr [max 10 cr]; A-F or Aud. Prereq-50 cr incl 8 cr in INTS or #)

Detailed examination of contemporary international studies topics.

## Italian (ITAL)

### College of Liberal Arts

**ITAL 1101. Beginning Italian.** (3 cr; A-F or Aud. LEIP 03)

Conversation and communicative course for students with little or no previous study of Italian. Emphasis on oral and aural skills, and vocabulary and idioms useful in daily life. Taught in Italian and English.

**ITAL 1102. Beginning Italian II.** (3 cr; A-F or Aud. Prereq-1101 or # LEIP 03)

Conversation and communicative course for students with lone semester's previous study of Italian. Emphasis on oral and aural skills, and vocabulary and idioms useful in daily life, building on the content of Italian 1101: Beginning Italian. Taught in Italian and English.

## Course Descriptions

### Journalism (JOUR)

#### College of Liberal Arts

##### JOUR 2001. Reporting and Writing I. (3 cr; A-F or Aud. Prereq-COMP 1120)

Basic course in reporting and writing on which much of the student's work for the Journalism minor is built. Information gathering, writing of basic news stories; news style, structure and readability; news sources and interviewing techniques.

##### JOUR 2501. History of American Journalism. (3 cr; A-F or Aud.)

Examines the cultural and social history of journalism in the United States, from Colonial times to the present, using a variety of both secondary and contemporary samples of journalistic work. Students will explore the values, practices and social roles that encompass the institution of journalism.

##### JOUR 3001. Reporting and Writing II. (3 cr; A-F or Aud. Prereq-2001, COMP 1120)

Emphasizes magazine-style feature writing. Students will develop interviewing skills and learn advanced reporting techniques, including searching public records and using the Freedom of Information Act.

##### JOUR 3101. News Editing. (3 cr; A-F or Aud. Prereq-2001, COMP 1120)

Mechanics of copy and picture editing, selection of stories, news judgment, the writer-reporter relationship, headline writing, basic page layout and design, and use of graphics, and basic legal issues.

##### JOUR 3300. News Photography. (3 cr; A-F or Aud)

Theory and practice of news photography. Practical experience taking news photographs as well as the professional standards required of photojournalists. Discusses the theoretical issues behind news photography.

##### JOUR 3400. Community Journalism. (3 cr; A-F or Aud)

An introduction to community journalism. Useful for those interested in daily journalism (print or broadcast) to learn how to cover the daily lives of citizens, as well as those interested in working for weekly publications or publicizing community issues.

##### JOUR 3401. Broadcast News Writing. (3 cr; A-F or Aud. Prereq-2001, COMP 1120)

Students will learn to research and write broadcast news reports and features. They will edit quarter inch tape and be introduced to digital editing techniques. They will prepare a weekly public affairs news program for broadcast on KUMD.

##### JOUR 3555. Research for Reporters. (3 cr; A-F or Aud. Prereq-8 COMP 3555)

Covers research techniques for reporters, including computer-assisted reporting, data practices laws, using government documents, reading business reports, and an introduction to statistical methods.

##### JOUR 3700. Media Law and Ethics. (3 cr; A-F or Aud. Prereq-Comp 1120)

Laws regarding news gathering and dissemination. First Amendment principles of press freedom, libel, invasion of privacy, prior restraint, access to information, and electronic media content regulation issues.

##### JOUR 3991. Independent Study in Journalism. (1-5 cr [max 5 cr]; A-F or Aud. Prereq-2001, #)

Directed reading and research in journalism.

##### JOUR 4001. Specialized Reporting and Writing. (3 cr; A-F or Aud. Prereq-2001, 3101, Comp 1120; no Grad School cr)

Students will study basic concepts of investigative reporting, opinion writing, science reporting and feature writing, then choose any two of the above as the basis for long articles and write short pieces in the remaining two areas.

##### JOUR 4021. Sports and Outdoors Journalism. (3 cr; A-F or Aud. Prereq-2001, Comp 1120; no Grad School cr)

Covers the basics of sports journalism as it pertains to newspapers, magazine and television. Explores the psychology, sociology, business and ethics of sports

##### JOUR 4101. News Layout and Design. (3 cr; A-F or Aud. Prereq-2001, no Grad School credit)

Students will learn basic principles as well as gain practical skills with advanced programs. Students will layout and paginate newspaper pages, choose and edit photographs and other graphical elements, and write headlines.

##### JOUR 4500. Special Topics: (Various Titles to be Assigned). (3 cr [max 6 cr]; A-F or Aud. Prereq-2001, 3101, Comp 1120; no Grad School cr)

Selected themes and issues in journalism, such as staff organization, policies, finance, law, photography, design, and the role of the student press.

##### JOUR 4800. Perspectives on International News Reporting and Editing. (3 cr; A-F or Aud. Prereq-No Grad School credit)

Outlines the role of the press in shaping foreign policy and highlight the challenges faced by journalists working abroad. We shall critique editorial routines and examine ways to improve international news pages in local newspapers.

##### JOUR 5102. Advanced Editing. (3 cr; A-F or Aud. Prereq-2001, 3101 or Grad Student)

Advanced theory and practice in news selection, preparation, and display for newspaper, magazine, broadcast and photo-journalism media; emphasis on the ethical and professional responsibility of the journalist.

##### JOUR 5197. Journalism Internship. (1-3 cr [max 3 cr]; S-N only. Prereq-2001, 3700, 60 cr or Grad Student, #)

Supervised professional experience as a working staff member with a newspaper, magazine, broadcast station or other communications organization.

## Labovitz School of Business and Economics (LSBE)

#### Labovitz School of Business and Economics

##### LSBE 1101. The Business Environment. (3 cr; A-F or Aud. LE 8)

Introduction to context, environment, and operation of business and organizations. Study of foundations and functional areas of business and entrepreneurship. Analysis of technological, ethical, diversity, and global issues from business and organizational perspectives.

### Language (LANG)

#### College of Liberal Arts

##### LANG 1101. Beginning Foreign Language I. (4 cr; A-F or Aud. Prereq-#, % LE 3)

For students studying beginning language where that language is spoken, under the auspices of another college or university or by individual arrangement with prior approval by the Department of Foreign Languages and Literatures; or students studying a less frequently taught language at UMD.

##### LANG 1102. Beginning Foreign Language II. (4 cr; A-F or Aud. Prereq-1101 or # LE 3)

For students studying beginning language where that language is spoken, under the auspices of another college or university or by individual arrangement with prior approval by the Department of Foreign Languages and Literatures; or students studying a less frequently taught language at UMD.

**LANG 1201. Intermediate Foreign Language I.** (4 cr; Stdt Opt. Prereq-1102 or # LE 3)

For students studying intermediate language under the auspices of another college or university or by individual arrangement with prior approval by the Department of Foreign Languages and Literatures; or students studying a less frequently taught language at UMD.

**LANG 1202. Intermediate Foreign Language II.** (4 cr; A-F or Aud. Prereq-1201 or # LEIP 03)

For students studying intermediate language under the auspices of another college or university or by individual arrangement with prior approval by the Department of Foreign Languages and Literatures; or students studying a less frequently taught language at UMD.

**LANG 1301. ESL: English for Academic Writing and Speaking.** (3 cr [max 6 cr]; A-F or Aud)

Integrated study of reading, listening, writing, and speaking skills for students who are not native speakers, with an emphasis on academic and scholarly American English. Content is individualized to each student's needs.

**LANG 3091. Directed Study.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-#, %)

Directed Study

**LANG 3095. Special Topics:** (Various titles to be Assigned). (1-4 cr [max 8 cr]; Stdt Opt)

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; A-F or Aud. Prereq-Fr 2301 or Ger 2301 or Span 2301 or equiv)

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. Language Workshop.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Tchg credentials in a second lang or #)

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 5004. Field Limnology.** (2 cr; A-F or Aud. Prereq-Graduate student or #)

Field measurements on local lakes, streams; research cruise aboard R/V Blue Heron on Lake Superior; laboratory exercises in biological, chemical, geological and physical limnology.

**LIM 5101. Physical Limnology.** (3 cr; A-F or Aud. Prereq-Math 1297, Phys 2012, or grad student, \$5001)

Physical description of lake dynamics including: lake morphometry, water budget, light distribution, circulation, fronts, waves and mixing. Descriptive, mathematical, numerical and data-analysis techniques are used to investigate the various topics.

**LIM 5102. Chemical Limnology.** (3 cr; A-F or Aud. Prereq-Math 1296, Phys 1002 or 1202, Chem 1152 or 1162, or grad student, \$5001)

Organic and inorganic chemistry of natural waters, major and minor ions, pH-Eh relationships, carbon and nutrient cycles, pore water chemistry, sediment chemistry, microbial geochemistry. Offered alternate years.

**LIM 5103. Geological Limnology.** (3 cr; A-F or Aud. Prereq-Math 1296, Phys 1002 or 1202, Chem 1152 or 1162, or grad student, \$5002)

Geological aspects of freshwater systems: origins, tectonic and climatic settings of lakes, geophysical mapping, physical sedimentary processes, sedimentary geochemistry, geochronology and paleolimnology. Offered alternate years

## Linguistics (LING)

### College of Liberal Arts

**LING 1811. Introduction to Language.** (3 cr; A-F or Aud. LE 2)

Theoretical study of the nature of language and its application, including a survey of linguistic science (sound system, structures, words, meaning, first language acquisition, socio-linguistics, and computational linguistics).

**LING 3101. Introduction to Phonology.** (3 cr; A-F or Aud. Prereq-1811 or #)

Survey of the fundamentals of phonology and its place in linguistic science, with emphasis on descriptive analysis.

**LING 3102. Introduction to Syntax.** (3 cr; A-F or Aud. Prereq-1811 or #)

Survey of the fundamentals of syntax, with emphasis on systems for describing, analyzing, and creating natural languages, studied within the development of linguistic science.

**LING 3195. Special Topics:** (Various Titles to be Assigned). (3 cr [max 12 cr]; A-F or Aud. Prereq-1811 or #)

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]; A-F or Aud. Prereq-1811 or #, %)

Directed reading and/or research.

**LING 5195. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 4 cr]; A-F or Aud. Prereq-60 cr)

Subdisciplines such as pragmatics, semantics, regional and social language variation, sociolinguistics, childhood language acquisition, second language learning, language change and linguistic reconstructions, and history of linguistic inquiry.

**LING 5802. Applied Linguistics.** (4 cr; A-F or Aud. Prereq-1811 or #)

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; A-F or Aud. Prereq-1811, 3101, 3102 or #)

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]; A-F or Aud. Prereq-%)

Directed reading and/or research.

## Management Studies (MGTS)

### Labovitz School of Business and Economics

**MGTS 3401. Organizational Behavior and Management.** (3 cr; A-F only. Prereq-LSBE cand or approved non-LSBE bus adm minor or □)

Introduction to organizations, management processes, and understanding human behavior at work. Covers the effects of the external environment, organizational structure, job design, teams, and leadership on employees attitudes, motivation, and behavior.

**MGTS 3491. Independent Study.** (1-3 cr [max 3 cr]; A-F only. Prereq-%)

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.

## Course Descriptions

**MGTS 3497. Organizational Management Internship.** (3 cr; A-F only. Prereq-LSBE cand, consent of internship director)

Work-integrated learning program providing practical experiences within students' major. Students participate in approved program within cooperating businesses, governmental agencies, or civic organizations. Requires minimum of 200 hours work experience, assigned written reports, and performance evaluations.

**MGTS 3801. Human Resource Management.** (3 cr; A-F only. Prereq-LSBE cand or approved non-LSBE bus adm or □)

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 3897. Human Resources Internship.** (3 cr; A-F only. Prereq-LSBE cand, consent of internship director)

Work-integrated learning program providing practical experiences within students' major field. Students participate in approved program with businesses, governmental agencies, or civic organizations. Requires minimum of 200 hours work experience, assigned reports, and performance evaluations.

**MGTS 3997. Management of Community Projects.** (1-3 cr [max 3 cr]; A-F only. Prereq-3401, 3801, LSBE cand or #)

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; A-F only. Prereq-3401, LSBE cand or □)

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; A-F only. Prereq-3401, 3801 or equiv, LSBE cand or grad student or □)

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; A-F only. Prereq-3401, LSBE cand or □)

Nature and character of leadership; traditional and contemporary views of leadership.

**MGTS 4443. Building and Leading Teams in Organizations.** (3 cr; A-F only. Prereq-LSBE candidate, 3401 or #)

Examines effective design and management of a variety of groups in organizations, including work groups, task forces, self-managed teams and coalitions. Covers group composition, goals, processes, and effectiveness; includes leadership, managing external relationships, and performance measurement.

**MGTS 4451. Management Inquiry.** (3 cr; A-F only. Prereq-3401, 3801, approved LSBE cand or □)

Methods employed by organizational specialists in conducting applied inquiry (research) to assist organizational decision making, coupled with an examination of a contemporary management issue. Preparation and written/oral presentation of research findings from student-conducted field, laboratory, or library research projects focused on contemporary management issues.

**MGTS 4461. Business and Society.** (3 cr; A-F only. Prereq-3401, 3801, LSBE cand or □)

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 4472. Entrepreneurship.** (3 cr; A-F only. Prereq-LSBE cand or □)

Seminar on the fundamentals of entrepreneurship, the characteristics of entrepreneurs, and the life cycle of a new venture: creating and starting a new venture; financing the new venture; managing, growing, and ending the new venture.

**MGTS 4473. Management of Innovation and Technology.** (3 cr; A-F only. Prereq-3401, LSBE cand or □)

Issues related to achieving maximum leverage from innovation competencies, skills, and resources. Factors distinguishing high-innovation companies, strategies for innovation, internal and external conditions, and market consequences of innovation. Integration of technology within the strategic management process.

**MGTS 4474. International Management.** (3 cr; A-F only. Prereq-3401, LSBE candidate or □)

Differences in culture, history, resources, etc. are explored in the context of managing global businesses and workforce. Students will reflect on their own managerial skills, and develop skills to become a global manager.

**MGTS 4475. Negotiations, Bargaining and Conflict Resolution.** (3 cr; A-F only. Prereq-LSBE candidate, 3401 or #)

Combines analytical material on the negotiation process, with a series of negotiating experiences, to develop your understanding of, and skills in, negotiating and resolving conflicts in business. Covers topics and strategies appropriate for use between people, departments, organizations and countries, across a variety of industries.

**MGTS 4481. Strategic Management.** (3 cr; A-F only. Prereq-3401, 3701, FMIS 3301, FMIS 3601, 90 cr, LSBE cand or □; no Grad School credit)

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 4483. Cooperative Strategy and Strategic Alliances.** (3 cr; A-F only. Prereq-LSBE candidate, 3401, 4481 preferred or #)

Introduces the concept that firms are engaged in cooperative as well as competitive relationships. Creates understanding for the nature of strategic alliances-forming, negotiating, operating, evaluating-in an international context.

**MGTS 4495. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 9 cr]; A-F only. Prereq-LSBE cand, 3401 or □)

Enables students, working closely with the instructional faculty, to explore one or more contemporary organization management issues in substantial depth.

**MGTS 4821. Staffing Work Organizations.** (3 cr; A-F only. Prereq-3801, LSBE cand or □)

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; A-F only. Prereq-3801, LSBE cand or □)

Theory, design, and practice of employee compensation systems. Impacts of compensation, economic and institutional forces influencing employer compensation policies and practices, supplemental forms of compensation and administrative practices.

**MGTS 4841. Training and Development.** (3 cr; A-F only. Prereq-3801, LSBE cand or □)

Elements of training and development program planning and delivery: learning theories and approaches, needs assessment, training objectives, design, training methods, transfer-of-training strategies, and evaluation. Assess, design, and evaluate human resource development systems. Develop training skills and techniques.

**MGTS 4851. Unions and Collective Bargaining.** (3 cr; A-F only. Prereq-3801, LSBE cand 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 4861. International Human Resource Management.** (3 cr; A-F only. Prereq-3801, LSBE candidate or #)

Course combines theories of culture with HRM applications to develop students' awareness cultural issues as they apply in the workplace.

**MGTS 4881. Human Resource Issues and Trends.** (3 cr; A-F only. Prereq-3801, LSBE cand or □)

Integrative, problem-solving approaches to contemporary human resource challenges, with emphasis on employment law.

**MGTS 4895. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 9 cr]; A-F only. Prereq-LSBE cand, 3801 or □)

Enables students, working closely with the instructional faculty, to explore one or more contemporary human resource management issues in substantial depth.

## Marketing (MKTG)

### Labovitz School of Business and Economics

**MKTG 3701. Principles of Marketing.** (3 cr; A-F only. Prereq-LSBE cand or approved non-LSBE bus adm minor or o; \$MgtS 3701)

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.

**MKTG 3711. Marketing Research.** (3 cr; A-F only. Prereq-MGTS 3701 or MKTG 3701, LSBE cand or o; \$MgtS 3711)

Emphasis on improving skills of conducting secondary research, designing a primary research study, and analyzing and reporting results of a research study.

**MKTG 3741. Fundamentals of Selling.** (3 cr; A-F only. Prereq-MGTS 3701 or MKTG 3701, LSBE cand or o; \$MgtS 3741)

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.

**MKTG 3781. International Marketing.** (3 cr; A-F only. Prereq-MGTS 3701 or MKTG 3701, LSBE cand or o; \$MgtS 3781)

Marketing across national boundaries; effects of foreign economic, legal/political, and sociocultural environments on multinational marketing strategies.

**MKTG 3791. Independent Study.** (1-3 cr [max 3 cr]; A-F only. Prereq-%)

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

**MKTG 3797. Marketing Internship.** (3 cr; A-F or Aud. Prereq-LSBE cand, consent of internship director; \$MgtS 3797)

Work-integrated learning program providing practical experiences within students' major. Students participate in approved program within cooperating businesses, governmental agen-

cies, or civic organizations. Requires minimum of 200 hours work experience, assigned written reports, and performance evaluations.

**MKTG 4711. Business-to-Business Marketing.** (3 cr; A-F only. Prereq-MGTS 3701 or MKTG 3701, LSBE cand or o; \$MgtS 4711)

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.

**MKTG 4721. Advertising and Marketing Communications.** (3 cr; A-F only. Prereq-MGTS 3701 or MKTG 3701, LSBE cand or o; \$MgtS 4721)

Promotional planning. Emphasis on planning for advertising, sales promotion, public relations/publicity, direct marketing, and personal selling. Importance of integrated marketing communications to organizations.

**MKTG 4731. Consumer Behavior.** (3 cr; A-F only. Prereq-MGTS 3701 or MKTG 3701, LSBE cand or o; \$MgtS 4731)

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.

**MKTG 4741. Developing and Marketing New Products.** (3 cr; A-F only. Prereq-MGTS 3701 or MKTG 3701, LSBE cand or o; \$MgtS 4741)

A marketing-oriented new products management course that explores the new product development process with a focus on marketing strategies for the planning, development and launch of new products and services.

**MKTG 4751. Retailing.** (3 cr; A-F only. Prereq-3701, LSBE candidate or □, no Grad School cr)

Principles of establishing and operating a retail business. Topics include retail market analysis and research, store layout, retail accounting, merchandise selection and financing, pricing, selling, advertising, budgets and current trends. Emphasis on retail management from a strategic perspective.

**MKTG 4781. Marketing Management and Strategy.** (3 cr; A-F only. Prereq-MGTS 3701 or MKTG 3701, MGTS 3711 or MKTG 3711, 1 other MKTG course, 90 cr, LSBE cand or grad or o; \$MgtS 4781)

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.

**MKTG 4795. Special Topics** (Various Topics to be Assigned). (1-3 cr [max 9 cr]; A-F only. Prereq-LSBE cand, MGTS 3701 or MKTG 3701 or □)

Enables students, working closely with the instructional faculty, to explore one or more contemporary marketing issues in substantial depth.

## Course Descriptions

# Master in Advocacy and Political Leadership (MAPL)

## College of Liberal Arts

**MAPL 5110. Ethics in Politics: Developing a Shared Ethical Code for Involvement in MN Advocacy, Political Life.** (3 cr; A-F only. Prereq-MAPL or Collegiate or Grad School or #)

Develop a shared, rudimentary ethical code for participation in Minnesota advocacy and political life. The exercise in developing the code will be informed by reading a few of the major political/ethical theorists, by dialogue with various political/advocacy figures, and by case studies.

**MAPL 5111. Labor Organizing.** (3 cr; A-F or Aud. Prereq-MAPL or Grad School or Collegiate Grad students or #)

Historical overview of the evolution of modern labor movement, examine the state of organized labor and labor organizing today, and analyze two emerging models of union leadership—social movement leadership and institutional leadership.

**MAPL 5112. Politics of Labor.** (3 cr; A-F or Aud. Prereq-MAPL or Grad School or Collegiate Grad student or #)

Overview of labor's historical involvement in politics, examine different models for building worker power that compliment and at times contradict one another, and analyze the evolution of organized labor's legislative agenda.

**MAPL 5113. Labor and Political Economy.** (3 cr; A-F or Aud. Prereq-MAPL or collegiate grad student or Grad student or #)

Overview of political economy and labor, examine different economic theories, changing economic policies and their impact on workers and labor, and examine specific case studies of political economy: the New Deal/Great Society policies, deindustrialization, monetary policy, globalization, welfare reform and taxation.

**MAPL 5115. Small Community Leadership.** (3 cr; S-N or Aud. Prereq-MAPL or Grad School or Collegiate Grad student or #)

Engages students in essential questions relating to the practice of effective small community leadership: What is leadership and its relationship to community building? What is good leadership and how do community leaders develop/maintain it?

**MAPL 5116. Rural Politics and Community Advocacy.** (3 cr; A-F or Aud. Prereq-MAPL or Grad School or Collegiate Grad Student or #)

Applications to assess operative power structures in rural and small communities, the sources of community cohesion and conflict, and the designing and implementing of effective economic and civic improvement projects and policies.

**MAPL 5117. Urban Policy and Community Organizing.** (3 cr; A-F only. Prereq-MAPL or Collegiate or Grad School students or #)

Focuses on policy issues such as housing, transportation, youth programs, poverty, and economic development, and models and practices for community organizing at the neighborhood level and in urban communities. Students will learn to do research with local community organizations.

**MAPL 5119. Techniques for Nonprofit Advocacy: Nonprofits as Agents of Democracy.** (3 cr; A-F or Aud. Prereq-MAPL or Grad School or Collegiate Grad student or #)

Teaches the purpose of nonprofit associations as agents of democracy to deepen the understanding of the role of nonprofits in facilitating democratic citizenship.

**MAPL 5200. Nonprofits and Civic Engagement.** (3 cr; A-F or Aud. Prereq-MAPL or Grad School or Collegiate Grad student or #)

History, theory and current practice of nonprofits in educating and activating citizens to participate in the public dialogue. Special attention is given to the role of nonprofits as resources to elected and appointed policy makers.

**MAPL 5202. Nonprofits and Government: The Public and Private Partnership.** (3 cr; A-F or Aud. Prereq-MAPL or collegiate grad student or Grad School student or #)

An indepth look at the intersection between non-profits and government. Addresses the origin, growth and future of the relationship between non-profit organizations and the government sector, and current and historical partnerships will be reviewed. Through readings, case studies, and guest lecturers, students will be exposed to the challenges of these partnerships as well as success stories. Students will be exposed to the State and Federal programs related to economic development, housing, and social services. Students will also discuss the devolution of government functions to third parties and private organizations, as well as the associated funding implications.

**MAPL 5301. Campaigns and Elections.** (3 cr; A-F or Aud. Prereq-MAPL or Grad School or Collegiate Grad student or #)

Overview of campaigns and elections, to include both the party nomination process and general elections, at the national, state, and local levels.

**MAPL 5302. Policy and the Media.** (3 cr; A-F or Aud. Prereq-MAPL or Collegiate Grad or Grad School student or #)

Examination of the way policy makers use the media and ways media affects policy. Traditional and new media and media methods regarding current debates framing political issues, media consolidation and role in shaping rather than reporting news are offered.

**MAPL 5303. Lobbying and Intergovernmental Relations.** (3 cr; A-F or Aud. Prereq-MAPL or Grad School or Collegiate Grad student or #)

What and why public policy is being set in Minnesota and Wisconsin, at the statewide, major local and regional levels.

**MAPL 5304. Public Opinion Formation and Measurement.** (3 cr; A-F or Aud. Prereq-MAPL or Grad School or Collegiate Grad student or #)

Explores the question of public opinion in a democracy, examines the public perceptions of U.S. citizens with a focus on Minnesota and Wisconsin residents, and provides an overview of the methods of public opinion gathering and analysis.

**MAPL 5305. Courts and Public Policy.** (3 cr; A-F or Aud. Prereq-MAPL or Grad School or Collegiate Grad student or #)

The extent to which courts, or more precisely lawsuits and court challenges, can be effective agents of social and political change.

**MAPL 5306. Gender and Public Policy.** (3 cr; A-F or Aud. Prereq-MAPL or Collegiate Grad or Grad School student or #)

Explores the politics of gender and public policy in the U.S. and is designed to provide students with a historical and theoretical background on policy formation, and a set of analytical tools applied to policy case studies.

**MAPL 5307. Political and Advocacy Leadership.** (3 cr; A-F or Aud. Prereq-MAPL or Collegiate Grad or Grad School student or #)

Help advocates strengthen abilities to lead wisely, ethically and effectively in political settings. Provides an interdisciplinary framework to explore the principles of power and leadership, and features effective political leaders from Minnesota and Wisconsin who discuss their principles of leadership.

**MAPL 5308. The Impact of Art on Social Change.** (3 cr; A-F or Aud. Prereq-MAPL or Collegiate Grad or Grad School student or #)

Analysis and understanding of how art works influence public perception, political will, social policy. Topics include environmental protection, labor movement, attitudes toward war, civil rights, and gay and lesbian rights. Art forms examined include drama, literature, film, music, photography, painting.

**MAPL 5395. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 9 cr]; A-F or Aud. Prereq-MAPL or Grad School or Collegiate Grad student or #)

Opportunity to explore diverse topics in advocacy, to take advantage of new developments in the field and to explore current issues or events related to advocacy.

**MAPL 6001. Political Process and Public Policy.** (3 cr; Stdnt Opt. Prereq-MAPL student or Grad School or Collegiate Grad student or #)

After allowing students to gain familiarity with the concepts of agenda setting and policy development, this course will trace four different policy changes which have been effected; one nationally, one in Wisconsin and two in Minnesota.

**MAPL 6002. Policy Evaluation.** (3 cr; Stdnt Opt. Prereq-MAPL or Grad School or Collegiate Grad student or #)

Prepares students to understand and, in some cases, to perform, formal evaluations of policy proposals, including cost benefit analysis and other efficacy-based measures. Students will learn that neither public policy nor politics are or can be ethically neutral.

**MAPL 6003. Civic Engagement and Political Cultures.** (3 cr; Stdnt Opt. Prereq-MAPL or Grad School or Collegiate Grad student or #)

Surveying and critiquing the philosophical foundations of American politics, from Jefferson and Madison to Rawls and Martin Luther King. It exams the development of the American political system and the role of social movements and explores political cultures.

**MAPL 6004. Political Organizing and Communication.** (3 cr; Stdnt Opt. Prereq-MAPL or Grad School or Collegiate Grad student or #)

Offers the history and techniques of political organizing and communication, particularly at the grassroots level. Students engage in why and how movements succeed/fail, and apply theoretical and historical analysis of political communication to contemporary policy change.

**MAPL 6008. Advocacy Internship I.** (3 cr; S-N or Aud. Prereq-MAPL student or #, no Grad School cr)

Internship experiences will be offered in the advocacy and political leadership program. Students will have supervised direct experience with an individual or organizational sponsor in advocacy.

**MAPL 6009. Advocacy Internship.** (2 cr [max 4 cr]; S-N or Aud. Prereq-MAPL or #, no Grad School cr)

Internship experiences will be offered in the advocacy and political leadership program. Students will have supervised direct experience with an individual or organizational sponsor in advocacy.

## Master of Business Administration (MBA)

### Labovitz School of Business and Economics

**MBA 8111. Business, Government, and Society.** (2 cr; A-F or Aud. Prereq-MBA student or □)

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; A-F or Aud. Prereq-Econ 2020 or equiv, MBA student or □)

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; A-F or Aud. Prereq-FMIS 3301 or equiv, MBA student or □)

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; No grade. Prereq-Master's student, adviser and DGS consent)

**MBA 8411. Policy Formulation and Implementation.** (3 cr; A-F or Aud. Prereq-8311, 8611, 8711, 8811, MBA student or □)

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; A-F or Aud. Prereq-Acct 2005 or equiv, MBA student or □)

Interpreting and using accounting reports and supplementary information for management planning, coordination, and control; emphasis on using accounting information for decision making in problems of product mix, cost-volume-profit analysis, and other profit planning and control areas.

**MBA 8512. Managerial Economics.** (2 cr; A-F or Aud. Prereq-Econ 1022, Econ 1023 or equiv, MBA student or □)

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; A-F or Aud. Prereq-FMIS 3601 or equiv, MBA student or □)

Corporate financial policy. Application of financial theory and decision-making tools.

**MBA 8711. Marketing Management.** (3 cr; A-F or Aud. Prereq-MgtS 3701 or equiv, MBA student or □)

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; A-F or Aud. Prereq-MgtS 3401 or equiv, MBA student or □)

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; A-F or Aud. Prereq-MgtS 3801 or equiv, MBA student or □)

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]; A-F or Aud. Prereq-□)

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]; A-F or Aud. Prereq-MBA student, □)

Directed research.

**MBA 8995. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 8 cr]; A-F or Aud. Prereq-MBA student or □)

Special topics on or integrative, interdisciplinary study of problems in accounting, economics, and business administration.

## Course Descriptions

**MBA 8999. Projects in Business.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-MBA student, □)

Community or campus-based projects involving analysis of an issue or problem in an organization and proposal of a solution. Provides an opportunity for integrative, interdisciplinary study of problems in accounting, economics, and business administration.

## Mathematics (MATH)

### College of Science and Engineering

**MATH 102. Euclidean Geometry.** (0 cr; A-F or Aud. Prereq-High school algebra; the preparatory course fee is equal to 3 credits of resident tuition)

Plane and solid geometry. Brief introduction to analytic geometry. Intended for students who have not taken high school geometry or who need additional background in geometry.

**MATH 1005. College Algebra.** (5 cr; A-F or Aud. Prereq-Math placement or %)

Basic concepts of solving equations and inequalities. Introduction to function concept and graphing. Polynomial, rational, logarithmic, and exponential functions.

**MATH 1007. Algebra Review.** (1 cr; S-N or Aud)

College-level algebra: solving equations and inequalities. Designed for students who need to review high-school algebra topics and/or supplement previous courses, such as College Algebra.

**MATH 1024. Introduction to Contemporary Mathematics.** (3 cr; A-F or Aud. Prereq-1005 or math placement LE 2)

Increases awareness and appreciation of uses, richness, and power of mathematics. Sample topics: graph theory for management science, scheduling, linear programming, statistical sampling and inference, coding information, decision making, voting theory, game theory, geometric growth, symmetry, and patterns.

**MATH 1141. Mathematics for Elementary Education.** (4 cr; A-F or Aud. Prereq-1005 or math placement, pre-elementary education major or %)

Subject matter for effective elementary school teaching.

Problem solving, structure of number systems, and properties of geometric figures. Use of microcomputers in mathematics.

**MATH 1160. Finite Mathematics and Introduction to Calculus.** (5 cr; A-F or Aud. Prereq-1005 or math placement; \$1290, 1296 LE 2)

Elementary functions, matrices, 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; A-F or Aud. Prereq-Freshman, fewer than 30 cr. LE 2)

Concepts from mathematics/statistics and their areas of use. See Class Schedule for topics.

**MATH 1250. Precalculus Analysis.** (4 cr; A-F or Aud. Prereq-A grade of at least C- in 1005 or math placement LE 2)

Inequalities, analytical geometry; relations, functions, and graphs; exponential, logarithmic, and trigonometric functions; complex numbers and De Moivre's Theorem; permutations, combinations, binomial theorem, and mathematical induction.

**MATH 1290. Calculus for the Natural Sciences.** (5 cr; A-F or Aud. Prereq-1250 or math placement; \$1296 or 1596 LE 2)

Differential and integral calculus needed for modeling in earth and life sciences. Computational software. Not intended for students in mathematics, engineering, or physical sciences.

**MATH 1296. Calculus I.** (5 cr; A-F or Aud. Prereq-3 1/2 yrs high school algebra or trig or geometry or college precalc course, a grade of at least C- in 1250 or math placement, \$1290 or 1596 LE 2)

First part of a standard introduction to calculus of functions of a single variable. Limits, continuity, derivatives, integrals, and their applications.

**MATH 1297. Calculus II.** (5 cr; A-F or Aud. Prereq-A grade of at least C- in 1290 or 1296 or 1596)

Second part of a standard introduction to calculus. Vectors, applications of integrals, transcendental functions, series, and multivariable functions and partial derivatives.

**MATH 1596. Honors: Calculus I.** (5 cr; A-F or Aud. Prereq-1250 or 3 1/2 years high school mathematics including trigonometry,%; \$1290, 1296 LE 2)

First part of standard introduction to calculus of functions of single variable. Limits, continuity, derivatives, integrals, and their applications, indeterminate forms. Same as Math 1296, but with more depth, rigor, more challenging assignments. For high-ability students with excellent preparation.

**MATH 1597. Honors: Calculus II.** (5 cr; A-F or Aud. Prereq-1596 or a grade of A in 1290 or 1296,%; \$1297)

Same as Math 1297, but with more depth, rigor, and challenging assignments. Techniques of integration, transcendental functions, exponentials and logarithms, infinite sequences and series, vectors, partial differentiation, and applications. Intended for high-ability students with excellent preparation.

**MATH 2326. Introduction to Linear Algebra and Mathematical Reasoning.** (3 cr; A-F or Aud. Prereq-1290 or 1296 or 1596)

Mathematical reasoning, including direct proofs, indirect proofs, proofs by contradiction, and counterexamples. Systems of linear equations; matrix algebra; determinants; an introduction to vector spaces, subspaces, linear independence, span, basis; change of coordinates, matrix transformations, eigenvalues, eigenvectors, and orthogonal projections.

**MATH 3091. Independent Study.** (1-3 cr [max 8 cr]; A-F or Aud. Prereq-%)

Directed reading and/or research in mathematics. Must be arranged with instructor and department head before registration.

**MATH 3097. Internship.** (1-3 cr [max 3 cr]; S-N or Aud. Prereq-Math major, %)

Practical, independent project in commercial, government, or industrial setting. Department approval required before beginning project.

**MATH 3110. Foundations of Mathematics and Geometry.** (4 cr; A-F or Aud. Prereq-1297 or 1597, teaching math major)

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]; S-N or Aud. Prereq-1290 or 1296 or 1596, SSP 3003, #)

Primarily for 1xxx mathematics courses, under supervision of mathematics department member.

**MATH 3280. Differential Equations with Linear Algebra.** (4 cr; A-F or Aud. Prereq-A grade of at least C- in 1297 or 1597)

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; A-F or Aud. Prereq-A grade of at least C- in 1297 or 1597)

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; A-F or Aud. Prereq-1297 or 1597)

In-depth study of fundamental notions such as limit, convergence, continuity, differentiability, and integrability on which all reflective study of calculus must rest.

**MATH 3355. Discrete Mathematics.** (4 cr; A-F or Aud. Prereq-1297 or 1597 or #) 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; S-N or Aud. Prereq-Math major or minor; % must regis during sem of 16th point)

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 4230. Applied Mathematics: Complex Variables.** (3 cr; A-F or Aud. Prereq-3280)

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; A-F or Aud. Prereq-3280)

Laplace transform; Fourier series, integrals, and transforms; Sturm-Liouville operator- and boundary-value problems; orthogonal functions; operator solutions of partial differential equations.

**MATH 4326. Linear Algebra.** (3 cr; A-F or Aud. Prereq-A grade of at least C- in 3280, [3299 or 3355], 3 cr Math/Stat above 3120; no Grad School cr)

Systems of linear equations, matrix algebra, determinants, vector spaces, subspaces, linear independence, span, basis, coordinates, linear transformations, matrix representations of linear transformations, eigenvalues and eigenvectors, diagonalization, Gram-Schmidt orthogonalization, orthogonal projection and least squares.

**MATH 4371. Introduction to Abstract Algebra.** (3 cr; A-F or Aud. Prereq-3355, 4326 or 3280, teaching math major, cannot be used for math major elective; no Grad School cr)

Introduction to groups and rings appropriate for students majoring in teaching mathematics.

**MATH 5110. Foundations of Secondary-level Mathematics: Algebra.** (3 cr; A-F or Aud. Prereq-4326 or mathematics teaching license or #)

Advanced pre-service and in-service secondary mathematics teachers. Secondary mathematics from a higher perspective: definitions, history, and machinery of functions; concept of and solving equations; algebraic structures; congruence transformation; symmetry; similar figures; distances within figures; relationship among area, volume, and dimension.

**MATH 5120. Foundations of Secondary-level Mathematics: Analysis.** (3 cr; A-F or Aud. Prereq-4326 or mathematics teaching license or #)

Real and complex numbers; natural numbers, induction, and recursion; divisibility properties of the integers and polynomials; systems of modular arithmetic; number fields; angle measure and the trigonometric ratios; trigonometric functions and their connections; cartesian model for Euclidean Geometry.

**MATH 5201. Real Variables.** (4 cr; A-F or Aud. Prereq-3299)

Limits, sequence and series of real numbers, tests for convergence, rearrangements, summability, and the class L-SQUARED. Metric spaces; continuous functions, connectedness, completeness, compactness. Banach fixed-point theorem and Picard existence theorem for differential equations.

**MATH 5233. Mathematical Foundations of Bioinformatics.** (3 cr; A-F or Aud. Prereq-Any two of the following: Biol 5233, Math 3355, CS 1511, Stat 3611 or #) Mathematical, algorithmic, and computational foundations of common tools used in genomics and proteomics. Topics include: sequence alignment algorithms and implementations (Needleman-Wunsch, Smith-Waterman, BLAST, Clustal), scoring matrices (PAM, BLOSUM), statistics of DNA sequences (SNPs, CpG islands, isochores, satellites), and phylogenetic

tree methods (UPGMA, parsimony, maximum likelihood). Other topics will be covered as time permits: RNA and protein structure prediction, microarray analysis, post-translational modification prediction, gene regulatory dynamics, and whole-genome sequencing techniques.

**MATH 5260. Dynamical Systems.** (3 cr; Stdnt Opt. Prereq-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.

**MATH 5270. Modeling with Dynamical Systems.** (3 cr; Stdnt Opt. Prereq-3280)

Application and analysis of continuous and discrete dynamical systems. Model construction, simulation, and interpretation.

**MATH 5280. Partial Differential Equations.** (3 cr; A-F or Aud. Prereq-A grade of at least C- in 3280 or grad standing)

Introduction, emphasizing use of Fourier series, Green's functions, and other classical techniques.

**MATH 5327. Advanced Linear Algebra.** (3 cr; A-F or Aud. Prereq-Graduate student or #)

Vector spaces over fields, subspaces, linear transformations, matrix representations, change of basis, inner-product spaces, singular value decomposition, eigenspaces, diagonalizability, annihilating polynomials, Jordan form.

**MATH 5330. Theory of Numbers.** (3 cr; A-F or Aud. Prereq-3355 or #)

Properties of integers, primes, divisibility, congruences, and quadratic reciprocity. Computational aspects include factoring algorithms and RSA cryptosystem.

**MATH 5365. Graph Theory.** (3 cr; A-F or Aud. Prereq-3355 or #)

Finite graphs, including trees, connectivity, traversability, planarity, colorability, labeling, and matchings.

**MATH 5366. Enumerative Combinatorics.** (3 cr; A-F or Aud. Prereq-3355)

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; A-F or Aud. Prereq-3355 or 4326 or grad standing or #)

Introduction to groups and rings and their applications.

**MATH 5372. Abstract Algebra II.** (3 cr; A-F or Aud. Prereq-3355 or #)

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

**MATH 5384. Algebraic Coding Theory.** (3 cr; A-F or Aud. Prereq-3355 or #)

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.

**MATH 5810. Linear Programming.** (3 cr; A-F or Aud. Prereq-3280 or 4326)

Motivation problems, modeling, theory of simplex method, duality and sensitivity analysis, large-scale problems, complexity, and Karmarkar algorithm.

**MATH 5830. Numerical Analysis: Approximation and Quadrature.** (4 cr; Stdnt Opt. Prereq-3280 or 4326, proficiency in FORTRAN or C or C++)

Error analysis, interpolation and approximation, numerical integration, solution of nonlinear systems.

**MATH 5840. Numerical Analysis: Systems and Optimization.** (4 cr; Stdnt Opt. Prereq-3280 or 4326, proficiency in FORTRAN or C or C++)

Solution of systems of linear equations; elimination and factorization methods; iterative methods; error analysis; eigenvalue/eigenvector approximation; unconstrained optimization; nonlinear least squares.

## Course Descriptions

**MATH 5850. Numerical Differential Equations.** (4 cr; A-F or Aud. Prereq-3280, proficiency in FORTRAN or C or C++)

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

**MATH 5991. Independent Study.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-%; Max 6 cr to a Grad School program)

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]; A-F or Aud. Prereq-%)

Topics not available in standard curriculum.

**MATH 8201. Real Analysis.** (3 cr; A-F or Aud. Prereq-5201)

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; No grade. Prereq-Master's student, adviser and DGS consent)

**MATH 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**MATH 8811. Mathematics Seminar.** (3 cr; S-N or Aud. Prereq-8980)

Applications of mathematical and computational modeling methods; high-performance computation, visualization, and modeling techniques. Case-study analyses of models from areas such as the sciences, medicine, engineering, and industry.

**MATH 8980. Graduate Seminar.** (1 cr; A-F or Aud. Prereq-#)

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]; A-F or Aud. Prereq-#)

## Mechanical Engineering (ME)

### College of Science and Engineering

**ME 3111. Fluid Mechanics.** (3 cr; A-F or Aud. Prereq-Engr 2026, BSME or BSChE cand or #; §IE 3111)

Mass and energy balances, Bernoulli's Equation, momentum balance, laminar and turbulent flow, boundary layer theory, flow through porous media.

**ME 3140. System Dynamics and Control.** (3 cr; A-F or Aud. Prereq-CS 1121 or 1131 or 1211 or 1511 or 2121, ECE 2006, Math 3298, BSME cand or #)

Mathematical modeling of mechanical, electrical, thermal, fluid, and hybrid systems. System response using numerical integration and Laplace transforms. Fourier transform and convolution. Transfer functions and frequency response. Classical control theory.

**ME 3211. Thermodynamics.** (3 cr; A-F or Aud. Prereq-Phys 2012, ME 3111, BSME cand or #)

Thermodynamics, thermodynamic properties of liquids and gases, 1st and 2nd laws of thermodynamics, irreversibility and entropy. Carnot systems, work producing systems, combustion engine cycles, work absorbing systems, refrigeration cycles, psychrometrics.

**ME 3222. Controls and Kinematics Laboratory.** (2 cr; A-F only. Prereq-3140 with a grade of C- or better, IE 3122, [P]3230; §IE 4135 and/or ME 4135)

Perform computer simulations and hands on laboratory exercises to explore effective control systems design. Robotic programming exercises using industrial robots will be performed. Design and construction of mechatronic devices will be completed.

**ME 3230. Kinematics and Mechatronics.** (3 cr; A-F only. Prereq-3140, [P]3230, §3230 or 4135)

Classical closed and open form kinematics modeling will be developed. Use of Denavit Hartenberg structural analysis will be explored. Kinetic models of structures will be developed. Explores the design and use of mechatronic devices.

**ME 4112. Heat and Mass Transfer.** (3 cr; A-F or Aud. Prereq-3211, Math 3298, BSME or BSChE cand or #, §CHE 3112)

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

**ME 4122. Heat Transfer, Thermodynamics and Fluid Mechanics Laboratory.** (2 cr; A-F or Aud. Prereq-[P]4112 or CHE 3112 or #, BSME cand)

Heat transfer and Thermo-Fluids lab, experimental evaluation of conductive, convective and radiation heat transfer, and analysis of performance of various energy systems such as compressors, turbines, fans, refrigerators and combustion engines.

**ME 4135. Robotics and Controls.** (4 cr; A-F or Aud. Prereq-CS 1121 or CS 1511 or CS 1131 or CS 1211 or CS 2121, ECE 2006, Math 3298, Engr 2026, BSME or BSIE candidate or #; §IE 4135)

Exploration of Forward and Inverse Kinematics models for individual robots. Study of robot motion trajectories at the micro- and macroscopic level. Study of PE, PD and PID controllers for robots. Exploration of efficient methods for developing stable controllers for various geometric configurations. Laboratory exercises and final group project to demonstrate mastery of the subject matter.

**ME 4145. CAD/CAM.** (4 cr; A-F or Aud. Prereq-Engr 2016, BSIE International Engineering, or BSME cand, or #, §IE 4145)

Description of hardware for CAD/CAM, principles of solie modeling, data structures, visualization, calculation of mass properties, surface modeling. Introduction to FEM usage, lab use of CAD/CAM system for solid modeling, cutter path generation, and FEM problems in vibration, stress analysis.

**ME 4175. Machine Design.** (3 cr; A-F or Aud. Prereq-Engr 2016, Engr 2110, BSME cand or #; §IE 4175)

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.

**ME 4196. Cooperative Education.** (1 cr; A-F or Aud. Prereq-BSME cand, #, no Grad School credit; §IE 4196)

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.

**ME 4245. Machining and Machine Tools.** (4 cr; A-F or Aud. Prereq-IE 1225, Engr 2016, BSIE or BSME cand; §IE 3245)

Metal cutting theory, aspects of tool design, fastener and power screw threads, machine tool design: mechanical and electrical, digital control theory for machine tools. Lab experiments in metal cutting, laser metrology, and manual programming of CNC machine tools.

**ME 4255. Multidisciplinary Senior Design.** (4 cr; A-F or Aud. Prereq-EMgt 4110, BSME cand, or #; no Grad School credit; §IE 4255)

Capstone design course in mechanical engineering. Project Management, problem definition, root cause analysis, baseline analysis, alternative solutions, analysis, reporting. Societal, economic, ethical, environmental, political considerations. Oral and written reports. Work is in teams focused on industrial or competition-based projects.

**ME 4491. Independent Study in Mechanical Engineering.** (1-4 cr [max 4 cr]; Stdnt Opt; Prereq-Sr standing in engineering discipline, #)

Directed study of special interest topics not available in standard curriculum. Must be arranged with instructor before registration. May include readings, research and/or special projects.

**ME 4495. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 12 cr]; A-F or Aud. Prereq-BSME cand or #)

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

**ME 5305. Computational Fluid Dynamics.** (3 cr; A-F only. Prereq-[P]4112 or ChE 3112, BSChE, or BSME or BSIE candidate or %)

Finite-difference methods for steady and transient diffusion and convection-diffusion problems. Finite-volume technique for the solution of multi-dimensional fluid flow, and heat and mass transfer problems. Utilize CFD software to solve complex problems.

**ME 5315. Nondestructive Evaluation of Engineering Materials.** (3 cr; A-F only. Prereq-Phys 2012, Engr 2110, Stat 3411)

Fundamentals of Ultrasonic and Acoustic Emission NDE are considered including wave propagation, experimental measurement systems, flaw detection and characterization, and material characterization. Labs are used to support the study of ultrasonic and acoustic emission NDE. Other NDE techniques including magnetics, penetrants, eddy currents, thermography, are surveyed.

**ME 5325. Sustainable Energy System.** (3 cr; A-F only. Prereq-Min 90 cr, BSChE or BSECE or BSIE or BSME candidate. pr %)

A comparison of different energy systems will be made in terms of economic, environmental and political implications. Specific energy alternatives will include coal, oil, geothermal, bioenergy, solar, wind, fission, fusion, hydrogen, fuel cell.

**ME 5335. Introduction to Finite Element Analysis.** (3 cr; A-F only. Prereq-Engr 2016, BSME or BBSIE or MSEM candidate or %)

An introduction to finite element analysis, including theoretical and applied components in mechanical and thermal systems.

**ME 5991. Independent Study in Mechanical Engineering.** (1-4 cr [max 6 cr]; Stdnt Opt; Prereq-MSEM can, %)

Directed study of special interest topics not available in standard curriculum. Must be arranged with instructor before registration. May include readings, research and/or special projects.

## Medical and Molecular Physiology (PHSL)

### School of Medicine

**PHSL 3011. General Physiology.** (4 cr; A-F or Aud. Prereq-Biol 1761 or Chem 1102 or #)

Lectures and demonstrations illustrate key aspects of function and mechanisms of action of major organ systems. Primarily for students preparing for nursing, dental hygiene, pre-professional programs, communication disorders, life science teaching, majors in natural sciences.

**PHSL 5211. Literature Seminar.** (1-2 cr [max 2 cr]; S-N or Aud)

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 [max 3 cr]; Stdnt Opt. Prereq-#)

Topics in physiology selected for each student; written reviews prepared and discussed.

**PHSL 5294. Research in Physiology.** (1-15 cr [max 15 cr]; Stdnt Opt. Prereq-#)

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; A-F or Aud. Prereq-Biol 2101 or Biol 2201 or Chem 3322 or 4341 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; A-F or Aud. Prereq-5601 or #)

Advanced study of organ system functions in context of interaction of organism with environment.

**PHSL 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master s student, adviser and DGS consent)

**PHSL 8401. Physiology of Aging.** (2 cr; Stdnt Opt. Prereq-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; A-F or Aud. Prereq-5601, #)

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. Special Topics:** (Various Titles to be Assigned). (2 cr; Stdnt Opt. Prereq-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; Stdnt Opt. Prereq-5601, #)

In-depth, quantitative approach to transport processes in biological systems.

**PHSL 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**PHSL 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Max 6 cr per semester or summer; doctoral student who has not passed prelim oral; no required consent for the first two registrations up to 12 cr; departmental consent for the third and fourth registrations up to an additional 12 cr, or 24 cr total (for doctoral students admitted summer 2007 and beyond; doctoral students admitted prior to summer 2007 may register up to 4 times totaling 60 cr))

**PHSL 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**PHSL 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

## Medical Microbiology and Immunology (MICB)

### School of Medicine

**MICB 5545. Immunobiology.** (3 cr; A-F or Aud. Prereq-%)

The immune system including the cells and molecules which work cooperatively to resist disease and aberrations resulting in immune disorders.

**MICB 5555. Molecular Pathogenesis: Current Concepts.** (3 cr; A-F or Aud. Prereq-Biol 2201 or equiv, Biol 4501 or equivalent or #)

Study of current discoveries in microbial pathogenesis and the molecular techniques used in elucidating pathogenic mechanisms of viral, bacterial and parasitic agents. A survey of current literature related to human infectious disease including malignant transformation.

## Course Descriptions

**MICB 5591. Problems in Medical Microbiology and Immunology.** (1-4 cr [max 8 cr]; Stdn Opt. Prereq-Open to med students or qualified upper div and grad students with #)

Independent study on tutorial basis. Emphasis on basic and clinical microbiology problems, 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; No grade. Prereq-Master s student, adviser and DGS consent)

**MICB 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**MICB 8554. Advanced Immunology and Immunobiology.** (2 cr; A-F or Aud. Prereq-5545 or #)

Detailed study of mechanisms involved in immunologic defense. Emphasis on concepts and current literature.

**MICB 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**MICB 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

## Medicine (MED)

### School of Medicine

**MED 601. Basic Science I.** (0 cr; P-N or Aud. Prereq-Regis Med Student)

For selected medical students working toward an M.D. who are doing continuing work in their first year. Students must be recommended by the Scholastic Standing Committee or associate dean for student affairs. May be repeated.

**MED 602. Basic Science II.** (0 cr; P-N or Aud. Prereq-Regis Med Student)

For selected students working towards an M.D. who are doing continuing work in their second year. Students must be recommended by the Scholastic Standing Committee or associate dean for student affairs. May be repeated.

**MED 691. Independent Study.** (0 cr; P-N or Aud. Prereq-Regis Med Student)

For selected medical students working toward an M.D. who are pursuing independent study (e.g., remedial coursework, repeating a course, medical leave). Students must be recommended by the Scholastic Standing Committee or associate dean for student affairs.

**MED 693. Directed Study.** (0 cr; P-N or Aud. Prereq-Regis Med Student)

For selected medical students working toward an M.D. who are in a supervised program preparing for the National Boards Exam. Students must be recommended by the Scholastic Standing Committee or associate dean for student affairs.

**MED 694. Research.** (0 cr; P-N or Aud. Prereq-Regis Med Student)

For selected medical students working toward an M.D. who are doing research over an extended period of time. Students must be recommended by the Scholastic Standing Committee or associate dean for student affairs. May be repeated.

**MED 3998. Human Biology and Behavior Topics.** (1-10 cr [max 12 cr]; Stdn Opt. Prereq-#)

Advanced undergraduate or graduate students can study in depth normal human biology and behavior. During the academic year, students may elect to enroll in one or several subtopics. No basic science clinical correlation.

**MED 6023. Seminars in Indian Health.** (1-2 cr [max 3 cr]; P-N or Aud. Prereq-Regis med student, social work student with #)

Current issues impacting health of Indian people. Causes of morbidity and mortality, including social, cultural, and economic issues. Discussion focuses on solutions to problems in context of Indian communities.

**MED 6301. Medical Epidemiology and Biometrics.** (2 cr; P-N only. Prereq-SBhSc 6301, regis med student)

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

**MED 6420. Introduction to Rural Primary Care Medicine.** (2 cr; P-N or Aud. Prereq-Regis med Student)

Introduces medical students to rural medicine and community health assessments through lecture, panel discussions, small group encounters and rural community site visits.

**MED 6505. Applied Anatomy.** (8 cr; O-N or Aud. Prereq-Regis med student)

Adult gross structure taught using regional approach with strong emphasis on functional and clinical applications. Basic-clinical science correlation conferences held frequently to emphasize applied anatomy of a region.

**MED 6510. Histopathology.** (6 cr; O-N or Aud. Prereq-Regis med)

Integrated course correlating normal structure and function of cells, tissues, and organs of the body with examples of pathological changes that take place within these cells, tissues, and organs during disease processes.

**MED 6520. Principles of Basic Medical Science.** (9 cr [max 12 cr]; O-N only. Prereq-Regis med student)

Introduction to cellular homeostatic principles and mechanisms associated with normal and abnormal structure and function. Basic science principles of integrative medical sciences. Interdisciplinary sessions emphasize fundamental concepts of biochemistry, molecular biology, anatomy, microbiology, physiology, and pharmacology.

**MED 6541. Hematopoiesis and Host Defenses.** (9 cr; O-N or Aud. Prereq-Regis med student)

Introduction to principles of human immunology and hematology. Basic science principles, including pharmacology and pathology together with clinical aspects of innate and acquired immunity within context of hematolympho-reticular system.

**MED 6566. Cardiovascular System.** (7 cr; O-N only. Prereq-Regis med student)

Integrated comprehensive overview of cardiovascular system. Anatomical, biochemical, physiological, pathological, and pharmacological aspects of heart, blood vessels, and blood, including histology, embryology, anatomy, gross and microscopic pathology, as well as clinical features, diagnosis, and pharmacological therapy.

**MED 6573. Nervous System.** (11 cr; O-N only. Prereq-Regis med student or #)

Interdisciplinary study of human nervous system, including consideration of eye and ear. Basic sciences of anatomy, behavioral science, biochemistry, microbiology, pathology, pharmacology, and physiology correlated with clinical material.

**MED 6724. Gastrointestinal Hepatobiliary System.** (6 cr; O-N only. Prereq-Regis med student)

Interdisciplinary integrative course discusses fundamental concepts of anatomy, physiology, nutrition, pathology, clinical medicine, and microbiology as they relate to issues of gastrointestinal and hepatobiliary system.

**MED 6728. Respiratory System.** (5 cr; O-N only. Prereq-Regis med student)

Maintenance and regulation of human internal environment by the respiratory system. Histology of upper airways and lungs; respiratory gas exchange; introduction to respiratory component of acid-base balance. Integrative lab covering cardiovascular-respiratory adjustments to exercise.

**MED 6746. Fluids and Electrolytes.** (4 cr; O-N or Aud. Prereq-Regis med student)

Introduction to principles and mechanisms associated with human renal and genitourinary function in health and disease. Integrates anatomical, physiological, pharmacological,

pathological, immunological, and basic clinical aspects of renal and genitourinary systems in context of fluid and electrolyte homeostasis.

**MED 6762. Endocrine and Reproductive System.** (5 cr; O-N only. Prereq-Regis med student)

Structure and function of endocrine and reproductive systems. Essential background for understanding findings of clinical medicine related to endocrine regulation of reproduction and homeostasis.

**MED 6773. Integrated Clinical Medicine.** (6 cr; O-N or Aud. Prereq-Regis med student)

Integration of basic, clinical, and behavioral science principles to understand the human body and its integrative function and psychosocial responses, especially in multisystem conditions. Emphasizing evidence-based medicine principles, health issues are explored over the life cycle from pediatrics to geriatrics.

**MED 6788. Dermatology and Musculoskeletal System.** (6 cr; O-N or Aud. Prereq-Regis med student)

Interdisciplinary study of integument and musculoskeletal system. Basic sciences of anatomy, microbiology, pathology, pharmacology, and physiology correlated with clinical material.

**MED 6997. Summer Internship in Medicine.** (3-12 cr [max 12 cr]; P-N or Aud.

Prereq-Regis med, satisfactory completion of first year of medical school, #, no Grad School credit)

Medical students, typically between their first- and second-year of medical school, may elect to participate in either directed clinical experiences in small communities or research studies.

## Music (MU)

### School of Fine Arts

**MU 100. Recital Hour.** (0 cr; S-N only. Prereq-Concurrent registration in applied instruction)

Attendance at scheduled musical events.

**MU 1001. Introduction to Music.** (3 cr; Stdnt Opt. Prereq-Not for music majors or minors LEIP 09)

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

**MU 1003. Beethoven to the Beatles.** (3 cr; Stdnt Opt. LE 9)

Survey of 19th- and 20th-century classical, jazz, rock, pop, and ethnic music genres.

**MU 1005. Jazz Studies.** (3 cr; A-F only. LCD 09)

Evolution of jazz; social problems in America that fostered its origin and continues to shape its development.

**MU 1010. Introductory Theory.** (2 cr [max 4 cr]; A-F only. Prereq-Music major or musical theatre major or [T], [P]1011, §Th 1114, Mu 1111)

Introduction to basic Western theoretical concepts: music reading, key signatures, key signatures, intervals, scale and chord construction, elementary harmonic analysis, basic time signatures and rhythms, form, terminology, elementary keyboard, transposition, and musical communication with other musicians. Prepares students for successful entry into MU 1111 (Tonal Harmony I).

**MU 1011. Introductory Ear-Training and Sight-Singing.** (1 cr [max 2 cr]; A-F only. Prereq-Music major or musical theatre major or [T], [P]1010, §Th 1114, Mu 1112)

Introductory training in hearing and distinguishing musical rhythms, melodies, harmonies, and nuance. Singing, conducting, written dictation, and active body movement to enhance musical performance and to prepare for successful entry into MU 1112 (Ear-Training and Sight Singing I).

**MU 1111. Tonal Harmony I.** (2 cr; A-F only. Prereq-Music major or music minor) Introduction to four-part harmony, Common Practice methods of composition and analysis.

**MU 1112. Ear-Training and Sight-Singing I.** (1 cr; A-F only. Prereq-Music major or music minor)

Introduction to ear-training and sight-singing of tonal music.

**MU 1121. Tonal Harmony II.** (2 cr; A-F only. Prereq-1111)

Continued study of four-part harmon, Common Practice methods of composition and analysis. Introduction to secondary dominants and modulation.

**MU 1122. Ear-Training II.** (1 cr; A-F only. Prereq-1112)

Continued study of ear-training and sight-singing of tonal music.

**MU 1311. Voice.** (1-3 cr [max 18 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 1312. Voice.** (1 cr; A-F or Aud. Prereq-Non-music major or music major secondary instr; may be repeated)

Individual lesson: one-half hour weekly.

**MU 1321. Piano.** (1-3 cr [max 18 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 1322. Piano.** (1 cr; A-F or Aud. Prereq-Non-music major or music major sec instr; may be repeated)

Individual lesson: one-half hour weekly.

**MU 1325. Jazz Piano.** (1-3 cr [max 18 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 1326. Jazz Piano.** (1 cr [max 12 cr]; No grade. Prereq-Non-music major or music major sec instrument)

Individual lesson: one-half hour weekly.

**MU 1328. Jazz Applied.** (1 cr [max 12 cr]; A-F only. Prereq-Non-music major or music major secondary instrument; #)

Individual lesson; 1/2 hour weekly.

**MU 1331. Organ.** (1-3 cr [max 18 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 1332. Organ.** (1 cr; A-F or Aud. Prereq-Non-music major or music major sec instr; may be repeated)

Individual lesson: one-half hour weekly.

**MU 1351. Strings.** (1-3 cr [max 18 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 1352. Strings.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major sec instrument)

Individual lesson: one-half hour weekly.

**MU 1357. Harp.** (1-3 cr [max 18 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 1358. Harp.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major sec instrument)

Individual lesson: one-half hour weekly.

## Course Descriptions

**MU 1361. Woodwinds.** (1-3 cr [max 18 cr]; A-F only. Prereq-Music major, %) Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 1362. Woodwinds.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major sec instrument)

Individual lesson: one-half hour weekly.

**MU 1371. Brass.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 1372. Brass.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major sec instrument)

Individual lesson: one-half hour weekly.

**MU 1381. Percussion.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 1382. Percussion.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major sec instrument)

Individual lesson: one-half hour weekly.

**MU 1391. Classical Guitar.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 1392. Classical Guitar.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major sec instrument)

Individual lesson: one-half hour weekly.

**MU 1395. Jazz Guitar.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 1396. Jazz Guitar.** (1 cr; A-F or Aud)

Individual lesson: one-half hour weekly.

**MU 1398. Pop Styles Guitar.** (1 cr [max 12 cr]; A-F only. Prereq-Non-music major or music major sec instrument)

Individual lesson: one-half hour weekly.

**MU 1411. Diction: Italian and English.** (1 cr; A-F or Aud. Prereq-Principal instr voice or #)

Proper enunciation of English and Italian as applied to vocal literature.

**MU 1412. Diction: German.** (1 cr; A-F or Aud. Prereq-1411 or #)

Proper enunciation of German as applied to vocal literature.

**MU 1413. Diction: French.** (1 cr; A-F or Aud. Prereq-1411 or #)

Proper enunciation of French as applied to vocal literature.

**MU 1421. Piano Class I.** (1 cr; A-F or Aud. Prereq-Music major or #)

Basic piano technique; sight reading, harmonizing melodies, improvisation for music major working toward department piano proficiency requirement.

**MU 1422. Piano Class II.** (1 cr; A-F or Aud. Prereq-Music major or #)

Continuation of piano skills introduced in MU 1421: sight-reading, harmonizing melodies, scale playing, transposition, score reading, improvisation for the music major working toward the departmental piano proficiency requirement.

**MU 1440. Survey of Instrumental Techniques.** (1 cr; A-F or Aud. Prereq-Music major or #)

Pedagogical, technical and acoustical principles of percussion, brass, woodwinds, and strings; direct practical experience with each instrument group.

**MU 1441. Vocal Techniques.** (1 cr; Stdnt Opt. Prereq-Music major or #)

Beginning group instruction in voice and vocal pedagogy; principles of vocal acoustics.

**MU 1442. Percussion Techniques.** (1 cr; A-F or Aud. Prereq-Music major or #)

Beginning group instruction and pedagogy on instruments in the percussion family; principles of percussion acoustics.

**MU 1501. Concert Band.** (1 cr [max 12 cr]; Stdnt Opt. Prereq-Instructor determines placement LE 10)

Study and performance of transcribed and original concert literature.

**MU 1502. Symphonic Wind Ensemble.** (1 cr [max 12 cr]; Stdnt Opt. Prereq-Instructor determines placement LEIP 10)

Study and performance of symphonic wind ensemble and contemporary band literature by a select group.

**MU 1503. Symphony Orchestra.** (1 cr [max 12 cr]; Stdnt Opt. Prereq-Instructor determines placement LEIP 10)

Rehearsal and performance of representative musical literature for symphony orchestra.

**MU 1504. Chamber Orchestra.** (1 cr [max 12 cr]; Stdnt Opt. Prereq-# LE 10)

Rehearsal and performance of chamber orchestra literature.

**MU 1505. Jazz Ensemble.** (1 cr [max 12 cr]; Stdnt Opt. Prereq-Instructor determines placement LECD 10)

Study and performance of large jazz ensemble literature.

**MU 1510. Concert Chorale.** (1 cr [max 12 cr]; Stdnt Opt. Prereq-Instructor determines placement LE 10)

Rehearsal and performance of representative choral literature from a variety of periods and cultures.

**MU 1511. University Singers.** (1 cr [max 12 cr]; Stdnt Opt. Prereq-Instructor determines placement LEIP 10)

A select group for study and performance of distinctive choral literature from diverse historical periods, cultures, and languages. Regional tour usually taken during spring semester. Extended domestic or international tours when possible.

**MU 1512. Chamber Singers.** (1 cr [max 12 cr]; Stdnt Opt. Prereq-[P]1511 or 4511; instructor determines placement LE 10)

Study and performance of vocal chamber music.

**MU 1513. Vocal Jazz Ensemble.** (1 cr [max 12 cr]; Stdnt Opt. Prereq-Instructor determines placement LECD 10)

Study and performance of music for vocal jazz ensemble.

**MU 1541. Chamber Music.** (.5 cr [max 6 cr]; A-F or Aud. Prereq-Instructor determines placement)

Study and performance of chamber music literature, classical and/or jazz.

**MU 1601. Music Fundamentals.** (1 cr; A-F or Aud. Prereq-Pre-ElEd major)

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.** (1 cr; A-F or Aud. Prereq-Music major or #)

Introduction to music notation software and ear-training software.

**MU 2001. Ethnic and Folk Music of the World.** (3 cr; Stdnt Opt. LEIP 09)

Survey of music of selected world cultures.

**MU 2003. Survey of American Music.** (3 cr; Stdnt Opt. LE 9)

American folk, popular, and art music from colonial times to present.

**MU 2005. African Roots of American Music.** (3 cr; Stdnt Opt. LECD 09)

Traditional African music and culture and their influence on American musical styles.

**MU 2105. Composition I.** (2 cr [max 4 cr]; A-F or Aud. Prereq-1121, 1122 or 1102)  
Beginning music composition technique leading to creation of original works.

**MU 2111. Tonal Harmony III.** (2 cr; A-F only. Prereq-1102 or 1121)  
Continued study of tonal theory with an emphasis on late 18th and early 19th century methods of composition and analysis.

**MU 2112. Ear-Training III.** (1 cr; A-F only. Prereq-1102 or 1122)  
Continued study of ear-training and sight-singing of tonal music.

**MU 2121. Tonal Harmony IV.** (2 cr; A-F only. Prereq-2111)  
Continued study of tonal theory with an emphasis on 19th century methods of composition and an introduction to 20th century and contemporary modes of musical organization.

**MU 2122. Ear-Training and Sight Singing IV.** (1 cr; A-F only. Prereq-2112)  
Continued study of ear-training and sight-singing of tonal and an introduction to post-tonal music.

**MU 2422. Piano Proficiency Preparation.** (1 cr [max 2 cr]; A-F only. Prereq-Music major, [T])

For students who have completed 1422 or studied piano privately, this course provides training in specific skills required by the departmental piano proficiency exam.

**MU 2443. Woodwind Techniques I.** (1 cr; A-F or Aud. Prereq-Music major or #)  
Beginning group instruction and pedagogy on single reed instruments; principles of woodwind acoustics.

**MU 2444. Woodwind Techniques II.** (1 cr; A-F or Aud. Prereq-Music major or #)  
Beginning group instruction and pedagogy on double reed instruments; principles of double reed acoustics.

**MU 2445. String Techniques I.** (1 cr; A-F or Aud. Prereq-Music major or #)  
Beginning group instruction and pedagogy on high string instruments; acoustic principles for strings.

**MU 2446. String Techniques II.** (1 cr; A-F or Aud. Prereq-Music major or #)  
Beginning group instruction and pedagogy on low string instruments; acoustic principles for strings.

**MU 2447. Brass Techniques I.** (1 cr; A-F or Aud. Prereq-Music major or #)  
Beginning group instruction and pedagogy on high brass instruments; acoustic principles for brass instruments.

**MU 2448. Brass Techniques II.** (1 cr; A-F or Aud. Prereq-Music major or #)  
Beginning group instruction and pedagogy on low brass instruments; acoustic principles for brass instruments.

**MU 2605. Introduction to Music Education.** (1 cr; A-F or Aud. Prereq-Music Ed major or #)  
Introduction to the music education profession; includes career options, history of the profession, professional writings, current research.

**MU 2624. Group Piano Teaching Techniques.** (2 cr; A-F or Aud. Prereq-Music major or #)

Study of recognized group piano curricula and materials; discussion of significant research. Group keyboard teaching (various ages) in a lab setting.

**MU 2701. Fundamentals of Conducting.** (1 cr; A-F or Aud. Prereq-1102 or [1121,1122], Music major or #)

Beginning instruction in leading musical ensembles: meter patterns, conventional gestures, instrumental transposition, choral techniques.

**MU 2801. Improvisation.** (1 cr; A-F or Aud. Prereq-1102 or [1121, 1122])  
Introduction to basic principles and techniques.

**MU 2802. Jazz Improvisation I.** (1 cr; A-F or Aud. Prereq-2801)  
Beginning techniques and concepts.

**MU 2803. Jazz Improvisation II.** (1 cr; A-F or Aud. Prereq-2101, 2801 or #)  
Study and development of improvisational facility as used in the jazz idiom.

**MU 2901. Recording Techniques and Methods.** (2 cr; A-F only. Prereq-Music major or #)  
The study of sound, hearing, and the aesthetics of audio recording as applied to recording processes and technologies (microphones, recording systems, digital signal processing, editing, and synchronization techniques). Recording studio techniques (mixing, multi-track recording, production), and digital audio workstation application.

**MU 2911. Electronic Composition I.** (2 cr; A-F only. Prereq-#)  
Introduction to composing using only digital resources. Understanding the electronic composition workstation environment, basic MIDI sequencing, virtual instruments, electronic transcription of engraved scores, and synthesis.

**MU 2912. Electronic Composition II.** (2 cr; A-F only. Prereq-2911 or #)  
Continued study of composition using primarily digital resources. Advanced MIDI sequencing and processing, recording live-to-virtual instruments, handling complex workflow, and orchestration with synthetic sound courses. Introduction to scoring of video and computer music.

**MU 3101. Form and Analysis.** (2 cr; A-F or Aud. Prereq-[2121, 2122] or 2102)  
Overview of form in music; structure from Renaissance through 20th-century.

**MU 3105. Composition II.** (2 cr [max 4 cr]; A-F or Aud. Prereq-2105)  
Continued study of musical composition techniques leading to creation of original works.

**MU 3201. Music History I.** (4 cr; A-F or Aud. Prereq-2121, 2122 or 2102 or #)  
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; A-F or Aud. Prereq-3201 or #)  
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; A-F or Aud. Prereq-1102 or [1121, 1122], music major or #)  
Survey of art song, emphasizing German, French, and English compositions and composers.

**MU 3212. Opera Literature.** (2 cr; A-F or Aud. Prereq-1102 or [1121, 1122], music major or #)  
Survey of opera solo and ensemble literature from Italian, German, French, English, and American traditions.

**MU 3300. Recital.** (1 cr [max 3 cr]; A-F or Aud. Prereq-%, may be repeated)  
Preparation and presentation of a solo performance.

**MU 3510. Opera Studio.** (1 cr; A-F or Aud. Prereq-#, may be repeated)  
Production techniques and performances of solo and ensemble opera literature.

**MU 3511. Performance Practicum.** (1-2 cr [max 2 cr]; A-F or Aud. Prereq-Music major, #)  
Performance of significant role in a musical production.

**MU 3601. Elementary School Music Teaching.** (2 cr; A-F or Aud. Prereq-Elem/ middle educ major)

Methods and materials for teaching music in elementary school classroom. Philosophy of music education, curriculum design, lesson planning, implementation, evaluation, integrated arts experiences.

## Course Descriptions

**MU 3605. Teaching Classroom Music.** (4 cr; A-F or Aud. Prereq-60 cr, music ed major or #)

Philosophy, theory, techniques of instruction for general classroom music, grades K-12.

**MU 3606. Field Experience: Classroom Music Pre K-8.** (1 cr; A-F or Aud. Prereq-60 cr, music ed major. [P]3605 or #, \$EEd 3425)

Observations and micro-teaching in general music classrooms grades Pre-K through 8. Supervised by music education faculty member from the department of music, in cooperation with general music teachers.

**MU 3607. Instrumental Music Methods.** (3 cr; A-F or Aud. Prereq-60 cr, music major or #)

Methods and materials for teaching instrumental students in the secondary setting: role and extent of instrumental music in the school curriculum, philosophies and current trends in instrumental music education, recruiting, scheduling, administrative tasks, literature, organizing and training athletic bands.

**MU 3627. Art of Accompanying: Vocal Music.** (2 cr; A-F or Aud. Prereq-#)

Vocal accompanying (art song, recitative and aria, choral music, and functional skills (e.g., score reading, keyboard harmony). Vocal coaching techniques, listening to standard vocal repertoire, performance.

**MU 3628. Art of Accompanying: Instrumental Music.** (2 cr; A-F or Aud. Prereq-#)

Instrumental accompanying (strings, brass, and woodwinds) and functional skills (e.g., score reading, keyboard harmony). Rehearsal techniques, listening to standard instrumental repertoire, performance.

**MU 3701. Choral Conducting and Methods I.** (3 cr; A-F or Aud. Prereq-2701 or #)

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; A-F or Aud. Prereq-3701 or #)

Continued conducting instruction, with methods and materials related to high school choral ensembles.

**MU 3705. Instrumental Conducting I.** (1 cr; A-F or Aud. Prereq-2701 or #)

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; A-F or Aud. Prereq-3705 or #)

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; A-F or Aud. Prereq-2803 or #)

Study and development of improvisational facility as used in jazz idiom.

**MU 3802. Jazz Improvisation IV.** (1 cr; A-F or Aud. Prereq-3801 or #)

Study and development of improvisational facility as used in jazz idiom.

**MU 3805. Jazz Writing I.** (2 cr; A-F or Aud. Prereq-2102 or [2121, 2122] or #)

Transpositions, voicings, and arranging concepts for large and small jazz ensembles; development of composition in jazz idiom.

**MU 3806. Jazz Writing II.** (2 cr; A-F or Aud. Prereq-2102 or [2121, 2122], 3805 or #)

Continuation of arranging concepts for large and small jazz ensembles; further development of composition in jazz idiom.

**MU 3901. Sound Design Techniques of Digital Music in New Media.** (3 cr; A-F only. Prereq-Music major or #)

Application of digital music composition to a variety of media, including film, video, and the internet. Methods for integrating and editing music with spoken text, sound effects, and mixing for visual production. Introduction to Final Cut, Dreamweaver, and ProTools.

**MU 3911. Electronic Composition III.** (2 cr; A-F only. Prereq-2912 or #)

Continued study of composition using primarily digital resources. Integrating live electronics and live performance with digital music, sampling techniques. Algorithmic composition introduced as part of the study of computer assisted music creation.

**MU 3991. Independent Study.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-#)

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]; A-F or Aud. Prereq-#)

Selected topics defined by type, period, or composer.

**MU 3997. Field Study in Music.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq- %)

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.** (2 cr; A-F or Aud. Prereq-1901, 3101 or #)

Idiomatic scoring for instruments; individual assignments in problems and possibilities of various instrument combinations.

**MU 4103. Contrapuntal Techniques.** (2 cr; A-F or Aud. Prereq-2102 or [2121, 2122] or #)

Study of, and practice in, use of polyphonic devices in Western art music.

**MU 4105. Composition III.** (2 cr [max 4 cr]; A-F or Aud. Prereq-3105)

Advanced creative composition; individual assignments in various contexts.

**MU 4201. Piano Literature.** (3 cr; A-F or Aud. Prereq-Music major or #)

Study of representative piano literature from various periods of music history.

**MU 4311. Voice.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major or fee-waiver student, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 4312. Voice.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-Music major or music major secondary instrument)

Individual lesson: one-half hour weekly.

**MU 4321. Piano.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 4322. Piano.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major secondary instrument)

Individual lesson: one-half hour weekly.

**MU 4325. Jazz Piano.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 4331. Organ.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 4332. Organ.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major secondary instrument)

Individual lesson: one-half hour weekly.

**MU 4351. Strings.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 4352. Strings.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major secondary instrument)

Individual lesson; one-half hour weekly.

**MU 4357. Harp.** (1-3 cr [max 12 cr]; Stdnt Opt. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 4358. Harp.** (1 cr [max 12 cr]; Stdnt Opt. Prereq-Non-music major or music major secondary instrument)

Individual lesson; one-half hour weekly.

**MU 4361. Woodwinds.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 4362. Woodwinds.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major secondary instrument)

Individual lesson; one-half hour weekly.

**MU 4371. Brass.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 4372. Brass.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major secondary instrument)

Individual lesson; one-half hour weekly.

**MU 4381. Percussion.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 4382. Percussion.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major secondary instrument)

Individual lesson; one-half hour weekly.

**MU 4391. Classical Guitar.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 4392. Classical Guitar.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major secondary instrument)

Individual lesson; one-half hour weekly.

**MU 4395. Jazz Guitar.** (1-3 cr [max 12 cr]; A-F only. Prereq-Music major, %)

Individual and one-hour group lesson weekly. Partial fee waiver lessons are provided to music majors for a maximum of eight semesters.

**MU 4396. Jazz Guitar.** (1 cr [max 12 cr]; A-F or Aud. Prereq-Non-music major or music major secondary instrument)

Individual lesson; one-half hour weekly.

**MU 4501. Concert Band.** (1 cr [max 6 cr]; A-F or Aud. Prereq-Instructor determines placement)

Study and performance of transcribed and original concert literature.

**MU 4502. Symphonic Wind Ensemble.** (1 cr [max 6 cr]; A-F or Aud. Prereq-Instructor determines placement)

Study and performance of symphonic wind ensemble and contemporary band literature by a select group.

**MU 4503. Symphony Orchestra.** (1 cr [max 6 cr]; A-F or Aud. Prereq-Instructor determines placement)

Rehearsal and performance of representative literature for symphony orchestra.

**MU 4504. Chamber Orchestra.** (1 cr [max 6 cr]; A-F or Aud. Prereq-Instructor determines placement)

Study and performance of chamber orchestra literature.

**MU 4505. Jazz Ensemble.** (1 cr [max 6 cr]; A-F or Aud. Prereq-Instructor determines placement)

Study and performance of large jazz ensemble literature.

**MU 4510. Concert Chorale.** (1 cr [max 6 cr]; A-F or Aud. Prereq-Instructor determines placement)

Study and performance of representative choral literature from various style periods and cultures.

**MU 4511. University Singers.** (1 cr [max 6 cr]; A-F or Aud. Prereq-Instructor determines placement)

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 [max 6 cr]; A-F or Aud. Prereq-[P]1511 or 4511; instructor determines placement)

Study and performance of vocal chamber music.

**MU 4513. Vocal Jazz Ensemble.** (1 cr [max 6 cr]; A-F or Aud. Prereq-Instructor determines placement)

Study and performance of music for vocal jazz ensemble.

**MU 4541. Chamber Music.** (.5 cr [max 12 cr]; A-F or Aud. Prereq-#)

Study and performance of chamber music literature, classical and/or jazz.

**MU 4601. Applied Music Teaching.** (1 cr; A-F or Aud. Prereq-#)

Procedures and materials for class and individual instruction in approved fields of applied music; evaluation of solo literature; discussion of approved and experimental pedagogical practice; lesson observation; and supervised student teaching.

**MU 4605. Kodaly, Orff, Dalcroze: Classroom Applications.** (1 cr; A-F or Aud. Prereq-Music ed major and #; no Grad School cr)

Study and application of the philosophies and instructional approaches of Zoltan Kodaly, Carl Orff, and Emile Jaques-Dalcroze to American music education.

**MU 4621. Piano Pedagogy and Practicum I.** (2 cr; A-F or Aud. Prereq-Music major or #)

Principles and materials for teaching elementary piano students; supervised practice teaching.

**MU 4622. Piano Pedagogy and Practicum II.** (2 cr; A-F or Aud. Prereq-Music major or #)

Principles and materials for teaching intermediate piano students; supervised practice teaching.

**MU 4623. Piano Techniques and Style.** (3 cr; A-F or Aud. Prereq-1321 or #)

Technical and stylistic considerations for teaching and performing advanced piano literature.

**MU 4801. Evolution and Analysis of Jazz Styles.** (2 cr; A-F or Aud. Prereq-2102 or [2121, 2122])

Study and analysis of various jazz styles and idioms.

**MU 4803. Jazz Pedagogy.** (3 cr; A-F or Aud. Prereq-2102 or [2121, 2122])

Techniques and materials necessary to organize and develop a jazz band in junior and senior high school.

**MU 4807. Music Industry.** (2 cr; A-F or Aud. Prereq-#)

Study of developing commercial applications and trends in the music industry, including basic concepts of business and marketing.

**MU 4901. Digital Capstone Project.** (3 cr; A-F only. Prereq-3911 or #)

One large-scale, semester-long project designed to provide a cumulative assessment of the student's development and breadth of knowledge, including artistic maturation and technical expertise. Collaboration with a similarly experienced peer from another SFA discipline is encouraged.

## Course Descriptions

- MU 4997. Internship in Music.** (1-2 cr [max 4 cr]; A-F or Aud. Prereq-%) 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; A-F or Aud. Prereq-60 cr or #) Traditional African music and culture and their influences on American musical styles.
- MU 5201. Advanced Music History.** (2 cr; A-F or Aud. Prereq-3201, 3202 or #) Specialized study of selected composers and/or genres.
- MU 5203. Advanced Choral Literature.** (3 cr; A-F or Aud. Prereq-3702 or #) Study of representative choral literature from various periods of music history.
- MU 5204. Instrumental Ensemble Literature.** (2 cr; A-F or Aud. Prereq-Grad Student or #) Study of major works for large wind and orchestral ensembles.
- MU 5205. Instrumental Solo Literature.** (1 cr; A-F or Aud. Prereq-Grad student or #) Survey of instrumental solo literature within the student's applied field of study.
- MU 5206. Vocal Solo Literature.** (1 cr; A-F or Aud. Prereq-Grad student or #) A historical survey of standard repertoire for solo voice in art song, opera, and oratorio; focus varies by semester.
- MU 5207. Instrumental Chamber Music Literature.** (1 cr; A-F or Aud. Prereq-Grad student or #) Study of chamber music literature with emphasis on student's major applied area.
- MU 5208. Vocal Chamber Literature.** (1 cr; A-F or Aud. Prereq-Grad student or #) A survey of standard repertoire for solo voice with chamber ensembles.
- MU 5510. Opera Studio.** (1 cr [max 6 cr]; A-F or Aud. Prereq-3510 or equivalent, Grad student or #) Opera production techniques; performance of solo and ensemble opera literature.
- MU 5695. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 9 cr]; A-F or Aud. Prereq-#; can apply max 6 cr to Grad School program) Selected topics of interest to music educators concerning philosophy, history, and teaching/learning theory and practice.
- MU 5701. Advanced Conducting.** (3 cr; A-F or Aud. Prereq-3702 or #) Score reading, analysis, styles, and conducting and rehearsal techniques related to performance.
- MU 5991. Independent Study.** (1-3 cr [max 9 cr]; A-F or Aud. Prereq-Min 60 cr or Grad Student or #; can apply max 6 cr to a Grad School program) Directed study in areas of student interest arranged with instructor before registration.
- MU 5995. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud. Prereq-#) Selected studies in topics defined by type, period, or composer.
- MU 8101. Graduate Music Theory.** (2 cr; A-F or Aud. Prereq-Graduate student or #) Advanced analytical studies of representative historical musical compositions. Students will utilize multiple analytical processes and compose model pieces.
- MU 8222. Music Bibliography and Research.** (3 cr; A-F or Aud. Prereq-Grad student or #) Research methods in music; preparation for writing plan B project.
- MU 8300. Graduate Recital.** (1 cr [max 2 cr]; A-F or Aud. Prereq-Grad student, #) Preparation and presentation of a solo musical performance.
- MU 8301. Graduate Applied Music: Major Instrument.** (1-2 cr [max 2 cr]; A-F or Aud. Prereq-Advanced proficiency, grad student, #) Studio lesson on major instrument or voice; one-half hour per week per credit.

- MU 8302. Graduate Applied Music: Secondary Instrument.** (1 cr; A-F or Aud. Prereq-Intermediate proficiency, grad student, #; may be repeated) Half-hour weekly studio lesson; instrument or voice.
- MU 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)
- MU 8401. Graduate Music Pedagogy.** (1 cr; A-F or Aud. Prereq-Graduate Student or #) Principles and techniques of music pedagogy with emphasis on the student's applied field of study.
- MU 8600. Seminar in Music Education.** (2 cr [max 6 cr]; A-F or Aud. Prereq-Grad student or #) Survey and analysis of current issues in music education research and/or practice.
- MU 8601. Foundations of Music Education.** (3 cr; A-F or Aud. Prereq-Grad student or #) Philosophical, psychological, and historical foundations; principles of school music teaching and learning.
- MU 8605. Leadership in Music Education.** (3 cr; A-F or Aud. Prereq-Grad student or #) Techniques, theories, and models of music and arts leadership; considerations for supervising music personnel, facilities, budgets, curricular programs, and policies.
- MU 8701. Graduate Applied Conducting.** (1-2 cr [max 12 cr]; A-F or Aud. Prereq-3702, 3706 or equivalent; Graduate Student or #) Studio lessons in conducting; one half-hour per week per credit.
- MU 8899. Directed Project in Music Education.** (1-12 cr [max 12 cr]; A-F or Aud. Prereq-Grad, #) Directed project, Plan B. Research project on selected theoretical or practical issue/topic in Music Education.
- MU 8900. Seminar in Music.** (2 cr [max 6 cr]; A-F or Aud. Prereq-Grad student, #) Survey and analysis of current issues and problems in music research, performance, and pedagogy.
- MU 8991. Independent Study.** (1-2 cr [max 6 cr]; A-F or Aud. Prereq-Grad student, #) Directed study in areas of student interest arranged with instructor before registration; written report required.

## Ojibwe Education (OJED)

### College of Education and Human Service Professions

- OJED 3100. Advanced Ojibwe Grammar and Narrative.** (4 cr; A-F only. Prereq-[P]3101, 3102, 3103, 3104, admission to Ojibwe elem/middle school program, two years college-level Ojibwe or AMIN 2204 or #) Advanced study of grammatical forms in Ojibwe; identification and conjugation of major verb types; formation of simple and complex sentences; language learning styles.
- OJED 3101. Circle of Life.** (4 cr; A-F only. Prereq-[P]3100, 3101, 3103, 3104, admission to Ojibwe elem/middle school program) Explores human development from an Anishinaabeg perspective, from birth through death; emphasis on early childhood through adolescence. Western theories of development and traditional Anishinaabe development.
- OJED 3102. Historical and Contemporary Issues in American Indian Education.** (3 cr; A-F only. Prereq-[P]3100, 3101, 3104, admission to Ojibwe elem/middle school program) Past and present educational experiences of American Indian people in the U.S.; professional conduct and dispositions for teachers; best practices in contemporary American Indian education.

**OJED 3103. Teaching American Indian Studies.** (3 cr; A-F only. Prereq-[P]3100, 3102, 3104, admission to Ojibwe elem/middle school program)

Contemporary American Indian education; evaluation of attitudes toward American Indian students; identity development in the middle school years, direct interaction with American Indian communities; teaching plans reflective of American Indians, specifically for the middle school.

**OJED 3104. College Skills for Pre-service Teachers.** (2 cr; S-N only. Prereq-[P]3100, 3102, 3103, admission to Ojibwe elem/middle school program)

Familiarizes students with the campus community, resources, and the tribal college transition, both personally and academically. Successful college student strategies, including: study skills, balancing life and school, and Praxis test-taking approaches.

**OJED 3200. Ojibwe Language for Teachers.** (4 cr; A-F only. Prereq-3100, [P]3201, 3202, 3203, Math 1141, admission to Ojibwe elem/middle school program)

Provides pre-service teachers the requisite knowledge to interact with students in a classroom. General and specialized language for each of the core subjects taught, daily routines, and common classroom discourse. Relevant methods for teaching Ojibwe language in the classroom.

**OJED 3201. Holistic Instruction and Assessment.** (3 cr; A-F only. Prereq-[P]3200, 3202, 3203, Math 1141, admission to Ojibwe elem/middle school program)

Student-centered methods of instruction, classroom management, and formal and informal assessments that enhance the whole child. Draws from the American Indian Learner Outcomes for methods and materials to guide instruction and assessment strategies.

**OJED 3202. Anishinaabe Art, Music and Dance.** (3 cr; A-F or Aud. Prereq-[P]3200, 3201, 3203, Math 1141, admission to Ojibwe elem/middle school program)

Selecting and evaluating materials appropriate for elementary classrooms in American Indian art, music, dance, singing & drumming; developing integrated cross-curriculum elementary programs.

**OJED 3203. Health, Wellness and Movement.** (3 cr; A-F only. Prereq-[P]3200, 3201, 3202, Math 1141, admission to Ojibwe elem/middle school program)

Health and wellness from an Anishinaabeg perspective; teaching strategies appropriate for holistic health, physical education activities, healthy diets, drug education, mental health and spirituality; comprehensive school health and physical fitness for elementary and middle school levels.

**OJED 4100. Conversational Ojibwe for the Classroom and Community.** (4 cr; A-F only. Prereq-3200, [P]4101, 4102, 4103, 4104, admission to Ojibwe elem/middle school program or #, no Grad School cr)

Applications of Ojibwe language use to interactions between school and the surrounding community. Key vocabulary, phrases, and dialogues; strategies through which this material may be shared with the community at large.

**OJED 4101. Language, Literacy and Literature.** (4 cr; A-F only. Prereq-[P]4100, 4102, 4103, 4104, admission to Ojibwe elem/middle school program, no Grad School cr)

Development and instruction in children's literature-based reading, writing and oral language in elementary schools. Methods, materials, research findings related to teaching integrated language arts.

**OJED 4102. Oral Tradition and Language Acquisition.** (4 cr; A-F only. Prereq-[P]4100, 4101, 4103, 4104, admission to Ojibwe elem/middle school program, no Grad School cr)

Elementary school teaching methods and materials for integrated language arts instruction; understanding of children's language acquisition skills; role of stories in Anishinaabeg culture.

**OJED 4103. Elementary Mathematics Methods.** (4 cr; A-F only. Prereq-[P]4100, 4101, 4102, 4104, admission to Ojibwe Elem/Middle School Program; no Grad School cr)

Mathematics concepts, classroom methods, curriculum and materials; exploring the nature of mathematics, how children learn mathematics; effective mathematics instruction.

**OJED 4104. Professional Development.** (2 cr; A-F only. Prereq-[P]4100, 4101, 4102, 4103, admission to Ojibwe Elementary/Middle School Program; no Grad School cr)

Documentation, reflection, synthesis of learning; professional portfolio, reflective journaling, dialogue, and goal setting. The Good Path, which reflects personal/ professional growth and development related to integrity of teaching; analyzing how internalized oppression affects families, schools, communities and tribes.

**OJED 4200. Ojibwe Language Methods.** (4 cr; A-F only. Prereq-4100 or #,[P]4201, 4202, 4203, admission to Ojibwe Elem/Middle School Program, successful completion of block one, no Grad School cr)

Methods for teaching Ojibwe, an endangered, indigenous language. Curriculum development to support Ojibwemowin; grammatical structure of the Ojibwe language; indigenous language revitalization movement; developmental and cognitive understanding of children, especially as related to language learning.

**OJED 4201. Understanding Our Environment and Mother Earth.** (4 cr; A-F only. Prereq-[P]4200, 4202, 4203, admission to Ojibwe Elem/Middle School Program; successful completion of block one courses; no Grad School cr)

Methods and materials for elementary school science instruction based on research, Anishinaabeg culture & traditions. Integration of theory and practice; understanding our relationship as human beings to the world around us.

**OJED 4202. Minnesota Based Treaties, Sovereignty, and Tribal Government.** (4 cr; A-F only. Prereq-[P]4200, 4201, 4203, admission to Ojibwe Elem/Middle School Program; successful completion of block one courses; no Grad School cr)

Content and organization of social studies; treaties, sovereignty, and tribal government of Minnesota Ojibwe & Dakota people. Planning instruction, methods, and assessment; relationships among humans, the environment, and land.

**OJED 4203. The Inclusive Classroom.** (4 cr; A-F only. Prereq-[P]4200, 4201, 4202, admission to Ojibwe Elem/Middle School Program; successful completion of block one courses; no Grad School cr)

Philosophy and psychology of the inclusive classroom; management, materials and methods; understanding children with a variety of special needs; FAS/FAE; writing IEPs; making adaptations and accommodations; working with American Indian families.

**OJED 4600. Student Teaching.** (12 cr; S-N only. Prereq-[P]4610, admission to Ojibwe Elementary/Middle School Program; successful completion of block one and block two courses; no Grad School cr)

Fifteen weeks of full-time student teaching in a K-8 classroom. Demonstration of competence in planning, teaching, and evaluating elementary curriculum, age-appropriate Ojibwe language, and American Indian Learner Outcomes. Application of knowledge and skills in assessing and meeting the learning needs of children.

**OJED 4610. Professional Issues.** (2 cr; A-F only. Prereq-[P]4600, admission to Ojibwe Elementary/Middle School Program; successful completion of block one and block two courses; no Grad School cr)

Reflections on current issues and ethical dilemmas in the fields of elementary education, American Indian education, and Ojibwe language education. Preparation for professional job-seeking, interviewing, and continued professional development as a teacher.

## Course Descriptions

**OJED 5110. Teaching and Learning Ojibwe As A Second Language.** (2 cr; A-F only. Prereq-#, no Grad School cr)

Study of advanced writing features, grammatical structure of sentences and paragraphs, and key methodologies of teaching Ojibwe as a second language. Advanced topics include introduction to narrative structure and dialectology.

**OJED 5120. Ojibwe Language Grammatical Pedagogy.** (2 cr; A-F only. Prereq-#, no Grad School cr)

Provides students with a knowledge of core Ojibwe grammar structures for use in second language and immersion programs. Students will investigate the teaching and learning of grammar, its socio-linguistic application, and how advanced structures are created. Includes a strong written and oral component.

**OJED 5200. Methods in Ojibwe Language Immersion.** (2-6 cr [max 12 cr]; A-F only. Prereq-#, no Grad School cr)

Designed to improve comprehension and oral proficiency in Ojibwemowin. A total immersion approach will be complemented by structured conversational patterns, language mini-lessons, and defined situational experiences.

## Pharmacology (PHCL)

### School of Medicine

**PHCL 4001. Introduction to Pharmacology.** (2 cr; A-F or Aud. Prereq-Biol 1011, Chem 1151,1152, 2521, 2522 or #)

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]; A-F or Aud. Prereq-Upper div sci major, #)

Directed Research in Pharmacology

**PHCL 5204. Pharmacology Seminar.** (1 cr [max 4 cr]; A-F or Aud. Prereq-Grad student, #)

Presentation of selected research problems and current journal articles.

**PHCL 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master s student, adviser and DGS consent)

**PHCL 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**PHCL 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Max 6 cr per semester or summer; doctoral student who has not passed prelim oral; no required consent for the first two registrations up to 12 cr; departmental consent for the third and fourth registrations up to an additional 12 cr, or 24 cr total (for doctoral students admitted summer 2007 and beyond; doctoral students admitted prior to summer 2007 may register up to 4 times totaling 60 cr))

**PHCL 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**PHCL 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

## Pharmacy (PHAR)

### College of Pharmacy

**PHAR 1001. Orientation to Pharmacy.** (2 cr; Stdt Opt)

Online (Vista), unlimited enrollment course designed for those interested in pharmacy as a potential career or those just curious about the profession. One credit option provides information on need for pharmacists, work settings and educational process. Two credit option adds learning materials on the impact of pharmacists, professional challenges and expanding roles. For more information, including which credit option to select, explore <http://courses.pharmacy.umn.edu/> and/or contact medterm@umn.edu, pharintr@umn.edu or 612-624-7976.

**PHAR 1003. Non-Prescription Medications and Self-Care: Treating Minor Conditions.** (2 cr; Stdt Opt)

Self-study, online course. Nonprescription medications, appropriate self care. How to become informed customer of over-the-counter medications and testing devices. Textbook is supplemented with online coursework. Students use Web CT.

**PHAR 1004. Common Prescription Drugs and Diseases.** (2 cr; A-F or Aud)

Self-study, online course. Frequently prescribed medications, conditions medications are intended to treat. Diagnostic criteria, disease complications, mechanism-of-action, side effects. Direct-to-consumer advertising. Students use Vista to view Power Point presentations, download materials, and complete study guides.

**PHAR 3700. Directed Studies: Fundamentals of Pharmacotherapy.** (3 cr; A-F only. Prereq-Medical terminology)

Drug therapy. Emphasizes recognition of brand/generic drug names, their therapeutic classes and common uses. Use of drug information resources.

**PHAR 4200. Drugs and the US Health Care System.** (3 cr; A-F only. Prereq-\$3200 or 5200)

How to be an informed/responsible user of medications within U.S. health care system.

**PHAR 5101. Pharmacology for Pharmacy Students.** (3 cr; A-F only. Prereq-Regis 2nd yr pharmacy student or #, \$Phcl 5101; Added every fall (10/12/06))

Action/fate of drugs. Lectures, lab.

**PHAR 5102. Pharmacology for Pharmacy Students.** (2 cr; A-F only. Prereq-5101 or #, \$Phcl 5102)

Action/fate of drugs.

**PHAR 5200. Drugs and the US Healthcare System.** (3 cr; A-F only. Prereq-\$3200 or 4200)

Prepares students to be informed and responsible users of medications within the US Healthcare system. This is a writing intensive course.

**PHAR 5201. Health Sciences Applied Terminology.** (2 cr; Stdt Opt. Prereq-Basic knowledge of human anatomy/physiology)

Self-study course. Medical terms, how to apply them when documenting/reporting patient care procedures.

**PHAR 5210. Diminishing Health Disparities Through Cultural Competence.** (2 cr; A-F only)

Various dynamics of health disparities, cultural competencies. Uses sociological framework

**PHAR 5270. Therapeutics of Herbal and Other Natural Medicinals.** (2 cr; A-F only. Prereq-Phsl 6051, organic chemistry, pathophysiology of disease states, 3rd or 4th yr pharmacy student)

Herbal products/supplements. Pharmacology, clinical indications, and drug interactions of most commonly used products in nontraditional/complementary health care. Historical significance and evidenced-based role of these products in health care. Case studies of clinical applications.

**PHAR 5620. Drug Metabolism and Disposition.** (3 cr; A-F or Aud)

Oxidative/conjugative enzymes systems involved in human drug metabolism/disposition. Various in vitro models used to evaluate drug metabolism or chemical entity, pros/cons of each. Factors involved in conducting in vivo studies.

**PHAR 5700. Directed Studies: Applied Fundamentals of Pharmacotherapy.** (3 cr; A-F only. Prereq-Medical Terminology and admission to a graduate program or permission of instructor, \$3700)

Designed for students pursuing careers that require a basic familiarity with drug therapy. Offered totally online and will focus on recognition of brand and generic drug names, their therapeutic classes and common uses. In addition, participants will develop a basic proficiency in the use of drug information resources. With the competencies developed, participants

of the course can expect to better review medication lists and work with health communication/documentation. Professional students who will be responsible for routinely and directly administering medication and monitoring/reporting medication effectiveness should enroll in PHAR 3800. Credit not allowed if PHAR 3700 has been completed. As compared to PHAR 3700, PHAR 5700 participants will complete a paper in a drug-related topic of their choosing, in addition to completing additional learning modules.

**PHAR 6061. Physiology and Neurophysiology Systems.** (5 cr; A-F only. Prereq-[Biochemistry, human anatomy] recommended; intended primarily for PharmD students or grad students in health sciences)

Survey of general physiology, neurophysiology, endocrine, circulatory, respiratory, digestive, energy metabolism, and renal physiology at molecular, cellular, and organ level. Emphasizes homeostasis and basic regulatory aspects of physiological processes of organ systems.

**PHAR 6111. The Practice of Pharmaceutical Care I.** (3 cr; A-F only. Prereq-First yr pharmacy student, [P]6171)

The practice of pharmaceutical care, the pharmacy profession, drug information retrieval, professional communications, problem-solving skills, introductory clerkship.

**PHAR 6112. The Practice of Pharmaceutical Care II.** (3 cr; A-F only. Prereq-First yr pharmacy student, 6111, [P]6172)

Comprehensive pharmaceutical care, health belief model, legal issues, prescription processing, clerkship continued and introduction to pharmacotherapy issues

**PHAR 6121. Pharmacotherapy I: Patient-Centered Pathophysiologic Approach.** (5 cr; A-F only. Prereq-6111, 6112, [P]5101, 6163, 6154 and 6173)

Pathophysiology/pharmacotherapy of common fluid-electrolyte, renal, acid-base, immunologic, and hematologic disorders.

**PHAR 6122. Pharmacotherapy II: Patient-Centered Pathophysiologic Approach.** (5 cr; A-F only. Prereq-5101, 6121, 6131, 6163, [P]5102, 6154 and 6173)

Pathophysiology/pharmacotherapy of common cardiovascular, endocrine, and gastrointestinal disorders.

**PHAR 6123. Pharmacotherapy III: Patient-Centered Pathophysiologic Approach.** (5 cr; A-F only. Prereq-5101, 5102, 6112, 6153, 6163, [P]6175)

Pathophysiology/pharmacotherapy of common neurologic, psychiatric, pulmonary, and geriatric disorders.

**PHAR 6124. Pharmacotherapy IV: Patient-Centered Pathophysiologic Approach.** (5 cr; A-F only. Prereq-6121, 6122, 6123, 6155, 6163, [P]5102)

Pathophysiology and pharmacotherapy of common infectious diseases, oncologic and toxicologic disorders.

**PHAR 6131. Pharmacy and Health Care System.** (3 cr; A-F only. Prereq-Second year pharmacy student)

Delivery of pharmaceuticals and pharmacy services in the U.S. health care system, issues in hospital and community practice, characteristics of the pharmaceutical industry, economic and financial issues in delivering pharmaceutical services.

**PHAR 6132. Biostatistics and Drug Literature Evaluation.** (2 cr; A-F only. Prereq-6111, [P]6173)

Biostatistical methods for data analysis and principles of study design for clinical research. Use of small computers to analyze and present data. Methods of searching for and evaluating drug-related information.

**PHAR 6133. Pharmacy Practice Management.** (3 cr; A-F only. Prereq-Third year pharmacy student)

Principles of pharmacy management, including inventory control, purchasing, pricing, financial analysis, and personnel management.

**PHAR 6134. Law and Ethics in Pharmacy Practice.** (2 cr; A-F only)

Minnesota and federal laws, rules, regulations and court decisions affecting pharmacy practice. Moral and ethical considerations that affect and influence pharmacy practice.

**PHAR 6135. Pharmacy Outcomes.** (2 cr; A-F only. Prereq-6123, 6175)

How to integrate knowledge of basic sciences, pharmacotherapy, pharmacy practice management, pharmaceutical care, written communication, literature evaluation, drug information retrieval, law/ethics, and pharmacoconomics to manage patients with multiple medical conditions.

**PHAR 6141. Medical Microbiology and Immunizations.** (1 cr; A-F only)

Background knowledge in medical microbiology. Evaluating information on emerging infectious diseases, recommending immunization schedules for childhood/adult vaccines.

**PHAR 6151. Biochemistry of Medicinals I.** (3 cr; A-F only. Prereq-[Chem 4351])

Biochemistry topics required for understanding pharmacodynamic action and therapeutic use of medicinal agents.

**PHAR 6152. Biochemistry of Medicinals II.** (3 cr; A-F only. Prereq-6151, [P]6172; [Chem 4352])

Intermediary metabolism of carbohydrates, lipids, amino acids and nucleic acids and how these pathways are affected by therapeutic agents. Introduction to bioenergetics and drug metabolism.

**PHAR 6154. Medicinal Agents I.** (3 cr; A-F only. Prereq-6152, [P]5101)

Basic principles of drug design, metabolism of action, and receptor interaction. Chemical/biological properties and therapeutic uses of autonomic, antihistaminic, renal, and cardiovascular drugs.

**PHAR 6155. Medicinal Agents II.** (2 cr; A-F only. Prereq-6154, [P]5102 and 6174)

Chemical/biological properties and therapeutic uses of drugs affecting central nervous, endocrine, and intermediary metabolism systems.

**PHAR 6156. Medicinal Agents III.** (4 cr; A-F only. Prereq-6152, 6153, 6154)

Therapeutic properties and uses of antiviral, anti-infective and antineoplastic agents.

**PHAR 6157. Human Nutrition and Drug Therapy.** (3 cr; A-F only. Prereq-6152)

Basic concepts of human nutrition and clinical application.

**PHAR 6158. Recombinant DNA-Derived Drugs.** (1 cr; A-F only. Prereq-6151)

Biotechnology as it related to basic/clinical pharmaceutical sciences. Emphasizes recombinant DNA techniques and preparation/use of biotechnology-derived agents in diagnosing/treating disease.

**PHAR 6159. Pharmaceutical Immunology and Biotechnology.** (3 cr; A-F only. Prereq-6151)

Basic biological mechanisms of immune system. Emphasizes drug allergies, immunosuppressives, monoclonal antibodies, and preparation/use of immunologic derived agents in diagnosing/treating disease. Biotechnology as it relates to basic/clinical pharmaceutical sciences. Emphasizes recombinant DNA techniques and preparation/use of biotechnology-derived agents in diagnosing/treating disease.

**PHAR 6161. Drug Delivery I.** (3 cr; A-F only. Prereq-[P]6171)

Mathematics associated with drug dispensing; technology of common pharmaceutical dosage forms. Phenomenological and theoretical basis of equilibrium and steady-state processes controlling drugs and dosage forms.

**PHAR 6162. Drug Delivery II.** (3 cr; A-F only. Prereq-6161, [P]6172)

Phenomenological and theoretical basis of kinetic and dynamic processes controlling drugs and dosage forms.

**PHAR 6163. Pharmacokinetics.** (3 cr; A-F only. Prereq-Calculus I or equiv, 6162)

Physiological basis for drug absorption, distribution, metabolism and excretion; use of mathematical principles and equations to describe these processes as well as design dosage regimens for individual patients.

**PHAR 6164. Biopharmaceutics.** (3 cr; A-F only. Prereq-6163, [P]6175)

Applied theory of dosage form design for optimal drug activity and bioavailability for all routes of drug administration.

## Course Descriptions

**PHAR 6165. Pharmaceutical Calculations.** (1 cr; A-F only. Prereq-First yr pharmacy student)

Performing pharmaceutical calculations for patient care in all pharmacy practice environments.

**PHAR 6171. Pharmaceutical Care Skills.** (2 cr; A-F only. Prereq-[P] 6151, 6111, 6161)

Integrating basic and clinical science curriculum in a lab setting.

**PHAR 6172. Pharmaceutical Care Skills.** (2 cr; A-F only. Prereq-6112, 6152, 6162)

Basic/clinical science curriculum in lab setting. Longitudinal care in lab setting.

**PHAR 6173. Pharmaceutical Care Skills.** (2 cr; A-F only. Prereq-[P] 6121, 6132)

Integrating basic/clinical science curriculum in a lab setting.

**PHAR 6174. Pharmaceutical Care Skills.** (2 cr; A-F only. Prereq-6122)

Basic/clinical science curriculum in lab setting. Longitudinal care in lab setting.

**PHAR 6175. Pharmaceutical Care Skills V.** (2 cr; A-F only. Prereq-[P] 6123 and 6164 and 6171 and 6172 and 6173 and 6174 or #)

Integrating basic and clinical science curriculum in a lab setting.

**PHAR 6177. Patient Assessment.** (1 cr; A-F only. Prereq-first yr pharmacy student)

How to obtain accurate health histories and perform systemic physical assessments of adult patients in pharmacy practice.

**PHAR 6181. Pharm.D. Paper & Seminar.** (1 cr; A-F or Aud. Prereq-Third year pharmacy student)

How to write a research paper. Students present research project plan. Professional behavior, patient confidentiality, universal precautions.

**PHAR 6182. Pharm.D. IV Seminar.** (1 cr; S-N only. Prereq-4th yr pharmacy student, 6181)

Students present thesis topics to peers and faculty evaluators.

**PHAR 6183. Pharm.D. IV Paper.** (2 cr; S-N only. Prereq-4th yr pharmacy student, 6181)

Final paper describing a hypothesis-driven research project, patient-care oriented project, management project, drug-usage evaluation, or extensive literature review.

**PHAR 6200. Directed Studies: Drug-related Controversies in the U.S. Health Care System.** (2 cr; A-F only. Prereq-Pharmacy student)

Online course. Medication development, regulation, and distribution in the U.S. Business, political, and legal/ethical issues involved. Weekly reading/writing assignments, exams, final paper.

**PHAR 6210. Immunization Tour.** (1 cr; A-F only. Prereq-6175 or [P]6175, third year pharm student, #)

Role that health care practitioners play with respect to population based disease prevention. Students work collaboratively with students from another health discipline in planning/delivering influenza vaccination clinics. Student-led collaborative public health intervention.

**PHAR 6211. Non-Prescription Drug Therapy: Focus on Patient Self-Care.** (2 cr; A-F only. Prereq-6112)

Expands on over-the-counter medications presented in 6112. Diagnostic and durable medical equipment available in community pharmacies as well as the use of alternative medications is discussed.

**PHAR 6212. Dermatology.** (1 cr; A-F only. Prereq-2nd or 3rd yr pharmacy student)

Pathophysiology and pharmacotherapy of dermatologic disorders.

**PHAR 6215. Applied Pharmacokinetics.** (2 cr; A-F only. Prereq-6163)

Applying clinical pharmacokinetics and assay methodologies to patient care. Assessing drug therapy outcomes.

**PHAR 6219. Building a Pharmaceutical Practice.** (2 cr; A-F only. Prereq-6111, 6112)

Initiating a pharmaceutical care practice. Building a personal practice plan.

**PHAR 6220. Pediatric Drug Therapy.** (2 cr; A-F only. Prereq-3rd or 4th yr pharmacy student)

Pathophysiology/therapeutics of disease states. Common issues encountered in providing pharmaceutical care to pediatric patients.

**PHAR 6221. Geriatric Pharmacotherapy.** (2 cr; A-F only. Prereq-3rd or 4th yr pharmacy student)

Pharmacokinetic/pharmacodynamic changes and their implications in elders. Effects of drug-drug/drug-disease interactions. Drug adherence barriers to provide optimum pharmacotherapy to elderly persons.

**PHAR 6222. Advanced Pharmaceutical Compounding.** (2 cr; A-F only. Prereq-2nd or 3rd yr pharmacy student)

Expands compounding skills beyond those gained in pharmaceutical care lab.

**PHAR 6223. Pharmacokinetics Research Seminar.** (1 cr; A-F only. Prereq-6163 with a grade of "B" or better)

Students critically evaluate literature in pharmacokinetics, pharmacodynamics, and drug metabolism.

**PHAR 6224. Pharmacogenomics: Genetic Basis for Variability in Drug Response.** (2 cr; A-F only. Prereq-2nd or 3rd yr pharmacy student or grad student, #) Theory/practice of pharmacogenomics. Principles of human genetics/genomics. Applications to scientific education, problems in drug therapy optimization, and patient care.

**PHAR 6230. Ambulatory PC Clinic.** (2 cr; Stdnt Opt. Prereq-Enrolled pharmacy student)

How to conduct pharmaceutical care assessments, for patients with actual drug-related needs, in a controlled clinic setting.

**PHAR 6231. Community Pharmacy Management.** (2 cr; A-F only. Prereq-6133) Management techniques needed in community pharmacy practice, with emphasis on marketing and service.

**PHAR 6232. Institutional Pharmacy Management.** (2 cr; A-F only. Prereq-2nd or 3rd year pharmacy student)

Management techniques needed in various institutional pharmacy settings. Integrating distributive and clinical components of institutional practice

**PHAR 6233. Drug Use Review and Management.** (2 cr; A-F only. Prereq-3rd yr pharmacy student, #)

Principles of drug use review in various health care settings. Optimizing quality, minimizing cost.

**PHAR 6236. Survey of Laws Affecting Pharmacy Practice.** (2 cr; A-F only)

U.S. Food and Drug (FDA) law, civil liability of malpractice, duty of pharmacy professionals, implications of intellectual property rights of others. Business law topics ranging from contracts to non-compete agreements.

**PHAR 6248. Drugs of Abuse.** (2 cr; A-F only. Prereq-Organic chemistry I/II or [organic chemistry I, biochemistry])

Basic medicinal chemistry of substances of abuse, associated paraphernalia.

**PHAR 6250. Honors: Social and Administrative Pharmacy Seminar.** (1 cr; A-F only. Prereq-#)

Current topics in hospital pharmacy

**PHAR 6255. Medicating the Soul.** (2 cr; A-F only. Prereq-6155)

New developments in study of major psychiatric disorders. Potential of findings for development of novel pharmacological treatments.

**PHAR 6270. Honors: Critical Care Seminar.** (2 cr; A-F only. Prereq-#) Research/topics of importance to experimental/clinical pharmacology.

**PHAR 6293. Directed Research I.** (1-5 cr [max 5 cr]; Stdnt Opt. Prereq-#)

Directed research in pharmacy practice, pharmaceutics, medicinal chemistry, or experimental and clinical pharmacology.

**PHAR 6294. Directed Study I.** (1-5 cr [max 5 cr]; Stdnt Opt. Prereq-#)

Directed studies in pharmacy practice, pharmaceutics, medicinal chemistry, and experimental or clinical pharmacology.

**PHAR 6393. Directed Research II.** (1-5 cr [max 5 cr]; Stdnt Opt. Prereq-#)

Directed research in pharmacy practice, pharmaceutics, medicinal chemistry, or experimental and clinical pharmacology.

**PHAR 6394. Directed Study II.** (1-5 cr [max 5 cr]; Stdnt Opt. Prereq-#)

Directed studies in pharmacy practice, pharmaceutics, medicinal chemistry, and experimental or clinical pharmacology.

**PHAR 6493. Directed Research III.** (1-5 cr [max 5 cr]; Stdnt Opt. Prereq-#)

Directed research in pharmacy practice, pharmaceutics, medicinal chemistry, or experimental and clinical pharmacology.

**PHAR 6494. Directed Study III.** (1-5 cr [max 5 cr]; Stdnt Opt. Prereq-#)

Directed studies in pharmacy, pharmaceutics, medicinal chemistry, and experimental or clinical pharmacology.

**PHAR 6501. Ethics in Pharmacy Practice.** (2 cr; A-F only. Prereq-2nd or 3rd yr pharmacy student)

Ethical principles, selected schools of ethical thought. Students discuss/debate ethical dilemmas in pharmacy practice and health care.

**PHAR 7001. Early Pharmacy Practice Experience I.** (1 cr; A-F only. Prereq-Criminal bkgr chk, BLS CPR cert for infants/child/adults, [proof of negative Mantoux test or explanation of positive test], proof of chicken pox immunity)

First in a series of four courses. Focuses on patient's perspective in managing and living with chronic conditions and chronic medication use. Includes community-based instruction, mentor program

**PHAR 7002. Early Pharmacy Practice Experience II.** (1 cr; A-F only. Prereq-7001 or #, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test or explanation of positive test, proof of chicken pox immunity)

Second in a series of four courses. Focuses on patient's perspective in managing and living with chronic conditions and chronic medication use. Includes community-based instruction, mentor program.

**PHAR 7003. Early Pharmacy Practice Experience III.** (.5 cr; A-F only. Prereq-7002 or #, criminal bkgr chk, BLS CPR cert for infants/child/adults, [proof of negative Mantoux test or explanation of positive test], proof of chicken pox immunity)

Third in a series of four courses. Focusing on patient's perspective in managing and living with chronic conditions and chronic medication use. Includes community-based instruction. Emphasizes mentoring.

**PHAR 7004. Early Pharmacy Practice Experience IV.** (.5 cr; A-F only. Prereq-7003 or #, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test or explanation of positive test, proof of chicken pox immunity)

Fourth in a series of four courses. Focuses on patient's perspective in managing and living with chronic conditions and chronic medication use. Includes community-based instruction. Emphasizes mentoring. Upcoming patient care opportunities.

**PHAR 7120. Community Practice Experience.** (4 cr; A-F only. Prereq-Pharm. D. IV, MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Students assigned to participating community pharmacies and involved in community practice activities full-time for five weeks.

**PHAR 7121. Institutional Practice Experience.** (4 cr; A-F only. Prereq-Pharm.

D. IV, MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Students are assigned to participating hospital pharmacies.

Student participate in drug distribution, IV compounding, clinical services, and administrative activities. Full-time for five weeks.

**PHAR 7122. Acute Patient Care Practice Experience I.** (4 cr; A-F only. Prereq-Pharm. D. I-III, MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Experience in an inpatient setting. Students are responsible for all drug-related needs of individual patients. Full-time for five weeks.

**PHAR 7123. Ambulatory Patient Care Practice Experience.** (4 cr; A-F only. Prereq-Pharm.

D. IV, MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Experience in an ambulatory setting. Students responsible for drug-related needs of individual patients. Full-time for five weeks.

**PHAR 7126. Patient Care Practice Experience.** (4 cr; A-F only. Prereq-Pharm.

D. I-III, MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Patient care experience in any setting. Students responsible for drug-related needs of individual patients. Full-time for five weeks.

**PHAR 7128. Acute Patient Care Practice Experience II.** (4 cr; A-F only. Prereq-Pharm.

D. I-III, MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Experience in an inpatient setting. Students are responsible for all drug-related needs of individual patients. Full-time for five weeks.

**PHAR 7211. Elective Practice Experience I.** (4 cr; A-F only. Prereq-Pharm. D. I-III,

MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Patient care experience in any patient care setting. Students are responsible for drug-related needs of individual patients. Full-time for five weeks.

**PHAR 7212. Elective Practice Experience II.** (4 cr; A-F only. Prereq-Pharm. D. I-III,

MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Patient care experience in any setting. Students are responsible for drug-related needs of individual patients. Full-time for five weeks.

**PHAR 7213. Elective Practice Experience III.** (4 cr; A-F only. Prereq-Pharm.

D. I-III, MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Patient care experience in any setting. Students are responsible for drug-related needs of individual patients. Full-time for five weeks.

**PHAR 7216. Elective Practice Experience IV.** (4 cr; A-F only. Prereq-Pharm.

D. I-III, MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Experience in an inpatient setting. Students responsible for all drug-related needs of individual patients. Full-time for five weeks.

## Course Descriptions

**PHAR 7231. Research Practice Experience I.** (4 cr; A-F only. Prereq-Pharm. D.I-III, MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Experience using research techniques in basic or clinical sciences or pharmacy practice. Full-time for five weeks.

**PHAR 7232. Research Practice Experience II.** (4 cr; A-F only. Prereq-Pharm. D.I-III, MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Experience using research techniques in basic or clinical sciences or pharmacy practice. Full-time for five weeks.

**PHAR 7233. Research Practice Experience III.** (4 cr; A-F only. Prereq-Pharm. D.I-III, MN Board of Pharm intern, criminal background check, BLS CPR cert for infants/child/adults, proof of negative Mantoux test [or explanation of positive test], proof of chicken pox immunity)

Experience using research techniques in basic or clinical sciences or pharmacy practice. Full-time for five weeks.

## Philosophy (PHIL)

### College of Liberal Arts

**PHIL 1001. Introduction to Philosophy.** (3 cr; A-F or Aud. Prereq-\$1101 LE 7)

Introduction to philosophical heritage through examination of several classic philosophical problems such as the existence of God, nature of knowledge, free will versus determinism, and the relation of mind to body.

**PHIL 1003. Ethics and Society.** (3 cr; A-F or Aud. LEIP 08)

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 or Aud. LEIP 07)

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.** (4 cr; A-F or Aud. LE 2)

Patterns of reasoning encountered in everyday life, including advertising, editorials, and politics. Use of language in formulating arguments; differences between deductive and inductive arguments; how to detect and avoid mistakes in reasoning.

**PHIL 1018. Logic.** (4 cr; A-F or Aud. Prereq-\$1118 LE 2)

Introduction to symbolic logic. Nature of language, species of arguments, informal versus formal arguments, techniques of translation, methods of sentential logic, and methods of predicate logic.

**PHIL 1021. Classical Mythology.** (3 cr; A-F or Aud. LE 9)

Readings in Greek and Roman myths, especially in those that have influenced Western culture.

**PHIL 1101. Honors: Introduction to Philosophy.** (3 cr; A-F only. Prereq-Honors student, \$1001 LE 7)

Honors introduction to philosophical heritage through examination of several classic philosophical problems such as the existence of God, nature of knowledge, free will versus determinism, and the relation of mind to body.

**PHIL 1118. Freshman Seminar: Honors: Logic.** (4 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits, honors student, \$1018 LE 2)

Honors introduction to symbolic logic. Formal systems, deductive validity, proofs and translation in sentence and predicate logics. Introduction to met-theory and extensions of logic.

**PHIL 2001. Existential Literature.** (3 cr; A-F or Aud. Prereq-Comp 1120, 30 cr or #) 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; A-F or Aud. Prereq-Course in logic or literary analysis or human communication or CS or math or # LE 3)

Introduction to theories of meaning and truth and the structure of language. Relation of language to thought and the world; semantics and syntax; speech acts and performative utterances; descriptions and reference; and structuralism and the possibility of objective knowledge.

**PHIL 2021. Science and Pseudo-Science: Thinking about Weird Things.** (3 cr; A-F or Aud. LE 8)

A critical introduction to the nature of knowledge and belief by focusing on contemporary issues, such as UFOs, ESP, mysticism, creationism and evolution, and near-death experiences, which explains the differences between rational beliefs and articles of faith and between science and pseudo-science.

**PHIL 3118. Special Topics:** (Various Titles to be Assigned). (3-9 cr [max 9 cr]; A-F or Aud. Prereq-1001 or #)

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 or Aud)

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; A-F or Aud. Prereq-1001 or Soc 1301)

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; A-F or Aud. Prereq-60 cr or # LE 8)

Problems related to science and technology. Application of moral theory to issues raised by technology, such as distribution of power, effects on environment, labor and social life, privacy, intellectual property rights, product liability, and professional codes of ethics.

**PHIL 3281. Ethical Theory.** (4 cr; A-F or Aud. Prereq-1001 or 1003 or #)

Characteristics and criteria of value statements; justification of moral standards; some 20th-century ethical theories.

**PHIL 3291. Current Social Political Philosophy.** (4 cr; A-F or Aud. Prereq-1001 or 1003 or #)

Detailed philosophical analysis of recent writings about social and political concepts such as freedom, democracy, socialism, communism, fascism, and anarchism.

**PHIL 3301. Greek Philosophy.** (4 cr; A-F or Aud. Prereq-30 cr or #)

Greek philosophy from the pre-Socratic era through Socrates, Plato, and Aristotle to Neoplatonism and the rediscovery of Aristotle. Philosophy of nature, theories of persons, possibility of human knowledge, happiness, and the good life.

**PHIL 3303. The Birth of Modern Philosophy.** (4 cr; A-F or Aud. Prereq-30 cr, course in phil, hist, pol sci or lit or #)

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; A-F or Aud. Prereq-3303 or #)

Survey of main issues and philosophers, with emphasis on the analytic tradition.

**PHIL 3325. Environmental Ethics.** (4 cr; A-F or Aud. Prereq-30 cr or #)

Moral dimension of relationship between humans and earth's natural environment. Pollution, energy policy, economics, law, and environment; endangered species; rights of nonhumans; preservation and conservation; obligations toward future generations; ethical theory and environment.

**PHIL 3570. Philosophy of Psychology.** (4 cr; A-F or Aud. Prereq-1001 or Psy 1003, 60 cr or #)

Current philosophical issues surrounding psychology: behaviorism, dualism, mind/brain identity theories, computer models of cognition, and functionalism.

**PHIL 3900. Colloquium for Majors.** (1 cr; S-N or Aud. Prereq-Phil major/minor, %; attendance at 12 dept-approved lectures/discussions over 4-yr period; regis only during semester of 10th lect)

Lectures and discussion groups on variety of philosophical topics; required reading; places and topics to be announced.

**PHIL 4655. Theory of Knowledge.** (4 cr; A-F or Aud. Prereq-1001, 1008 or 1018 or #; no Grad School credit)

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]; A-F or Aud. Prereq-12 cr Phil or #; no Grad School credit)

Detailed examination of major topics or philosophical works. See department for details.

**PHIL 5245. Aesthetics.** (3 cr; A-F or Aud. Prereq-60 cr)

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 5991. Independent Study.** (1-3 cr [max 10 cr]; A-F or Aud. Prereq-#, cannot be used to satisfy requirements for phil major or minor)

Work in problems of special interest to student arranged with instructor before registration. Written work required. May be taken in conjunction with another philosophy course.

**PHIL 5997. Intern Teaching Assistantship.** (2 cr [max 4 cr]; A-F or Aud. Prereq-#)

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 1220. Intermediate Swimming.** (1 cr; Stdnt Opt. PE)

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; Stdnt Opt. PE)

Development of the basic steps and patterns for ballroom dance. Development of technical and choreographic skill for personal expressive communication through movement.

**PE 1304. Square Dance.** (1 cr; Stdnt Opt. PE)

Development of the basic steps and patterns of square dance. Development of technical and choreographic skill for personal expressive communication through movement.

**PE 1402. Tennis.** (1 cr; Stdnt Opt. PE)

Development of personal skills in tennis. Understanding of strategies and concepts for participation in the game.

**PE 1410. Golf.** (1 cr; Stdnt Opt. PE)

Development of personal golf skills and understandings for participation in the sport.

**PE 1414. Bowling.** (1 cr; Stdnt Opt. PE)

Development of personal skills in bowling. Understanding of concepts and strategies for participation in the game.

**PE 1500. Cross-Country Skiing.** (1 cr; Stdnt Opt. PE)

Development of personal skills in cross country skiing. Understanding of the techniques and concepts for participation in the sport.

**PE 1502. Alpine Skiing.** (1 cr; A-F or Aud. PE)

Development of personal skills in alpine skiing. Understanding of the techniques and concepts for participation in the sport.

**PE 1506. Sailing.** (1 cr; Stdnt Opt. PE)

Development of personal skills in sailing. Understanding of the techniques and concepts for participation in the activity. Understanding of the principles of safety on the water.

**PE 1507. Introduction to River Kayaking.** (1 cr; Stdnt Opt. PE)

River kayaking techniques. History, safety, kayak design, basic braces, paddle strokes, and maneuvering for river conditions.

**PE 1508. Flatwater Canoeing.** (1 cr; Stdnt Opt. PE)

Basic skills and terminology relevant for safe canoeing on flatwater and slow-stream conditions.

**PE 1510. Whitewater Kayaking.** (2 cr; Stdnt Opt. Prereq-1507, # PE)

Whitewater kayaking on Lake Superior and the St. Louis River to learn about: cold water paddling equipment, reading rapids, maneuvering, basic rescues, bracing, rolling, surfing on waves and in holes, includes leadership skill development related to trip-prep, communication and river safety.

**PE 1511. Sea Kayaking.** (1 cr; A-F or Aud)

Sea kayaking techniques; history, safety, kayak design, basic braces, paddle strokes, and maneuvering in large water conditions.

**PE 1512. Fishing Skills.** (1 cr; Stdnt Opt. PE)

Development of personal skills in fishing. Acquisition of understanding, techniques, and patterns for participation in the activity.

**PE 1530. Rock Climbing.** (1 cr; Stdnt Opt. PE)

History, techniques and safety, equipment, knots, basic belay systems, route finding, face and crack climbing, identification of environmental hazards.

**PE 1531. Intermediate Rock Climbing.** (1 cr; Stdnt Opt. Prereq-1530 or #)

Intermediate rock climbing skills and knowledge including use of and placement of anchor systems, top rope set-up, introductory lead climbing and climb site risk management. This course builds upon basic rock climbing skills and techniques which are prerequisite for this course.

**PE 1600. Physical Fitness.** (1 cr; Stdnt Opt. PE)

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; Stdnt Opt. PE)

Knowledge of cardiovascular fitness, including aerobic exercise and hydro-aerobics. Physical development through cardiovascular training, muscle strengthening, and stretching.

**PE 1612. Karate.** (1 cr; Stdnt Opt. PE)

Development of personal skills in karate. Understanding history, cultural background, patterns, and strategies for participation in karate.

## Course Descriptions

**PE 1613. Karate: Advanced Belts.** (1 cr [max 4 cr]; A-F or Aud. Prereq-1612 or equivalent or #)

An advanced course for the experienced student who has achieved the basic competencies in karate.

**PE 1614. Self Defense.** (1 cr; Stdnt Opt. PE)

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; Stdnt Opt. PE)

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; Stdnt Opt. PE)

Development of personal skills in aikido. Understanding of the history, cultural background, patterns, and strategies for participation in aikido.

**PE 1706. Volleyball.** (1 cr; Stdnt Opt. PE)

Development of personal skills in volleyball. Understanding of strategies, concepts, and skills for participation in volleyball.

**PE 1708. Basketball.** (1 cr; Stdnt Opt. PE)

Development of personal skills in basketball. Understanding of strategies, concepts, and skills for participation in the sport.

**PE 1901. Varsity Football.** (1 cr [max 4 cr]; S-N only. Prereq-#)

Participation in intercollegiate football competition.

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

Participation in intercollegiate soccer competition.

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

Participation in intercollegiate basketball competition.

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

Participation in intercollegiate ice hockey competition.

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

Participation in intercollegiate cross country competition.

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

Participation in intercollegiate volleyball competition.

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

Participation in intercollegiate track competition.

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

Participation in intercollegiate tennis competition.

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

Participation in intercollegiate baseball competition.

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

Participation in intercollegiate softball competition.

**PE 2001. Sport Ethics and Society.** (3 cr; A-F or Aud. LE 7)

Explores ethical issues in sport to develop moral reasoning skills for a successful life.

**PE 2240. Lifeguarding Today.** (1 cr; Stdnt Opt. Prereq-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; A-F or Aud. Prereq-1240, 17 yrs old, knowledge and skill based on Emergency Water Safety Standard)

Knowledge, skills, and strategies to teach American Red Cross swimming and water safety courses.

**PE 2500. Advanced Nordic Ski: Telemark and Backcountry Ski Techniques.** (2 cr; A-F or Aud. Prereq-1500 or #)

Traditional Nordic Techniques of telemark skiing will be presented. Background on the history of Nordic skiing will set the foundation for this active physical skill development course.

Students will develop skills for Telemark and back country skiing such as safety, body position, weighting, use of the fall line, and pole planting. Contemporary telemark/back-country gear will be used and reviewed.

**PE 3495. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 4 cr]; A-F only) Treatment of topics beyond those included in regular curriculum or in-depth treatment of topics associated with normal curricular offering.

## Physical Education Professional (PEP)

### College of Education and Human Service Professions

**PEP 1001. Introduction to Physical Education.** (2 cr; A-F or Aud. Prereq-Pre-PE major or #)

Introduction to physical education as a profession. Course will address professional standards, accrediting procedures, portfolio development, and an orientation to the disciplines of the field.

**PEP 1010. Teaching Elementary Games and Gymnastics.** (1 cr; A-F or Aud. Prereq-PE or rec major or #, §1000)

Basic skills, teaching strategies, practices, and drills for teaching elementary games and gymnastics.

**PEP 1020. Teaching Rhythms.** (1 cr; A-F or Aud. Prereq-PE or rec major or #, §1000)

Basic skills, teaching strategies, and practices for teaching rhythms.

**PEP 1310. Teaching Dance.** (2 cr; A-F or Aud. Prereq-Pre PE major or rec major)

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

**PEP 1400. Teaching Tennis and Golf.** (1 cr; A-F or Aud. Prereq-Pre PE major or rec major)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching tennis and golf.

**PEP 1504. Teaching Skating.** (1 cr; Stdnt Opt. Prereq-Pre PE major or rec major or #)

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

**PEP 1600. Teaching Fitness and Weight Training.** (2 cr; A-F or Aud. Prereq-Pre PE major or rec major or #)

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; A-F or Aud. Prereq-Pre PE major or rec major or #)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching soccer and softball.

**PEP 1710. Teaching Volleyball and Basketball.** (1 cr; A-F or Aud. Prereq-Pre PE major or rec major or #)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching volleyball and basketball.

**PEP 2000. Foundations of Physical Education.** (3 cr; A-F or Aud. Prereq-Pre PE major or rec major and min 30 cr or #)

Historical, philosophical, sociological, and scientific foundations within physical education and its subdisciplines.

**PEP 3010. Adapted Physical Education.** (3 cr; A-F or Aud. Prereq-PE major or candidate or #)

Developmental/adapted physical education for children with disabilities.

**PEP 3035. Physiology and Mechanics of Physical Activity.** (3 cr; A-F or Aud. Prereq-Hlth 2040, pre pe major or #)

Physiological and biomechanical concepts as applied to skillful movement, physical activity and fitness.

**PEP 3126. Elementary School Physical Education.** (2 cr; A-F or Aud. Prereq- elem/middle schl teach educ pre- or candidate or #)

Teaching physical education for elementary education majors; need for physical education for elementary school children, planning and teaching age appropriate developmental movement experiences.

**PEP 3501. Teaching Cross-Country Skiing.** (1 cr; A-F or Aud. Prereq-PE, exer sci or rec major or #, \$1500)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching cross-country skiing.

**PEP 3505. Teaching Whitewater Kayaking.** (1 cr; Stdnt Opt. Prereq-Exer sci or pe or rec major, pe 1510 or #, \$1505)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching whitewater kayaking. Successful completion results in American Canoe Association instructor certification.

**PEP 3506. Teaching Sea Kayaking.** (1 cr; Stdnt Opt. Prereq-Exer sci or pe or rec major, PE 1507 or #, \$1506)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching sea kayaking. Successful completion results in American Canoe Association instructor certification.

**PEP 3507. Teaching Outdoor Skills.** (2 cr; Stdnt Opt. Prereq-Exer sci or pe or rec major, Rec 1201, Rec 1202 or Rec 1203, Rec 1204 or #, \$1507)

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 3508. Teaching Rock Climbing.** (1 cr; Stdnt Opt. Prereq-Exer sci or pe or rec major, PE 1530 or #, \$1508)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching rock climbing.

**PEP 3509. Teaching Canoeing.** (1 cr; Stdnt Opt. Prereq-Exer sci or pe or rec major, PE 1508 or #, \$1509)

Basic skills, teaching strategies, practice, drills, and skill analysis for teaching canoeing. Successful completion results in American Canoe Association instructor certification.

**PEP 3520. Alpine Ski Instructor's Course.** (1 cr; A-F or Aud. Prereq-Exer sci or pe or rec major, \$1520)

Instructor training for alpine skiing. Provides a basis of training for professional development as a skiing instructor.

**PEP 3700. Student Assessment in Physical Education.** (3 cr; A-F or Aud. Prereq- Secondary Teacher Education Program (STEP) or #)

Key components of student assessment for physical education teacher education candidates.

**PEP 3720. Elementary Physical Education Methods.** (4 cr; A-F or Aud. Prereq- 3010, 3700, Secondary Teacher Education Program (STEP), #, [P]PEP 3721)

Methods, instructional techniques and strategies, classroom management, lesson planning, developmental levels, elementary curriculum and standards.

**PEP 3721. Apprenticeship: Elementary.** (2 cr; A-F or Aud. Prereq-Secondary Teacher Education Program (STEP), #, [P]PEP 3720)

Supervised clinical teaching experience with responsibilities that include planning, managing, and implementing instructional experiences for elementary school children.

**PEP 3730. Secondary Physical Education Methods.** (4 cr; A-F only. Prereq-3720, PE 2244, Secondary Teacher Education Program (STEP), #, [P]EdSe 3205)

Methods, instructional techniques and strategies, classroom management, lesson planning, developmental levels, secondary curriculum and standards.

**PEP 3731. Apprenticeship: Secondary.** (2 cr; A-F only. Prereq-Secondary Education Teacher Program, #, [P]3730)

Supervised teaching experience with responsibilities that include planning, managing, and implementing instructional experiences for secondary school children.

**PEP 3970. Supervised Teaching: College.** (1 cr; A-F only. Prereq-Secondary Teacher Education Program (STEP), #)

Supervised teaching experience in a college setting.

**PEP 4991. Independent Study.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-PE or exer sci major and #, no Grad School credit)

Research or study in selected noncurricular area of exercise science or physical education.

**PEP 4992. Directed Readings.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-#, no Grad School credit)

Study of varying topics by reading specific books, journal articles, etc. Topics selected based on student interests or academic preparation.

**PEP 4997. Practicum.** (1-5 cr [max 5 cr]; A-F or Aud. Prereq-PE or exer sci major; no Grad School credit)

Supervised practical experience related to physical education teaching or exercise science professional experiences.

**PEP 5991. Independent Study.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Quick enroll or grad student and #)

Directed research and study in selected area of physical education or exercise science.

**PEP 5992. Directed Readings.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-Quick enroll or grad student or #)

Directed Readings

## Physics (PHYS)

### College of Science and Engineering

**PHYS 1001. Introduction to Physics I.** (5 cr; A-F or Aud. Prereq-Algebra, trig LE 4)

Noncalculus general physics course primarily for certain preprofessional fields. Topics in mechanics, heat, and sound.

**PHYS 1002. Introduction to Physics II.** (5 cr; A-F or Aud. Prereq-1001)

Noncalculus general physics course primarily for certain preprofessional fields. Topics in light, electricity, magnetism, and modern physics.

**PHYS 1011. Ideas in Physics.** (3 cr; A-F or Aud. Prereq-Will not satisfy major or minor requirements in phys LE 5)

Descriptive, nonmathematical survey of basic concepts in physics from Newton to present. Instructor has considerable latitude regarding content. Primarily for liberal arts students; not for preprofessional preparation.

**PHYS 1021. Exploring Current Topics in Physics.** (1 cr; A-F or Aud)

Introduction to current topics in the field of physics, with emphasis on recent research developments and local research activities.

**PHYS 2011. General Physics I.** (4 cr; A-F or Aud. Prereq-Math 1290 or Math 1296 or Math 1596; \$1201 LE 4)

Calculus-based introduction to Newtonian mechanics, fluid mechanics, and heat.

**PHYS 2012. General Physics II.** (4 cr; A-F or Aud. Prereq-2011, Math 1297 or Math 1597; \$1202 or 1204)

Calculus-based introduction to electricity, magnetism, and optics.

**PHYS 2021. Relativity and Quantum Physics.** (4 cr; A-F or Aud. Prereq-1202 or 1204 or 2012)

Descriptive course; relativity, quantum mechanics, hydrogen atom, multielectron atoms, molecular structure, quantum statistics, thermal radiation, solid state physics, nuclear physics.

**PHYS 2022. Classical Physics.** (4 cr; A-F or Aud. Prereq-2012, \$1203, \$1205, \$2001)

Survey of various topics in classical physics: vector angular momentum, AC circuits, oscillatory motion, waves, physical optics.

## Course Descriptions

**PHYS 2033. Classical and Quantum Physics Lab.** (2 cr; A-F or Aud. Prereq-[P]2021 and 2022, §2031)

Experiments and computer simulations selected to provide experience with both concepts and techniques in classical and quantum physics.

**PHYS 2111. Solving Physics Problems I.** (1 cr; S-N or Aud. Prereq-Math 1296 or Math 1596, concurrent registration is required in 2011, §1101)

Extended practice in applying basic physics principles and mathematical reasoning to problems in mechanics and thermodynamics.

**PHYS 2112. Solving Physics Problems II.** (1 cr; S-N or Aud. Prereq-Math 1297 or Math 1597, concurrent registration is required in 2012)

Extended practice in applying basic physics principles and mathematical reasoning to problems in electricity, magnetism and optics.

**PHYS 2199. Physics Tutoring.** (1-2 cr [max 4 cr]; S-N or Aud. Prereq-2012 or %) Tutoring students in 1xxx- and 2xxx-level physics courses.

**PHYS 3061. Instrumentation.** (3 cr; A-F or Aud. Prereq-2022 or 1203 or 1205, 1 sem programming)

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]; A-F or Aud. Prereq-%) Directed individual study.

**PHYS 3094. Physics Research.** (1-6 cr [max 6 cr]; S-N or Aud. Prereq-%) Supervised research.

**PHYS 3561. Astrophysics.** (3 cr; A-F only. Prereq-2021, §5561)

The application of physical laws and processes to the understanding of astrophysical objects: celestial mechanics, energy transport, stellar structure and evolution, the interstellar medium, stellar remnants, galactic structure and dynamics, large scale structure and cosmology.

**PHYS 4001. Classical Mechanics.** (4 cr; A-F or Aud. Prereq-2022 or 2001, Math 3280)

Theoretical mechanics, including Lagrangian and Hamiltonian functions, symmetries, and conservation laws.

**PHYS 4011. Electromagnetic Theory.** (4 cr; A-F or Aud. Prereq-2022 or 1203 or 1205, Math 3280)

Electric and magnetic fields, Maxwell's equations and applications, radiation.

**PHYS 4021. Quantum Physics II.** (4 cr; A-F or Aud. Prereq-2021, Math 3280)

Quantum wave mechanics with applications; Schrödinger equation, angular momentum, hydrogen atom, symmetries, identical particles.

**PHYS 4031. Thermal and Statistical Physics.** (4 cr; A-F or Aud. Prereq-2021)

Elements of thermodynamics; principles of statistical physics applied to equilibrium properties of classical and quantum systems.

**PHYS 4110. Physics for Science Teachers.** (2 cr; A-F or Aud. Prereq-1002 or 2012, no Grad School cr)

Preparation for teaching physics at the high school level.

Review of physics concepts important at the high school level. Methods for effective presentation, including problem solving, discussions, demonstrations and lab experiments.

**PHYS 5041. Optics.** (3 cr; A-F or Aud. Prereq-2022 or 2001)

Fundamentals of physical optics.

**PHYS 5043. Environmental Optics.** (3 cr; A-F or Aud. Prereq-2012 or course containing elementary optics)

Application of optics in environmental measurements of irradiance and radiance, optical remote sensing using ship-borne and satellite platforms, diffuse spectra, single vs. multiple scattering, object visibility, inherent vs. apparent optical properties, scattering in Beer's law, optical algorithms.

**PHYS 5052. Computational Methods in Physics.** (3 cr; A-F or Aud. Prereq-2021, 1 sem programming, Math 3280)

Applications of numerical methods to problems in classical and quantum physics, emphasizing ordinary and partial differential equations. Computer modeling of physical systems and experimentation with simulations of physical systems.

**PHYS 5053. Data Analysis Methods in Physics.** (3 cr; A-F or Aud. Prereq-2012, 1 sem programming, lab or field experience beyond 2012)

Problems of data analysis in the context of dynamical models. Emphasis will be placed on large datasets that arise in astrophysics, particle dynamics, physical oceanography and meteorology. (2 hr lect & 2 hr lab)

**PHYS 5061. Experimental Methods.** (3 cr; A-F or Aud. Prereq-2033 or 2031, 3061)

Instruction and practice in methods of experimental physics; microcomputer-based data acquisition; vacuum techniques.

**PHYS 5090. Physics Seminar.** (1 cr [max 2 cr]; A-F or Aud. Prereq-Sr or grad student)

Preparation and presentation of oral reports on approved physics topics, research projects, and journal articles.

**PHYS 5501. Advanced Classical Mechanics.** (3 cr; A-F or Aud. Prereq-4001)

Hamiltonian and Lagrangian formulations for discrete systems, canonical transformations, nonlinear dynamics, and chaos theory.

**PHYS 5511. Electrodynamics.** (3 cr; A-F or Aud. Prereq-4011)

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; A-F or Aud. Prereq-4021)

Schrödinger equation, operator formulation, angular momentum, symmetries.

**PHYS 5522. Quantum Mechanics II.** (3 cr; A-F or Aud. Prereq-5521)

Identical particles, perturbation theory, scattering, interaction with electromagnetic field.

**PHYS 5531. Introduction to Solid State Physics.** (3 cr; A-F or Aud. Prereq-4021, 4031)

Solid structure, thermal, and electronic properties of solids and solid surfaces.

**PHYS 5541. Fluid Dynamics.** (3 cr; A-F or Aud. Prereq-2022 or 2001, Math 3280)

Analytic and numeric treatment of dynamics of fluids. Rotating, stratified fluids, with applications in limnology, oceanography, and meteorology.

**PHYS 5551. General Relativity.** (4 cr; A-F or Aud. Prereq-4001)

Differential geometry, tensors, metrics, curvature, Einstein's equation, Newtonian limit, Killing vectors, cosmology, perfect fluids, Schwarzschild and Kerr solutions, observational tests, black holes.

**PHYS 5561. Astrophysics.** (3 cr; A-F or Aud. Prereq-2021 and 2022, Math 3280)

The application of physical laws and processes to the understanding of astrophysical objects: celestial mechanics, energy transport, stellar structure and evolution, the interstellar medium, stellar remnants, galactic structure and dynamics, large scale structure and cosmology.

**PYHS 5591. Independent Study.** (1-3 cr [max 6 cr]; S-N or Aud. Prereq-Consent of director of graduate studies, #)

Special studies, useful in individual graduate programs, not available in regular course offerings.

**PYHS 5594. Physics Research.** (1-3 cr [max 6 cr]; S-N or Aud. Prereq-#)

Physics Research

**PYHS 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

**PYHS 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-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; A-F or Aud. LE 6)

Principles of American national government. Survey of American governmental system, structure, operations, and services; constitutionalism, federalism, civil liberties, parties, pressure groups, and elections.

**POL 1050. International Relations.** (3 cr; A-F or Aud. LEIP 08)

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]; A-F or Aud)

Contemporary topics in American governmental systems and processes. Specific course announced in [Class Schedule].

**POL 1500. Introduction to Comparative Politics.** (3 cr; A-F or Aud. LEIP 06)

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. Introduction to Political Theory.** (3 cr; A-F or Aud. LE 7)

Survey of major contemporary political ideologies: liberalism, conservatism, socialism, Marxism, fascism, feminism, anarchism, ecologism, and liberation ideologies

**POL 2700. Methodology and Analysis.** (4 cr; A-F or Aud)

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; A-F or Aud. Prereq-1011, min 45 cr or #)

Approaches to policy study, context of policy process, and discussion of policy issues.

**POL 3015. State and Local Government.** (4 cr; A-F or Aud. Prereq-1011, 45 cr or #; §3020)

State and local governments in the United States; governmental institutions and processes; intergovernmental relations. Special reference to Minnesota

**POL 3025. Popular Culture and Politics.** (4 cr; A-F or Aud. Prereq-45 cr incl 6 cr soc sci or #)

Evaluation of the presentation of American political institutions, officials, and policy issues in mass entertainment. How accurate are the portrayals? How influential is Hollywood's view of American government? How do Americans know what they think they know about politics?

**POL 3040. Women and Politics.** (3 cr; A-F or Aud. Prereq-45 cr or #)

Women's political status; implications of women's role in political process; women as political actors; feminist critique and vision of politics.

**POL 3080. Environment and Politics.** (3 cr; A-F or Aud. Prereq-1011, 45 cr or #)

American natural resource problems with special attention to conservation activities on national, state, and local levels; development of conservation agencies in Minnesota.

**POL 3097. Government Internship.** (1-12 cr [max 12 cr]; S-N or Aud. Prereq-60 cr; 4 cr max from 3097, 3197, 3297 may be applied toward advanced Pol major requirements; #)

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]; S-N or Aud. Prereq-90 cr, Pol major; 3 cr max may be applied to upper div Pol major requirements; #)

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; A-F or Aud. Prereq-1011, 45 cr or #)

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 3141. American Political Parties.** (3 cr; A-F only. Prereq-1011 or equivalent, 45 cr)

History of political parties in the U.S.; the role of parties in the executive, legislative, and judicial branches of government and their effect on public policy; party organization; parties at the state and local level; party competition and third parties.

**POL 3142. Voting, Campaigning, and Elections.** (3 cr; A-F only. Prereq-1011, 45 cr)

Covers theories of voting, including how they explain who votes and vote choice. Examines how campaign money, policy issues, the media, and campaign advertising play a role in presidential and congressional elections

**POL 3150. American Constitutional Law I.** (4 cr; A-F or Aud. Prereq-1011, 45 cr or #)

Institutional powers and civil rights: judicial review; authority of Congress and President; powers in war and foreign affairs; power of national and state governments; property rights; civil rights and equal protection (race, gender, and other groups); anti-discrimination; affirmative action.

**POL 3151. American Constitutional Law II.** (4 cr; A-F or Aud. Prereq-1011, 45 cr or #)

Civil liberties: incorporation of the Bill of Rights; Due Process clause; freedom of religion; freedom of speech; freedom of press; privacy rights; rights of the accused; search and seizure; rights before the Courts; cruel and unusual punishment.

**POL 3170. Political Interest Groups and Individuals.** (3 cr; A-F or Aud. Prereq-1011, 45 cr or #)

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]; A-F or Aud. Prereq-45 cr incl 6 cr in soc sci or #)

Detailed examination of contemporary topics in political science. Specific course announced in [Class Schedule].

**POL 3197. Nongovernmental Internship.** (1-12 cr [max 12 cr]; S-N or Aud.

Prereq-60 cr; 4 cr max from 3097, 3197, 3297 may be applied toward advanced Pol major requirements; #)

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.

## Course Descriptions

**POL 3222. The Politics of Bureaucracy.** (3 cr; A-F only. Prereq-1011 or equivalent, 45 cr, §3221)

Operations of bureaucratic organizations and their role in government policy making. Capability of modern bureaucracy in meeting own goal of technical efficiency; impact of bureaucratic forms of organization on democratic society

**POL 3311. Public Opinion and Polling Methods.** (4 cr; A-F only. Prereq-1011 or equivalent, 45 cr)

Formation of public opinion; attitudes and nonattitudes; polls in the media; role of public opinion in democracy; measurement of opinion; survey methods; questionnaire construction; sampling techniques.

**POL 3400. Contemporary Issues in World Politics.** (4 cr [max 8 cr]; A-F or Aud. Prereq-1050, 45 cr; 4 cr may be applied toward Pol major requirements)

Detailed examination and analysis of selected contemporary issues in world politics and international relations. Policy recommendations dealing with each issue.

**POL 3403. American Foreign Policy.** (3 cr; A-F only. Prereq-1011 or 1050, 45 cr, §3402)

Various influences on the making of American foreign policy; understanding why particular foreign policy choices are made and the effects of a changing international environment on American foreign policy.

**POL 3451. Theories of International Relations.** (4 cr; A-F or Aud. Prereq-45 cr incl 8 cr soc sci or #)

Historical and contemporary theories of international relations. Views of contending theorists are analyzed and assessed.

**POL 3456. International Security: Theory and Policy.** (4 cr; A-F or Aud. Prereq-45 cr incl 6 cr soc sci or #)

Introduces undergraduates to the principal theories used in international security studies and to the major security issues faced by the United States in the post-Cold War world.

**POL 3457. Understanding Terrorism and the Terrorist Threat to America.** (4 cr; A-F or Aud. Prereq-30 cr incl 6 cr soc sci or #)

Introduces students to the major causes of terrorism in the Cold War and post-Cold War worlds and the threats terrorist groups pose to the United States and its interests around the world.

**POL 3511. Politics of South Asia.** (4 cr; A-F or Aud. Prereq-1500, 45 cr incl 8 cr soc sci or #)

Comparative study of five South Asian countries (namely India, Pakistan, Bangladesh, Sri Lanka, and Nepal). It analyzes the history and impact of colonialism in South Asia; state formations in South Asia; and controversies in recent South Asian politics over issues like globalization; democratization; religious fundamentalism; nuclearism; and gender. Policy solutions to these problems will be considered.

**POL 3515. Theories of Comparative Politics.** (4 cr; A-F or Aud. Prereq-1500, 45 cr incl 8 cr soc sci or #)

Introduces the theoretical, methodological, and substantive debates in the discipline of Comparative Politics.

**POL 3517. Western European Political Systems.** (4 cr; A-F or Aud. Prereq-45 cr incl 8 cr soc sci or #)

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 3518. Transitional Politics of Asia.** (3 cr; A-F only. Prereq-1500, 3570, or equivalent, 45 cr)

A comparative study of transitional societies in Asia (i.e., societies undergoing political, economic, technological, and socio-cultural changes--in varying degrees and forms--as part of their state building projects). Addresses the political economy of transitional states of Asia such as China, Japan, Korea, Taiwan, and India. Exploration, in the context of their historical

experiences, of the rise of their state structures; ideologies; their transition from agrarian toindustrialization; and how has this transition impacted their indigenous social cultures and identities.

**POL 3570. Politics of Developing Nations.** (3 cr; A-F or Aud. Prereq-1050 or 1500 or 8 cr soc sci, 45 cr or #)

Nature of political development; individual and institutional causes and consequences of development; political economy of Third World.

**POL 3600. Political Concepts.** (4 cr; A-F or Aud. Prereq-45 cr or #)

Fundamental political themes and concepts in political theory, 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; A-F or Aud. Prereq-45 cr incl 6 cr soc sci or econ or bus or #)

Relationship between politics and economics and ways they affect each other, focusing on political and economic values/goals and their role in shaping public policy; policies and policy making in selected national systems; the international economy.

**POL 3651. Classical Political Thought.** (4 cr; A-F or Aud. Prereq-1610 or #)

Justice and the political community; classical Greek thought and medieval thought, concentrating on Plato, Aristotle, Augustine, Aquinas, Machiavelli, and More.

**POL 3652. Modern Political Thought.** (4 cr; A-F or Aud. Prereq-1610 or #)

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 3910. Honors Seminar: Landmarks in Political Science..** (4 cr; A-F or Aud.

Prereq-30 cr, 3.10 GPA in pol courses, %)

Selected books and essays considered to be outstanding contributions to political science. The works' arguments and contribution to political science.

**POL 4190. The Senior Seminar.** (4 cr; A-F or Aud. Prereq-6 cr in relevant upper div pol courses, #)

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]; A-F or Aud. Prereq-8 cr in pol, 6 cr in other soc sci, #)

Advanced study and research under supervision of a staff member; student must consult with instructor before registration.

**POL 4195. Special Topics:** (Various Titles to Be Assigned). (1-4 cr [max 6 cr]; A-F or Aud. Prereq-45 cr incl 8 cr in soc sci or #)

Detailed examination of contemporary topics in political science. Specific course announced in Class Schedule.

## Psychology (PSY)

### College of Education and Human Service Professions

**PSY 1003. General Psychology.** (4 cr; A-F or Aud. LE 6)

Scientific study of behavior; current knowledge of biological, social, and cognitive areas of psychology. Assessment, research methods, human development, personality, mental disorders, and therapy.

**PSY 2003. Psychology: Discipline and Profession.** (1 cr; S-N only. Prereq-Pre-psychology or psychology major)

Orientation to psychology: the major, discipline, and professions available. Subfields of psychology, ethical issues, careers, preparation for graduate school, and opportunities for

professional development. Introduction to research, available resources, and preparation for writing assignments required in upper-division psychology courses.

**PSY 2021. Developmental Psychology.** (4 cr; A-F or Aud. LECD 06)

Major processes in human development, conception through lifespan; biological and cultural influences on physical-motor, cognitive, social, and emotional development; effects of diverse cultural traditions and values; social policy implications.

**PSY 2023. Marriages and Families Worldwide.** (4 cr; A-F or Aud. LEIP 08)

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 or Aud. LECD 08)

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 3010. Internship Preparation.** (2 cr; A-F only. Prereq-Psy major, #)

For psychology majors preparing to complete an internship. Includes career development, site selection, exploration of community or business organizations and study of ethics.

**PSY 3011. Internship in Psychology.** (3 cr [max 6 cr]; A-F only. Prereq-3010, #)

Internship with a school, community agency or business. Nine hours supervised experience on site and one hour on campus per week. Students complete an internship contract, weekly log, relevant readings, and paper or presentation. Includes direct contact with clients and staff.

**PSY 3020. Statistical Methods.** (4 cr; A-F or Aud. Prereq-Elem Algebra, Math placement test)

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; A-F or Aud. Prereq-3020)

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; A-F or Aud. Prereq-3020, 3021, #)

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; A-F or Aud. Prereq-4 or Psy or #)

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; A-F or Aud. Prereq-3 or Psy)

Survey of historical development and current status of contemporary systems and theories in psychology.

**PSY 3098. The Psychological Principles of Stress Management.** (3 cr; A-F or Aud)

Examines the psychological principles applicable to stress management and holistic life management. Advanced experiential application of a wide spectrum of approaches integrating the mental, physical, and spiritual characteristics of wellbeing.

**PSY 3111. Theories of Personality.** (3 cr; A-F or Aud. Prereq-3 or Psy)

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; A-F or Aud. Prereq-Upper div standing, strong interest in scientific study of religious experience and behavior)

Religious beliefs and their functional value in human life. Varieties of religious experience and behavior.

**PSY 3121. Abnormal Psychology.** (4 cr; A-F or Aud. Prereq-3 cr Psy)

Mental disorders, including DSM-IV classification system, etiology, and treatment.

**PSY 3122. Child and Adolescent Abnormal Psychology.** (3 cr; A-F only. Prereq-1003, 2021)

Overview of psychological disorders common among children and adolescents, including theoretical approaches, diagnostic criteria, developmental trajectory and framework, etiology, risk and protective factors, and treatment. Ethical considerations, research methodology, and diversity considerations in child clinical psychology will also be covered.

**PSY 3201. Social Psychology.** (3 cr; A-F or Aud. Prereq-3 cr Psy)

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; A-F or Aud. Prereq-3 cr Psy)

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; A-F or Aud. Prereq-\$3216; 3 cr Psy)

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 3231. Psychology of Drug Use.** (3 cr; A-F or Aud. Prereq-3 cr Psy)

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; A-F or Aud. Prereq-1003)

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; A-F or Aud. Prereq-2021 or #)

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; A-F or Aud. Prereq-1003 or #)

Branch of psychology that studies spiritual and transcendental experiences. Concerned with the whole of being, it recognizes potential for a variety of states of consciousness; it acknowledges developmental psychology and draws further insights from the spiritual dimensions of human beings. Lab fee.

**PSY 3450. Dreamwork.** (3 cr; A-F or Aud. Prereq-3 cr Psy)

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 3520. Introduction to Industrial/Organizational Psychology.** (4 cr; A-F or Aud. Prereq-\$Psy 3701 and/or Psy 3707, 3 cr psy or #)

Introduction to the field of industrial/organizational psychology. Major content areas within the field will be covered, including selection, training, performance evaluation, motivation, work stress, organizational culture, teams, and leadership.

## Course Descriptions

### Course Descriptions

#### **PSY 3524. Basic Helping Skills.** (4 cr; A-F or Aud)

Rationale for and practice of basic skills needed for effective interpersonal helping.

#### **PSY 3527. Psychology and Social Responsibility.** (4 cr; A-F or Aud. Prereq-3 or Psy)

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 3540. Psychology of Food Abuse.** (3 cr; A-F or Aud. Prereq-3 or Psy)

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; A-F or Aud. Prereq-3 cr Psy)

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 Behavior.** (4 cr; A-F or Aud. Prereq-3 cr Psy)

Study of basic learning and behavior processes including the evolution of behavior, pavlovian conditioning, instrumental learning, and elementary cognitive processes.

#### **PSY 3613. Behavior Modification.** (3 cr; A-F or Aud. Prereq-3 cr Psy)

Basic psychological methods, techniques, and findings in applications of operant and respondent conditioning to treatment of human behavior problems.

#### **PSY 3621. Cognition.** (4 cr; A-F or Aud. Prereq-3 cr Psy)

An overview of cognitive processes, using historical, philosophical, biological and experimental perspectives. Course topics include attention, perception, knowledge representation memory, language, thinking, reasoning, and decision-making.

#### **PSY 3631. Cognitive Development: Ways of Knowing.** (3 cr; A-F or Aud)

Development of cognitive processes from infancy through adolescence. Perception in infancy; development of information processing capacities; constructing understandings; language, culture and thinking; thinking as theory building; thinking about self and others. Impact of research on child rearing, education, public policy.

#### **PSY 3661. Psychology of Language.** (3 cr; A-F or Aud. Prereq-3 cr Psy)

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 or Aud)

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; A-F or Aud. Prereq-3 cr Psy)

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; A-F or Aud. Prereq-3 or Psy)

Overview of organizational topics within industrial/organizational psychology. Leadership, job satisfaction, motivation theories, goal setting, organizational behavior, organizational development, and industrial relations.

#### **PSY 3760. Work and Self.** (4 cr; A-F or Aud)

Examines how work affects various aspects of the self. Issues include effects of corporate culture on identity, routinized work, physical health and safety, emotional labor, organizational ethics and justice, as well as the social and psychological meanings that work provides.

#### **PSY 3985. Honors Seminar in Psychology.** (2 cr; A-F or Aud. Prereq-3021, Psy major with 60 or, 3.00 GPA overall, 3.25 GPA in psy, #)

Concentrated study using original writings on major issue or by person with historical or theoretical importance within psychology. Bibliography, individual paper, and group project required.

#### **PSY 3990. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 3 cr]; A-F or Aud. Prereq-3 or Psy)

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]; S-N or Aud. Prereq-Psy major or minor, #)

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]; S-N or Aud. Prereq-Psy major or minor, #)

Research problem chosen by instructor; written report required.

#### **PSY 3995. Research in Psychology.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq-Psy major or minor, #)

Intensive independent empirical research on problem in psychology chosen by student; research report required.

#### **PSY 3996. Pre-Professional Field Placement.** (1-4 cr [max 4 cr]; S-N only. Prereq-3010, [P]3011, #)

Preprofessional field placement. For students wishing additional internship experience. Requires additional 3 hours per week of supervised experience on site for each credit. Must be taken with Psy 3011 Internship in Psychology.

#### **PSY 3997. Honors Project in Psychology.** (1-3 cr [max 3 cr]; A-F or Aud. Prereq-major, #, 3.00 GPA overall, 3.25 GPA in psy)

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]; A-F or Aud. Prereq-Psy major, #, 3.00 GPA overall, 3.25 GPA in psy)

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]; Stdnt Opt. Prereq-#)

Students work with department faculty in planning and helping teach an undergraduate course.

#### **PSY 4021. Research Methods I.** (4 cr; A-F or Aud. Prereq-3020, #; no Grad School cr)

Provides an overview of research methods in psychology; logical and scientific basis of experimental psychology; problems and techniques of designing, conducting and reporting experiments; selecting and constructing psychological instruments, a review of statistics and how to design a research project.

#### **PSY 4022. Research Methods II.** (4 cr; A-F or Aud. Prereq-4021, #; no Grad School cr)

Discusses research methodology as it is applied within different areas of psychology. Reviews statistics and introduces the use of statistical software (e.g.,SPSS). Provides an overview of testing and measurement and research ethics.

**PSY 4023. Research Methods III.** (3 cr; A-F or Aud. Prereq-4022, #; no Grad School cr)

Emphasizes designing and conducting a study, analyzing data, and interpreting and reporting the results.

**PSY 4121. Foundations of Clinical Psychology.** (3 cr; A-F or Aud. Prereq-3121, no Grad School cr)

An overview of clinical psychology as well as contemporary issues and trends within the field. Emphasizes areas in which clinical psychologists are principally involved, including assessment, treatment, and clinical research.

**PSY 4500. Health Psychology.** (3 cr; A-F or Aud. Prereq-1003, 12 sem cr in psy or #)

Concepts, issues, and methods of health psychology; health maintenance and illness prevention integrating biological, psychological, and social factors; utilization of health psychological assessments; and interdisciplinary aspects of health psychology.

**PSY 5001. Transpersonal Development.** (3 cr; Stdnt Opt)

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; A-F or Aud. Prereq-Grad student or #)

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; A-F or Aud. Prereq-3020, 5051 or #)

Advanced parametric and nonparametric statistics; application of variance, covariance, and linear regression analyses to a variety of multilevel and factorial research designs; psychometric statistics; computer-based data management; ethical and legal considerations.

**PSY 5061. Research Problems I.** (1-2 cr [max 2 cr]; S-N or Aud)

Application of principles and procedures of research methods, needs assessments, and program evaluations; integration of research concepts with counseling problems through guided study and practice; ethical and legal considerations. Partially fulfills Plan B requirement.

**PSY 5062. Research Problems II.** (1-2 cr [max 2 cr]; S-N or Aud. Prereq-5061 or #)

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 5098. Psychological Transformation and the Spiritual Journey.** (3 cr; A-F or Aud. Prereq-3445 or 5001 or 3601 or #)

Explores how psychological change develops and proceeds leading to self-realization and the emergence of the self including experiential activities designed to deepen the human experience. May be offered as a retreat.

**PSY 5121. Psychopathology Over the Lifespan.** (3 cr; A-F or Aud. Prereq-3121 or Grad Student or #)

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; A-F or Aud. Prereq-Sr or grad student or #)

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; A-F or Aud. Prereq-Sr or Grad Student or #)

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 5130. Evolutionary Psychology.** (3 cr; A-F or Aud. Prereq-1003, 3020 or #)

Evolution and the theory of natural selection as it applies to behavioral processes, e.g., survival, mating strategies, parenting and family, cooperation and conflict.

**PSY 5131. Mind-Body Connection.** (3 cr; A-F or Aud)

Examination of interface between biological and psychological development associated with risks for substance abuse, depression, and conduct disorders; potential commonality of mechanisms. Topics may include communication between brain and endocrine systems, evolution of the brain, homosexuality, psychoneuroimmunology, and psychopharmacology.

**PSY 5155. Forensic Psychology.** (3 cr; A-F or Aud. Prereq-1003 or #)

Examines the application of psychology to the judicial system in such diverse areas as criminal diversion and rehabilitation; expert testimony; jury selection; police training; divorce mediation; and custody evaluations.

**PSY 5160. Psychology of Hope.** (3 cr; A-F or Aud. Prereq-1003 or #)

Examines human behavior from a positivistic perspective, examining what works well for individuals, behaviorally, emotionally, psychologically, and how to expand on it.

**PSY 5201. Childhood and Adolescence: Advanced Study.** (3 cr; A-F or Aud. Prereq-2021 or 3371, sr or Grad Student or #)

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 5455. Jungian Psychology.** (3 cr; A-F or Aud. Prereq-1003 or 2021 Or 3081 or #)

Examines the primary theories and research of C. G. Jung. To include a thorough study of the purposive nature of individual psychological development, personality typologies, and the Jung's structure of the psyche: archetypes, anima/animus, shadow, collective unconscious.

**PSY 5603. Cultural and Family Counseling: Theories and Techniques.** (3 cr; A-F or Aud. Prereq-Couns psy or soc work grad or #)

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 exosystems. Ethical and legal considerations.

**PSY 5611. Behavior and Cognitive Therapy Approaches.** (3 cr; A-F or Aud. Prereq-Grad Student or Psy 3611 or #)

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 5990. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 8 cr]; A-F or Aud. Prereq-Sr or grad student or #)

Analysis of selected advanced topics in psychology and/or counseling.

## Course Descriptions

**PSY 5992. Directed Reading.** (1-4 cr [max 4 cr]; Stdnt Opt. Prereq-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]; Stdnt Opt. Prereq-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]; Stdnt Opt. Prereq-5051 or equiv, #)

Advanced individual research with faculty approval and direction; demonstration of sound theoretical foundations and research skills resulting in written report.

**PSY 8005. Ethical and Professional Issues in School Counseling.** (2 cr; A-F or Aud. Prereq-Couns psy grad major or #)

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; S-N or Aud. Prereq-5501, 5601, 5603, cours psy grad major or %)

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 [max 6 cr]; S-N or Aud. Prereq-8001, 8101, %)

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 [max 6 cr]; S-N or Aud. Prereq-8101, 8111, %)

Supervised practice of counseling skills with focus on individual counseling at a community site. Videotaping required.

**PSY 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

**PSY 8597. Internship I: Group Counseling in Schools, K-8.** (3-6 cr [max 6 cr]; S-N or Aud. Prereq-8101, %)

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 [max 6 cr]; S-N or Aud. Prereq-8005, 8101, 8131, %)

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 [max 6 cr]; S-N or Aud. Prereq-8005, 8101, %)

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 [max 6 cr]; S-N or Aud. Prereq-8005, 8101, 8797, %)

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 or Aud)

Overview of recreation and leisure and its impact on modern society.

**REC 1201. Outdoor Skills I.** (2 cr; A-F or Aud. PE)

Instruction and practice in skills of fall outdoor activities. Camping, canoeing, hunting, and climbing; equipment, shelters, and navigation.

**REC 1202. Outdoor Skills II.** (2 cr; A-F or Aud. PE)

Instruction and practice in skills of winter and spring outdoor activities. Camping, backpacking, dogsledding, and fishing; equipment and navigation.

**REC 1203. Outdoor Skills I.** (2 cr; A-F or Aud. Prereq-Pre-rec, rec major or minor)

Instruction and practice in skills of fall outdoor activities. Camping, canoeing, fishing, hunting, and climbing; equipment, shelters, and navigation.

**REC 1204. Outdoor Skills II.** (2 cr; A-F or Aud. Prereq-Pre rec or rec major or minor or #)

Instruction and practice in skills of winter and spring outdoor activities. Camping, backpacking, dogsledding, and fishing; equipment and navigation.

**REC 2300. Recreation Programming.** (3 cr; A-F or Aud. Prereq-1000 or #)

Designing, presenting, and evaluating recreation programs. Components of planning, such as facilities management and equipment procurement. Leadership practices pertaining to outdoor education programs.

**REC 3320. Recreational Sports.** (3 cr; A-F or Aud. Prereq-2300 or #)

Organization and administration of intramural and formal sport programs in a recreational sport agency.

**REC 3327. Large Event Management.** (3 cr; A-F or Aud. Prereq-2300 or #)

Organization and administration of life fitness activities and nonformal instruction in recreational sport programs. Design, implementation, and evaluation of large-scale recreational sports events such as triathlons and tournaments.

**REC 3330. Outdoor Recreation.** (3 cr; A-F or Aud. Prereq-2300 or #)

Examination of outdoor recreation as a part of natural resource based agencies as well as in nature centers, commercial operations, and in municipal settings. This course will focus on outdoor recreation uses in Northeastern Minnesota.

**REC 4320. GIS Management for Recreation Professionals.** (3 cr; Stdnt Opt. Prereq-No Grad School credit)

Using G.I.S. mapping techniques for recreation and outdoor education professionals in resource management decisions. The use of Arcview and Landview software will be used to visualize and analyze landscapes. This course is specific to recreation and/or outdoor education professionals.

**REC 4991. Independent Study.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq-#; no Grad School credit)

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]; A-F or Aud. Prereq-#; no Grad School credit)

Complementary readings and discussion in student's area of interest with faculty supervision.

**REC 4997. Recreation Practicum.** (3 cr; S-N only. Prereq-1000, rec minor; no Grad School credit)

Field-based experience through a selected recreation agency.

# Russian (RUSS)

## College of Liberal Arts

### RUSS 1101. Beginning Russian I. (4 cr; A-F or Aud. LE 3)

Grammar, reading, and conversation for students with no previous knowledge of Russian.

### RUSS 1102. Beginning Russian II. (4 cr; A-F or Aud. Prereq-1101 or equiv # LE 3)

Grammar, reading, and conversation.

# Safety (SAFE)

## College of Science and Engineering

### SAFE 6002. Regulatory Standards and Hazard Control. (3 cr; A-F or Aud. Prereq-MEHS student or BSIE candidate and % or BSME candidate and % or #)

Overview of OSHA and other health and safety standards, codes and regulations with an emphasis on the recognition and control of workplace hazards as defined by the standards, codes and regulations.

### SAFE 6011. System Safety and Loss Control Techniques. (3 cr; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program 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. Lab arranged.

### SAFE 6012. Risk Management and Workers' Compensation. (2 cr; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program 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. Lab arranged.

### SAFE 6051. Construction Safety. (3 cr; A-F or Aud. Prereq-MEHS student or BSIE and % or BSME cand and % or #)

Code of Federal Regulations 1926 and other standards and regulations that affect construction industry. Emphasis on recognition, analysis, and corrective action. Principles of construction safety management, project implementation, and subcontractors management. Lab arranged.

### SAFE 6101. Principles of Industrial Hygiene. (3 cr; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program only)

Effects of chemical, physical, and biological agents on the body and typical methods of control; lab use of monitoring and corrective devices. Lab arranged.

### SAFE 6102. Advanced Industrial Hygiene and Health Physics. (2 cr; A-F or Aud. Prereq-6101 or %; can apply credit to MEHS program 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. Lab arranged.

### SAFE 6111. Industrial Noise and Ventilation Control. (3 cr; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program only)

Physics of sound, industrial noise sources, effects of noise on humans, and noise control. Basic principles of ventilation as applied to control of air contaminants; elementary principles of design for exhaust ventilation systems; and fan specifications. Lab applications.

### SAFE 6121. Epidemiology and Industrial Toxicology. (2 cr; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program 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; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program 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; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program only)

Study of health and safety programs used in rail, road, air, and marine transportation, emphasizing fleet safety programs.

### SAFE 6212. Noise Control Engineering. (3 cr; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program only)

A multi-disciplinary approach to a comprehensive introduction to the principles of noise and noise conservation (hygiene, safety, acoustics, audiology, occupational medicine, engineering, behavioral and legal). Emphasis will be on noise control engineering protocols. Lab arranged.

### SAFE 6213. Principles of Ventilation and Indoor Air Quality. (3 cr; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program only)

Comprehensive introduction on design, maintenance, and evaluation of exhaust ventilation systems. Methodology for conducting indoor air quality investigations. Lab arranged.

### SAFE 6291. Independent Study in Industrial Safety. (1-3 cr [max 3 cr]; S-N or Aud. Prereq-MEHS student or %; can apply credit to MEHS program 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 [max 3 cr]; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program 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; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program 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. Lab arranged.

### SAFE 6302. Occupational Ergonomics and Injury Management. (3 cr; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program 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. Lab arranged.

### SAFE 6401. Environmental Safety and Legal Implications. (2 cr; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program only)

Federal, state, and local laws and judicial interpretations that have applications to environmental health and safety programs. Corporate responsibility regarding environment, employee, and product.

### SAFE 6402. Environmental Control Operations and Design. (2 cr; A-F or Aud. Prereq-6401 or %, MEHS student; can apply cr to MEHS program only)

Focus is on design and use of equipment used to control environmental pollution in industry and municipalities. Takes a multimedia approach looking at applications in air pollution, water/wastewater and solid/hazardous wastes. Lab arranged.

## Course Descriptions

**SAFE 6802. Leadership, Teamwork, and Behavior in EHS.** (3 cr; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program only)

Behavior-based approach to EHS as characterized by effective leadership, teamwork, and employment of principles which create a culture in which workers are motivated to promote a safe and healthful environment. Applied projects and activities based on actual industrial situations. Lab arranged.

**SAFE 6821. Organization and Administration of Safety Programs.** (2 cr; A-F or Aud. Prereq-MEHS student or %; can apply credit to MEHS program only)

Current administrative practices. Involvement in design and development of safety programs suitable for an industrial facility.

**SAFE 6997. Internship in Environmental Health and Safety.** (3 cr; S-N or Aud. Prereq-MEHS student or %; can apply credit to MEHS program 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.

## Science (SCI)

### College of Science and Engineering

**SCI 3351. Chemistry for High School Teachers I.** (2 cr; Stdnt Opt. Prereq-%)

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; Stdnt Opt. Prereq-%)

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 or Aud. Prereq-\$1211 or 1212. LEIP 08)

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.

**SW 1211. Freshman Seminar: Global Issues.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 cr, \$1210 or 1212 LEIP 08)

Global problems of war, peace, and national security; population, food, and hunger; environmental concerns and global resources; economic and social development; human rights. Examination of issues from systems, problem solving, and futurist perspectives in seminar format. Consideration of value, race, class, and gender differences.

**SW 1212. Global Issues Honors Seminar.** (3 cr; A-F or Aud. Prereq-honors student, \$1210 or 1211 LEIP 08)

Focus on global problems of war, peace, and national security; population, food, and hunger; environmental concerns and global resources; economic and social development; human rights. Examination of issues from systems, problem solving, and futurist perspectives in honors seminar format.

**SW 1619. Race, Class, and Gender in the United States.** (3 cr; A-F or Aud. LECD 08)

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; A-F only. Prereq-Jr or sr or grad student or #)

Intensive advanced course in the federal, state, and tribal laws and court processes regulating child welfare practice. Includes laws and procedures and the role of the social worker in legal proceedings.

**SW 5061. Computers in the Human Services.** (1-2 cr [max 2 cr]; Stdnt Opt. Prereq-Jr or sr or grad student or #)

Overview of computers in the human services, including word processing, spreadsheets, databases, communication, and internet.

**SW 5091. Independent Study.** (1-4 cr [max 8 cr]; Stdnt Opt. Prereq-#)

Directed reading, research, or other experiences leading to presentation of a report.

**SW 5095. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 12 cr]; Stdnt Opt)

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]; S-N or Aud. Prereq-#)

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 5101. Human Behavior in the Social Environment.** (3 cr; A-F only. Prereq-Jr or sr or Grad or #)

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 5111. Grant Writing in the Human Services.** (1-2 cr [max 2 cr]; A-F only. Prereq-Jr or sr or Grad or #)

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; A-F only. Prereq-Jr or sr or Grad or #)

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 [max 2 cr]; A-F only. Prereq-Jr or sr or grad student or #)

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; A-F only. Prereq-5201 or advanced standing MSW program 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; A-F only. Prereq-Jr or sr or Grad or #)

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 8021. Methods of Clinical Social Work Practice.** (1-2 cr [max 2 cr]; A-F only. Prereq-8111 or admission to advanced standing MSW program)

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. Advanced Practice in Child Welfare.** (2-3 cr [max 3 cr]; A-F only. Prereq-5032, 8441)

Advanced skill development in assessment, intervention, and evaluation in relationship to direct child welfare social work practice.

**SW 8051. School Social Work.** (1-2 cr [max 2 cr]; A-F only. Prereq-Soc work grad student or #)

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 8100. Social Work with Diverse Populations.** (3 cr; A-F only. Prereq-MSW students or #)

Examines societal issues generated by systemic discrimination and explores methods for reducing discrimination. Particular focus on advanced social work practice with diverse populations.

**SW 8101. Introduction to Research.** (2 cr; A-F only. Prereq-SW Grad School student or #)

Introduction to social science research and its applications to social work and social welfare.

**SW 8102. Advanced Research.** (3 cr; A-F only. Prereq-8101 or admission to advanced standing MSW program)

Application of social science knowledge and skills to evaluate practice and to conduct community-based research and program evaluation projects. Develop a research proposal.

**SW 8104. Project Seminar II.** (1 cr; S-N only. Prereq-8103)

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. Individual, Family and Group Practice I.** (3 cr; A-F only. Prereq-SW grad student or #)

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. Organization and Community Practice I.** (3 cr; A-F only. Prereq-8111)

Using a problem-solving model and the ecological and strengths perspectives, students develop assessment and interventions skills for effective practice with organizations and community. Topics include using supervision, facilitating meetings, advocacy, cultural competence, and promoting organizational and community change.

**SW 8331. Organization and Community Practice II.** (3 cr; A-F only. Prereq-5101, 8112 or Advanced Standing in MSW program)

Prepares students for advanced practice in organizations and communities. It provides a framework for assessing and intervening in organizational and communities using an asset-based and problem-solving approach. Specific strategies and tactics for strengthening organizations and communities are addressed.

**SW 8332. Advanced Practice in Administration and Community Development.** (2-3 cr [max 3 cr]; A-F only. Prereq-8331)

This course focuses on application of advanced knowledge and skills essential for understanding macro practice. Analysis of organizations and communities is required. Emphasis will be on analysis of complex social problems and the development of organizational and community solutions.

**SW 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master's student, adviser and DGS consent)

**SW 8441. Individual, Family and Group Practice II.** (3 cr; A-F only. Prereq-5101, 8112 or advanced standing MSW student)

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 [max 2 cr]; A-F only. Prereq-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 8443. Advanced Practice in Mental Health.** (2-3 cr [max 3 cr]; A-F only. Prereq-8441)

Advanced skill development in direct practice social work assessment, intervention, and evaluation in relationship to mental health issues.

**SW 8544. Advanced Practice with Families.** (2-3 cr [max 3 cr]; A-F only. Prereq-8441)

Advanced skill development in social work assessment, interventions, and evaluations in relationship to families at various stages across the life span.

**SW 8771. Health in American Indian Communities.** (2 cr; A-F only. Prereq-5235)

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.** (3-6 cr [max 6 cr]; S-N only. Prereq-8111, 8112; SW Grad student, #)

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 [max 8 cr]; S-N only. Prereq-[P]8031 or 8332 or 8443 or 8544, SW Grad Student and #)

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; A-F only. Prereq-5235 or #)

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 [max 4 cr]; S-N only. Prereq-Soc work grad student, 8771 or 8881, #)

Gives MSW students supervised direct practice experience in the American Indian community. Application of cultural knowledge and culturally competent practice skills.

## Course Descriptions

# Sociology (SOC)

## College of Liberal Arts

**SOC 1080. Freshman Seminar: Development of Social Selves.** (3 cr; A-F or Aud. Prereq-Freshman, fewer than 30 credits)

Examines how the self develops. The primary focus is the socialization process, a process which continues throughout the life course. Special attention will be given to childhood and adolescent socialization. How do we learn? How do we understand behavior? What are the consequences of inadequate socialization?

**SOC 1095. Freshman Seminar: Topics:** (Various Titles to be Assigned). (3-4 cr [max 4 cr]; A-F or Aud. Prereq-Freshman, fewer than 30 cr LE 8)

Seminar designed specifically for freshmen.

**SOC 1096. Freshman Seminar: Topics** (Various Titles to be Assigned). (3-4 cr [max 4 cr]; A-F or Aud. Prereq-Freshman, fewer than 30 cr LECD 08)

Seminar designed specifically for freshmen.

**SOC 1101. Introduction to Sociology.** (4 cr; A-F or Aud. LECD 06)

Introduction to sociological concepts and their application.

**SOC 1201. Sociology of the Family.** (3 cr; A-F or Aud. LECD 08)

The family as a basic social institution: similarities and variations in family systems, their interrelationships with other institutions, and patterns of continuity and change.

**SOC 1301. Introduction to Criminology.** (4 cr; A-F or Aud. LE 8)

Analysis of social justice with emphasis on criminal justice system in United States. Nature and extent of crime; social factors related to criminal behavior.

**SOC 1400. Alcohol and College Life.** (1 cr; A-F or Aud. Prereq-Freshman status)

Online web class providing first year students with factual information about how alcohol affects college life and reinforces personal prevention strategies as well as aiming to maximize student and campus safety. This class cannot count toward a sociology major or minor.

**SOC 2111. Sociological Theory.** (4 cr; A-F or Aud. Prereq-1101, 15 cr)

Analysis of classical and contemporary sociological theory. Major theorists, including Durkheim, Weber, and Marx; major paradigms and their importance to sociological thought.

**SOC 2155. Introduction to Research Methods and Analysis.** (4 cr; A-F or Aud. Prereq-[1101 or 1301], at least 15 cr)

Principles/practice of research design, sampling, data collection including field observation/surveys. Data management, analysis, and reporting of quantitative/qualitative data. Ethics/administration in sociological research. Introduction to SPSS statistical software. Lab

**SOC 2311. Criminological Theory.** (4 cr; A-F or Aud. Prereq-1301, 15 cr)

Examination of the major theories of crime causation. Specific theories include macro and micro sociological explanations, as well as biological and psychological perspectives. Discussion includes the history, social context, and policy implications of each theory.

**SOC 3155. Quantitative Research Methods and Analysis.** (4 cr; A-F or Aud.

Prereq-2155, [crim major or soc major or URS major], at least 30 cr)

Descriptive statistics. Measures of central tendency, deviation, association. Inferential statistics focusing on probability and hypothesis testing. T-tests, Chi-square tests, analysis of variance, measures of association, introduction to statistical control. Statistical software (SPSS) used to analyze sociological data. Lab.

**SOC 3156. Qualitative Research Methods and Analysis.** (4 cr; A-F or Aud. Prereq-[2155 or anth major or urs major or cst minor], at least 60 cr) or #)

Application of qualitative research methods to study of social structures. Emphasizes field techniques, secondary data analysis, and interpretation. Lab

**SOC 3306. Deviance.** (3 cr; A-F or Aud. Prereq-1101 or 1301, min 15 cr; §2306)

Behaviors, beliefs, and physical characteristics defined as deviant; legal and other formal and informal reactions to deviance; subjective and objective effects of being defined as deviant.

**SOC 3322. Law and Society.** (3 cr; A-F or Aud. Prereq-30 cr or #)

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; A-F or Aud. Prereq-30 cr or #)

Nature, goals, and problems in administration of the American criminal judicial process.

**SOC 3328. Delinquency and Juvenile Justice.** (3 cr; A-F or Aud. Prereq-30 cr or #)

Delinquency in contemporary American society. Major issues concerning causes, prevention, and treatment of juvenile offenders. Focus on U.S. juvenile justice system.

**SOC 3336. Crime and the Media.** (3 cr; A-F or Aud. Prereq-Min 30 cr or #)

Examines the relationship between crime, criminal justice and the media. It explores how news and entertainment media portray criminals, crime and the criminal justice system, and the effects of these portrayals on the justice system and society.

**SOC 3338. Sociology of Gangs.** (3 cr; A-F or Aud. Prereq-30 cr or #)

Street and prison gangs in America at the national, state, and local level. Sociological research and theories relative to gang formation and the economics related to street and prison gangs.

**SOC 3342. Law Enforcement Administration.** (3 cr; A-F or Aud. Prereq-30 cr or #)

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; A-F or Aud. Prereq-30 cr or #)

Role of police and relationship of law enforcement to the community; focuses on crime prevention.

**SOC 3361. Correctional Continuum.** (3 cr; A-F or Aud. Prereq-1101, Soph or higher or #)

Analysis of the range of sanctions and programs in corrections. Topics include both community-based and institutional corrections, as well as juvenile and adult corrections.

**SOC 3363. Correctional Organizations.** (3 cr; A-F or Aud. Prereq-3361, 30 or or #)

Examination of the factors that influence the operation of correctional organizations. Focus on the impact of organizational and outside actors on correctional policies and everyday correctional practices (e.g., management of inmates/clients and programming).

**SOC 3369. Correctional Assessment and Intervention.** (3 cr; A-F or Aud. Prereq-Min 30 cr or #, §3365)

Issues germane to intervention with criminal offenders. Philosophical (should we intervene?) and pragmatic (what, if anything "works") debates are reviewed, and both punishment oriented and rehabilitative intervention programs are discussed.

**SOC 3375. Restorative Justice.** (3 cr; A-F only. Prereq-Min 60 or or #)

Examines the principles and practices of restorative justice. Covers early and contemporary philosophies and practices, as well as domestic and international examples.

**SOC 3395. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud. Prereq-30 cr or #)

Contemporary topics in criminology.

**SOC 3595. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud. Prereq-Min 30 cr or #)

Contemporary topics in sociology.

**SOC 3650-3664. Hazelden Program Courses.** (2 cr; A-F or Aud)

**SOC 3701. Social Psychology.** (3 cr; A-F or Aud. Prereq-2001, 30 cr or #)

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; A-F or Aud. Prereq-2111, 30 cr or #)

Theoretical orientations and empirical investigations of community structure, processes, conflict, and change. Community components and types; community development strategies reviewed and applied.

**SOC 3831. Organizations and Society.** (3 cr; A-F or Aud. Prereq-30 cr or #)

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 3841. Urban Justice Field Experience.** (2 cr; S-N or Aud. Prereq-Min 60 cr or Grad student or #)

Guided tour of large metropolitan courts, correctional facilities, and social service agencies.

**SOC 3901. Social Change and Social Policy.** (3 cr; A-F or Aud. Prereq-2111, 30 cr or #)

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; A-F or Aud. Prereq-1101 or 1301 or CSt 1101 or Anth 1604, 30 cr or #)

Structural investigation of effect of social class on people's lives. Theories and research on social class; social mobility theory and effects. Intertwining of social class, gender, and race/ethnicities.

**SOC 3960. Sociology of Sport.** (3 cr; A-F or Aud. Prereq-30 cr or #)

Examination of the sociological phenomena of organized and not so organized amateur and professional sports. Topics include culture, socialization, social economics, social organization, inequality, politics, urban stadiums, stratification and history of sports.

**SOC 4323. Women and Justice.** (3 cr; A-F or Aud. Prereq-1101 or 1301 or CSt 1101 or Anth 1604 or WS 1000, 30 cr, or #; §3326; no Grad School cr)

Women's involvement in the civil and criminal justice systems of the United States both historically and currently. Attention given to women as criminal and civil defendants, issues of women's civil rights, and to women practitioners within each system.

**SOC 4333. Legal Research.** (3 cr; A-F or Aud. Prereq-Min 60 cr or Grad School student)

Overview of American legal system, including the courts and legislature; primary and secondary sources of law; judicial reports, citations and digest; annotated law reports; legal periodicals and research procedure. Different areas of law and associated research.

**SOC 4340. Minorities, Crime and Justice in the United States.** (3 cr; A-F or Aud. Prereq-1101 or 1301 or Anth 1604 or CSt 1101, 30 cr, or #; §3326, no Grad School credit)

Examines U.S. criminal justice system in relation to minorities. Attitudes and perceptions of crime and justice from minority perspectives. Differential crime rates among majority-minority groups, police-minority contacts, processing of minorities by the courts, and disproportionate representations of minorities in prison system.

**SOC 4382. Victimization.** (3 cr; A-F or Aud. Prereq-1101 or 1301, 60 cr; no Grad School credit)

Extent, nature, and forms of criminal victimizations; profiles of crime victims; coping strategies; victims' rights; impact of victimizations on victims and nonvictims; victim attitudes about crime and interactions with justice system; evaluation of victim service programs.

**SOC 4384. Child Abuse and Child Protection in Minnesota.** (3 cr; A-F or Aud. Prereq-90 cr or Grad Student or #)

Examine how our legal system and community discovers and protects neglected or abused children. Provide understanding of juvenile court, the role of forensic science, social workers, police, teachers, nurses, physicians, and other professionals mandated to report suspected abuse.

**SOC 4395. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud. Prereq-90 cr or Grad Student or #)

Proseminar on contemporary topics. Course announced in Class Schedule.

**SOC 4587. Internship Preparation.** (1 cr; A-F or Aud. Prereq-1101, 1301, 2311, 2155) or (1101, 2111, 2155), soc or crim major, min 60 cr, upper div comp (31xx), no Grad School cr)

Introduction to internship by learning about internship expectations, developing internship objectives, exploring internship opportunities, and developing an application for an internship.

**SOC 4595. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud. Prereq-90 cr or Grad Student or #)

Proseminar on contemporary topics.

**SOC 4596. Practicum in Criminology.** (3-14 cr; S-N or Aud. Prereq-#)

Supervised experience in criminal justice agency and concurrent seminar which focus on identification, application, and evaluation of implementation of concepts, principles, theories and best practices in criminal justice. Law enforcement agencies, juvenile courts, probation and parole departments, correctional institutions, delinquency control programs, and public or voluntary agencies experience.

**SOC 4597. Internship.** (1-9 cr [max 9 cr]; S-N or Aud. Prereq-#, no Grad School cr)

Supervised lab experience in a human service agency or project.

**SOC 4735. Social Conflict Management Strategies.** (3 cr; A-F or Aud. Prereq-60 cr or #)

Introduction to social conflict as a social process as a basis for understanding conflict management strategies and tactics. Emphasis on interpersonal and organizational based conflicts not regulated by formal structures such as contracts.

**SOC 4860. Environmental Sociology.** (3 cr; A-F or Aud. Prereq-90 cr or Grad Student or #)

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. Science, Technology and Society.** (4 cr; A-F or Aud. Prereq-90 cr or Grad Student or #)

Applying cultural analysis to assessing the effects of science and technology on communities, institutions, organizations, and individuals. Emphasis on topics involving cross-discipline effects.

**SOC 4911. Alcoholism and other Addictions.** (3 cr; A-F or Aud. Prereq-90 cr or Grad Student or #)

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; A-F or Aud. Prereq-1101 or 1301 or CSt 1101 or Anth 1604 or WS 1000, 30 cr, or #)

Social, moral, and legal definitions and implications of rape.

## Course Descriptions

**SOC 4935. Conflict and Violence.** (3 cr; A-F or Aud. Prereq-60 cr or Grad Student or #)

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 Gender Identities and Systems.** (3 cr; A-F or Aud. Prereq-1101 or 1301 or CST 1101 or Anth 1604 or WS 1000, 30 cr, or #)

Status and experiences in society through the exploration of gender identities, systems and social structures. Topics include politics, discrimination, family, education, workplace, popular culture, and changing definitions of gender. Emphasis on the expectations and performance of masculinity/femininity, and the intersection of gender, race, and class.

**SOC 4949. Race and Ethnic Relations.** (3 cr; A-F or Aud. Prereq-1101 or 1301 or CST 1101 or Anth 1604, 30 cr, or #)

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 4950. International Migration to the United States.** (3 cr; A-F or Aud.)

Prereq-90 cr or grad or #)

Delineates geopolitical, social, legal, economic and cultural factors spurring recent migrations from underdeveloped to developed regions. In-depth analysis of push-pull factors that trigger transnational movement of population. Trace past and current immigration policies in immigrant receiving countries and highlight parallels between old and new migration. Focus on migration of skilled and unskilled migrants. Identification of economic models that predict the transnational migration of labor and policy implications.

**SOC 4960. Graveyard Culture.** (4 cr; A-F or Aud. Prereq-30 cr or #)

Structure and cultural traditions surrounding resting places of the departed with emphasis on stratification, discrimination, cultural identity, identity tags, community integration as well as preservation issues, community history, and the business end of cemeteries. Further emphasis on cemeteries in Duluth and surrounding areas within the context of broader movements. Exploring Duluth history becomes an essential part of the course.

**SOC 4981. Social Movements, Protest and Change.** (3 cr; A-F or Aud. Prereq-45 cr or #)

Focusing on the origins, dynamics, and consequences of social movements, this course explores debates about the dilemmas and challenges facing movement organizations, the relationship between social movements and political institutions, and the role of social movements in bringing about social change. Draws on empirical case-studies of a wide variety of social movements.

**SOC 4982. Political Sociology and the Global Economy.** (4 cr; A-F or Aud. Prereq-60 cr or # or Grad School student)

Explores the field of power and economics, understanding the major theoretical debates and issues both past and present. Examines the nature of the state and economy, while also examining how class, race, and gender shape both the political and economic process. Focuses on how power is constructed, legitimated, and delegitimated concentrating on state formation, expansion, rebellion, and revolution.

**SOC 4991. Independent Study in Sociology.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-#)

Directed reading, research, or involvement in social action leading to preparation of a paper or other product.

**SOC 4997. Teaching Assistantship in Sociology/Criminology.** (1-3 cr [max 3 cr]; A-F only; Prereq-60 cr, #; no Grad School cr)

Practical experience in teaching-related activities in sociology or criminology courses.

**SOC 4999. Honors Project.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-90 cr, approval by dept honors program director; no Grad School credit)

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 or Aud. LE 3)

Conversation and communicative course for students with little or no previous study of Spanish. Emphasis on oral and aural skills; some grammar. Taught primarily in Spanish, with some English.

**SPAN 1102. Beginning Spanish II.** (4 cr; A-F or Aud. Prereq-1-2 yrs high school Span or 1101 or # LE 3)

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; A-F or Aud. Prereq-3-4 yrs high school Span or 1102 or # LE 3)

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; A-F or Aud. Prereq-4 yrs high school Span or 1201 or # LEIP 03)

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 2301. Advanced Spanish.** (4 cr; A-F or Aud. Prereq-5 yrs high school Span or 1202 or # LEIP 03)

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; A-F or Aud. LECD 08)

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 3031-3032. Spanish Language Study Abroad I-II.** (1-5 cr [max 10 cr]; Stnt Opt. Prereq-%)

Advanced language study abroad.

**SPAN 3042. Hispanic American Civilization and Culture.** (4 cr; A-F or Aud. Prereq-2301 with C or better or #; offered alt yrs)

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; A-F or Aud. Prereq-2301 with C or better or #; offered alt yrs)

Historical survey. Taught in Spanish.

**SPAN 3045–3048. Spanish Culture and Civilization Study Abroad I–IV.** (1-5 cr [max 10 cr]; Stdnt Opt. Prereq-%)

Study abroad of Spanish or Hispanic American culture.

**SPAN 4004. Spanish Conversation.** (1-4 cr [max 8 cr]; Stdnt Opt. Prereq-2301; use of 4 credits only toward degree)

Practice in oral conversation skills.

**SPAN 4011. Hispanic American Prose.** (4 cr; A-F or Aud. Prereq-2301 with C or better or #; no Grad School credit; offered every third yr)

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; A-F or Aud. Prereq-2301 with C or better or #; no Grad School credit; offered every third yr)

Emphasis on 20th and 21st centuries. Attention also to cultural background. Taught in Spanish.

**SPAN 4015. Literature and Culture of the Southern Cone.** (4 cr; A-F or Aud. Prereq-2301 with C or better or #; no Grad School credit)

A historical overview of literature, essays, cultural components, and events of major importance relating to three countries of Spanish American which form the Southern Cone--Uruguay, Argentina, Chile. Taught in Spanish.

**SPAN 4018. Hispanic America From Within.** (4 cr; A-F or Aud. Prereq-2301 with C or better or #; no Grad School credit)

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; A-F or Aud. Prereq-2301 with C or better or #; no Grad School credit; offered every third yr)

Survey of representative literary works, with attention to literature and cultural background. Taught in Spanish.

**SPAN 4025. Cervantes.** (4 cr; A-F or Aud. Prereq-2301 with C or better or #; no Grad School credit; offered every third yr)

Study of representative short works and his masterpiece [Don Quixote] as literary expressions of the time and with respect to the modern novel. Taught in Spanish.

**SPAN 4027. Modern Spanish Literature and Culture.** (4 cr; A-F or Aud. Prereq-2301 with C or better or #; no Grad School credit)

The study of Spanish peninsular literature and culture during the twentieth century up to the death of Francisco Franco, 1975. Taught in Spanish.

**SPAN 4029. Contemporary Spanish Literature and Culture.** (4 cr; A-F or Aud. Prereq-2301 with C or better or #; no Grad School credit)

Literature and culture (art, film, music, architecture, popular culture) of contemporary (1975 to the present) Spain, within historical, political and social context. Works studied will shed light on the author/composer/artist's ideology vis-a-vis dominant philosophical and political climates.

**SPAN 4090. Aspects of the Hispanic World.** (4 cr; A-F or Aud. Prereq-2301 with C or better or #; no Grad School credit)

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.** (1-4 cr [max 8 cr]; A-F or Aud. Prereq-2301 with C or better or #; no Grad School credit)

Students devise programs of reading and research in consultation with instructor to expand upon a topic related to one studied in regular coursework. Taught in Spanish.

**SPAN 4095. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 12 cr]; A-F or Aud. Prereq-2301 with C or better or #; no Grad School credit)

Literature and/or culture of Spanish-speaking populations: Spaniards, Hispanic Americans, or Latinos in the United States. Taught in Spanish.

## Special Education (SPED)

### College of Education and Human Service Professions

**SPED 1357. Individuals with Disabilities in Society.** (3 cr; A-F or Aud. LECD 08)

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; A-F or Aud. Prereq-UECh major or #, §5103)

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-Eight.** (4 cr; A-F or Aud. Prereq-#, §5105)

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 3106. Working with Young Children with Low Incidence Disabilities.** (4 cr; A-F or Aud. Prereq-Admission to the UECh program)

Skills and information useful in the provision of quality services for young children with low incidence disabilities. Class sessions and field-based experiences will address supports young children with low incidence disabilities.

**SPED 3109. Working with Challenging Behavior in Young Children.** (3 cr; A-F or Aud. Prereq-Admission to the UECh program)

Provides information needed to evaluate and implement behavior change programs that are appropriate for young children who exhibit challenging behaviors. A key element will be functional behavioral assessment procedures and a range of preventative behavioral interventions.

**SPED 3205. Assessment in Early Childhood Special Education.** (4 cr; A-F or Aud. Prereq-3103, 3105, #, §5205)

Measurement theory, assessment practices, familiarization with selected instruments, legal and ethical precautions for assessing preschool and primary age children with disabilities. Practicum.

**SPED 3310. Introduction to Special Education for Elementary Education.** (1 cr; A-F or Aud. Prereq-EIEd major)

Introductory course for elementary education majors, emphasizing attitudes and language towards students with disabilities, focusing on abilities and on understanding differences in learners, social, legal and educational issues, collaboration and individual education planning mandates.

**SPED 4204. Assessment for Children and Youth with Disabilities.** (4 cr; A-F or Aud. Prereq-§5204, 45 cr, postbac undergrad or sped minor, no Grad School credit)

Use assessment data for making decisions about exceptionality, eligibility, and educational programming. Curriculum includes laws governing assessment in special education, standards of professional practice, standardized and teacher-developed assessment procedures, and psychometric theory.

**SPED 4210. Special Education for Secondary Educators.** (3 cr; A-F or Aud. Prereq-No Grad School credit)

Educator's role and responsibilities in meeting the diverse needs of students with disabilities in the general education setting. Current laws and legislation, characteristics of students with disabilities, informal assessment, and research-based strategies and methods for instruction in the areas of reading, math, and written language.

## Course Descriptions

### Course Descriptions

**SPED 4250. Foundations of Autism Spectrum Disorders.** (4 cr; A-F or Aud. Prereq-\$5250, no Grad School cr)

Includes history, definitions, assessment, characteristics, legal aspects, varying perspectives, and etiology of the Autism Spectrum Disorders.

**SPED 4260. Language and Social Skills for Children and Youth with Autism Spectrum Disorders.** (4 cr; A-F or Aud. Prereq-\$5260, no Grad School credit)

Specialized instruction in the foundation of language development, social stories, augmented and alternative communication systems, theory of mind, social skill development and play.

**SPED 4270. Methods for Teaching Children and Youth with Autism Spectrum Disorders.** (4 cr; A-F or Aud. Prereq-4250 or 5250 or #, §5270, no Grad School credit)

Indepth assessment, environmental factors, curricular options, instructional strategies, behavioral programming, material for teaching, sensory integration strategies, IEP/IIIP development and implementation, and technology on the continuum of placements for children and youth with ASD.

**SPED 4310. Adapting for Diverse Learners in General Education Settings.** (4 cr; A-F or Aud. Prereq-EdEd or EdSe major or #, §5310)

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 4351. Learning Disabilities Characteristics and Interventions.** (4 cr; A-F or Aud. Prereq-4433, postbac or #, §5351; no Grad School cr)

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 4381. Behavior Management Principles and Practices.** (4 cr; A-F or Aud. Prereq-\$5381, 45 cr, postbac or sped minor, no Grad School credit)

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 4382. Advanced Theory and Practice in Emotional, Behavioral Disorders.** (4 cr; A-F or Aud. Prereq-4433, 4381, postbac or #, §5382, no Grad School cr)

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 4433. Foundations in Special Education.** (4 cr; A-F or Aud. Prereq-Cr will not be granted if cr received for 5433, 45 cr, postbac grad or sped minor, no Grad School credit)

Overview of children with disabilities. Special emphasis will be placed on characteristics of exceptional children; the legal aspects of educating students with disabilities; and assessment, instructional, and collaborative strategies.

**SPED 4434. Assistive and Computer Technology for Teaching.** (2 cr; A-F or Aud. Prereq-\$5433, 4433, postbac or sped minor or #, no Grad School credit)

Introduction for educators to the legal guidelines and required technology practices governing the use of technology devices and accommodations for individual with disabilities in school settings.

**SPED 4435. Parent and Professional Communication and Collaboration.** (4 cr; A-F or Aud. Prereq-\$5435, 4433, 45 cr, postbac or sped minor or #, no Grad School credit)

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 Education Plans.

**SPED 4452. Academic Interventions for Students with Disabilities.** (4 cr; A-F or Aud. Prereq-4433, postbac or #, §5452; no Grad School cr)

Understanding various models for teaching students with reading, writing, or math difficulties; development of intervention plan based on assessment and observation. Practicum.

**SPED 4455. Transitional Planning for Adolescents with Disabilities.** (4 cr; A-F or Aud. Prereq-\$5455, 4433, postbac or #, no Grad School cr)

Assessment procedures, planning and instructional methods to help students with disabilities make the transition from school to postsecondary training, education, and employment. Practicum.

**SPED 4486. Teaching Reading, Writing and Math.** (3 cr; A-F or Aud. Prereq-4433, §5434, no Grad School cr)

A wide range of strategies for instruction of reading, writing, and math to students with disabilities. Specific areas of instruction includes: laws, technological and information resources pertaining to reading, writing, and math instruction as well as research-based instructional strategies.

**SPED 4555. Assessment and Instruction of Culturally and Linguistically Diverse Exceptional Learners.** (3 cr; A-F or Aud. Prereq-\$5555, 4433, postbac or sped minor or #, no Grad School credit)

Participants learn assessment, instructional and collaboration models and approaches to address the educational needs of culturally and linguistically diverse exceptional learners. Core skills and strategies are designed to meet special education standards of effective practice in this field.

**SPED 4585. Individual Education Plans: Development and Implementation.** (3 cr; A-F or Aud. Prereq-\$5585, no Grad School credit)

Historical perspective of the Individual Education Plan (IEP), its professional significance in education and the impact of the IEP on students and teachers in special education. Explores procedural guidelines, develop an IEP based on best practice and develop lesson and unit plans.

**SPED 4600. Student Teaching.** (3-12 or [max 12 cr]; S-N or Aud. Prereq-Postbac or #, no Grad School credit)

Observational, evaluative, and instructional experience with students with disabilities in K-12 settings.

**SPED 4610. Professional Issues.** (1 cr; S-N or Aud. Prereq-No Grad School credit)

Reflections on current issues and ethical dilemmas in the field of early childhood special education, birth through age eight.

**SPED 5010. Mental Health Issues for Teachers.** (1 cr; A-F or Aud. Prereq-No Grad School cr)

Devoted to addressing the licensure renewal requirements for all general education teachers. Focus on understanding key warning signs and early detection of mental illnesses in children and adolescents.

**SPED 5103. Infants and Toddlers with Special Needs.** (3 cr; A-F only. Prereq-Bachelors degree in a related area of study (early childhood educ, elem educ, comm sci disorders, social work), §3103)

Addresses the many causes of disabling conditions in infants and toddlers. Effective intervention techniques and appropriate environments for young children with special needs will be discussed. Family involvement and community support for children with special needs will also be addressed.

**SPED 5105. Young Children with Special Needs: Ages Three to Eight.** (4 cr; A-F or Aud. Prereq-UECh major or #)

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 5109. Working with Challenging Behavior in Young Children.** (3 cr; A-F only. Prereq-Min 120 cr, no Grad School cr)

Provides information needed to evaluate and implement behavior change programs that are appropriate for young children who exhibit challenging behaviors. A key element will be functional behavioral assessment procedures and a range of preventative behavioral interventions.

**SPED 5204. Assessment for Children and Youth with Disabilities.** (4 cr; A-F or Aud. Prereq-4433 or 5433, postbac grad or #, § 4204)

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. Concurrent with 4202, additional paper, project or field based practicum required.

**SPED 5205. Assessment in Early Childhood Special Education.** (3 cr; A-F only. Prereq-initial baccalaureate degree in a related area (elem educ, comm disorder, social work, nursing), §3205)

Measurement theory, assessment practices, familiarization with selected instruments, legal and ethical precautions for assessing preschool and primary age children with disabilities. Practicum.

**SPED 5250. Foundations of Autism Spectrum Disorders.** (4 cr; A-F or Aud. Prereq-§4250)

Includes history, definitions, assessment, characteristics, legal aspects, varying perspectives, and etiology of the Autism Spectrum Disorders.

**SPED 5260. Language and Social Skills for Children and Youth with Autism Spectrum Disorders.** (4 cr; A-F or Aud. Prereq-§4260)

Specialized instruction in the foundation of language development, social stories, augmented and alternative communication systems, theory of mind, social skill development and play.

**SPED 5270. Methods for Teaching Children and Youth with Autism Spectrum Disorders.** (4 cr; A-F or Aud. Prereq-4250 or 5250 or #, §4270)

Indepth assessment, environmental factors, curricular options, instructional strategies, behavioral programming, material for teaching, sensory integration strategies, IEP/IIIP development and implementation, and technology on the continuum of placements for children and youth with ASD.

**SPED 5300. Special Education Seminar.** (1 cr [max 6 cr]; Stdt Opt. Prereq-Postbac grad or #)

In-depth discussion of practices, trends, issues, and problems related to student's selected area in special education.

**SPED 5351. Learning Disabilities Characteristics and Interventions.** (4 cr; A-F or Aud. Prereq-4433 or 5433, postbac grad or #, §4351)

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 Principles and Practices.** (4 cr; A-F or Aud. Prereq-4433 or 5433, postbac grad or #, §4381)

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. Concurrent with 4381, it will require additional paper, project or field based practicum.

**SPED 5382. Advanced Theory and Practice in Emotional/Behavioral Disorders.** (4 cr; A-F or Aud. Prereq-4433 or 5433 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; Stdt Opt. Prereq-Postbac grad student, §4433)

History, philosophy, theories, and issues of special education. Overview of special education rules and processes. Survey of exceptionalities, including disability perspectives. Because this course is taught concurrently with 4433, it will require one or more of the following: paper, project, or field based practicum.

**SPED 5434. Assistive and Computer Technology for Teaching.** (2 cr; A-F or Aud. Prereq-4433 or 5433, postbac grad or #, §4434)

Introduction for educators to the legal guidelines and required technology practices governing the use of technology devices and accommodations for individual with disabilities in school settings.

**SPED 5435. Parent and Professional Communication and Collaboration.** (4 cr; Stdt Opt. Prereq-4433 or 5433, postbac grad or #, §4435)

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. Because this course is taught concurrently with 4435, it will require one or more of the following: paper, project or field based practicum.

**SPED 5452. Academic Interventions for Students with Disabilities.** (4 cr; A-F or Aud. Prereq-4433 or 5433, postbac grad or #, §4452)

Understanding various models for teaching students with reading, writing, or math difficulties; development of intervention plan based on assessment and observation. Practicum.

**SPED 5455. Transitional Planning for Adolescents With Disabilities.** (4 cr; A-F or Aud. Prereq-5433 or 4433, postbac grad or #, §4455)

Assessment procedures, planning and instructional methods to help students with disabilities make the transition from school to postsecondary training, education, and employment. Practicum.

**SPED 5486. Teaching Reading, Writing and Math.** (3 cr; A-F or Aud. Prereq-4433 or 5433, no Grad School cr)

A wide range of strategies for instruction of reading, writing, and math to students with disabilities. Specific areas of instruction include laws, technological and information resources pertaining to reading, writing and math instruction as well as research-based strategies.

**SPED 5555. Assessment and Instruction of Culturally and Linguistically Diverse Exceptional Learners.** (3 cr; A-F or Aud. Prereq-4433 or 5433, postbac grad or #, §4555)

Participants learn assessment, instructional and collaboration models and approaches to address the educational needs of culturally and linguistically diverse exceptional learners. Core skills and strategies are designed to meet special education standards of effective practice in this field. Taught concurrently with 4555, it will require one or more of the following: paper, project or field based practicum.

## Course Descriptions

**SPED 5585. Individual Education Plans: Development and Implementation.** (3 cr; A-F or Aud. Prereq-\$4585)

Historical perspective of the Individual Education Plan (IEP), its professional significance in education and the impact of the IEP on students and teachers in special education. Explores procedural guidelines, develop an IEP based on best practice and develop lesson and unit plans.

**SPED 5600. Student Teaching.** (1-12 cr [max 12 cr]; S-N or Aud. Prereq-#; no Grad School credit)

Observational, evaluative, and instructional experience with students with disabilities in K-12 settings. Seminar included.

**SPED 5795. Special Topics:** (Various Titles to be Assigned). (.5-4 cr [max 8 cr]; A-F or Aud. Prereq-No Grad School cr)

Current issues in Special Education to meet needs and interests of various groups, particularly practicing professionals.

**SPED 5991. Independent Study.** (1-6 cr [max 6 cr]; A-F or Aud. Prereq-%)

Directed independent study, readings, or projects of interest to student.

**SPED 5993. Special Area Project.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq-#, no Grad School credit)

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

**SPED 5995. Special Topics:** (Various Titles to be Assigned). (1-6 cr [max 12 cr]; A-F or Aud)

Current issues to meet needs and interests of various groups, particularly practicing professionals. Topics vary; specific title and content announced in [Class Schedule].

**SPED 7100. Professional Issues in Special Education.** (3 cr; A-F or Aud. Prereq-Acceptance into master's of special education program)

Provides graduate candidates a seminar to write about and discuss current professional issues raised in recognized sources within the field of special and general education (e.g., journals, education news sources, and topical conferences).

**SPED 7200. Advanced Behavior Management Principles and Practices.** (3 cr; A-F or Aud. Prereq-Acceptance into M.Sp.Ed. program)

Application of theory and techniques in behavior management, assessment, intervention, monitoring, generalizing, and maintenance in behaviors of individuals with exceptionalities. Focus is on advanced principles and practices in behavior management as well as social skill instruction.

**SPED 7710. Practice, Research, and Leadership I.** (3 cr; A-F or Aud. Prereq-MEd student or #)

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; A-F or Aud. Prereq-SpEd 7710 or #)

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; A-F or Aud. Prereq-SpEd 7720 or #)

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.

**SPED 7800. Special Education Law.** (3 cr; A-F or Aud. Prereq-Acceptance into master's of special education program)

Examination of special education statutory law and case law, principles of Individuals with Disabilities Act, Americans with Disabilities Act, and Section 504 of the Rehabilitation Act of 1973.

**SPED 7912. Special Education Administration and Supervision.** (3 cr; A-F or Aud. Prereq-Acceptance into master's of special education program)

Analyze administrative theory that is applicable to special education, curricula development, fiscal issues, interagency agreements, role of human resources management and improvement of teaching with emphasis on effective procedures.

## Statistics (STAT)

### College of Science and Engineering

**STAT 1411. Introduction to Statistics.** (3 cr; A-F or Aud. Prereq-A grade of at least C- in Math 1005 or math placement or % LE 2)

Statistical ideas involved in gathering, describing, and analyzing observational and experimental data. Experimental design, descriptive statistics, correlation and regression, probabilistic models, sampling, and statistical inference.

**STAT 2411. Statistical Methods.** (3 cr; A-F or Aud. Prereq-Math 1250 or 1160 LE 2)

Graphical and numerical descriptions of data, elementary probability, sampling distributions, estimations, confidence intervals, one-sample and two-sample t-test.

**STAT 3411. Engineering Statistics.** (3 cr; A-F or Aud. Prereq-1297, cannot be applied to a math or statistics major)

Statistical considerations in data collection and experimentation. Descriptive statistics, least squares, elementary probability distributions, confidence intervals, significance tests, and analysis of variance as applied analysis of engineering data.

**STAT 3611. Introduction to Probability and Statistics.** (4 cr; A-F or Aud. Prereq-A grade of at least C- in Math 1290 or Math 1296)

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 4101. Actuarial Probability.** (1 cr; S-N or Aud. Prereq-3611, Math 3298; credit cannot be applied to math major or minor; no Grad School cr)

Problem-solving techniques in probability used in the mathematical foundations of actuarial science.

**STAT 5411. Analysis of Variance.** (3 cr; Stdnt Opt. Prereq-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; A-F or Aud. Prereq-3611, Math 3280 or Math 4326)

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; Stdnt Opt. Prereq-5411 or 5511, Math 3280 or Math 4326)

Multivariate normal distribution, MANOVA, canonical correlation, discriminant analysis, principal components. Use of computer software.

**STAT 5531. Probability Models.** (4 cr; A-F or Aud. Prereq-3611, Math 1297 or Math 1597)

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; A-F or Aud. Prereq-3611, Math 3298)

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; A-F or Aud. Prereq-5571)

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; No grade. Prereq-Doctoral student, adviser and DGS consent)

**STAT 8611. Linear Models.** (3 cr; A-F or Aud. Prereq-5572)

Developing statistical theory of general linear model. Distribution theory, testing, and estimation. Analysis of variance and regression. (offered alt yrs)

**STAT 8711. Statistics Seminar.** (3 cr; S-N or Aud. Prereq-5572)

Applications of probabilistic and statistical modeling methods, such as linear and nonlinear regression, generalized linear models, Markov chains, and Poisson processes. Case-study analyses of models from areas such as natural sciences, medicine, engineering, and industry.

**STAT 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-max 18 cr per semester or summer; 24 cr required)

## Supportive Services Program (SSP)

### Academic Support and Student Life

**SSP 103. Basic Mathematics and Introductory Algebra.** (0 cr; S-N or Aud. Prereq-[3 cr equiv]; \$Math 1004; cannot apply cr toward a degree. (the preparatory course fee is equal to 3 credits of resident tuition))

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

**SSP 1000. Introduction to College Learning.** (1-2 cr [max 2 cr]; A-F or Aud)

Facilitates the successful transition into college learning and student life at UMD.

**SSP 1052. College Writing Strategies.** (2 cr; S-N or Aud. Prereq-§Comp 1120)

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 or Aud)

Focuses on the skills necessary to study more efficiently for college. Topics include: time management, test taking strategies, note taking, concentration, and library orientation.

**SSP 1101. Personal Development.** (2 cr; A-F or Aud)

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 or Aud)

Preparation for Comp 1120 for ESL students.

**SSP 3001. Preparation for SSP Teaching Assistantship.** (1-3 cr [max 3 cr]; S-N or Aud. Prereq-#)

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]; A-F or Aud. Prereq-#)

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; A-F only. Prereq-#)

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]; A-F only. Prereq-3003 or #)

Supervised practicum for students leading one-on-one and small group tutorials. Tutor responsibilities outlined in contract with instructor.

## Theatre (TH)

### School of Fine Arts

**TH 901. B.F.A. Qualifying Presentation.** (0 cr; S-N or Aud. Prereq-%)

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

**TH 1001. Introduction to Theatre Arts.** (3 cr; A-F or Aud. LE 9)

Appreciation of theatre arts. Developing sensitivity and critical sophistication as articulate, discriminating theatregoers. Play viewing, play reading, critiques, and term projects.

**TH 1051. Introduction to Film.** (3 cr; A-F or Aud. LE 9)

History and genres of film; how movies are made. Watching and analyzing films and developing an articulate and discerning viewpoint. (2 hrs lect, 2.5 hrs lab)

**TH 1053. Film and Society.** (3 cr; A-F or Aud. LE 9)

An examination of how films influence the moral and cultural life of our time, and how culture affects film.

**TH 1071. Musical Theatre History.** (3 cr; A-F or Aud. LE 9)

Musical theatre genre focusing on integration of theatre, music, and dance. Major librettists, composers, directors, choreographers, and performers.

**TH 1099. Theatre Practicum I.** (1 cr [max 6 cr]; A-F or Aud. LE 10)

Experience in backstage areas and front-of-house operations or rehearsal and performance of a minor role in UMD theatrical or dance productions. Credit can be received for work in one of the following areas: performance, box office/marketing, costumes, scenery, properties, lighting/sound, makeup and stage management before/during performance runs for UMD Theatre productions (45 hours work per semester).

**TH 1111. Acting Fundamentals I.** (3 cr; A-F or Aud. Prereq-Not open to BFA Th majors LE 10)

Developing the ability to respond to imaginative situations with sincerity, individuality, and effectiveness; projects in elementary acting techniques.

**TH 1112. Acting I.** (3 cr; A-F or Aud. Prereq-1801 or BFA Th major or #)

Introduction to fundamental skills of acting: objectives, actions, given circumstances, activities. Focus on freeing natural impulses through imagination and improvisation. For BFA theatre majors.

## Course Descriptions

**TH 1114. Musical Theatre: Theory/Sight Singing.** (3 cr; A-F or Aud. Prereq-#) 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; A-F or Aud. Prereq-#) Theory, technique, and application of audition skills for the actor.

**TH 1118. Voice and Movement for the Actor.** (3 cr; A-F or Aud. Prereq-#) Introduction to voice and movement techniques designed to liberate, develop, and strengthen actor's body and voice.

**TH 1299. Theatre Marketing/Management Practicum.** (2 cr [max 6 cr]; A-F or Aud. Prereq-Th major or minor)

Practical experience working in theatre box office, management, marketing, and advertising promotion for UMD theatre productions. (90 hrs work)

**TH 1301. Stagecraft.** (5 cr; A-F or Aud. Prereq-1801 or #)

Introduction to methods of planning, constructing, painting, rigging, and shifting stage scenery. Lab work required constructing and painting scenery and properties for theatrical productions.

**TH 1351. Stage Rendering Techniques.** (3 cr; A-F or Aud. Prereq-1801 or #)

Practical course in study of different rendering mediums, styles, and techniques for the theatrical designer.

**TH 1399. Scenery and Properties Practicum.** (2 cr [max 6 cr]; A-F or Aud. Prereq-Th major or minor)

Practical experience constructing and painting scenery and properties for theatrical productions. (90 hrs work)

**TH 1401. Costume Construction I.** (5 cr; A-F or Aud. Prereq-1801 or #)

Introduction to study and practice of methods and materials used in building costumes for theatrical productions. Lab work required.

**TH 1451. Stage Makeup.** (3 cr; A-F or Aud. Prereq-1801 or #)

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]; A-F or Aud. Prereq-Th major or minor)

Practical experience working on costume construction and costume crafts for theatrical productions. (90 hrs work)

**TH 1501. Stage Lighting I.** (4 cr; A-F or Aud. Prereq-1001 or 1801 or #)

Principles and practice of stage lighting.

**TH 1551. Sound Design.** (3 cr; A-F or Aud. Prereq-1801 or #)

Principles and practice of choosing, editing, and running sound cues for theatrical productions.

**TH 1599. Lighting/Sound Practicum.** (1 cr [max 3 cr]; A-F or Aud. Prereq-Th major or minor)

Practical experience working on lighting and sound for theatrical productions. (45 hrs work)

**TH 1601. Stage Management.** (3 cr; A-F or Aud)

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]; A-F or Aud. Prereq-#)

Practical experience working backstage during the run of theatrical productions. (90 hrs work)

**TH 1801. Elements of Theatre.** (3 cr; A-F or Aud. Prereq-th major)

Intensive study in rudimentary theatre vocabulary, research methods, principles of play production, preproduction script analyses, performance criticism, and postproduction assessment. Play viewing, play reading, critiques, and term projects.

**TH 2112. Acting II: American Realism.** (3 cr; A-F or Aud. Prereq-#)

Continuation of 1112 with a concentration on American realism, characterization, and living truthfully in the moment.

**TH 2113. Acting III: Classical Styles.** (3 cr; A-F or Aud. Prereq-2112 or #)

Acting styles from various classical periods, emphasizes Shakespeare and verse.

**TH 2114. Acting: Musical Theatre.** (3 cr; A-F or Aud. Prereq-#)

Application of theories and techniques of musical theatre performance.

**TH 2118. Speech for the Actor.** (3 cr; A-F or Aud. Prereq-#)

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; A-F or Aud. Prereq-#)

Facilitates actor's acquisition and performance of stage dialects.

**TH 2851. Film History.** (3 cr; A-F only. Prereq-soph or #)

Survey of American and international cinema from 1870s to present day, with special focus on filmmakers, genres, and styles.

**TH 2871. Honors: Collective Creation: Creating Theatre as a Group.** (3 cr [max 6 cr]; A-F or Aud. Prereq-Honors student LE 10)

Working as a group, course participants will create a play based on a specific historical event, a book, or a social justice topic.

**TH 3099. Theatre Practicum II.** (2 cr [max 12 cr]; A-F or Aud)

Experience in backstage areas and front-of-house operations or rehearsal and performance of a minor role in UMD theatrical or dance productions. Credit can be received for work in one of the following areas: performance, box office/marketing, costumes, scenery, properties, lighting/sound, makeup and stage management before/during performance runs for UMD Theatre productions (90 hours per semester).

**TH 3111. Acting Fundamentals II.** (3 cr; A-F or Aud. Prereq-1111 or 1112 or #; not open to BFA th majors)

Continuation of 1111. Development of acting skills beyond the fundamental level for non-BFA theatre majors. Project work emphasis on characterization and contemporary scene study.

**TH 3112. Improvisation for the Theatre.** (3 cr; A-F or Aud. Prereq-#)

Freeing the actor's natural impulses through in-depth, hands-on exploration of improvisational theatre. Emphasis placed on actor's learning to create without fear.

**TH 3151. Stage Combat/Circus.** (3 cr; A-F or Aud. Prereq-0901 or #)

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; A-F or Aud. Prereq-60 cr, BFA Th major, #)

Using the body to express and develop character through mask work, improvisation, and selected scene work.

**TH 3201. Stage Direction.** (3 cr; A-F or Aud. Prereq-1112, 60 cr, Th major or minor or #)

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; A-F or Aud. Prereq-1301 or #)

Elements of design used in creation of scenery for theatre.

**TH 3351. Theatrical Drafting.** (3 cr; A-F or Aud. Prereq-1301)

Principles and practice in techniques of drafting traditional and nontraditional types of stage scenery.

**TH 3355. Computer-Aided Theatrical Design.** (3 cr; A-F or Aud. Prereq-1301 or #) Computer-aided drafting and design with technical applications to scenic design, lighting design, and technical direction.

**TH 3371. Scene Painting.** (3 cr; A-F or Aud. Prereq-1301)

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; A-F or Aud. Prereq-3331, 3441 or #)

Introduction to historical styles: architecture, painting, and dress as they influence theatrical design through the ages.

**TH 3401. Costume Construction II.** (3 cr; A-F or Aud. Prereq-1401 or #)

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; A-F or Aud. Prereq-1401, 1801 or #)

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]; A-F or Aud. Prereq-#)

Participation in management and leadership in all areas of theatre production. (90 hrs work)

**TH 3801. Drama Titles.** (1 cr; A-F or Aud. Prereq-1801 or #)

Survey of dramatic literature and theatre texts. Playreading, script analysis, term projects.

**TH 3851. Screenwriting.** (3 cr; A-F or Aud. Prereq-#)

Introduction to and practice in fundamentals of screenwriting. Dialogue, character, structure, story development, writing for a visual medium, formatting.

**TH 3871. Playwriting.** (3 cr; A-F or Aud. LE 9)

Instruction and practice in fundamentals of playwriting, including dialogue, character, and scenario development; traditional and experimental formal structures; emphasizes theatre format with peripheral screenplay information.

**TH 3881. New Play Development Workshop.** (3 cr [max 6 cr]; A-F or Aud. Prereq-1001 or 1801 or #)

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]; A-F or Aud. Prereq-#, undergrads max 6 or in 3991 and 5991 combined)

Directed readings and projects arranged between student and faculty mentor.

**TH 3995. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 9 cr]; A-F or Aud. Prereq-#)

Intensive study of special topics falling outside usual theatre or dance courses. Topic announced before course offered.

**TH 4112. Acting Scene Study.** (3 cr [max 6 cr]; A-F or Aud. Prereq-#, no Grad School credit)

Concentrated exploration of realistic acting through use of scene study and other text work, with special focus on scenes and characters dealing with heightened emotions and situations.

**TH 4151. Acting V: Senior Studio.** (3 cr; A-F or Aud. Prereq-#, no Grad School credit)

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; A-F or Aud. Prereq-4151 or #; no Grad School credit)

Contemporary acting adjustments necessary for film, television, and commercials.

**TH 4331. Scenic Design II.** (3 cr; A-F or Aud. Prereq-3331)

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; A-F or Aud. Prereq-#, no Grad School credit)

Capstone course utilizes presentation of student's work in technical theatre/design to assess design/technical skills. Analysis of portfolio, job applications, resume development, and portfolio development techniques.

**TH 4399. Theatre: Special Projects.** (1-2 or [max 12 cr]; A-F or Aud. Prereq-#)

Projects in directing, choreography of individual or groups, or designing of costumes, lighting, scenery, or sound.

**TH 4441. Costume Design II.** (3 cr; A-F or Aud. Prereq-3441 or #)

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; A-F or Aud. Prereq-1501 or #; no Grad School credit)

Advanced theories and techniques used in designing lights for traditional and nontraditional theatre works.

**TH 4801. History of the Theatre I.** (3 cr; A-F or Aud. Prereq-3801 or #)

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.** (3 cr; A-F or Aud. Prereq-4801 or #)

Survey of style, theory, performance, and production techniques of world theatre from 19th century to present.

**TH 4851. Dramatic and Performance Theory.** (3 cr; A-F or Aud. Prereq-3801 or #)

Survey and analysis of dramatic and performance theory texts, playscripts, and criticism.

**TH 4901. Intern Teaching in Theatre.** (3 cr [max 9 cr]; A-F or Aud. Prereq-#, no Grad School credit)

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]; A-F or Aud. Prereq-Sr, %; undergrads max 6 cr in 3991 and 5991 combined; no Grad School credit)

Directed, advanced readings and projects arranged between student and faculty mentor.

**TH 5997. Internship in Professional Theatre.** (1-12 cr [max 12 cr]; S-N or Aud. Prereq-%; 1 cr for each 45 hrs work; no Grad School credit)

Internship with a cooperating professional, commercial, or repertory theatre.

## Toxicology (TXCL)

### School of Medicine

**TXCL 5000. Directed Research in Toxicology.** (1-4 cr [max 16 cr]; S-N or Aud. Prereq-#)

Special project that addresses specific issue in toxicology. Under guidance of faculty member.

**TXCL 5011. Principles of Toxicology.** (2 cr; A-F or Aud. Prereq-Grad Txcl major or #)

Introduction to fundamentals of poisoning in individuals and the environment, assessment of potential health hazards, and application of toxicology in various professional careers.

**TXCL 5545. Introduction to Regulatory Medicine.** (2 cr; A-F or Aud. Prereq-Grad School student or #)

Explanation of products requiring a pre-market approval and those that may be marketed without approval. Post-market surveillance. Adverse reactions, removal of product from market.

## Course Descriptions

**TXCL 8012. Advanced Toxicology I.** (3 cr; A-F or Aud. Prereq-5011, Chem 4341 or #)

Absorption, distribution, metabolism, and excretion of xenobiotics; toxicokinetics; mechanisms of toxicity or specific classes of chemical agents.

**TXCL 8013. Advanced Toxicology II.** (3 cr; A-F or Aud. Prereq-8012, Chem 4342, Phsl 5601 or #)

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]; A-F or Aud. Prereq-8013 or #)

Evaluating toxicology research issues and literature.

**TXCL 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master s student, adviser and DGS consent)

**TXCL 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**TXCL 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Max 6 cr per semester or summer; doctoral student who has not passed prelim oral; no required consent for the first two registrations up to 12 cr; departmental consent for the third and fourth registrations up to an additional 12 cr, or 24 cr total (for doctoral students admitted summer 2007 and beyond; doctoral students admitted prior to summer 2007 may register up to 4 times totaling 60 cr)

**TXCL 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**TXCL 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-Max 18 cr per semester or summer; 24 cr required)

## Urban and Regional Studies (URS)

### College of Liberal Arts

**URS 1001. Introduction to Urban and Regional Studies.** (3 cr; A-F only. LE 8)

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]; S-N only. Prereq-URS major, jr or sr, #)

Scheduled assignments with direct supervision in public agencies or relevant private firms.

**URS 3991. Independent Study in Urban and Regional Studies.** (1-4 cr [max 6 cr]; Stdt Opt. Prereq-#)

For students interested in doing advanced work in urban and regional studies.

## Water Resources Science (WRS)

### College of Science and Engineering

**WRS 8050. Special Topics:** (Various Titles to be Assigned). (1-3 cr [max 6 cr]; A-F or Aud. Prereq-#)

Selected topics in water resources science.

**WRS 8060. Directed Studies in Water Resources Science.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-#)

Directed studies in water resources science.

**WRS 8095. Plan B Project.** (3 cr; S-N or Aud. Prereq-#)

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]; Stdt Opt)

Seminar in water resources science.

**WRS 8333. FTE: Master's.** (1 cr; No grade. Prereq-Master s student, adviser and DGS consent)

**WRS 8444. FTE: Doctoral.** (1 cr; No grade. Prereq-Doctoral student, adviser and DGS consent)

**WRS 8666. Doctoral Pre-Thesis Credits.** (1-6 cr [max 12 cr]; No grade. Prereq-Max 6 cr per semester or summer; doctoral student who has not passed prelim oral; no required consent for the first two registrations up to 12 cr; departmental consent for the third and fourth registrations up to an additional 12 cr, or 24 cr total (for doctoral students admitted summer 2007 and beyond; doctoral students admitted prior to summer 2007 may register up to 4 times totaling 60 cr))

**WRS 8777. Thesis Credits: Master's.** (1-18 cr [max 50 cr]; No grade. Prereq-Max 18 cr per semester or summer; 10 cr total required (Plan A only))

**WRS 8888. Thesis Credits: Doctoral.** (1-24 cr [max 100 cr]; No grade. Prereq-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 or Aud. LECD 07)

Women's studies as an interdisciplinary field of study; overview of the many issues related to current and changing role and status of women. International perspectives.

**WS 2101. Women, Race, and Class.** (3 cr; A-F or Aud. LECD 08)

Complex influences of gender, race, and class on women's lives in the United States. Focuses on experiences, views, and cultural expression of contemporary women who are not white or middle class. Cross-cultural perspectives.

**WS 3000. Transnational Perspectives on Feminism.** (3 cr; A-F or Aud. Prereq-1000 or 2101 or #)

Focuses on the new Europe, following the demise of the former Soviet Union and the East Block, and the formation of the European Union. What are the feminist issues over there? How are the challenges European women face different from those faced by women in the United States.

**WS 3001. Third World Women.** (3 cr; A-F or Aud. Prereq-1000 or 2101 or #)

A critical examination of how major social-economic, political and historical factors such as colonialism and imperialism affected and continue to structure women's lives in postcolonial cultures. Examines and compares how Third World women, and women of color in the U.S., as active and resilient social actors resisted and continue to resist all forms of oppression.

**WS 3002. Latin American Women: Culture and Politics.** (3 cr; A-F or Aud. Prereq-1000 or 2101 or #)

Examination of contemporary economic and socio-political issues affecting Latin American women.

**WS 3100. Feminist Theory.** (4 cr; A-F or Aud. Prereq-1000, 45 cr or #)

Historical and conceptual examination and analysis of central ideas and problems within several feminist theories.

**WS 3150. Women-Identified Culture.** (3 cr; A-F or Aud)

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; A-F or Aud)

Women's self-concepts as expressed in autobiographical writings. Meanings women give their lives as women; impact of race and class; choices for artistic, political, intellectual, and/or private lives. Autobiographical techniques and style.

**WS 3250. Women, Peace and War.** (3 cr; A-F or Aud. Prereq-1000)

A feminist analysis of war and peace; women's role in warfare and the effects of war on women; feminism and peace; women's efforts at peacemaking.

**WS 3300. Women and Spirituality.** (3 cr; A-F or Aud. Prereq-1000 or 2101 or #)

Spirituality in relation to women, theoretical and experiential. Contemporary and historical issues and practices.

**WS 3350. Women and the Law.** (3 cr; A-F or Aud. Prereq-1000 or 2101 or #)

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; A-F or Aud)

American and foreign films screened, analyzed, and reviewed from a feminist perspective. Role of women in history, economics, and politics of filmmaking.

**WS 3450. Motherhood and Mothering: Institution and Experience.** (3 cr; A-F only. Prereq-1000 or 2101 or #)

An examination of the institution, experience, and practices of motherhood and mothering, including the social, legal, medical, cultural, and economic factors shaping motherhood in the U.S. and elsewhere, and feminist analyses of the experience and practice of mothering across cultures.

**WS 3595. Special Topics:** (Various Titles to be Assigned). (1-4 cr [max 9 cr]; A-F or Aud. Prereq-1000 or #)

Topics that fall outside current women's studies courses. Topic announced before course offered.

**WS 3600. Ecofeminist Theories and Practices.** (3 cr; A-F or Aud. Prereq-1000 or #)

Theories of ecofeminism; ecofeminist analysis applied to contemporary global ethical, social and environmental issues.

**WS 3891. Independent Study.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-1000, 3100, 15 cr WS or WS-related courses, #)

Directed readings, research, and/or projects on topics of interest to the student.

**WS 3896. International Fieldwork in Women's Studies.** (1-3 cr [max 6 cr]; A-F or Aud. Prereq-1000, #. \$Comp 3133)

Travel abroad with an instructor. Live with local families and learn about local women's lives through field work involving community visits, presentations by grassroots women, community-service work, reading, and follow-up writing and discussion. Repeatable once, in two different geographical areas.

**WS 3897. Internship.** (1-9 cr [max 9 cr]; S-N or Aud. Prereq-1000, 2101, 3100, 15 cr WS or WS-related courses, WS major or minor, 53 cr, #)

Work in public agency, private organization, or service agency offering practical application of women's studies theories and/or experience not available in classroom. Students must set goals, fulfill requirements for credit earned, and submit written and oral evaluations of experience.

**WS 4000. Seminar.** (4 cr; A-F or Aud. Prereq-1000, 2101, 3100, 15 cr WS or WS-related courses, WS major or minor, or #)

Major issues, concepts, and questions addressed by feminist scholarship; context of feminist inquiry.

**WS 5595. Special Topics:** (Various Titles to Be Assigned). (3 cr; A-F or Aud. Prereq-1000, 2101, 3100, 90 cr or grad student or #)

Advanced study. Topic announced before course offered.

**WS 5897. Teaching Internship in Women's Studies.** (1-2 cr [max 2 cr]; S-N or Aud. Prereq-1000, 2101, 90cr, WS major, #; no Grad School credit)

Practical experience assisting in teaching in Department of Women's Studies. Before interning for a course, students must obtain a grade of at least B+ in the course.

**WS 5991. Independent Study.** (1-4 cr [max 4 cr]; A-F or Aud. Prereq-1000, 3100, 15 cr WS or WS related courses or grad student, #)

Readings, research, and/or projects on topics of interest to graduate students concerning women and women's issues.